

SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM S-1
REGISTRATION STATEMENT UNDER THE SECURITIES ACT OF 1933

MKS INSTRUMENTS, INC.
(Exact name of registrant as specified in its charter)

MASSACHUSETTS
(State or other jurisdiction of
incorporation or organization)

3823
(Primary Standard Industrial
Classification Code Number)

04-2277512
(I.R.S. Employer
Identification Number)

Six Shattuck Road
Andover, MA 01810
(978) 975-2350
(Address, including zip code, and telephone number,
including area code, of registrant's principal executive offices)

JOHN R. BERTUCCI
Chairman, President and Chief Executive Officer
MKS Instruments, Inc.
Six Shattuck Road
Andover, MA 01810
(978) 975-2350
(Name, address, including zip code, and telephone
number, including area code, of agent for service)

COPIES TO:

MARK G. BORDEN, ESQ.
HALE AND DORR LLP
60 State Street
Boston, Massachusetts 02109
(617) 526-6000

DAVID C. CHAPIN, ESQ.
ROPES & GRAY
One International Place
Boston, Massachusetts 02110
(617) 951-7000

APPROXIMATE DATE OF COMMENCEMENT OF PROPOSED SALE TO THE PUBLIC:

As soon as practicable after the effective date hereof.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box. []

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. []

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. []

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. []

If delivery of the prospectus is expected to be made pursuant to Rule 434, please check the following box: []

CALCULATION OF REGISTRATION FEE

| TITLE OF EACH CLASS OF SECURITIES TO BE REGISTERED | AMOUNT TO BE REGISTERED(1) | PROPOSED MAXIMUM OFFERING PRICE PER SHARE(2) | PROPOSED MAXIMUM AGGREGATE OFFERING PRICE(2) | AMOUNT OF REGISTRATION FEE |
|--|----------------------------|--|--|----------------------------|
| Common Stock, no par value per share... | 4,600,000 shares | \$15.00 | \$69,000,000 | \$20,909.10 |

(1) Includes 600,000 shares which the Underwriters have the option to purchase from the Company to cover over-allotments, if any. See "Underwriting."
(2) Estimated solely for the purpose of calculating the amount of the registration fee pursuant to Rule 457(a) under the Securities Act of 1933.

THE REGISTRANT HEREBY AMENDS THIS REGISTRATION STATEMENT ON SUCH DATE OR DATES AS MAY BE NECESSARY TO DELAY ITS EFFECTIVE DATE UNTIL THE REGISTRANT SHALL FILE A FURTHER AMENDMENT WHICH SPECIFICALLY STATES THAT THIS REGISTRATION STATEMENT SHALL THEREAFTER BECOME EFFECTIVE IN ACCORDANCE WITH SECTION 8(a) OF THE SECURITIES ACT OF 1933 OR UNTIL THE REGISTRATION STATEMENT SHALL BECOME EFFECTIVE ON SUCH DATE AS THE COMMISSION, ACTING PURSUANT TO SECTION 8(a), MAY DETERMINE.

=====

INFORMATION CONTAINED HEREIN IS SUBJECT TO COMPLETION OR AMENDMENT. A REGISTRATION STATEMENT RELATING TO THESE SECURITIES HAS BEEN FILED WITH THE SECURITIES AND EXCHANGE COMMISSION. THESE SECURITIES MAY NOT BE SOLD NOR MAY OFFERS TO BUY BE ACCEPTED PRIOR TO THE TIME THE REGISTRATION STATEMENT BECOMES EFFECTIVE. THIS PROSPECTUS SHALL NOT CONSTITUTE AN OFFER TO SELL OR THE SOLICITATION OF AN OFFER TO BUY NOR SHALL THERE BE ANY SALE OF THESE SECURITIES IN ANY STATE IN WHICH SUCH OFFER, SOLICITATION OR SALE WOULD BE UNLAWFUL PRIOR TO REGISTRATION OR QUALIFICATION UNDER THE SECURITIES LAWS OF ANY SUCH STATE.

SUBJECT TO COMPLETION, DATED NOVEMBER , 1997

4,000,000 SHARES

[LOGO]
MKS INSTRUMENTS

COMMON STOCK

All of the 4,000,000 shares of Common Stock offered hereby are being sold by the Company. Prior to this offering, there has been no public market for the Common Stock of the Company. It is currently estimated that the initial public offering price per share will be between \$ and \$. See "Underwriting" for a discussion of factors to be considered in determining the initial public offering price.

Application has been made for quotation of the Common Stock on the Nasdaq National Market under the symbol "MKSI."

SEE "RISK FACTORS" COMMENCING ON PAGE 5 FOR CERTAIN FACTORS THAT SHOULD BE CONSIDERED BY PROSPECTIVE PURCHASERS OF THE COMMON STOCK OFFERED HEREBY.

THESE SECURITIES HAVE NOT BEEN APPROVED OR DISAPPROVED BY THE SECURITIES AND EXCHANGE COMMISSION OR ANY STATE SECURITIES COMMISSION NOR HAS THE SECURITIES AND EXCHANGE COMMISSION OR ANY STATE SECURITIES COMMISSION PASSED UPON THE ACCURACY OR ADEQUACY OF THIS PROSPECTUS. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.
=====

| | Price to Public | Underwriting Discount(1) | Proceeds to Company(2) |
|----------------|-----------------|--------------------------|------------------------|
| Per Share..... | \$ | \$ | \$ |
| Total(3)..... | \$ | \$ | \$ |

- =====
- (1) See "Underwriting" for information concerning indemnification of the Underwriters and other matters.
 - (2) Before deducting estimated expenses payable by the Company, estimated at \$.
 - (3) The Company has granted to the Underwriters a 30-day option to purchase up to 600,000 additional shares of Common Stock solely to cover over-allotments, if any. If the Underwriters exercise this option in full, the Price to Public will total \$, the Underwriting Discount will total \$ and the Proceeds to the Company will total \$. See "Underwriting."

The shares of Common Stock are offered by the several Underwriters named herein, subject to receipt and acceptance by them and subject to their right to reject any order in whole or in part. It is expected that certificates representing such shares will be made against payment therefor at the offices of NationsBanc Montgomery Securities, Inc. on or about , 1998.

NATIONSBANC MONTGOMERY SECURITIES, INC.

DONALDSON, LUFKIN & JENRETTE

SECURITIES CORPORATION

PAINWEBBER INCORPORATED

, 1998.

MKS INSTRUMENTS, INC.
PROSPECTUS COVER
NOVEMBER 14, 1997

INSIDE FRONT COVER (PG. 2):

This page is produced in four-color process. Amidst a dark background, the MKS logo appears at the top of the page, and underneath is the phrase "A wide range of products made using MKS Process Control Instruments." Two paragraphs describing the role MKS plays in complex advanced materials manufacturing processes, such as semiconductor, also appear on this page, and are as follows:

(first paragraph) "MKS Surrounds the Process. In semiconductor and other industries involving advanced materials processing, products such as semiconductor devices, CD ROMS, flat panel displays, and fiber optic cables are the result of complex manufacturing processes. These processes build up very thin layers of materials, step by step, through the interaction of specific gases and materials inside tightly controlled process chambers. Maintaining control of these complex steps throughout the entire manufacturing process is critical to performance and yield. (second paragraph) MKS Process Control Instruments are integrated into almost every step of gas-related processes--managing the flow rates of gases entering and exiting the process chamber, controlling the gas composition and pressure inside the chamber, analyzing and monitoring the composition of the gases, and isolating the gases from the outside environment."

In the center of the page is a photo montage, displaying images of semiconductor devices, flat panel displays, magnetic and optical storage media, fiberoptic cables, solar panels, and gas lasers. Each of these images has a text label adjacent to it.

INSIDE SPREAD (PGS. 3 AND 4):

These pages are produced in four-color process. The main focus of the spread is the illustration of a typical process chamber, with numerous MKS products surrounding the chamber. At the top of the illustration, centered across the two pages, is the title "MKS Instruments...Surrounding the Process." Each product is described in a brief paragraph, and the paragraphs appear on both sides of the illustration--left and right columns. The paragraphs are as follows:

DIRECT LIQUID INJECTION SUBSYSTEMS

For use in the delivery of a wide variety of new materials to the process chamber that cannot be delivered using conventional thermal-based mass flow controllers.

AUTOMATIC PRESSURE CONTROLLERS WITH INTEGRATED BARATRON(R) PRESSURE TRANSDUCERS
A compact, integrated measurement and control package for use in controlling upstream or downstream process chamber pressure.

ULTRACLEAN MINI-BARATRON(R) PRESSURE TRANSDUCERS

For use in gas cabinets to feed ultra-pure gases to critical process systems.

ULTRACLEAN MASS FLOW CONTROLLERS

For the precise measurement and control of mass flow rates of inert or corrosive gases and vapors into the process chamber.

IN SITU FLOW VERIFIERS

For fast verification of mass flow controller accuracy and repeatability during a process.

PRESSURE CONTROL VALVES

To precisely control the flow of gases to a process chamber in a wide range of flow rates.

DIGITAL COLD CATHODE IONIZATION AND CONVECTION VACUUM GAUGES

A variety of indirect pressure gauges for measuring very low chamber pressures and conveying information digitally to host computers.

HEATED PUMPING LINES

For the reduction of contaminants in the vacuum pump and pump exhaust stream.

ORION(R) PROCESS MONITORS AND RESIDUAL GAS ANALYZERS

For the analysis of the composition of background and process gases inside a process chamber.

PRESSURE SWITCHES

Provide protection of vacuum equipment and processes by signaling when atmospheric pressure has been reached.

IN SITU DIAGNOSTICS ACCESS VALVE

Allows for accurate calibration and diagnostics of vacuum gauges and pressure transducers while directly mounted on the process chamber.

BARATRON(R) PRESSURE MEASURING INSTRUMENTS

For the accurate measurement and control of a wide range of process pressures.

EXHAUST THROTTLE VALVES AND AUTOMATIC PRESSURE CONTROLLERS

For isolation and downstream control of process chamber pressures, and pressure control within the exhaust systems.

HIGH VACUUM VALVES

To isolate the process chamber from both the pumps and from atmosphere.

VAPOR SUBLIMATION TRAP

To collect by-products and particulates that could otherwise contaminate devices in the process chambers and damage vacuum pumps.

Lines are drawn from each paragraph section to its corresponding part on the illustration. The MKS logo appears in color above the left column of text. Underneath the illustration at the bottom of the page spread is a sentence that reads as follows: 'The above graphic depicts a typical process chamber and surrounding equipment used in semiconductor manufacturing.' At the bottom of the right column (on pg. 4) is a sentence in smaller type that reads: 'Prices of products shown above range from \$400 to \$80,000.'

[PICTURES]

MKS, MKS Instruments, Baratron and Orion are trademarks of the Company. This Prospectus contains trade marks, service marks and trade names of companies and organizations other than MKS.

CERTAIN PERSONS PARTICIPATING IN THIS OFFERING MAY ENGAGE IN TRANSACTIONS THAT STABILIZE, MAINTAIN OR OTHERWISE AFFECT THE PRICE OF THE COMMON STOCK OFFERED HEREBY, INCLUDING THE ENTRY OF STABILIZING BIDS, SYNDICATE COVERING TRANSACTIONS OR THE IMPOSITION OF PENALTY BIDS. FOR A DESCRIPTION OF THESE ACTIVITIES, SEE "UNDERWRITING."

PROSPECTUS SUMMARY

The following summary is qualified in its entirety by the more detailed information, including "Risk Factors" and the Consolidated Financial Statements and the Notes thereto appearing elsewhere in this Prospectus. Except as otherwise noted herein, all information in this Prospectus (i) gives effect to a 2,110-for-1 stock split, to be effected prior to the closing of this offering, of each share of Class A Common Stock and Class B Common Stock of the Company and the conversion of such shares upon the closing of this offering into an aggregate of 12,035,440 shares of Common Stock of the Company (the "Recapitalization") and (ii) assumes no exercise of the Underwriters' over-allotment option. See "Description of Capital Stock," "Underwriting" and Note 2 of Notes to Consolidated Financial Statements.

THE COMPANY

MKS Instruments, Inc. ("MKS" or the "Company") is a leading worldwide supplier of instruments and components used to measure, control, analyze and isolate gases in semiconductor and other manufacturing processes. The Company offers a comprehensive line of products which are used around the process chamber in both semiconductor front-end manufacturing processes and other advanced thin-film and vacuum-based processes used in the manufacture of, among other things, flat panel displays, magnetic and optical storage media, solar cells, fiber optic cables and gas lasers. The Company's products include: (i) pressure and flow measurement and control instruments; (ii) vacuum gauges, valves and components; and (iii) gas analysis instruments.

The trend toward semiconductor devices with smaller geometries and enhanced functionality has resulted in higher value per wafer and more complex manufacturing processes. This has led to the need for increasingly sophisticated semiconductor manufacturing equipment, a heightened emphasis on uptime, yield and throughput, and the need for more precise process controls. As a result, the design and performance of instruments that control pressure or the flow of gases, or analyze the mixture of gases, are becoming even more critical to the semiconductor manufacturing process. In addition, the number and diversity of components and subassemblies used in the manufacturing process has grown as the number and complexity of process steps and sophistication of process equipment has increased. These trends in the semiconductor industry have led semiconductor equipment manufacturers to seek to establish relationships with a smaller group of suppliers that provide broad and integrated product lines, worldwide sales and support and advanced technological capabilities for critical process technology areas.

The Company believes that it offers the widest range of pressure and vacuum measurement and control products serving the semiconductor industry. The Company's objective is to be the leading worldwide supplier of instruments and components used to measure, control, analyze and isolate gases in semiconductor and other advanced thin-film processing applications. The Company's strategies to accomplish this objective include extending its technology leadership, providing a comprehensive product line, building upon its close customer relationships in the semiconductor industry, expanding the application of its existing technologies to related markets and leveraging its global infrastructure.

For over 20 years the Company has been focused on serving the needs of semiconductor device manufacturers and semiconductor equipment OEMs and has established long-term relationships with many of its customers. The Company has over 4,000 customers worldwide including most major semiconductor equipment OEMs, semiconductor device manufacturers, a broad range of industrial companies and university, government and industrial research laboratories. The Company's customers in its principal market, the semiconductor market, include Applied Materials, Eaton, Hitachi, Lam Research, Tokyo Electron, Ltd. ("TEL") and ULVAC. The Company sells its products primarily through its direct sales force in 22 offices in Canada, France, Germany, Japan, Korea, the Netherlands, the United Kingdom and the United States.

MKS Instruments, Inc. is a Massachusetts corporation organized in June 1961. The Company's principal executive offices are located at Six Shattuck Road, Andover, MA 01810, and its telephone number is (978)975-2350.

THE OFFERING

| | |
|--|---|
| Common Stock offered by the Company..... | 4,000,000 shares |
| Common Stock to be outstanding after the offering..... | 16,035,440 shares(1) |
| Use of proceeds..... | For distributions to current stockholders and general corporate purposes. |
| Proposed Nasdaq National Market symbol..... | MKSI |

- (1) Based on shares of Common Stock outstanding as of September 30, 1997. Excludes (i) 1,042,361 shares of Common Stock issuable upon exercise of stock options outstanding as of such date at an exercise price of \$6.64 per share and (ii) 1,978,139 additional shares reserved for future grants or issuances under the Company's stock option and stock purchase plans.

SUMMARY CONSOLIDATED FINANCIAL DATA
(IN THOUSANDS, EXCEPT PER SHARE DATA)

| | YEAR ENDED DECEMBER 31, | | | | | NINE MONTHS ENDED SEPTEMBER 30, | |
|--|-------------------------|----------|-----------|-----------|-----------|---------------------------------|-----------|
| | 1992 | 1993 | 1994 | 1995 | 1996 | 1996 | 1997 |
| STATEMENT OF INCOME DATA: | | | | | | | |
| Net sales..... | \$73,260 | \$80,852 | \$106,829 | \$157,164 | \$170,862 | \$136,097 | \$134,629 |
| Gross profit..... | 30,628 | 34,068 | 47,016 | 69,461 | 68,854 | 55,019 | 56,173 |
| Income from operations..... | 4,593 | 6,365 | 12,087 | 24,106 | 16,068 | 12,990 | 15,088 |
| Net income..... | \$ 2,646 | \$ 4,351 | \$ 10,003 | \$ 21,658 | \$ 12,503 | \$ 10,291 | \$ 12,892 |
| PRO FORMA STATEMENT OF INCOME DATA: | | | | | | | |
| Pro forma net income(1)..... | | | | | \$ 8,248 | | \$ 8,731 |
| Pro forma net income per share(2)..... | | | | | \$ 0.59 | | \$ 0.62 |
| Pro forma weighted average common shares outstanding(2)..... | | | | | 13,994 | | 14,134 |

SEPTEMBER 30, 1997

| | PRO FORMA AS ADJUSTED(3)(4) | | |
|--|-----------------------------|--------------|-----------------------------|
| | ACTUAL | PRO FORMA(3) | PRO FORMA AS ADJUSTED(3)(4) |
| BALANCE SHEET DATA: | | | |
| Working capital..... | \$ 29,479 | \$ (704) | |
| Total assets..... | 106,685 | 106,685 | |
| Short-term obligations..... | 16,372 | 16,372 | |
| Long-term obligations, less current portion..... | 16,348 | 16,348 | |
| Stockholders' equity..... | 51,756 | 21,573 | |

- (1) Effective July 1, 1987, the Company elected to be treated as an S corporation. As an S corporation, the Company has not been subject to federal, and certain state, income taxes. The pro forma net income reflects the provision for income taxes that would have been recorded had the Company been a C corporation, assuming an effective tax rate of 38.0%. As a result of terminating its S corporation status upon the closing of this offering, the Company will record a one-time non-cash credit to historical earnings for additional deferred taxes. If this credit to earnings had occurred at September 30, 1997, the amount would have been approximately \$2.8 million. This amount is expected to change through the closing of this offering and is excluded from pro forma net income. See Notes 2 and 9 of Notes to Consolidated Financial Statements.
- (2) In accordance with a regulation of the Securities and Exchange Commission, the pro forma net income per share and weighted average common shares outstanding reflect the effect of an assumed issuance of sufficient shares to fund the S Corporation Distribution, as of January 1, 1997, to be made out of the proceeds of this offering. See "S Corporation and Termination of S Corporation Status" and Note 2 of Notes to Consolidated Financial Statements.
- (3) Pro forma balance sheet data reflects the distribution of an estimated \$30.2 million, calculated as of September 30, 1997, of cumulative undistributed S corporation taxable income for which stockholders of record prior to the closing of this offering have been or will be taxed. The actual amount to be distributed is expected to increase based upon taxable earnings for the period October 1, 1997 through the closing of the offering, subject to certain limitations. See "S Corporation and Termination of S Corporation Status."
- (4) Adjusted to reflect the sale of 4,000,000 shares of Common Stock at an assumed initial public offering price of \$ per share, after deducting the estimated underwriting discount and offering expenses payable by the Company.

RISK FACTORS

In addition to the other information in this Prospectus, prospective purchasers of the Common Stock offered hereby should consider carefully the following factors in evaluating the Company and its business.

CYCLICALITY OF THE SEMICONDUCTOR INDUSTRY

For the past three years and the first nine months of 1997, the Company estimates that approximately two-thirds of the Company's sales were to semiconductor equipment OEMs and semiconductor device manufacturers and the Company expects that sales to such customers will continue to account for a substantial majority of its sales. The Company's business depends substantially upon the capital expenditures of semiconductor device manufacturers, which in turn depend upon the demand for semiconductors and other products utilizing semiconductors. Historically, the semiconductor market has been highly cyclical and has experienced periods of overcapacity, resulting in significantly reduced demand for capital equipment. In 1996, the semiconductor industry experienced a significant decline, which caused a number of the Company's customers to reduce their orders from the Company. Although there have been indications that the semiconductor and semiconductor equipment industries have begun to recover from the 1996 downturn, there can be no assurance that such industries will continue to improve or that there will not be further downturns or slowdowns in any of the markets that the Company serves. More recently, the financial markets in Asia, one of the Company's principal international markets, have experienced significant turmoil. There can be no assurance that such turmoil in the financial markets will not negatively impact the growth of the semiconductor industry in the region. Also, the requirement that the Company continue to invest in research and development, marketing and customer support will constrain the Company's ability to reduce expenses in response to any such downturn or slowdown. In addition, the Company's future sales will depend in part on the sale of products for new large fabrication facilities that are either planned or under construction and there can be no assurance that such fabrication facilities will be completed or, if completed, will operate at full capacity. Any reduction in orders resulting from a downturn or slowdown in the semiconductor industry, together with the Company's inability to quickly adjust expenses, would have a material adverse impact on the Company's revenues, financial condition and results of operations.

FLUCTUATIONS IN OPERATING RESULTS

The Company has experienced and expects to continue to experience significant fluctuations in its quarterly and annual operating results. A substantial and increasing proportion of the Company's shipments are made on a just-in-time basis in which the shipment of products occurs shortly after an order is received. Due to the short time between receipt of orders and shipments, the Company operates with a low level of backlog. Moreover, this backlog at any point in time is not sufficient to meet the Company's revenue expectations for a particular quarter. As a consequence of the just-in-time basis of the Company's shipments and the low level of backlog, a decrease in demand for the Company's products from one or more customers could occur with limited advanced notice and could have an adverse effect on the Company's results of operations in a particular period. The Company's revenues and operating results are also affected by a variety of other factors, including specific economic conditions in the industries in which the Company's customers operate, particularly the semiconductor industry; the timing of the receipt of orders from major customers; customer cancellations or shipment delays; price competition; disruption in sources of supply; seasonal variations of capital spending by customers; production capacity constraints; specific features requested by customers; exchange rate fluctuations; the introduction or announcement of new products by the Company or its competitors; and other factors, many of which are beyond the Company's control.

The Company's results of operations for a particular period would be adversely affected if an anticipated significant order were not received in time to permit shipment during that period, as a significant portion of the Company's operating expenses are fixed in nature and planned expenditures are based in part on anticipated orders. In addition, the need for continued expenditures for research and development would make it difficult to reduce expenses in a particular period if the Company's sales goals for that period were not met. The inability to adjust spending quickly enough to compensate for any revenue shortfall would magnify the adverse impact of such revenue shortfall on the Company's results of operations. For example, the Company was in

the process of increasing its production capacity when the semiconductor capital equipment market began to experience a significant downturn in 1996. This downturn had a material adverse effect on the Company's operating results in the second half of 1996 and the first half of 1997. As a result of the factors discussed above, it is likely that the Company will in the future experience quarterly or annual fluctuations and that, in one or more future quarters, the Company's operating results will fall below the expectations of public market analysts or investors. In any such event, the price of the Company's common stock could decline significantly.

CUSTOMER CONCENTRATION

While the Company sold products to more than 4,000 customers in 1996, the Company's five largest customers in 1994, 1995 and 1996 accounted for approximately 18%, 24% and 26%, respectively, of the Company's net sales. During the first nine months of 1997, the five largest customers accounted for approximately 31% of the Company's net sales, and one customer, Applied Materials, accounted for approximately 21% of the Company's net sales. While the Company has entered into a purchase contract with Applied Materials that expires in 2002, no significant customer of the Company, including Applied Materials, has entered into an agreement requiring it to purchase any minimum quantity of the Company's products. The demand for the Company's products from its customers depends in part on orders received by such customers from their own semiconductor device manufacturer customers.

The Company sells its products primarily to semiconductor equipment OEMs and, to a lesser extent, semiconductor device manufacturers. The number of the Company's potential customers in its primary market is limited. The loss of a major customer or any reduction in orders by such customers, including reductions due to market or competitive conditions, would likely have a material adverse effect on the Company's business and results of operations. Attempts to mitigate the adverse impact of any such loss or reduction through the rapid addition of new customers could be difficult because prospective customers typically require lengthy qualification periods prior to placing volume orders with a new supplier. The Company's future success will continue to depend upon its ability to maintain its relationships with its existing key customers and to attract new customers, as well as the success of the Company's OEM customers in creating demand for their capital equipment products incorporating the Company's products.

COMPETITION

The market for the Company's products is highly competitive. The Company encounters substantial competition in each of its product lines from a number of competitors, although no one competitor competes with the Company across all product lines. Certain of the Company's competitors have greater financial and other resources than the Company. Other competitors are smaller than the Company but well established in specific product niches. In some cases, particularly with respect to mass flow controllers, end-user semiconductor device manufacturers may direct semiconductor equipment OEMs to use a specified supplier's product in their equipment. Accordingly, for such products, the Company's success will depend in part on its ability to have semiconductor device manufacturers specify that its products be used at their fabrication facilities and the Company may encounter difficulties in changing established relationships of competitors with a large installed base of products at such customers' fabrication facilities. There can be no assurance that competitors will not develop products that offer price or performance features superior to those of the Company's products. To the extent that the Company's products do not achieve performance or other advantages over products offered by competitors, the Company is likely to experience greater price competition or loss of market share with respect to such products. Also, certain of the Company's customers may develop in-house products that serve the functions of and replace the Company's products. The Company believes that the worldwide competitive pressures in the Company's markets could result in a decline in the prices of its products in the future. Declines in the selling prices of the Company's products, if not offset by reductions in the cost of producing such products and increased unit volume sales or by sales of products with higher gross margins, could have a material adverse effect on the Company's business and results of operations.

TECHNOLOGICAL CHANGES

The semiconductor equipment industry is subject to rapid technological change and new product introductions and enhancements. The Company's success depends in part upon its ability to develop enhanced and new products that keep pace with technological developments, achieve market acceptance and respond to evolving customer requirements. New product introductions may contribute to fluctuations in quarterly operating results, as customers may defer ordering products from the Company's existing product lines or may purchase products from competitors. Any new product reliability or quality problems could result in reduced orders, higher manufacturing costs and additional service and warranty expense. Responding to rapid technological change and the need to develop and introduce new products to meet customers' needs and evolving industry standards will require the Company to make substantial investments in research and product development. Any failure by the Company to anticipate or respond adequately to technological developments and customer requirements or any significant delays in product development or introduction could result in a loss of competitiveness and could materially adversely affect the Company's operating results. There can be no assurance that the Company will successfully develop and manufacture new products or that any product enhancements or new products developed by the Company will gain market acceptance.

The semiconductor device manufacturing industry is currently undergoing an evolution from 200mm to 300mm wafers and from .35 micron to .25 and .18 micron line-widths. Device manufacturers are beginning to establish pilot production lines and specifications for the use of 300mm wafers and the production of .25 and .18 micron devices. The Company has developed, and is developing, new products and product enhancements to address the expected increasing demand for equipment capable of handling these new wafer sizes and line-widths. There can be no assurance that the Company will be able to develop these new products and enhancements successfully or in time to meet emerging demand or that the new products and enhancements developed by the Company will be accepted by the Company's customers. Failure by the Company to develop such products or enhancements in a timely manner would have a material adverse effect on the Company's business, financial condition and results of operations.

EXPANSION INTO NEW MARKETS

The Company plans to build upon its experience in manufacturing and selling gas management products used by the semiconductor industry by designing and selling gas management products for applications in other industries which use production processes similar to those used in the semiconductor industry. The Company's future success will depend in part on its ability to identify new applications for its products, adapt its products for such applications and then market and sell such products to customers. The Company has limited experience selling its products in certain markets outside the semiconductor industry. There can be no assurance that the Company will be successful in further expanding its business outside the semiconductor industry. Any failure to penetrate additional markets would limit the Company's ability to reduce its vulnerability to downturns in the semiconductor industry and could have a material adverse effect upon its business and results of operations.

EXPANSION OF MANUFACTURING CAPACITY

The Company plans in 1998 to add manufacturing facilities to its Austin, Texas and United Kingdom operations and further equip its cleanroom facilities in Andover and Methuen, Massachusetts. The Company's ability to continue to increase sales of certain of its products depends in part upon its ability to expand its manufacturing capacity for such products in a timely manner. If the Company is unable to expand its manufacturing capacity on a timely basis or to manage such expansion effectively, the Company's rate of growth and market share could be reduced and its business and results of operations could be adversely affected. The Company's market share and results of operations could also be adversely affected if it is unable to adjust to a rapid demand increase in the highly cyclical semiconductor industry. Additionally, any capacity expansion by the Company will increase its fixed operating expenses and if sales levels do not increase to offset the additional expense levels associated with any such expansion, the Company's operating results would likely be adversely affected.

INTERNATIONAL OPERATIONS AND SALES

The Company has production, sales and service facilities in Germany, Japan, Korea and the United States and sales and service facilities in Canada, France, the Netherlands and the United Kingdom. In addition, the Company has established, through agents and representatives, sales and service facilities in China, India, Israel, Italy, Singapore and Taiwan. International sales (which include sales by the Company's foreign subsidiaries, but exclude export sales made directly by the Company, which were less than 10% of the Company's total net sales) accounted for approximately 32%, 30% and 28% of net sales in 1995, 1996, and the first nine months of 1997, respectively. The Company anticipates that international sales will continue to account for a significant portion of its net sales. As a result, the Company's operations are subject to risks inherent in international business activities, including, in particular, general economic conditions in each country, the overlap of different tax structures, management of a large organization spread over various countries, unexpected changes in regulatory requirements, compliance with a variety of foreign laws and regulations and longer accounts receivables payment cycles in certain countries. The Company's international sales are also subject to certain governmental restrictions including the Export Administration Act and the regulations promulgated thereunder. Other risks associated with international operations include import and export licensing requirements, trade restrictions and changes in tariff and freight rates. A number of these risks also apply to sales to U.S. based semiconductor equipment OEMs that incorporate the Company's products into systems delivered outside the United States. Additionally, the Company denominates in local currencies the prices for products sold to and by its foreign subsidiaries, and, therefore, the Company's operating results attributable to these sales are exposed to fluctuations in the value of the U.S. dollar versus other currencies. While the Company seeks to mitigate its exposure to currency fluctuations by entering into forward exchange contracts and local currency purchased options to reduce currency exposure arising from foreign denominated sales associated with intercompany purchases of inventory, there can be no assurance that exchange rate fluctuations will not have an adverse effect on the Company's results of operations and financial condition or that the Company will not realize losses with respect to its hedging activities. See "Management's Discussion and Analysis of Financial Condition and Results of Operations."

NEED TO RETAIN AND ATTRACT KEY PERSONNEL

The Company's success depends to a large extent upon the efforts and abilities of a number of key employees and officers. The loss of key employees or officers could materially and adversely affect the Company. The Company believes that its future success will depend in part on its ability to attract and retain highly skilled technical, financial, managerial and marketing personnel. Competition for such personnel is intense and there can be no assurance that the Company will be successful in attracting and retaining such personnel.

CONCENTRATION OF STOCK OWNERSHIP

Upon consummation of this offering, John R. Bertucci, Chairman of the Board of Directors, Chief Executive Officer and President of the Company, and members of his family will, in the aggregate, beneficially own approximately 72% of the Company's outstanding Common Stock. As a result, these stockholders, acting together, would be able to control all matters requiring stockholder approval, including the election of directors and approval of significant corporate transactions. See "Principal Stockholders."

INTELLECTUAL PROPERTY MATTERS

Although the Company seeks to protect its intellectual property rights through patents, copyrights, trade secrets and other measures, there can be no assurance that the Company will be able to protect its technology adequately, that competitors will not be able to develop similar technology independently, that any of the Company's pending patent applications will be issued or that intellectual property laws will protect the Company's intellectual property rights. In addition, litigation may be necessary in order to enforce the Company's patents, copyrights or other intellectual property rights, to protect the Company's trade secrets, to determine the validity and scope of the proprietary rights of others or to defend against claims of infringement. Such litigation could result in substantial costs and diversion of resources and could have a material adverse effect on the Company's business and results of operations. There can be no assurance that any patent issued

to the Company will not be challenged, invalidated or circumvented, that the rights granted thereunder will provide competitive advantages to the Company or that third parties may not assert that the Company's products infringe patent, copyright or trade secrets of such parties. Furthermore, there can be no assurance that others will not independently develop similar products or duplicate the Company's products.

ENVIRONMENTAL REGULATIONS

The Company's operations are subject to a variety of extensive and changing federal, state and local environmental and safety laws, regulations and ordinances. Such laws, regulations or ordinances may impose liability for the cost of remediating, and for certain damages resulting from, releases, including past releases, of hazardous materials. The Company believes that it currently conducts and in the past has conducted its activities and operations in substantial compliance with applicable environmental laws and believes that costs arising from existing environmental laws will not have a material adverse effect on the Company's financial condition or results of operations. There can be no assurance, however, that environmental laws will not become more stringent in the future or that the Company will not incur significant costs in the future in order to comply with such laws.

NO PRIOR PUBLIC MARKET; POSSIBLE VOLATILITY OF STOCK PRICE

Prior to this offering there has been no public market for the Company's Common Stock and there can be no assurance that an active public market for the Common Stock will develop or continue after the offering. The initial public offering price will be determined by negotiation between the Company and the representatives of the Underwriters. See "Underwriting." The trading price of the Company's Common Stock could be subject to wide fluctuations in response to quarterly variations in operating results, announcements of technological innovations or new products by the Company or its competitors or other events or factors. In addition, the stock market has experienced extreme price and volume fluctuations which have particularly affected the market prices for many high technology companies. These broad market fluctuations may materially and adversely affect the market price of the Company's Common Stock.

DILUTION

Purchasers of Common Stock offered hereby will incur immediate and substantial dilution in the net tangible book value per share of Common Stock from the assumed initial public offering price. See "Dilution."

ANTITAKEOVER PROVISIONS

Certain provisions of the Company's Articles of Organization, By-Laws and Massachusetts law could discourage potential acquisition proposals and could delay or prevent a change in control of the Company. Such provisions could diminish the opportunities for stockholders to participate in tender offers including tender offers at a price above the then current market value of the Common Stock. Such provisions may also inhibit increases in the market price of the Common Stock that could result from takeover attempts. In addition, the Board of Directors, without further stockholder approval, may issue preferred stock that could have the effect of delaying, deterring or preventing a change in control of the Company. The issuance of preferred stock could adversely affect the voting power of the holders of Common Stock including the loss of voting control to others. The Company has no present plans to issue any preferred stock. See "Description of Capital Stock."

SHARES ELIGIBLE FOR FUTURE SALE

Sales of substantial amounts of Common Stock in the public market following this offering could adversely effect the market price of the Common Stock. All of the outstanding shares of Common Stock are subject to lock-up agreements with the representatives of the Underwriters ("Lock-up Agreements") for a period of 180 days after the date of this Prospectus. Upon expiration of the Lock-up Agreements 180 days after the date of this Prospectus, 12,035,440 shares of Common Stock will be eligible for sale in the public market, subject to the provisions of Rule 144 under the Securities Act of 1933, as amended (the "Securities Act"). In addition, the Company intends to register approximately 3,020,500 shares of Common Stock issuable under its stock option and purchase plans upon the closing of this offering. See "Shares Eligible for Future Sale," "Description of Capital Stock" and "Underwriting."

USE OF PROCEEDS

The net proceeds to the Company from the sale of the 4,000,000 shares of Common Stock offered hereby are estimated to be \$ _____ (\$ _____ if the Underwriters' over-allotment option is exercised in full), assuming an initial public offering price of \$ _____ per share, after deducting the estimated underwriting discount and offering expenses. The principal purposes of this offering are to increase the Company's working capital and equity base, to provide a public market for the Company's Common Stock and to facilitate future access by the Company to public equity markets.

The Company expects to use a portion of the net proceeds to pay to current stockholders the undistributed S corporation earnings of the Company through the closing of this offering. Such undistributed S corporation earnings were approximately \$30.2 million at September 30, 1997 and are expected to increase from October 1, 1997 to the closing of this offering. See "S Corporation and Termination of S Corporation Status." The Company expects to use the remainder of the net proceeds for general corporate purposes, including working capital, product development and capital expenditures. The Company plans in 1998 to make capital expenditures totaling approximately \$10 million, primarily for additions of capital equipment and for expansion of its manufacturing facilities and the Company expects to use a portion of the net proceeds for such purposes.

A portion of the net proceeds may also be used for the acquisition of businesses, products and technologies that are complementary to those of the Company. The Company has no commitments or understandings for any acquisitions and no portion of the net proceeds has been allocated for any specific acquisition. Pending such uses, the Company intends to invest the net proceeds from this offering in short-term, investment-grade, interest-bearing securities.

S CORPORATION AND TERMINATION OF S CORPORATION STATUS

Effective July 1, 1987, the Company elected to be treated as an S corporation for federal income tax purposes. As a result, the Company currently pays no federal, and certain state, income tax and all of the earnings of the Company are subject to federal, and certain state, income taxation directly at the stockholder level. The Company's S corporation status will terminate upon the closing of this offering, at which time the Company will become subject to corporate income taxation under Subchapter C of the Internal Revenue Code of 1986, as amended (the "Code").

In 1996 and in the first nine months of 1997, the Company distributed \$14.5 million and \$6.4 million, respectively, of undistributed S corporation earnings to its stockholders. The Company expects to make additional distributions of approximately \$5.5 million prior to the closing of this offering.

As soon as practicable following the closing of the offering, the Company intends to make a distribution (the "S Corporation Distribution") to the holders of record on the day prior to the closing of this offering (the "Existing Stockholders") in an amount equivalent to the "accumulated adjustments account," as defined in Section 1368(a)(1) of the Code (the "AA Account"). As of September 30, 1997, the outstanding balance of the AA Account was approximately \$30.2 million, and such balance is expected to increase in the period from October 1, 1997 through the closing of the offering. The AA Account is cumulatively equal to financial reporting income, adjusted for differences between the methods of accounting used for financial accounting and for federal income tax purposes from the effective date of the Company's election to be treated as an S corporation through the date of termination of the Company's S corporation status, that has not been previously distributed. Investors purchasing shares in this offering will not receive any portion of the S Corporation Distribution.

The Company expects to enter into a Tax Indemnification and S Corporation Distribution Agreement (the "Existing Stockholders Agreement") with the Existing Stockholders providing for, among other things, the indemnification of the Company by such stockholders for any federal and state income taxes (including interest) incurred by the Company if for any reason the Company is deemed to be treated as a C corporation during any period which it reported its taxable income as an S corporation. The tax indemnification obligation of the Existing Stockholders is limited to the amount of any reduction in their tax liability as a result of any such determination. The Existing Stockholders Agreement also provides for the cross-indemnification by the Company of each Existing Stockholder for any losses or liabilities with respect to certain additional taxes (including interest and penalties) resulting from the Company's operations during the period in which it was an S corporation. The Existing Stockholders Agreement further provides for the payment, with interest, by the Existing Stockholders or the Company, as the case may be, for the difference between the S Corporation Distribution amount and the actual amount of the AA Account on the day immediately preceding the closing of the offering. The actual amount of the AA Account on the day prior to the closing of the offering cannot be determined until the Company calculates the amount of its taxable income for the year ending December 31, 1998. Purchasers of Common Stock in this offering will not be parties to the Existing Stockholders Agreement.

The termination date of the Company's S corporation status will occur on the closing date of this offering. Subsequent to the termination date, the Company will no longer be an S corporation and, accordingly, will be subject to federal and state income taxes. The pro forma Statement of Income set forth in this Prospectus has been adjusted to include pro forma federal income tax provisions as if the Company had been a C corporation under Subchapter C of the Code during the relevant periods.

DIVIDEND POLICY

The Company anticipates that following the completion of this offering and the S Corporation Distribution, subject to the Company's contractual obligations under the Existing Stockholders Agreement, all earnings will be retained for development of its business and will not be distributed to stockholders as dividends. Restrictions or limitations on the payment of dividends may be imposed in the future under the terms of credit agreements or under other contractual provisions. In the absence of such restrictions or limitations, the payment of any dividends will be at the discretion of the Company's Board of Directors.

CAPITALIZATION

The following table sets forth the capitalization of the Company (i) as of September 30, 1997, (ii) on a pro forma basis to reflect distributions and adjustments in connection with the Company's S corporation status and (iii) as adjusted to reflect the sale of 4,000,000 shares of Common Stock by the Company at an assumed initial public offering price of \$ per share and the application of the net proceeds therefrom. See "Use of Proceeds."

| | SEPTEMBER 30, 1997 | | |
|---|---|--------------|--------------------------------|
| | ACTUAL | PRO FORMA(1) | PRO FORMA AS ADJUSTED(1)(2) |
| | ----- (IN THOUSANDS, EXCEPT SHARE AND PER SHARE DATA) | | |
| Long-term obligations, less current portion..... | \$16,348 | \$ 16,348 | \$ |
| Stockholders' equity: | | | |
| Preferred stock, \$.01 par value; 2,000,000 shares authorized; no shares issued or outstanding..... | -- | -- | -- |
| Common Stock, no par value; 50,000,000 shares authorized, 12,035,440 shares issued and outstanding (actual and pro forma); 16,035,440 shares issued and outstanding (pro forma as adjusted)(3)..... | 113 | 113 | |
| Additional paid-in capital..... | 48 | 48 | |
| Unrealized gain on investments..... | 562 | 562 | |
| Retained earnings..... | 50,045 | 19,862 | |
| Cumulative translation adjustment..... | 988 | 988 | |
| Total stockholders' equity..... | 51,756 | 21,573 | |
| Total capitalization..... | \$68,104 | \$ 37,921 | \$ |
| | ===== | ===== | ===== |

(1) Pro forma data reflects the distribution of an estimated \$30.2 million, calculated as of September 30, 1997, of cumulative undistributed S corporation taxable income for which stockholders of record prior to the closing of the offering have been or will be taxed. The actual amount to be distributed is expected to increase based upon taxable earnings for the period from October 1, 1997 through the closing of the offering, subject to certain limitations. See "S Corporation and Termination of S Corporation Status" and Notes 2 and 9 of Notes to Consolidated Financial Statements.

(2) As adjusted to reflect the issuance of 4,000,000 shares of Common Stock at an assumed initial public offering price of \$ per share, after deducting the estimated underwriting discount and offering expenses payable by the Company.

(3) Gives effect to (i) a 2,110-for-1 stock split to be effected prior to the closing of this offering and the conversion upon the closing of this offering, of the 2,454 shares of Class A Common Stock and 3,250 shares of Class B Common Stock outstanding at September 30, 1997 into an aggregate of 12,035,440 shares of Common Stock and (ii) the filing of an amendment to the Company's Restated Articles of Organization to increase the number of authorized shares of Common Stock to 50,000,000 and to authorize 2,000,000 shares of Preferred Stock prior to the closing of this offering.

DILUTION

As of September 30, 1997, the Company had a net tangible book value of \$51,756,000, or \$4.30 per share of Common Stock. Without taking into account any changes in such net tangible book value subsequent to September 30, 1997, other than to give effect to the sale by the Company of 4,000,000 shares of Common Stock offered hereby at an assumed initial public offering price of \$ per share (after deducting the estimated underwriting discount and offering expenses) and the application of the estimated proceeds therefrom, including the distribution of an estimated \$30.2 million of cumulative undistributed S corporation taxable income for which stockholders have been or will be taxed, as of September 30, 1997, the pro forma net tangible book value of the Company as of September 30, 1997 would have been \$, or \$ per share. This represents an immediate increase in net tangible book value of \$ per share to current shareholders and the immediate dilution of \$ per share to new investors. The following table illustrates this per share dilution:

| | | |
|--|--------|-------------|
| Assumed initial public offering price per share..... | | \$ |
| Net tangible book value per share at September 30, 1997..... | \$4.30 | |
| Decrease per share attributable to the S Corporation Distribution... | | |
| Increase per share attributable to new investors..... | | |
| | ----- | |
| Pro forma net tangible book value per share after the offering..... | | ----- |
| Dilution per share to new investors..... | | \$ ===== |

The following table summarizes, on a pro forma basis as of September 30, 1997, the number of shares of Common Stock purchased from the Company, the total consideration paid to the Company, and the average price per share paid by the existing stockholders and by the investors purchasing shares of Common Stock in this offering at an assumed initial offering price of \$ per share:

| | SHARES PURCHASED | | TOTAL CONSIDERATION | | AVERAGE PRICE PER SHARE |
|----------------------------|------------------|---------|---------------------|---------|----------------------------|
| | NUMBER | PERCENT | AMOUNT | PERCENT | |
| Existing stockholders..... | 12,035,440 | 75.1% | \$ 161,000 | % | \$ 0.013 |
| New investors..... | 4,000,000 | 24.9 | | | |
| Total..... | 16,035,440 | 100.0% | \$ | 100.00% | |
| | ===== | ===== | ===== | ===== | |

As of September 30, 1997, there were options outstanding to purchase a total of 1,042,361 shares of Common Stock, at an exercise price of \$6.64 per share. To the extent that any of these options are exercised, there will be further dilution to new investors.

SELECTED CONSOLIDATED FINANCIAL DATA

The following selected financial data as of December 31, 1995 and 1996 and September 30, 1997 and for the years ended December 31, 1994, 1995 and 1996, and the nine month period ending September 30, 1997, have been derived from the Company's financial statements, included elsewhere in this Prospectus, which have been audited by Coopers & Lybrand L.L.P., independent accountants, as indicated in their report. The selected financial data as of and for the nine month period ended September 30, 1996 have been derived from unaudited financial statements that have been prepared on the same basis as the Company's audited financial statements and which, in the opinion of management, included all adjustments, consisting only of normal recurring adjustments, necessary for a fair presentation of the Company's financial position and results of operations. The selected financial data as of December 31, 1992, 1993 and 1994 and for the years ended December 31, 1992 and 1993 are derived from financial statements, which were also audited by Coopers & Lybrand L.L.P., not included herein. Operating results for the nine months ended September 30, 1997 are not necessarily indicative of the results that may be expected for the year ending December 31, 1997. The data should be read in conjunction with the Consolidated Financial Statements, including the Notes thereto, and with "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere herein.

| | YEAR ENDED DECEMBER 31, | | | | | NINE MONTHS ENDED SEPTEMBER 30, | |
|---|-------------------------|----------|-----------|-----------|-----------|---------------------------------------|-----------|
| | 1992 | 1993 | 1994 | 1995 | 1996 | 1996 | 1997 |
| (IN THOUSANDS, EXCEPT PER SHARE DATA) | | | | | | | |
| STATEMENT OF INCOME DATA: | | | | | | | |
| Net sales..... | \$73,260 | \$80,852 | \$106,829 | \$157,164 | \$170,862 | \$136,097 | \$134,629 |
| Cost of sales..... | 42,632 | 46,784 | 59,813 | 87,703 | 102,008 | 81,078 | 78,456 |
| Gross profit..... | 30,628 | 34,068 | 47,016 | 69,461 | 68,854 | 55,019 | 56,173 |
| Research and development..... | 5,836 | 6,244 | 8,036 | 10,935 | 14,195 | 11,220 | 10,336 |
| Selling, general and administrative..... | 20,199 | 21,459 | 26,893 | 34,420 | 37,191 | 29,409 | 30,749 |
| Restructuring..... | 0 | 0 | 0 | 0 | 1,400 | 1,400 | 0 |
| Income from operations..... | 4,593 | 6,365 | 12,087 | 24,106 | 16,068 | 12,990 | 15,088 |
| Interest expense, net..... | 1,784 | 1,421 | 1,284 | 1,448 | 2,286 | 1,811 | 1,466 |
| Other income (expense), net..... | -- | -- | -- | -- | (479) | (230) | 460 |
| Income before income taxes..... | 2,809 | 4,944 | 10,803 | 22,658 | 13,303 | 10,949 | 14,082 |
| Provision for income taxes(1)..... | 163 | 593 | 800 | 1,000 | 800 | 658 | 1,190 |
| Net income..... | \$ 2,646 | \$ 4,351 | \$ 10,003 | \$ 21,658 | \$ 12,503 | \$ 10,291 | \$ 12,892 |
| PRO FORMA STATEMENT OF INCOME DATA (UNAUDITED)(2): | | | | | | | |
| Income before income taxes, as reported..... | | | | | \$ 13,303 | | \$ 14,082 |
| Pro forma provision for income taxes..... | | | | | 5,055 | | 5,351 |
| Pro forma net income..... | | | | | \$ 8,248 | | \$ 8,731 |
| Pro forma net income per common share..... | | | | | \$ 0.59 | | \$ 0.62 |

| | DECEMBER 31, | | | | | SEPTEMBER 30, 1997 | |
|---|--------------|----------|----------|-----------|----------|--------------------|--------------|
| | 1992 | 1993 | 1994 | 1995 | 1996 | ACTUAL | PRO FORMA(3) |
| (IN THOUSANDS) | | | | | | | |
| BALANCE SHEET DATA: | | | | | | | |
| Working capital..... | \$19,293 | \$18,420 | \$25,078 | \$ 32,202 | \$22,404 | \$ 29,479 | \$ (704) |
| Total assets..... | 60,697 | 59,261 | 72,320 | 104,511 | 95,000 | 106,685 | 106,685 |
| Short-term obligations..... | 9,141 | 6,229 | 9,246 | 15,192 | 16,124 | 16,372 | 16,372 |
| Long-term obligations, less current portion..... | 15,761 | 15,326 | 14,948 | 20,462 | 18,899 | 16,348 | 16,348 |
| Stockholders' equity..... | 29,593 | 28,965 | 37,272 | 48,392 | 45,498 | 51,756 | 21,573 |

(1) Effective July 1, 1987, the Company elected to be treated as an S corporation under the applicable provisions of the Internal Revenue Code of 1986. As an S corporation, the Company has not been subject to federal, and certain state, income taxes. The pro forma net income reflects the provision for income taxes that would have been recorded had the Company been a C corporation, assuming an effective tax rate of 38.0%. As a result of terminating its S corporation status upon the closing of this offering, the Company will record a one-time non-cash credit to historical earnings for additional deferred taxes. If this credit to earnings had occurred at September 30, 1997, the amount would have been approximately

\$2.8 million. This amount is expected to change through the closing of the offering and is excluded from pro forma net income. See Notes 2 and 9 of Notes to Consolidated Financial Statements.

- (2) In accordance with a regulation of the Securities and Exchange Commission, the pro forma net income per share and weighted average common shares outstanding reflect the effect of an assumed issuance of sufficient shares to fund the S Corporation Distribution, as of January 1, 1997, to be made out of the proceeds of this offering. See "S Corporation and Termination of S Corporation Status" and Note 2 of Notes to Consolidated Financial Statements.
- (3) Pro forma balance sheet data reflects the distribution of an estimated \$30.2 million, calculated as of September 30, 1997, of cumulative undistributed S corporation taxable income for which stockholders of record prior to the closing of this offering have been or will be taxed. The actual amount to be distributed is expected to increase based upon taxable earnings for the period October 1, 1997 through the closing of the offering, subject to certain limitations. See "Use of Proceeds," "S Corporation and Termination of S Corporation Status" and Notes 2 and 9 of Notes to Consolidated Financial Statements.

MANAGEMENT'S DISCUSSION AND ANALYSIS OF
FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion of the results of operations and financial condition should be read in conjunction with the Company's Consolidated Financial Statements and Notes thereto included elsewhere in this Prospectus. With the exception of historical matters and statements of current status, certain matters discussed below are forward-looking statements that involve substantial risks and uncertainties that could cause actual results to differ materially from targets or projected results. Factors that could cause actual results to differ materially include, among others, those factors described in "Risk Factors." Many of these factors are beyond the Company's ability to predict or control. Prospective investors are cautioned not to put undue reliance on forward-looking statements, which statements have been made as of the date of this Prospectus, and prospective investors should not infer that there has been no change in the affairs of the Company since the date hereof that would warrant any modification of any forward-looking statement made herein. The Company disclaims any intent or obligation to update publicly these forward-looking statements, whether as a result of new information, future events or otherwise.

OVERVIEW

MKS was founded in 1961. The Company sells instruments and components to OEMs and end-users in the semiconductor and other advanced thin-film processing industries. For the past three years and the first nine months of 1997, the Company estimates that approximately two-thirds of its net sales were to semiconductor equipment OEMs and semiconductor device manufacturers. The Company expects that sales to such customers will continue to account for a substantial majority of its sales. The Company typically enters into contracts with its semiconductor equipment OEM customers that provide for quantity discounts. The Company recognizes revenues, and accrues for anticipated returns and warranty costs, upon shipment.

In the third quarter of 1996, as a result of the downturn in the semiconductor industry, the Company recorded a restructuring charge of \$1.4 million. The charge was primarily related to a reduction of personnel and the closure of certain facilities and included the cost of severance, lease commitments and the write-off of leasehold improvements.

A significant portion of the Company's sales are to operations in international markets. International sales by the Company's foreign subsidiaries were 30.1% and 27.9% of net sales for 1996 and for the nine months ended September 30, 1997, respectively. The Company does not classify export sales made directly by the Company as international sales. Such sales were less than 10% of net sales. The Company's foreign subsidiaries conduct their business in local currencies and the Company derives a significant portion of its cash flows from foreign denominated revenues. The Company plans to enter into forward exchange contracts and local currency purchased options to reduce currency exposure arising from foreign denominated sales associated with the intercompany purchases of inventory. Gains and losses on derivative financial instruments that qualify for hedge accounting are classified in cost of sales. Gains and losses on derivative financial instruments that do not qualify for hedge accounting are marked-to-market and recognized immediately in other income. See Note 2 to Notes to Consolidated Financial Statements.

Effective July 1, 1987, the Company elected to be treated as an S corporation for federal income tax purposes. The Company's S corporation status will terminate upon the closing of this offering, at which time the Company will become subject to federal, and certain state, income taxation as a C corporation. The pro forma net income reflects a pro forma effective tax rate of 38.0% to reflect federal and state income taxes which would have been payable for 1996 and the first nine months of 1997 had the Company been taxed as a C corporation.

RESULTS OF OPERATIONS

The following table sets forth for the periods indicated the percentage of total sales of certain line items included in the Company's consolidated statement of income data:

| | YEAR ENDED DECEMBER 31, | | | NINE MONTHS ENDED SEPTEMBER 30, | |
|--|-------------------------|--------|--------|---------------------------------|--------|
| | 1994 | 1995 | 1996 | 1996 | 1997 |
| Net sales..... | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Cost of sales..... | 56.0 | 55.8 | 59.7 | 59.6 | 58.3 |
| Gross profit..... | 44.0 | 44.2 | 40.3 | 40.4 | 41.7 |
| Research and development..... | 7.5 | 7.0 | 8.3 | 8.3 | 7.7 |
| Selling, general and administrative..... | 25.2 | 21.9 | 21.8 | 21.6 | 22.8 |
| Restructuring..... | 0.0 | 0.0 | 0.8 | 1.0 | 0.0 |
| Income from operations..... | 11.3 | 15.3 | 9.4 | 9.5 | 11.2 |
| Interest expense, net..... | 1.2 | 0.9 | 1.3 | 1.3 | 1.1 |
| Other income (expense), net..... | 0.0 | 0.0 | (0.3) | (0.2) | 0.4 |
| Income before income taxes..... | 10.1 | 14.4 | 7.8 | 8.0 | 10.5 |
| Provision for income taxes..... | 0.7 | 0.6 | 0.5 | 0.4 | 0.9 |
| Net income..... | 9.4% | 13.8% | 7.3% | 7.6% | 9.6% |
| Pro forma data: | | | | | |
| Historical income before income taxes..... | | | 7.8% | | 10.5% |
| Pro forma provision for income taxes..... | | | 3.0 | | 4.0 |
| Pro forma net income..... | | | 4.8% | | 6.5% |

NINE MONTHS ENDED SEPTEMBER 30, 1997 COMPARED TO NINE MONTHS ENDED SEPTEMBER 30, 1996

Net Sales. Net sales decreased 1.1% to \$134.6 million for the nine months ended September 30, 1997 from \$136.1 million for the same period of 1996. International net sales decreased 5.9% to \$37.5 million (27.9% of net sales) for the first nine months of 1997 from \$39.9 million (29.3% of net sales) for the first nine months of 1996. The decrease in net sales and international net sales was primarily due to the downturn in the semiconductor industry that began in 1996 and adversely affected the third quarter of 1996, as well as the first and second quarters of 1997.

Gross Profit. Gross profit as a percentage of sales increased to 41.7% for the nine months ended September 30, 1997 from 40.4% for the same period of 1996. The change was due primarily to the reduction in fixed costs resulting from the restructuring effected in the third quarter of 1996.

Research and Development. Research and development expenses decreased 7.9% to \$10.3 million (7.7% of net sales) for the nine months ended September 30, 1997 from \$11.2 million (8.2% of net sales) for the same period of 1996. The decrease was primarily due to lower staffing levels and project cost reductions during the first nine months of 1997 as a result of the restructuring effected in the third quarter of 1996. The Company expects research and development expenses to continue to increase as the Company continues to work to develop products to address advances in the semiconductor industry, such as the trend toward smaller device geometries and larger wafer sizes.

Selling, General and Administrative. Selling, general and administrative expense increased 4.6% to \$30.7 million (22.8% of net sales) for the nine months ended September 30, 1997 from \$29.4 million (21.6% of net sales) for the same period of 1996. The increase was due primarily to increased staffing levels and compensation expense, and the write-off of certain assets.

Restructuring. In the third quarter of 1996, as a result of the downturn in the semiconductor industry, the Company recorded a restructuring charge of \$1.4 million. The charge was primarily related to a reduction of personnel and the closure of certain facilities and included the cost of severance, lease commitments and the write-off of leasehold improvements.

Interest Expense, Net. Net interest expense decreased 19.1% to \$1.5 million for the nine months ended September 30, 1997 from \$1.8 million for the same period of 1996 primarily due to lower debt outstanding during 1997.

Other Income (Expense), Net. Other expense of \$0.2 million for the nine months ended September 30, 1996 and other income of \$0.5 million for the nine months ended September 30, 1997 reflect losses and gains, respectively, from foreign exchange contracts that did not qualify for hedge accounting.

Provision for Income Taxes. Effective July 1, 1987, the Company elected to be treated as an S corporation under the applicable provisions of the Code, and as a result has not been subject to federal income taxes, but it has been subject to certain state income taxes. The provision for income taxes is comprised of foreign income taxes and certain state income taxes. The provision increased to \$1.2 million for the nine months ended September 30, 1997 from \$0.7 million for the same period of 1996 primarily due to increased income.

Pro Forma Provision for Income Taxes. The pro forma provision for income taxes for the nine months ended September 30, 1997 reflects the estimated tax expense the Company would have incurred had it been subject to federal and state income taxes as a C corporation under the Code. The pro forma provision reflects a pro forma effective tax rate of 38.0%, which differs from the federal statutory rate due primarily to the effects of state and foreign taxes and certain tax credits.

YEAR ENDED DECEMBER 31, 1996 COMPARED TO YEAR ENDED DECEMBER 31, 1995

Net Sales. Net sales increased 8.7% to \$170.9 million for 1996 from \$157.2 million for 1995. International net sales were \$51.4 million for 1996 (30.1% of net sales) and \$50.2 million for 1995 (31.9% of net sales). In the fourth quarter of 1995 the Company purchased UTI Instruments Company ("UTI"), a designer and manufacturer of gas monitoring instrumentation, for \$4.4 million in cash. The increase in net sales was due primarily to the inclusion of sales by UTI as well as increased worldwide sales of the Company's existing products.

Gross Profit. Gross profit as a percentage of net sales decreased to 40.3% for 1996 from 44.2% for 1995. The decrease was primarily due to higher fixed costs resulting from manufacturing capacity expansion and lower margins initially earned on certain new products.

Research and Development. Research and development expenses increased 29.8% to \$14.2 million (8.3% of net sales) for 1996 from \$10.9 million (7.0% of net sales) for 1995. The increase was primarily due to the inclusion of a full year of costs associated with UTI and costs associated with the development of new products.

Selling, General and Administrative. Selling, general and administrative expenses increased 8.1% to \$37.2 million (21.8% of net sales) for 1996 from \$34.4 million (21.9% of net sales) for 1995. The increase was primarily due to the inclusion of a full year of costs associated with UTI.

Restructuring. In the third quarter of 1996 the Company recorded a restructuring charge of \$1.4 million. The charge was primarily related to a reduction of personnel and the closure of certain facilities and included the cost of severance, lease commitments and the write-off of leasehold improvements.

Interest Expense, Net. Net interest expense increased to \$2.3 million in 1996 from \$1.4 million in 1995 primarily due to increased debt outstanding during 1996.

Other Income (Expense), Net. Other expense of \$0.5 million in 1996 represents losses from foreign exchange contracts that did not qualify for hedge accounting.

Provision for Income Taxes. The provision for income taxes is comprised of foreign income taxes and certain state income taxes. The provision decreased to \$0.8 million in 1996 from \$1.0 million in 1995 primarily due to lower income.

Pro Forma Provision for Income Taxes. The pro forma provision for income taxes in 1996 reflects the estimated tax expense the Company would have incurred had it been subject to federal and state income taxes

as a C corporation under the Code. The pro forma provision reflects a pro forma effective tax rate of 38.0%, which differs from the federal statutory rate due primarily to the effects of state and foreign taxes and certain tax credits.

YEAR ENDED DECEMBER 31, 1995 COMPARED TO YEAR ENDED DECEMBER 31, 1994

Net Sales. Net sales increased 47.1% to \$157.2 million for 1995 from \$106.8 million in 1994. International net sales increased 44.0% to \$50.2 million (31.9% of net sales) for 1995 from \$34.8 million (32.6% of net sales) in 1994. These increases were due primarily to increased worldwide sales volume to customers in the semiconductor industry.

Gross Profit. Gross profit as a percentage of net sales was substantially the same for 1995 (44.2%) and 1994 (44.0%).

Research and Development. Research and development expenses increased 36.1% to \$10.9 million (7.0% of net sales) for 1995 from \$8.0 million (7.5% of net sales) in 1994. The increase in the dollar amount of the expenses was primarily due to increased staffing levels and other costs associated with continued development of new products.

Selling, General and Administrative. Selling, general and administrative expenses increased 28.0% to \$34.4 million (21.9% of net sales) for 1995 from \$26.9 million (25.2% of net sales) for 1994. The increase in expenses during 1995 was primarily due to the establishment of sales and service subsidiaries in Europe and Korea, increased selling costs, higher staffing levels and other general and administrative costs incurred to support the Company's increased sales volume.

Interest Expense, Net. Net interest expense increased to \$1.4 million for 1995 from \$1.3 million for 1994, primarily due to increased debt outstanding during 1995.

Provision for Income Taxes. The provision for income taxes is comprised of foreign income taxes and certain state income taxes. The provision increased to \$1.0 million for 1995 from \$0.8 million for 1994 primarily due to increased income.

SELECTED QUARTERLY OPERATING RESULTS

The following tables present unaudited consolidated financial information for the seven quarters ended September 30, 1997. In the opinion of management this information has been presented on the same basis as the audited Consolidated Financial Statements appearing elsewhere in this Prospectus and all adjustments (consisting only of normal recurring adjustments) which management considers necessary for a fair presentation of the results of such periods have been included in the amounts stated below to present fairly the unaudited quarterly results when read in conjunction with the Company's Consolidated Financial Statements and Notes thereto. The results for any quarter are not necessarily indicative of future quarterly results of operations.

| | QUARTER ENDED | | | | | | |
|---|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|
| | MARCH 31, 1996 | JUNE 30, 1996 | SEPT. 30, 1996 | DEC. 31, 1996 | MARCH 31, 1997 | JUNE 30, 1997 | SEPT. 30, 1997 |
| | (IN THOUSANDS) | | | | | | |
| STATEMENT OF INCOME DATA: | | | | | | | |
| Net sales..... | \$49,811 | \$ 48,278 | \$38,008 | \$ 34,765 | \$40,520 | \$ 45,749 | \$48,360 |
| Cost of sales..... | 29,610 | 29,235 | 22,233 | 20,930 | 24,277 | 26,413 | 27,766 |
| Gross profit..... | 20,201 | 19,043 | 15,775 | 13,835 | 16,243 | 19,336 | 20,594 |
| Research and development..... | 3,560 | 4,031 | 3,629 | 2,975 | 2,994 | 3,563 | 3,779 |
| Selling, general and administrative..... | 10,113 | 10,595 | 8,701 | 7,782 | 9,612 | 10,321 | 10,816 |
| Restructuring..... | 0 | 0 | 1,400 | 0 | 0 | 0 | 0 |
| Income from operations..... | 6,528 | 4,417 | 2,045 | 3,078 | 3,637 | 5,452 | 5,999 |
| Interest expense, net..... | 475 | 675 | 661 | 475 | 494 | 527 | 445 |
| Other income (expense), net..... | (12) | (9) | (209) | (249) | 275 | (447) | 632 |
| Income before income taxes..... | 6,041 | 3,733 | 1,175 | 2,354 | 3,418 | 4,478 | 6,186 |
| Provision for income taxes..... | 363 | 224 | 71 | 142 | 289 | 378 | 523 |
| Net income..... | \$ 5,678 | \$ 3,509 | \$ 1,104 | \$ 2,212 | \$ 3,129 | \$ 4,100 | \$ 5,663 |

| | QUARTER ENDED | | | | | | |
|---|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|
| | MARCH 31, 1996 | JUNE 30, 1996 | SEPT. 30, 1996 | DEC. 31, 1996 | MARCH 31, 1997 | JUNE 30, 1997 | SEPT. 30, 1997 |
| PERCENTAGE OF NET SALES: | | | | | | | |
| Net sales..... | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Cost of sales..... | 59.4 | 60.6 | 58.5 | 60.2 | 59.9 | 57.7 | 57.4 |
| Gross profit..... | 40.6 | 39.4 | 41.5 | 39.8 | 40.1 | 42.3 | 42.6 |
| Research and development..... | 7.2 | 8.4 | 9.5 | 8.5 | 7.4 | 7.8 | 7.8 |
| Selling, general and administrative..... | 20.3 | 21.9 | 22.9 | 22.4 | 23.7 | 22.6 | 22.4 |
| Restructuring..... | 0.0 | 0.0 | 3.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Income from operations..... | 13.1 | 9.1 | 5.4 | 8.9 | 9.0 | 11.9 | 12.4 |
| Interest expense, net..... | 1.0 | 1.4 | 1.7 | 1.4 | 1.2 | 1.1 | 0.9 |
| Other income (expense), net..... | 0.0 | 0.0 | (0.6) | (0.7) | 0.6 | (1.0) | 1.3 |
| Income before income taxes..... | 12.1 | 7.7 | 3.1 | 6.8 | 8.4 | 9.8 | 12.8 |
| Provision for income taxes..... | 0.7 | 0.4 | 0.2 | 0.4 | 0.7 | 0.8 | 1.1 |
| Net income..... | 11.4% | 7.3% | 2.9% | 6.4% | 7.7% | 9.0% | 11.7% |

The Company's quarterly operating results have varied significantly and are likely to continue to vary significantly due to a number of factors including specific economic conditions in the industries in which the Company's customers operate, particularly the semiconductor industry; the timing of the receipt of orders from major customers; customer cancellations or shipment delays; price competition; disruption in sources of supply; seasonal variations of capital spending by customers; production capacity constraints; specific features requested by customers; exchange rate fluctuations; the introduction or announcement of new products by the Company or its competitors; and other factors, many of which are beyond the Company's control. See "Risk Factors -- Fluctuations in Operating Results."

The Company's net sales have fluctuated over the past seven quarters primarily due to the decline in the semiconductor industry in 1996 that adversely affected sales of the Company's products in the third and fourth quarters of 1996 and the first and second quarters of 1997.

Gross profit as a percentage of net sales decreased for the second quarter of 1996 primarily due to higher fixed costs resulting from manufacturing capacity expansion. Gross profit as a percentage of net sales improved in the third quarter of 1996 primarily due to reduced overhead costs as a result of the Company's restructuring. Gross profit as a percentage of net sales decreased in the fourth quarter of 1996 primarily as a result of lower net sales relative to fixed costs. Gross profit as a percentage of net sales increased in the first, second and third quarters of 1997 primarily as a result of fuller utilization of existing manufacturing capacity as a result of increased net sales.

Research and development expenses increased in the second quarter of 1996 primarily as a result of increased staffing levels and costs related to product development support. The reduction in research and development expenses in the third and fourth quarters of 1996 was primarily due to lower staffing levels and project cost reductions. The increase in research and development expenses for the second and third quarters of 1997 was primarily due to increased staffing levels.

Selling, general and administrative expenses decreased in the third and fourth quarters of 1996 primarily due to a reduction of general and administrative staffing levels as a result of the restructuring effected in the third quarter of 1996 and other cost reductions, and increased in the first quarter of 1997 primarily due to increased staffing levels and increased compensation expense. The increase in selling, general and administrative expenses in the second and third quarter of 1997 was primarily due to increased compensation expense and the write-off of certain assets with no remaining value.

Other income primarily represents gains and losses on foreign exchange contracts.

LIQUIDITY AND CAPITAL RESOURCES

The Company has financed its operations and capital requirements through a combination of cash provided by operations, long-term real estate financing, capital lease financing and short-term lines of credit.

Operations provided cash of \$7.7 million, \$13.2 million, \$26.3 million and \$11.7 million for 1994, 1995, 1996 and the first nine months of 1997, respectively, primarily impacted in each period by net income, depreciation and changes in the levels of inventory and accounts receivable. Investing activities utilized cash of \$4.0 million, \$13.2 million, \$10.2 million, and \$2.6 million in 1994, 1995, 1996 and the first nine months of 1997, respectively, primarily for the purchase of property and equipment in each period and, in 1994, for the purchase of investments and, in 1995, the acquisition of UTI. Financing activities utilized cash of \$2.3 million, \$0.4 million, \$15.6 million and \$7.9 million in 1994, 1995, 1996 and the first nine months of 1997, respectively, primarily for stockholder distributions in each period. Cash flows from financing activities for each period were primarily from short-term and long-term borrowings.

Working capital was \$29.5 million as of September 30, 1997. The Company has a combined \$20.0 million unsecured revolving line of credit with two domestic financial institutions, expiring June 30, 1999. The unused balance under this revolving line of credit was \$17.5 million at September 30, 1997. The Company also has lines of credit through its foreign subsidiaries with several financial institutions, totaling \$13.3 million at September 30, 1997. The total unused balance under these lines of credit was \$2.6 million at September 30, 1997. These lines generally expire and are renewed at six month intervals. In addition, the Company has outstanding term loans and mortgage loans from banks totaling \$14.4 million (net of the current portion) at September 30, 1997. See Note 6 of Notes to Consolidated Financial Statements.

The Company believes that the net proceeds from this offering, together with the cash anticipated to be generated from operations and funds available from existing credit facilities, will be sufficient to satisfy its estimated working capital and planned capital expenditure requirements through at least the next 12 months.

EFFECT OF CURRENCY EXCHANGE RATES AND EXCHANGE RATE RISK MANAGEMENT.

A significant portion of the Company's business is conducted outside of the United States through its foreign subsidiaries. The foreign subsidiaries maintain their accounting records in their local currencies. Consequently, period to period comparability of results of operations is affected by fluctuations in exchange rates. The Company derives a significant portion of its cash flows from foreign denominated revenue. To the extent the dollar value of foreign denominated revenue is diminished as a result of a strengthening dollar, the Company's results of operations and cash flows could be adversely affected. To mitigate the risks associated with foreign currency rate fluctuations, the Company has entered into forward exchange contracts and local currency purchased options on a continuing basis in amounts and timing consistent with the underlying currency exposures. Gains on forward exchange contracts and local currency purchased options, qualifying for hedge accounting, amounted to \$0.9 million, \$1.9 million and \$2.5 million for the years ended December 31, 1994, 1995 and 1996, respectively, and \$1.6 million and \$1.0 million for the nine months ended September 30, 1996 and 1997, respectively, and are classified in cost of sales. Losses of \$0.5 million, \$0.2 million and gains of

\$0.5 million on forward exchange contracts that did not qualify for hedge accounting were recognized in earnings for 1996 and the nine months ended September 30, 1996 and 1997, respectively, and are classified in other income (expense), net. While the Company does not issue or hold derivative financial instruments for trading purposes, there can be no assurance that any losses realized on such instruments will be fully offset by gains on the underlying exposure. Prospectively, the Company plans to use local currency purchased options, and to a lesser extent forward exchange contracts, to seek to mitigate the impact of exchange rate fluctuations. See Notes 2 and 3 of Notes to Consolidated Financial Statements.

RECENTLY ISSUED ACCOUNTING PRONOUNCEMENTS

See Note 2 of Notes to Consolidated Financial Statements for a discussion of the impact of recently issued accounting pronouncements.

BUSINESS

The Company is a leading worldwide supplier of instruments and components used to measure, control, analyze and isolate gases in semiconductor and other manufacturing processes. The Company offers a comprehensive line of products which are used around the process chamber in both semiconductor front-end manufacturing processes and other advanced thin-film and vacuum-based processes used in the manufacture of, among other things, flat panel displays, magnetic and optical storage media, solar cells, fiber optic cables and gas lasers. The Company's products include: (i) pressure and flow measurement and control instruments; (ii) vacuum gauges, valves and components; and (iii) gas analysis instruments.

For over 20 years the Company has been focused on serving the needs of semiconductor device manufacturers and semiconductor equipment OEMs and has established long-term relationships with many of its customers. The Company has over 4,000 customers worldwide including most major semiconductor equipment OEMs, semiconductor device manufacturers, a broad range of industrial companies and university, government and industrial research laboratories. The Company's customers in its principal market, the semiconductor market, include Applied Materials, Eaton, Hitachi, Lam Research, TEL and ULVAC. The Company sells its products primarily through its direct sales force in 22 offices in Canada, France, Germany, Japan, Korea, the Netherlands, the United Kingdom and the United States.

INDUSTRY BACKGROUND

In the past 35 years, significant advances in materials science and processing technologies have enabled the manufacture of products ranging from highly complex microprocessor chips to simple but effective impervious coatings for food packaging. In many materials processing applications, specific gas mixtures at precisely controlled pressures are used to create and maintain the required process atmosphere, serve as a medium to deposit source material on a substrate and provide the etchant media for removing materials from a substrate. The largest commercial application of materials science technology processes is in the manufacture of semiconductor devices.

Worldwide semiconductor sales have increased as the use of semiconductors has expanded beyond personal computer and computer systems to a wide array of additional applications such as telecommunications and data communications systems, automotive products, consumer goods, medical products and household appliances. In large part, this growth has been facilitated by the ability of semiconductor manufacturers to produce increasingly fast, more complex, higher performance semiconductors while steadily reducing cost per function, power consumption requirements and size of these products to meet end-user and system designer requirements. These improvements in the ratio of price to performance have been enabled by advancements in semiconductor process technology, which have facilitated the ability to reduce circuit geometries and subsequently increase transistor densities, or the number of transistors on a silicon wafer. These trends have driven the need for increasingly complex and sophisticated semiconductor device manufacturing processes, process equipment and process controls.

SEMICONDUCTOR MANUFACTURING PROCESS

The front-end of the semiconductor manufacturing process, or wafer processing, requires hundreds of process steps involving the controlled application of materials on silicon wafers. These process steps take place within a process chamber, which provides a controlled environment for the fabrication of semiconductor devices. Most of the key front-end processes used in the production of semiconductors require precise control of gas pressure, flow and composition in the process chamber.

To ensure the integrity and performance of the manufacturing process, semiconductor device manufacturers require sophisticated instruments that can provide precise automated control of all major process variables within the process chamber. The process steps required to produce device features involve the control of multiple gases flowing into the process chamber at specified intervals, and at controlled pressure and vacuum levels. In a typical process step, the process chamber is evacuated to a base pressure established by a vacuum pumping system and measured with vacuum gauges. Automatic shut-off valves are sequenced to protect pumps and process instruments from exposure to atmospheric pressure. Chamber leak integrity may

be checked by gas analyzers scanning for the presence of undesirable atmospheric gases or water vapor. Mass flow controllers automatically control the flow rates of multiple gases into the process chamber. Simultaneously, the automatic pressure control system for the process chamber measures the pressure in the chamber and controls it at the desired level by electronically adjusting the position of a control valve located between the process chamber and the vacuum pump. Downstream of the process chamber, heated lines and vacuum valves and switches are used to prevent contamination of the devices as a result of backstreaming of particles and exhaust gases into the process chamber.

The front-end process steps involving gaseous media include deposition, etch, ion implantation, plasma stripping and cleaning, rapid thermal processing, diffusion and epitaxy. The most frequently employed front-end process steps requiring gaseous media are deposition, etch and ion implantation.

Deposition involves the formation of several layers of conducting, semiconducting and insulating thin films on the surface of a wafer. The two principal methods of film deposition are physical vapor deposition ("PVD"), which is used primarily to deposit conductive metal layers, and chemical vapor deposition ("CVD"), which is used primarily to deposit semiconducting and insulating thin films. In the PVD process, wafers are typically placed in a process chamber where solid sources of film materials mounted in the chamber are sputtered onto the wafer surface at precisely controlled pressures and temperatures. In the CVD process, a specially designed gas or vaporized liquid material is introduced into a pressure and temperature controlled process chamber containing the wafers. The gases interact with the wafer surface to form a semiconducting or insulating layer. The pressure in the process chamber during the deposition process and the mixture of deposition gases must be tightly controlled to achieve uniform film thickness and composition.

The etching process creates the line-widths and other feature sizes on integrated circuits. To produce specified line-widths manufacturers typically employ plasma etching techniques, which use ionized gases that chemically react with unprotected portions of the wafer to create the thinly etched features that form the patterns of the device. The pressure in the etch chamber and the mixture of etchant gases must be precisely controlled to achieve the specified side wall angle and ratio of line-widths to depths. Plasma stripping and cleaning are etching processes used to prepare the wafer surface for further processing steps.

In the ion implantation process, ions of certain materials are formed in minuscule quantities from gases introduced into a chamber on the implantation tool. The ions are generated in the chamber and are accelerated into the silicon wafer. The ions are implanted beneath the surface of the silicon, altering its electrical characteristics. The flow rates of the gases into the ion chamber and the pressure in the ion chamber must be precisely controlled to create and maintain the ion density required to achieve desired electrical characteristics.

The pressures used in semiconductor manufacturing processes range from as low as one trillionth of atmospheric pressure (10^{-9} Torr) to as high as 200 times atmospheric pressure. The following table shows the wide range of pressures required for typical semiconductor manufacturing processes:

[This table graphically depicts, using graybars, the gas pressure ranges (10^{-9} Torr to 152,000 Torr) used in various typical semiconductor process steps (Gas distribution, Atmospheric CVD, Sub-atmospheric CVD, Low Pressure CVD, Plasma Etching & Cleaning, PVD and Implant).]

[CHART]

Etching and deposition steps are repeated many times in the fabrication of a semiconductor device and require varying flow rates, pressures and gases. A typical process step uses from three to five different gases. The uptime, yield and throughput of the process depends on precise repeatable measurement and control of the specific gas pressure and flow rates, as well as the maintenance of the vacuum integrity of the process chamber and the prevention of wafer contamination from particles entering the chamber. Pressure variations of as little as one-hundred-thousandth of atmospheric pressure can change process yields significantly and errors in gas composition may impair device performance. Particle contamination can produce defects that significantly reduce device yields.

TRENDS IN SEMICONDUCTOR MANUFACTURING

The ability of semiconductor manufacturers to offer integrated circuits with greater functionality at higher speeds requires continuous improvements in semiconductor process equipment and process controls. The transition to smaller device geometries, such as .25 micron and smaller line-widths, may require shorter process steps and is also leading to the introduction of new materials such as copper and parylene for conductors and insulators which in turn require new technologies for delivery of gases and vapors to the process chamber. In addition, the introduction of advanced processes such as high density plasma is leading to a need for lower pressures, which are more difficult to measure and control than higher pressures. These trends, along with increased wafer sizes, which result in higher device value per wafer, are leading to the need for increased sophistication of semiconductor processing equipment, a heightened emphasis on uptime, yield and throughput and the need for more precise process controls. As a result, the design and performance of instruments that control pressure or the flow of gases, or analyze the mixture of gases, are becoming even more critical to the semiconductor manufacturing process.

At the same time, the accelerating pace of technological change and the increasing sophistication of semiconductor manufacturing equipment have led to an increase in the number of components and subsystems used in the semiconductor manufacturing process. To help address this increased complexity, semiconductor equipment manufacturers are increasingly seeking to establish relationships with a smaller group of broad-based suppliers that provide (i) value-added, integrated component solutions that address multiple steps in the semiconductor manufacturing process, (ii) a worldwide sales and support infrastructure and (iii) advanced technological capabilities to meet their needs on a worldwide basis.

MKS STRATEGY

The Company's objective is to be the leading worldwide supplier of instruments and components used to measure, control, analyze and isolate gases in semiconductor and other advanced thin-film materials processing applications. The principal elements of the Company's strategy to achieve this objective are set forth below:

Extend Technology Leadership. The Company seeks to apply its expertise in vacuum, pressure and flow measurement and control technologies to develop advanced products that meet the critical gas-related process requirements of semiconductor and advanced thin-film materials manufacturers. The Company has introduced technological innovations including corrosion-resistant pressure and vacuum sensors, closed-loop low pressure and vacuum control systems, and transducer-configured residual gas analyzers. The Company has developed, and continues to develop, new products to address emerging industry trends such as the transition from the use of 200mm wafers to 300mm wafers and the shrinking of integrated circuit line-widths from .35 micron to .25 and .18 micron and smaller. The Company has developed and, continues to develop materials delivery systems for new classes of materials, such as copper and parylene, that are beginning to be used in small geometry manufacturing technologies. In addition, the Company has been a leader in making its products compatible with emerging digital network standards, such as DeviceNet, for enabling components used in semiconductor manufacturing processes to transmit self-diagnostic and other information on a digital host network while reducing system complexity and space requirements.

Offer Comprehensive Product Lines. The Company believes that it offers the widest range of pressure and vacuum measurement and control products serving the semiconductor industry. The Company offers a full line of products including pressure and flow measurement and control instrumentation products; vacuum gauges, valves and components; and gas analysis instruments. Since the development of its original Baratron laboratory-based instrument in 1961, the Company has continuously enhanced and expanded its product offerings in response to the evolving needs of its customers. In 1997, for example, the Company introduced various new products and enhancements to existing products, including the Micro Baratron instrument, a significantly smaller version of its pressure measurement product, and a new low vapor pressure material delivery system. The Company plans to introduce new products in 1998, including a line of mass flow calibrators and process monitoring hardware and software for residual gas analysis. The Company plans to continue to expand its product lines through both internal development and acquisitions of complementary businesses, products and technologies.

Build Upon Close Working Relationships with Customers. The Company has been focused on serving the needs of semiconductor device manufacturers and semiconductor equipment OEMs for over 20 years and has established long-term relationships with many of its customers. The Company works closely with its OEM customers on future generation designs to provide products that are tailored for their specific needs. The Company works with its customers at the pre-design and design stage to identify and respond to their requests for current and future generations of products. These close working relationships also allow the Company to understand and address the cost and performance expectations of its customers. The Company plans to enhance its relationships with its major customers and identify opportunities to develop similar relationships with additional semiconductor equipment OEMs and device manufacturers.

Pursue Applications in Related Markets. The Company is leveraging its accumulated expertise in the semiconductor industry by developing products for applications that employ production processes similar to semiconductor fabrication processes in their reliance upon gases and vacuum-based production technologies. Applications served by the Company outside the semiconductor industry include vacuum freeze-drying of pharmaceuticals and foods, sterilization of medical appliances, and applications that involve advanced thin-film manufacturing such as flat panel displays, magnetic and optical storage media, solar cells, fiber optic cables and optical coatings. The Company plans to continue to identify and develop products that address advanced materials processing applications where gas management plays a critical role.

Leverage Global Infrastructure. As semiconductor device manufacturers have become increasingly sensitive to the significant costs of system downtime, they have required that suppliers offer comprehensive local repair service and close customer support. Manufacturers require close support to enable them to repair,

modify, upgrade and retrofit their equipment to improve yields and adapt to new materials or processes. To meet these market requirements, MKS maintains a worldwide sales and support organization with offices in 22 locations. The Company currently manufactures its products at nine facilities in the United States and abroad. The Company continues to devote significant resources to expand and maintain its worldwide production and service capabilities to meet the global demand for gas management instruments and components. The Company believes that the ability to manufacture reliable instruments and components in a cost-effective manner is critical to meet the demanding "just-in-time" delivery requirements of its OEM and end-user customers. In 1998, the Company plans to add manufacturing capabilities to its Austin, Texas and United Kingdom facilities and further equip its cleanroom facilities in Andover and Methuen, Massachusetts. The Company intends to open a sales and support facility in Singapore in 1998.

PRODUCTS

MKS offers a full line of instruments and components that are used to measure, control, analyze and isolate gases in semiconductor and other advanced thin-film manufacturing processes. The Company supplies products in three principal areas: (i) pressure and flow measurement and control instrumentation products; (ii) vacuum gauges, valves and components; and (iii) gas analysis instruments.

The following schematic shows where MKS products are used in a typical semiconductor manufacturing process.

[MANUFACTURING SCHEMATIC]

1. Ultraclean Mini-Baratron Pressure Transducer and Local Display Module
2. Automatic Pressure Controller/Regulator
3. Thermal Mass Flow Controller or Pressure-based Mass Flow Controller
4. Gas Box Rate-of-Rise In-situ Calibrator
5. Control and Shut-off Valves
6. Direct Liquid Injection -- Controller
7. Direct Liquid Injection -- Micropump
8. Direct Liquid Injection -- Vaporizer
9. RGA Mass Spectrometer with Software
10. Baratron Pressure Switch
11. In Situ Diagnostics Access Valve
12. Baratron Pressure Transducer
13. Automatic Downstream valve Controller
14. Vacuum Foreline
15. In-line Valve
16. Convection Pirani Gauge
17. Throttle Valve
18. Cold Cathode High Vacuum Gauge or Hot Cathode High Vacuum Gauge
19. In-line Trap
20. Foreline/Exhaust Line Heaters

[The schematic is the illustration of a typical process chamber, with numerous MKS products surrounding the chamber. The products are as those listed to the right of the schematic.]

PRESSURE AND FLOW MEASUREMENT AND CONTROL INSTRUMENTATION PRODUCTS

The Company designs and manufactures a wide range of pressure and flow measurement and control instrumentation. Each product line consists of products which are designed for a variety of pressure and flow ranges and accuracies.

Baratron Pressure Measurement Products. The Company's Baratron pressure measurement products are high-resolution, variable capacitance pressure measurement instruments and consist of five product lines that range from high accuracy digital output instruments to simple electronic switches. These products are typically used to measure the pressure of the gases being distributed upstream of the process chamber, to measure process chamber pressure and to measure pressures between the process chamber and the pump. Baratron instruments measure pressures at ranges from two hundred times atmospheric pressure to 10^{-6} Torr. The Company believes it offers the widest range of variable capacitance gas pressure measurement instruments in the semiconductor and advanced thin-film materials processing industries.

A key feature of Baratron instruments is that they measure pressure independent of gas composition, which is critical for precise pressure control of semiconductor processes that involve gas mixtures. In these processes, there is a need to control both pressure and gas mixture, but the pressure measurement instrument must measure only the pressure of the sum of the gases in the chamber, independent of gas composition. The Baratron line of instruments enables users to achieve a highly accurate and repeatable measurement of gas pressure. Pressure measurement, independent of gas composition, is also useful in evacuation (removal of atmospheric gases) and backfilling (introduction of specific amounts of several gases) applications, such as fluorescent bulb manufacturing and gas laser fabrication.

The following table shows the Company's principal Baratron pressure measurement product lines:

BARATRON PRESSURE MEASUREMENT PRODUCTS

| PRODUCT LINES | TYPICAL APPLICATIONS | DESCRIPTION | RANGES OF LIST PRICES |
|--|--|--|-----------------------|
| High accuracy pressure and vacuum measurement instruments | CVD PVD Etch Pressure calibration | Instruments with built-in temperature stabilization features, for high accuracy and high temperature operation | \$ 2,125 - \$6,125 |
| General purpose pressure and vacuum measurement instruments | CVD PVD Etch | Rugged instruments with and without built-in temperature stabilization features, for reliable, accurate, process measurement | \$450 - \$3,600 |
| Ultra-clean high pressure and vacuum measurement instruments | Gas Distribution CVD Etch | Instruments with ultra- clean surfaces exposed to gas, for high purity applications | \$650 - \$950 |
| General purpose "MINI" pressure and vacuum measurement instruments | CVD Etch | Small footprint instruments for accurate, general purpose process measurement | \$625 - \$1,700 |
| Electronic switches ranging from atmosphere to vacuum | PVD CVD Etch | Economical, stable instrument providing "go/no-go" output for pressure trip-points and alarms | \$375 - \$650 |

The Company's list prices for its Baratron measurement products vary depending upon accuracy, pressure range, operating temperature range, stability, resolution and gas purity specifications.

Pressure Control Products. The Company's pressure control products consist of analog and digital automatic pressure and vacuum control electronic instruments and valves. These products enable precise control of process pressure by electronically actuating valves which control the flow of gases in and out of the process chamber to minimize the difference between desired and actual pressure in the chamber. The electronic controllers vary from simple analog units with precise manual tuning capability to state-of-the-art self-tuning, digital signal processing controllers. The valve products vary from small gas inlet valves to large exhaust valves.

In most cases, the Company's Baratron pressure measurement instruments provide the pressure input to the pressure control device, providing the user with an integrated closed-loop pressure control system. The Company's pressure control products can also accept inputs from other measurement instruments, enabling the control of gas input or exhaust based on parameters other than pressure.

PRESSURE AND VACUUM CONTROL PRODUCTS

| PRODUCT LINES | TYPICAL APPLICATIONS | DESCRIPTION | RANGES OF LIST PRICES |
|--|--|--|-----------------------|
| Downstream automatic valve controllers | CVD Etch | Analog controllers, self-tuning digital controllers and displayless self-tuning controllers | \$850 - \$2,000 |
| Downstream exhaust control throttle valves | CVD Etch | Non-sealing valves, sealing valves, high speed sealing valves, microprocessor-based smart throttle valves and vane-type valves | \$ 1,250 - \$8,200 |
| Upstream or downstream automatic controllers | CVD Etch Implant Backside wafer cooling | Integrated sensor, valve and control electronics package | \$ 1,400 - \$3,000 |
| Upstream control valves | Etch Implant Backside wafer cooling | Elastomer and all-metal-sealed valves | \$450 - \$1,500 |

The Company has recently introduced a line of integrated pressure controllers that combine the functions of its Baratron pressure measurement instrument, control electronics and valve into a three-inch footprint instrument which can be placed directly on a gas line to control pressure either upstream or downstream of the instrument. This addresses the need for smaller components, saving valuable clean room space.

Flow Measurement and Control Products. The Company's flow measurement products include gas, vapor and liquid flow measurement products based upon thermal conductivity, pressure and direct liquid injection technologies. The flow control products combine the flow measuring device with valve control elements based upon solenoid, piezo-electric and piston pump technologies. The products measure and control the mass flow rate of gases and vapors into the process chamber. The Company's broad product lines include products that allow the precise flow control of inert or corrosive gases, the control of low vapor pressure gases, and heated liquid source materials, and the control of delicate, advanced technology liquid sources and dissolved solid sources for next generation devices.

The Company's line of thermal-based mass flow controllers includes all-metal-sealed designs and ultra-clean designs for semiconductor applications and general purpose controllers for applications where all-metal-sealed construction is not required. The Company has also developed pressure-based mass flow controllers, based on Baratron pressure instrument measurement and control technology, which use flow restrictors in the gas line to transform pressure control into mass flow control.

FLOW MEASUREMENT AND CONTROL PRODUCTS

| PRODUCT LINES | TYPICAL APPLICATIONS | DESCRIPTION | RANGES OF LIST PRICES |
|--|--|--|-----------------------|
| Direct liquid injection system | CVD | Pumps and vaporizes liquid metal and dielectric precursors into process chamber | \$8,500 - \$24,900 |
| Gas box rate of rise calibrator | In situ calibration of mass flow controllers | Measures pressure increase with time in a known volume | \$7,500 |
| Pressure-based vapor delivery systems | CVD | Measures and controls flow of low pressure vapors into chamber | \$4,600 - \$12,400 |
| Pressure-based mass flow controllers | CVD Implant | Gas flow controller consisting of Baratron sensor, control valve, orifice, and electronics | \$2,700 |
| Ultra-clean all-metal-sealed thermal mass flow controllers | CVD PVD Etch | Gas flow controller consisting of sensor, control valve and electronics | \$1,400 - \$13,850 |
| General purpose elastomer-sealed mass flow controllers | CVD Etch | Gas flow controller consisting of sensor, control valve and electronics | \$875 - \$2,000 |

Certain new materials required for the next generation of semiconductor devices are difficult to control using traditional thermal mass flow technology. To control these new materials, the Company has designed a direct liquid injection subsystem ("DLI") which pumps a precise volume of liquid into a vaporizer, which in turn supplies a controlled flow of vapor into the process chamber. The DLI pump and vaporizer are presently used principally for research and development applications for next generation semiconductor device conductors and insulators, such as copper and parylene.

The Company's flow measurement products also include an in situ calibration system which independently measures mass flow and compares this measurement to that of the process chamber mass flow controller. The demand for the Company's calibration system is driven by the increasingly stringent process control needs of the semiconductor industry and the need to reduce costly downtime resulting from stopping operations to address mass flow controller problems.

VACUUM GAUGES, VALVES AND COMPONENTS

The Company is a leading supplier of vacuum gauges, valves and components. The Company offers a wide range of vacuum instruments consisting of vacuum measurement sensors and associated power supply and readout units. These vacuum gauges measure phenomena that are related to the level of pressure in the process chamber and downstream of the process chamber between the chamber and the pump, but, unlike Baratron pressure measurement instruments, do not measure pressure directly. These gauges are used to measure vacuum at pressures lower than those measurable with a Baratron pressure measurement instrument or to measure vacuum in the Baratron pressure measurement instrument range where less accuracy is required. The Company's indirect pressure gauges use thermal conductivity and ionization gauge technologies to measure pressure from atmospheric pressure to 10⁽⁻⁹⁾Torr. The Company's Baratron pressure measurement instruments, together with its vacuum gauges are capable of measuring the full range of pressures used in semiconductor and other thin-film manufacturing processes from 200 times atmospheric pressure to 10⁽⁻⁹⁾Torr.

The Company also manufactures a wide range of vacuum gauge instruments in which the associated electronics are packaged with the vacuum sensor, reducing panel space and installation cost. The Company offers both analog and digital versions of these vacuum gauge transducers.

VACUUM GAUGES, VALVES AND COMPONENT PRODUCTS

| PRODUCT LINES | TYPICAL APPLICATIONS | DESCRIPTION | RANGES OF LIST PRICES |
|---|-------------------------------|--|-----------------------|
| Cold cathode and hot filament vacuum gauges | PVD Etch | Electronic gauges to measure pressure down to 10 ⁽⁻⁹⁾ Torr | \$600 - \$6,200 |
| Convection gauges | PVD CVD Etch | Electronic gauges to measure from atmosphere down to 10 ⁽⁻³⁾ Torr | \$200 - \$725 |
| Right-angle and in-line shut-off valves | PVD CVD Etch Implant | High vacuum rapid action poppet valves | \$275 - \$4,500 |
| Vacuum traps | CVD Etch | Contaminant particle trap | \$1,800 - \$2,500 |
| Other vacuum components | PVD CVD Etch Implant | Flanges, fittings and heated lines | \$325 - \$1,650 |

The Company's vacuum valves are used on the gas lines between the process chamber and the pump downstream of the process chamber for CVD, PVD, implant and etch processes. The Company's vacuum components consist of fittings, flanges, traps and heated lines that are used downstream from the process chamber to provide leak free connections and to prevent condensable materials from depositing particles near or back into the chamber. The manufacture of small geometry devices cannot tolerate contamination from atmospheric pressure or particles. The Company's vacuum components are designed to minimize such contamination and thus increase yields and uptimes.

GAS ANALYSIS INSTRUMENTS

The Company's gas analysis instruments are sold primarily to the semiconductor industry. The residual gas analysis product lines include a quadrupole mass spectrometer sensor with built-in electronics to analyze the composition of background and process gases in the process chamber. The Company's ORION process monitoring system is a sophisticated quadrupole mass spectrometer process analyzer for statistical process monitoring of manufacturing processes operating from very low pressures to atmospheric pressure. These instruments are provided both as portable laboratory systems and as process gas monitoring systems used in the diagnosis of semiconductor manufacturing process systems. The gas monitoring systems can indicate out-of-bounds conditions, such as the presence of undesirable atmospheric gases, water vapor or out-of-tolerance amounts of specific gases in the process chamber, enabling operators to diagnose and repair faulty equipment. The Company's gas sampling systems provide a turn-key solution for withdrawing gases from chambers at relatively high pressures for introduction into the low pressure gas analyzers. Next generation, smaller geometry and larger wafer size device manufacturing processes are expected to require sophisticated gas analysis instruments and or monitoring equipment to ensure tighter process control and earlier diagnosis of equipment failures.

MARKETS AND APPLICATIONS

The Company estimates that approximately two-thirds of its sales in the first nine months of 1997 were made to the semiconductor industry. The Company's products are also used in other markets and applications

including the manufacture of flat panel displays, magnetic and optical storage media, solar cells, fiber optic cables and optical coatings. The major markets for the Company's products include:

Semiconductor Manufacturing

The Company's products are sold to semiconductor device manufacturers and semiconductor equipment OEMs. The Company's products are used in the major front-end process technologies such as PVD, CVD, etch and ion implantation and for process facility applications such as gas distribution, clean room pressure control and vacuum distribution. The Company anticipates that the semiconductor manufacturing market will continue to account for a substantial portion of its sales. While the semiconductor device manufacturing market is global, the major semiconductor equipment OEMs are concentrated in the U.S., Japan and Europe.

Flat Panel Display Manufacturing

The Company's products are used in the manufacture of flat panel displays, which require the same or similar fabrication processes as semiconductor manufacturing. The dominant fabrication process is CVD, which uses the same or similar Company products as CVD for semiconductor manufacturing. The Company sells its products both to OEMs and to end-users in the flat panel display market. The transition to larger panel size and higher definition is driving the need for defect reduction which requires tighter process controls.

Magnetic and Optical Storage Media

The Company's products are used in the manufacture of CD-ROMs, CDs, hard disks, and DVDs (digital video disks), typically in PVD applications. The Company's products are also used in the production of thin-film heads where ion beam technology is typically used. The transition to higher density storage capacity requires manufacturing processes incorporating tighter process controls. While storage media manufacturing is global, the major manufacturers are concentrated in Japan and the Asia-Pacific region and equipment OEMs are concentrated in the U.S., Japan and Europe.

Optical Fiber and Optical Coating

The Company's products are used in optical fiber and optical coating film processes. The Company's products are sold both to coating equipment OEMs and to manufacturers of products made using optical thin-films processes. Optical fibers used for data transmission are manufactured using CVD processes similar to those used in semiconductor manufacturing. The requirement for greater data transmission is driving the need for tighter control of optical fiber coating processes. Optical thin films for eyeglasses, solar panels and architectural glass are deposited using evaporation, CVD or PVD in processes similar to those used in semiconductor manufacturing. Optical fiber manufacturing and optical thin-film processing are concentrated in the U.S., Japan and Europe.

Other Markets

The Company's pressure and flow measurement and control instruments are also used in CVD and PVD processes for the application of thin films to harden tool bit surfaces, in the production of diamond thin films, in plasma processes used to sterilize medical instruments, in vacuum freeze drying of pharmaceuticals, foods and beverages and in vacuum processes involved in light bulb and gas laser manufacturing. The major OEMs and manufacturers are concentrated in the U.S., Japan and Europe.

CUSTOMERS

The Company has more than 4,000 active customers worldwide (having purchased products during the past year), including most major semiconductor device manufacturers, semiconductor equipment OEMs and industrial and research laboratories. The Company's largest customers consist primarily of leading semiconductor equipment OEMs and semiconductor device manufacturers, including Applied Materials, Eaton, Hitachi, Lam Research, TEL and ULVAC. In 1995 and 1996 and the first nine months of 1997, sales to the Company's top five customers accounted for approximately 24%, 26% and 31%, respectively, of the Company's

net sales. During the same periods, international sales represented approximately 32%, 30% and 28% of total net sales, respectively. During the first nine months of 1997, Applied Materials accounted for approximately 21% of the Company's net sales. Applied Materials purchases products from the Company under the terms of an agreement, with no minimum purchase requirements, that expires in 2002.

SALES, MARKETING AND SUPPORT

The Company's worldwide sales, marketing and support organization is critical to its strategy of maintaining close relationships with semiconductor equipment OEMs and device manufacturers. The Company sells its products primarily through its direct sales force which consists of 134 employees in 22 offices in Canada, France, Germany, Japan, Korea, the Netherlands, the United Kingdom and the United States. This direct sales force is supplemented by sales representatives and agents in China, India, Israel, Italy, Singapore and Taiwan and in selected domestic cities. The Company maintains a marketing staff of 24 employees to identify customer requirements, assist in product planning and specifications and to focus on future trends in the semiconductor and other markets.

As semiconductor device manufacturers have become increasingly sensitive to the significant costs of system downtime they have required that suppliers offer comprehensive local repair service and close customer support. Manufacturers require close support to enable them to repair, modify, upgrade and retrofit their equipment to improve yields and adapt new materials or processes. To meet these market requirements, the Company maintains a worldwide sales and support organization with offices in 22 locations. Technical support is provided by applications engineers located at offices in Arizona, California, Colorado, Massachusetts, Oregon and Texas, as well as Canada, France, Germany, India, Israel, Italy, Japan, Korea, the Netherlands, Singapore, Taiwan and the United Kingdom. Repair and calibration services are provided at 14 service depots located both in the United States and abroad. The Company provides warranties from one to three years, depending upon the type of product. In addition, the Company offers training programs for its customers in a wide range of vacuum and gas handling technologies.

MANUFACTURING

The Company believes that the ability to manufacture reliable gas management instruments and components in a cost-effective manner is critical to meeting the demanding requirements of its OEM and end-user customers. The Company monitors and analyzes product lead times, warranty data, process yields, supplier performance, field data on mean time between failures, inventory turns, repair response time and other indicators so that it may continuously improve its manufacturing processes. The Company has adopted a total quality management process. Certain of the Company's major manufacturing and service operations are ISO 9001 certified and the Company is planning to implement ISO 9000 for the remainder of its U.S. and European operations by the end of 1998.

The Company is devoting significant financial and management resources to maintain and expand its worldwide production and service capabilities to meet the global demand for gas management instruments and components. The Company believes that the ability to manufacture reliable instruments and components in a cost-effective manner is critical to meet the demanding "just-in-time" delivery requirements of its OEM and end-user customers. Due to the short time between the receipt of orders and shipments, the Company normally operates with a level of backlog that is not significant. The Company currently manufactures its products at nine facilities in the United States and abroad. The Company plans in 1998 to add manufacturing capabilities to its Austin, Texas and United Kingdom facilities and further equip its cleanroom facilities in Andover and Methuen, Massachusetts.

The Company's principal manufacturing activities consist of precision assembly, test, calibration, welding and machining activities. The Company subcontracts a portion of its assembly, machining and printed circuit board assembly and testing. All other assembly, test and calibration functions are performed by the Company. Critical assembly activities are performed in cleanroom environments at the Company's facilities.

RESEARCH AND DEVELOPMENT

The Company's research and development efforts are directed toward developing and improving the Company's gas management instruments and components for semiconductor and advanced thin-film processing applications and identifying and developing products for new applications for which gas management plays a critical role. The Company has undertaken an initiative to involve its marketing, engineering, manufacturing and sales personnel in the concurrent development of new products in order to reduce the time to market for new products. The Company's employees also work closely with its customers' development personnel. These relationships help the Company identify and define future technical needs on which to focus its research and development efforts. In addition, the Company participates in SEMI/SEMATECH, a consortium of semiconductor equipment suppliers, to assist in product development and standardization of product technology, and it supports research at academic institutions targeted at advances in materials science and semiconductor process development.

As of September 30, 1997, the Company employed a research and development staff of 131 employees. In 1995, 1996 and the first nine months of 1997, the Company's research and development expenditures were approximately \$10.9 million, \$14.2 million and \$10.3 million, respectively, representing approximately 7.0%, 8.3% and 7.7% of net sales.

COMPETITION

The market for the Company's products is highly competitive. Principal competitive factors include historical customer relationships; product quality, performance and price; breadth of product line; manufacturing capabilities; and customer service and support. While the Company believes that it competes favorably with respect to these factors, there can be no assurance that it will continue to do so.

The Company encounters substantial competition in each of its product lines from a number of competitors, although no one competitor competes with the Company across all product lines. Certain of the Company's competitors have greater financial and other resources than the Company. In some cases, the competitors are smaller than the Company, but well established in specific product niches. Millipore offers products that compete with the Company's pressure and flow products. AERA, STEC and Unit Instruments each offer products that compete with the Company's mass flow control products. NOR-CAL and MDC each offer products that compete with the Company's vacuum components. Leybold-Inficon offers products that compete with the Company's vacuum measuring and gas analysis products. Spectra Instruments offers products that compete with the Company's gas analysis products. In some cases, particularly with respect to mass flow controllers, end-user semiconductor device manufacturers may direct semiconductor equipment OEMs to use a specified supplier's product in their equipment. Accordingly, the Company's success depends in part on its ability to have semiconductor device manufacturers specify that its products be used at their fabrication facilities and the Company may encounter difficulties in changing established relationships of competitors with a large installed base of products at such customers' fabrication facilities. In addition, the Company's competitors can be expected to continue to improve the design and performance of their products. There can be no assurance that competitors will not develop products that offer price or performance features superior to those of the Company's products.

PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

The Company relies on a combination of patent, copyright, trademark and trade secret laws and license agreements to establish and protect its proprietary rights. The Company has 37 U.S. patents and 22 U.S. patent applications pending. Foreign counterparts of certain of these applications have been filed or may be filed at the appropriate time. While the Company believes that certain patents may be important for certain aspects of its business, the Company believes that its success depends more upon close customer contact, innovation, technological expertise, responsiveness and worldwide distribution.

The Company requires each of its employees, including its executive officers, to enter into standard agreements pursuant to which the employee agrees to keep confidential all proprietary information of the Company and to assign to the Company all inventions made while in the employ of the Company.

EMPLOYEES

As of September 30, 1997, the Company employed 1,126 persons, including 711 in manufacturing, 131 in research and development, 284 in marketing, sales, support and general and administrative activities. Management believes that the Company's ongoing success depends upon its continued ability to attract and retain highly skilled employees.

FACILITIES

The Company's corporate headquarters are located in Andover, Massachusetts. Manufacturing and other operations are conducted in a number of locations worldwide. The following table provides information concerning the Company's principal owned and leased facilities:

| LOCATION | SQ. FT. | ACTIVITY | PRODUCTS MANUFACTURED |
|-------------------------|---------|--|--|
| Andover, Massachusetts | 82,000 | Headquarters, Manufacturing, Customer Support and Research & Development | Baratron pressure measurement products |
| Boulder, Colorado | 86,000 | Manufacturing, Customer Support, Service and Research & Development | Vacuum gauges, valves and components |
| Methuen, Massachusetts | 85,000 | Manufacturing, Customer Support, Service and Research & Development | Pressure control and flow measurement and control products |
| Lawrence, Massachusetts | 40,000 | Manufacturing | Baratron pressure measurement products |
| Tokyo, Japan | 20,700 | Manufacturing, Sales, Customer Support, Service and Research & Development | Mass flow measurement and control products |
| Walpole, Massachusetts | 20,000 | Manufacturing, Customer Support, Service and Research & Development | Gas analysis instruments |
| Munich, Germany | 14,100 | Manufacturing, Sales, Customer Support, Service and Research & Development | Mass flow measurement and control products |
| Le Bourget, France | 13,700 | Sales, Customer Support and Service | |
| Santa Clara, California | 13,000 | Sales, Customer Support and Service | |
| Richardson, Texas | 11,000 | Manufacturing, Sales, Customer Support and Service | Subassemblies |
| Austin, Texas | 8,200 | Sales, Customer Support and Service | |
| Seoul, Korea | 4,760 | Manufacturing, Sales, Customer Support and Service | Mass flow measurement and control products |
| Liverpool, U.K. | 2,500 | Sales, Customer Support and Service | |
| Ottawa, Canada | 2,095 | Sales, Customer Support and Service | |

LEGAL PROCEEDINGS

The Company is not a party to any material legal proceedings.

MANAGEMENT

EXECUTIVE OFFICERS AND DIRECTORS

The executive officers and directors of the Company as of October 31, 1997 are as follows:

| NAME | AGE | POSITION |
|-----------------------------|-----|---|
| John R. Bertucci..... | 56 | Chairman of the Board of Directors, President and Chief Executive Officer |
| Ronald C. Weigner..... | 52 | Vice President and Chief Financial Officer |
| John J. Sullivan..... | 62 | Executive Vice President of Technology |
| William D. Stewart..... | 53 | President, HPS |
| Leo Berlinghieri..... | 44 | Vice President, Customer Support Operations |
| Richard S. Chute(1)..... | 59 | Director |
| Owen W. Robbins(2)..... | 68 | Director |
| Robert J. Therrien(1)..... | 63 | Director |
| Louis P. Valente(1)(2)..... | 67 | Director |

(1) Member of Compensation Committee.

(2) Member of Audit Committee.

Mr. Bertucci has served as President of the Company since 1974 and has been Chief Executive Officer and Chairman of the Board of Directors since November 1995. From 1970 to 1974, he was Vice President and General Manager of the Company. Mr. Bertucci has an M.S. in Industrial Administration and a B.S. in Metallurgical Engineering from Carnegie-Mellon University. Mr. Bertucci is also a director of Applied Science and Technology Corporation.

Mr. Weigner has served as Vice President and Chief Financial Officer of the Company since November 1995. From September 1991 until November 1995, he was Vice President and Corporate Controller of the Company and from 1980 to 1993 he was Corporate Controller. Mr. Weigner is a certified public accountant and has a B.S. in Business Administration from Boston University.

Mr. Sullivan has served as Executive Vice President of Technology of the Company since March 1995. From 1982 to March 1995, Mr. Sullivan was Vice President of Marketing of the Company and from 1975 to 1982 he was Vice President of Sales and Marketing of the Company. Mr. Sullivan has an M.S. and a B.S. in physics from Northeastern University.

Mr. Stewart has served as President of HPS, the Company's Vacuum Gauges, Valves and Components product group since the Company's acquisition of HPS Corporation in 1986. Mr. Stewart co-founded HPS in 1976. Mr. Stewart has an M.B.A. from Northwestern University and a B.S. in Business Administration from the University of Colorado. Mr. Stewart also serves on the Board of Directors of the Janus Fund.

Mr. Berlinghieri has served as Vice President of Customer Support Operations for the Company since November 1995. From 1980 to November 1995, Mr. Berlinghieri served in various management positions for the Company, including Manufacturing Manager, Production & Inventory Control Manager, and Director of Customer Support Operations. Mr. Berlinghieri is also Treasurer of the TQM-Base Council, Inc., (a non-profit quality management consortium comprised of Boston-area semiconductor and capital equipment manufacturers).

Mr. Chute has served as a director of the Company since 1974. Mr. Chute has been a member of the law firm of Hill & Barlow, a professional corporation, since November 1971.

Mr. Robbins has served as a director of the Company since February 1996. Mr. Robbins was Executive Vice President of Teradyne, Inc., a manufacturer of electronic test systems and backplane connection systems used in the electronics and telecommunications industries from March 1992 to May 1997, and its Chief Financial Officer from February 1980 to May 1997. Mr. Robbins has served on the Board of Directors of Teradyne since March 1992 and was Vice Chairman from January 1996 to May 1997.

Mr. Therrien has served as a director of the Company since February 1996. Mr. Therrien has been President and Chief Executive Officer of Brooks Automation, Inc., a manufacturer of semiconductor processing equipment, since 1989.

Mr. Valente has served as a director of the Company since February 1996. Mr. Valente was a Senior Vice President of Acquisitions, Mergers and Investments of EG&G, Inc. from 1991 until July 1995. Mr. Valente has been President and Chief Executive Officer of Palomar Medical Technologies, Inc. ("PMT"), a company which designs, manufactures and markets cosmetic lasers, from May 1997 to September 1997, its Chairman of the Board of Directors and Chief Executive Officer from September 1997 to present and a director of PMT since February 1997. Mr. Valente is also a director of Micrion Corporation.

Executive officers of the Company are elected by the Board of Directors on an annual basis and serve until their successors are duly elected and qualified. There are no family relationships among any of the executive officers of the Company.

COMMITTEES OF THE BOARD OF DIRECTORS

The Compensation Committee consists of Messrs. Chute, Therrien and Valente. The Compensation Committee reviews and evaluates the salaries, supplemental compensation and benefits of all officers of the Company, reviews general policy matters relating to compensation and benefits of employees of the Company and makes recommendations concerning these matters to the Board of Directors. The Compensation Committee also administers the Company's stock option and stock purchase plans. See "-- Stock Plans."

The Audit Committee consists of Messrs. Robbins and Valente. The Audit Committee reviews with the Company's independent auditors the scope and timing of their audit services, the auditor's report on the Company's financial statements following completion of their audit and the Company's policies and procedures with respect to internal accounting and financial controls. In addition, the Audit Committee will make annual recommendations to the Board of Directors for the appointment of independent auditors for the ensuing year.

DIRECTOR COMPENSATION

Directors of the Company are reimbursed for expenses incurred in connection with their attendance at Board and committee meetings. Directors who are not employees of the Company are paid an annual fee of \$10,000 and \$1,000 for each Board meeting they attend and \$500 for each committee meeting they attend which is not held on the same day as a Board meeting. Messrs. Chute, Robbins, Therrien and Valente, the Company's four non-employee directors, have each been granted options, under the Company's 1996 Director Stock Option Plan, to purchase 5,125 shares of Common Stock at an exercise price of \$6.64 per share and will be eligible for future grants under the Company's 1997 Director Stock Option Plan.

COMPENSATION COMMITTEE INTERLOCKS AND INSIDER PARTICIPATION

The Compensation Committee is currently comprised of Messrs. Chute, Therrien and Valente. No member of the Compensation Committee was at any time during the fiscal year ended December 31, 1996 or at any other time an employee of the Company. No executive officer of the Company serves as a member of the board of directors or compensation committee of any other entity which has one or more executive officers serving as a member of the Company's Board of Directors or Compensation Committee.

EXECUTIVE COMPENSATION

The following table sets forth information with respect to the compensation of the Company's Chief Executive Officer and each of the four other most highly compensated executive officers for the year ended December 31, 1996 (the "Named Executive Officers").

SUMMARY COMPENSATION TABLE

| NAME AND PRINCIPAL POSITION | ANNUAL COMPENSATION | | | LONG-TERM COMPENSATION | ALL OTHER COMPENSATION(2) |
|---|---------------------|-------|------------------------------|----------------------------------|------------------------------|
| | SALARY | BONUS | OTHER ANNUAL COMPENSATION | AWARDS | |
| | | | | SECURITIES UNDERLYING OPTIONS | |
| John R. Bertucci..... President and Chief Executive Officer | \$319,712 | | -- | -- | \$15,942 |
| Ronald C. Weigner..... Vice President and Chief Financial Officer | 153,555 | | -- | 53,031 | 12,000 |
| John J. Sullivan..... Executive Vice President of Technology | 135,962 | | \$ 30,959(1) | -- | 11,957 |
| William D. Stewart..... President, HPS | 166,250 | | -- | 32,098 | 12,000 |
| Leo Berlinghieri..... Vice President, Customer Support Operations | 121,755 | | -- | 30,338 | 7,500 |

(1) Includes a transportation allowance of \$21,127.

(2) Includes a premium of \$3,942 paid on a life insurance policy, and payments of \$12,000 paid into a 401(k) plan for Mr. Bertucci and payments paid into a 401(k) plan for Messrs. Weigner, Sullivan, Stewart and Berlinghieri.

OPTION GRANTS

The following table contains information concerning the stock option grants made to each of the Named Executive Officers for the year ended December 31, 1996.

OPTION GRANTS IN LAST FISCAL YEAR

| NAME | INDIVIDUAL GRANTS | | | | POTENTIAL REALIZABLE VALUE AT ASSUMED ANNUAL RATES OF STOCK PRICE APPRECIATION FOR OPTION TERM (2) | |
|-------------------------|--|--|--|-----------------|--|-----------|
| | NUMBER OF SECURITIES UNDERLYING OPTIONS GRANTED(1) | PERCENT OF TOTAL OPTIONS GRANTED TO EMPLOYEES IN FISCAL YEAR | EXERCISE OR BASE PRICE PER SHARE | EXPIRATION DATE | 5% | 10% |
| | | | | | | |
| John R. Bertucci..... | -- | -- | -- | -- | -- | -- |
| Ronald C. Weigner..... | 53,031 | 9.82% | \$6.64 | 11/30/05 | \$200,965 | \$498,926 |
| John J. Sullivan..... | -- | -- | -- | -- | -- | -- |
| William D. Stewart..... | 32,098 | 5.94 | 6.64 | 11/30/05 | 121,642 | 301,994 |
| Leo Berlinghieri..... | 30,338 | 5.62 | 6.64 | 11/30/05 | 114,972 | 285,435 |

(1) These options become exercisable on a quarterly basis over a four year period.

(2) Amounts represent hypothetical gains that could be achieved for the respective options if exercised at the end of the option term. These gains are based on assumed rates of stock price appreciation of 5% and 10% compounded annually from the date the respective options were granted to their expiration date. These numbers are calculated based on rules promulgated by the Securities and Exchange Commission and do not reflect the Company's estimate of future stock price growth. Actual gains, if any, on stock option exercises and Common Stock are dependent on the timing of such exercise and the future performance of the Common Stock.

OPTION EXERCISES AND HOLDINGS

The following table sets forth information concerning option exercises and option holdings for the fiscal year ended December 31, 1996 with respect to each of the Named Executive Officers.

AGGREGATED OPTION EXERCISES IN LAST FISCAL YEAR
AND YEAR-END OPTION VALUES

| NAME | NUMBER OF SHARES UNDERLYING UNEXERCISED OPTIONS AT YEAR-END | | VALUE OF UNEXERCISED IN-THE-MONEY OPTIONS AT YEAR-END(1) | |
|-------------------------|--|---------------|--|---------------|
| | EXERCISABLE | UNEXERCISABLE | EXERCISABLE | UNEXERCISABLE |
| John R. Bertucci..... | -- | -- | -- | -- |
| Ronald C. Weigner..... | 10,607 | 42,424 | -- | -- |
| John J. Sullivan..... | -- | -- | -- | -- |
| William D. Stewart..... | 6,420 | 25,678 | -- | -- |
| Leo Berlinghieri..... | 6,068 | 24,270 | -- | -- |

(1) Values are based on the difference between the fair market value of the underlying securities at December 31, 1996 (\$6.64 per share) and the exercise price of each option listed (in each case, \$6.64 per share).

In January 1997, the Company granted options to purchase 31,369, 52,302 and 54,062 shares of Common Stock to Messrs. Weigner, Stewart and Berlinghieri, respectively, at an exercise price of \$6.64 per share.

STOCK PLANS

1995 Stock Incentive Plan

The Company's Amended and Restated 1995 Stock Incentive Plan (the "1995 Stock Plan") provides for the grant of incentive stock options, nonstatutory stock options, stock appreciation rights, performance shares and awards of restricted stock and unrestricted stock ("Awards"). An aggregate of 2,500,000 shares of Common Stock may be issued pursuant to the 1995 Stock Plan (subject to adjustment for certain changes in the Company's capitalization). No Award may be made under the 1995 Stock Plan after November 30, 2005.

The 1995 Stock Plan is administered by the Board of Directors and the Compensation Committee. The Board has the authority to grant Awards under the 1995 Stock Plan and to accelerate, waive or amend certain provisions of outstanding Awards. The Board has authorized the Compensation Committee to administer certain aspects of the 1995 Stock Plan and has authorized the Chief Executive Officer of the Company to grant Awards to non-executive officer employees. The maximum number of shares represented by such Awards may not exceed 300,000 shares in the aggregate or 20,000 shares to any one employee.

Incentive Stock Options and Nonstatutory Options. Optionees receive the right to purchase a specified number of shares of Common Stock at some time in the future at an option price and subject to such terms and conditions as are specified at the time of the grant. Incentive Stock Options and options that the Board of Directors or Compensation Committee intends to qualify as performance-based compensation under Section 162(m) of the Code may not be granted at an exercise price less than the fair market value of the Common Stock on the date of grant (or less than 110% of the fair market value in the case of incentive stock options granted to optionees holding 10% or more of the voting stock of the Company). All other options may be granted at an exercise price that may be less than, equal to or greater than the fair market value of the Common Stock on the date of grant.

Stock Appreciation Rights and Performance Shares. A stock appreciation right ("SAR") is based on the value of Common Stock and entitles the SAR holder to receive consideration to the extent that the fair market value on the date of exercise of the shares of Common Stock underlying the SAR exceeds the fair

market value of the underlying shares on the date the SAR was granted. A performance share award entitles the recipient to acquire shares of Common Stock upon the attainment of specified performance goals.

Restricted and Unrestricted Stock. Restricted stock awards entitle recipients to acquire shares of Common Stock, subject to the right of the Company to repurchase all or part of such shares at their purchase price from the recipient in the event that the conditions specified in the applicable stock award are not satisfied prior to the end of the applicable restriction period established for such award. The Company may also grant (or sell at a purchase price not less than 85% of the fair market value on the date of such sale) to participants shares of Common Stock free of any restrictions under the 1995 Stock Plan.

All of the employees, officers, directors, consultants and advisors of the Company and its subsidiaries who are expected to contribute to the Company's future growth and success are eligible to participate in the 1995 Stock Plan.

Section 162(m) of the Code disallows a tax deduction to public companies for certain compensation in excess of \$1 million paid to a company's chief executive officer or to any of the four other most highly compensated executive officers. Certain compensation, including "performance-based compensation," is not included in compensation subject to the \$1 million limitation. The 1995 Stock Plan limits to 900,000 the maximum number of shares of Common Stock with respect to which Awards may be granted to any employee in any calendar year. This limitation is intended to preserve the tax deductions to the Company that might otherwise be unavailable under Section 162(m) with respect to certain Awards.

Prior to the date of this Prospectus, the Company plans to grant options (to vest 20% after one year and 5% per quarter thereafter) to purchase approximately 350,000 shares of Common Stock to employees of the Company, at an exercise price equal to the initial public offering price.

1997 Employee Stock Purchase Plan

The Company's 1997 Employee Stock Purchase Plan (the "Purchase Plan") authorizes the issuance of up to an aggregate of 300,000 shares of Common Stock to participating employees. The Company will make one or more offerings ("Offerings") to employees to purchase Common Stock under the Purchase Plan. Offerings under the Purchase Plan commence on June 1 and December 1 and terminate, respectively on November 30 and May 31. During each Offering, the maximum number of shares which may be purchased by a participating employee is determined on the first day of the Offering period under a formula whereby 85% of the market value of a share of Common Stock on the first day of the Offering period is divided into an amount equal to 10% of the employee's annualized compensation (or such lower percentage as may be established by the Compensation Committee) for the immediately preceding six-month period. An employee may elect to have up to 10% deducted from his or her regular salary (or such lower percentage as may be established by the Compensation Committee) for this purpose. The price at which an employee's option is exercised is the lower of (i) 85% of the closing price of the Common Stock on the Nasdaq National Market on the day that the Offering commences or (ii) 85% of the closing price on the day that the Offering terminates.

The Purchase Plan is administered by the Board of Directors and the Compensation Committee. With certain exceptions, all eligible employees, including directors and officers, regularly employed by the Company for at least six months on the applicable Offering commencement date are eligible to participate in the Purchase Plan. The Purchase Plan is intended to qualify as an "employee stock purchase plan" as defined in Section 423 of the Code.

1997 Director Stock Option Plan

The Company's 1997 Director Stock Option Plan (the "1997 Director Plan") authorizes the issuance of up to an aggregate of 200,000 shares of Common Stock. The 1997 Director Plan is administered by the Company's Board of Directors. Options are granted under the 1997 Director Plan only to directors of the Company who are not employees of the Company ("eligible directors"). Under the 1997 Director Plan, prior to the date of this Prospectus each existing eligible director will receive an option to purchase 7,000 shares of Common Stock at an exercise price equal to the initial public offering price and future non-employee directors will receive an option to purchase 7,500 shares of Common Stock upon their initial election to the Board of

Directors ("Initial Options"). Each Initial Option shall vest in twelve equal quarterly installments following the date of grant. On the date of each annual meeting of the stockholders, options will be automatically granted to each eligible director then in office ("Annual Options"). Each Annual Option will entitle the holder to purchase 4,000 shares of Common Stock. Each Annual Option will become exercisable on the day prior to the first annual meeting of stockholders following the date of grant (or if no such meeting is held within 13 months after the date of grant, on the 13-month anniversary of the date of grant). The exercise price of all options granted under the 1997 Director Plan is equal to the fair market value of the Common Stock on the date of grant. Options granted under the 1997 Director Plan terminate upon the earlier of three months after the optionee ceases to be a director of the Company or ten years after the grant date. In the event of a Change in Control (as defined in the 1997 Director Plan), the vesting of all options then outstanding would be accelerated in full and any restrictions on exercising outstanding options would terminate.

The Company's 1996 Director Stock Option Plan, under which options have been granted to four non-employee directors of the Company, has been terminated. See "-- Director Compensation."

CERTAIN TRANSACTIONS

Mr. Chute a director of the Company, the Company's Clerk, and a co-trustee of certain of the Bertucci Family Trusts (See "Principal Stockholders") and Mr. Thomas H. Belknap, a co-trustee of certain of the Bertucci Family Trusts, are attorneys at the law firm of Hill & Barlow, a professional corporation. Hill & Barlow has provided legal services to the Company during the fiscal year ended December 31, 1996 for which it was compensated by the Company in the aggregate amount of \$189,000.

Mr. Stewart, the President of HPS, is the general partner of Aspen Industrial Park Partnership ("Aspen"). On October 12, 1989 the Company entered into a lease with Aspen for certain facilities occupied by the Company's Vacuum Gauges, Valves and Components product group in Boulder, Colorado. The Company pays Aspen approximately \$342,000 annually to lease such facilities.

Effective July 1, 1987, the Company elected to be treated as an S corporation for federal income tax purposes. As a result, the Company currently pays no federal, and certain state, income tax and all of the earnings of the Company are subject to federal, and certain state, income taxation directly at the stockholder level. The Company's S corporation status will terminate upon the closing of this offering, at which time the Company will become subject to corporate income taxation under Subchapter C of the Code. In 1996 and in the first nine months of 1997, the Company distributed \$14.5 million and \$6.4 million, respectively, of undistributed S corporation earnings to its stockholders. The Company expects to make additional distributions of approximately \$5.5 million prior to the closing of this offering. As soon as practicable following the closing of the offering, the Company intends to make a distribution to the holders of record on the day prior to the closing of this offering in an amount equivalent to the AA Account. As of September 30, 1997, the outstanding balance of the AA Account was approximately \$30.2 million and such balance is expected to increase in the period from October 1, 1997 through the closing of the offering. See "S Corporation And Termination of S Corporation Status."

PRINCIPAL STOCKHOLDERS

The following table sets forth certain information regarding beneficial ownership of the Company's Common Stock as of September 30, 1997, and as adjusted to reflect the sale of shares offered hereby, by (i) each of the directors of the Company, (ii) each of the Named Executive Officers, (iii) each person or entity known to the Company to own beneficially more than 5% of the Company's Common Stock and (iv) all directors and executive officers as a group. Except as indicated below, none of these entities has a relationship with the Company or, to the knowledge of the Company, any Underwriters of this offering or their respective affiliates. Unless otherwise indicated, each person or entity named in the table has sole voting power and investment power (or shares such power with his or her spouse) with respect to all shares of capital stock listed as owned by such person or entity.

| NAME OF BENEFICIAL OWNER | NUMBER SHARES BENEFICIALLY OWNED(1) | PERCENTAGE OF COMMON STOCK OUTSTANDING(1)(2) | |
|--|---|---|----------------|
| | | BEFORE OFFERING | AFTER OFFERING |
| John R. Bertucci(3) | 11,507,940 | 95.62% | 71.77% |
| Ronald C. Weigner(4) | 29,540 | * | * |
| John J. Sullivan(5) | 409,340 | 3.40 | 2.55 |
| William D. Stewart(4) | 29,540 | * | * |
| Leo Berlinghieri(4) | 29,540 | * | * |
| Richard S. Chute(6) | 1,430,731 | 11.89 | 8.92 |
| Owen W. Robbins(4) | 2,261 | * | * |
| Robert J. Therrien(4) | 2,261 | * | * |
| Louis P. Valente(4) | 2,261 | * | * |
| Thomas H. Belknap(7) | 1,280,770 | 10.64 | 7.99 |
| All executive officers and directors as a group | 12,014,944 | 99.03% | 74.47% |

* Less than 1% of outstanding Common Stock.

(1) The number of shares beneficially owned by each stockholder is determined under rules promulgated by the Securities and Exchange Commission and the information is not necessarily indicative of beneficial ownership for any other purpose. Under such rules, beneficial ownership includes any shares as to which the individual has sole or shared voting power or investment power and also any shares which the individual has the right to acquire within 60 days of September 30, 1997 through the exercise of any stock option or other right. The inclusion herein of such shares, however, does not constitute an admission that the named stockholder is a direct or indirect beneficial owner of such shares.

(2) Assumes no exercise of the Underwriters' over-allotment option.

(3) Includes 4,441,550 shares held directly by Mr. Bertucci, 4,357,150 shares held directly by Mrs. Claire R. Bertucci, wife of Mr. Bertucci, and 2,709,240 shares held by trusts (collectively, the "Bertucci Family Trusts") for which either Mr. or Mrs. Bertucci serves as a co-trustee.

(4) Comprised solely of options exercisable within 60 days of September 30, 1997.

(5) Includes 211,000 shares held in a grantor retained annuity trust.

(6) Includes 1,428,470 shares held by certain of the Bertucci Family Trusts for which Mr. Chute serves as a co-trustee and 2,261 shares subject to options held by Mr. Chute exercisable within 60 days of September 30, 1997.

(7) Represents shares held by certain of the Bertucci Family Trusts for which Mr. Belknap serves as a co-trustee.

DESCRIPTION OF CAPITAL STOCK

The authorized capital stock of the Company consists of 50,000,000 shares of Common Stock, no par value per share, and 2,000,000 shares of Preferred Stock, \$.01 par value per share, after giving effect to the amendment and restatement of the Company's Restated Articles of Organization (the "Articles of Organization") which will be filed with the Secretary of State of The Commonwealth of Massachusetts prior to the closing of this offering.

COMMON STOCK

As of September 30, 1997, there were 12,035,440 shares of Common Stock outstanding and held of record by seventeen stockholders, after giving effect to a 2,110-for-1 stock split, to be effected prior to the closing of this offering, of shares of Class A Common Stock and Class B Common Stock and the conversion of such shares into shares of Common Stock upon the closing of this offering.

Upon the closing of this offering, all holders of Common Stock shall be entitled to one vote for each share held on all matters submitted to a vote of stockholders and will not have cumulative voting rights. Accordingly, holders of a majority of the shares of Common Stock entitled to vote in any election of directors may elect all of the directors standing for election. Holders of Common Stock are entitled to receive ratably such dividends, if any, as may be declared by the Board of Directors out of funds legally available therefor, subject to any preferential dividend rights of outstanding Preferred Stock. Upon the liquidation, dissolution or winding up of the Company, the holders of Common Stock are entitled to receive ratably the net assets of the Company available after the payment of all debts and other liabilities, subject to the prior rights of any outstanding Preferred Stock. Holders of the Common Stock have no preemptive, subscription, redemption or conversion rights. The outstanding shares of Common Stock are, and the shares offered by the Company in the offering made by this Prospectus will be, when issued and paid for, fully paid and nonassessable. The rights, preferences and privileges of holders of Common Stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of Preferred Stock that the Company may designate and issue in the future. There are no shares of Preferred Stock outstanding.

PREFERRED STOCK

The Articles of Organization authorize the Board of Directors, subject to certain limitations prescribed by law, without further stockholder approval, from time to time to issue up to an aggregate of 2,000,000 shares of Preferred Stock in one or more series and to fix or alter the designations, preferences and rights, and any qualifications, limitations or restrictions thereof, of the shares of each such series, including the number of shares constituting any such series and the dividend rights, dividend rates, conversion rights, voting rights, terms of redemption (including sinking fund provisions), redemption price or prices and liquidation preferences thereof. The issuance of Preferred Stock may have the effect of delaying, deferring or preventing a change in control of the Company. The Company has no present plans to issue any shares of Preferred Stock.

MASSACHUSETTS LAW AND CERTAIN PROVISIONS OF THE COMPANY'S RESTATED ARTICLES OF ORGANIZATION AND BY-LAWS

The Company intends to amend and restate its bylaws (the "By-Laws") prior to the closing of the offering. The By-Laws will include a provision excluding the Company from the applicability of Massachusetts General Laws Chapter 110D, entitled "Regulation of Control Share Acquisitions." In general, this statute provides that any stockholder of a corporation subject to this statute who acquires 20% or more of the outstanding voting stock of a corporation may not vote such stock unless the stockholders of the corporation so authorize. The Board of Directors will be able to amend the By-Laws at any time to subject the Company to this statute prospectively.

Massachusetts General Laws Chapter 156B, Section 50A generally requires that publicly-held Massachusetts corporations have a classified board of directors consisting of three classes as nearly equal in size as possible, unless the corporation elects to opt out of the statute's coverage. The By-Laws, will contain provisions which give effect to Section 50A.

The By-Laws will require that nominations for the Board of Directors made by a stockholder of a planned nomination must be given not less than 30 and not more than 90 days prior to a scheduled meeting, provided that if less than 40 days' notice is given of the date of the meeting, a stockholder will have ten days within which to give such notice. The stockholder's notice of nomination must include particular information about the stockholder, the nominee and any beneficial owner on whose behalf the nomination is made. The Company may require any proposed nominee to provide such additional information as is reasonably required to determine the eligibility of the proposed nominee.

The By-Laws will also require that a stockholder seeking to have any business conducted at a meeting of stockholders give notice to the Company not less than 60 and not more than 90 days prior to the scheduled meeting, provided in certain circumstances that a ten-day notice rule applies. The notice from the stockholder will be required to describe the proposed business to be brought before the meeting and include information about the stockholder making the proposal, any beneficial owner on whose behalf the proposal is made, and any other stockholder known to be supporting the proposal. The By-Laws will require the Company to call a special stockholders meeting at the request of stockholders holding at least 40% of the voting power of the Company.

The Articles of Organization will provide that the directors and officers of the Company shall be indemnified by the Company to the fullest extent authorized by Massachusetts law, as it now exists or may in the future be amended, against all expenses and liabilities reasonably incurred in connection with service for or on behalf of the Company. In addition, the Articles of Organization will provide that the directors of the Company will not be personally liable for monetary damages to the Company for breaches of their fiduciary duty as directors, unless they violated their duty of loyalty to the Company or its stockholders, acted in bad faith, knowingly or intentionally violated the law, authorized illegal dividends or redemptions or derived an improper personal benefit from their action as directors.

The Articles of Organization will provide that any amendment to the Articles of Organization, the sale, lease or exchange of all or substantially all of the Company's property and assets, or the merger or consolidation of the Company into or with any corporation may be authorized by the approval of the holders of a majority of the shares of each class of stock entitled to vote thereon, rather than by two-thirds as otherwise provided by statute, provided that the transactions have been authorized by a majority of the members of the Board of Directors and the requirements of any other applicable provisions of the Articles of Organization have been met.

TRANSFER AGENT AND REGISTRAR

The Transfer Agent and Registrar for the Common Stock is Boston EquiServe LP.

SHARES ELIGIBLE FOR FUTURE SALE

Prior to this offering, there has been no public market for the securities of the Company. Upon completion of this offering, based upon the number of shares outstanding at September 30, 1997, there will be 16,035,440 shares of Common Stock of the Company outstanding (assuming no exercise of the Underwriters' over-allotment option or options outstanding under the Company's stock option plans). Of these shares, the 4,000,000 shares sold in this offering will be freely tradeable without restriction or further registration under the Securities Act of 1933, as amended (the "Securities Act"), except that any shares purchased by "affiliates" of the Company, as that term is defined in Rule 144 ("Rule 144") under the Securities Act ("Affiliates"), may generally only be sold in compliance with the limitations of Rule 144 described below.

SALES OF RESTRICTED SHARES

The remaining 12,035,440 shares of Common Stock are deemed "restricted securities" under Rule 144. All of these shares are subject to 180-day lock-up agreements (the "Lock-Up Agreements") with the Representatives of the Underwriters. Upon expiration of the Lock-Up Agreements 180 days after the date of this Prospectus (and assuming no exercise of any outstanding options), all such shares will be available for sale in the public market, subject to the provisions of Rule 144 under the Securities Act.

Stockholders who are parties to the Lock-Up Agreement have agreed that for a period of 180 days after the date of this Prospectus, they will not sell, offer, contract or grant any option to sell, pledge, transfer, establish an open put equivalent position or otherwise dispose of any shares of Common Stock, any options to purchase shares of Common Stock or any shares convertible into or exchangeable for shares of Common Stock, owned directly by such persons or with respect to which they have the power of disposition, without the prior written consent of NationsBanc Montgomery Securities, Inc.

In general, Rule 144 as currently in effect, beginning 90 days after the effective date of the Registration Statement of which this Prospectus is a part, a stockholder, including an Affiliate, who has beneficially owned his or her restricted securities (as that term is defined in Rule 144) for at least one year from the later of the date such securities were acquired from the Company or (if applicable) the date they were acquired from an Affiliate is entitled to sell, within any three-month period, a number of such shares that does not exceed the greater of 1% of the then outstanding shares of Common Stock (160,354 shares immediately after this offering) or the average weekly trading volume in the Common Stock during the four calendar weeks preceding the date on which notice of such sale was filed under Rule 144, provided certain requirements concerning availability of public information, manner of sale and notice of sale are satisfied. In addition, under Rule 144(k), if a period of at least two years has elapsed between the later of the date restricted securities were acquired from the Company or (if applicable) the date they were acquired from an Affiliate of the Company, a stockholder who is not an Affiliate of the Company at the time of sale and has not been an Affiliate of the Company for at least three months prior to the sale is entitled to sell the shares immediately without compliance with the foregoing requirements under Rule 144.

Securities issued in reliance on Rule 701 (such as shares of Common Stock acquired pursuant to the exercise of certain options granted under the Company's stock plans) are also restricted and, beginning 90 days after the effective date of the Registration Statement of which this Prospectus is a part, may be sold by stockholders other than Affiliates of the Company subject only to the manner of sale provisions of Rule 144 and by Affiliates under Rule 144 without compliance with its one-year holding period requirement.

OPTIONS

The Company has granted options to purchase an aggregate of 1,042,361 shares of which options to purchase an aggregate of 282,516 were exercisable as of September 30, 1997. Of these, [] shares were subject to the Lock-Up Agreements. The Company intends to file registration statements on Form S-8 under the Securities Act to register all shares of Common Stock issuable under each of the 1995 Stock Plan, Purchase Plan and the 1997 Director Plan promptly following the consummation of this offering. Shares issued pursuant to such plans shall be, after the effective date of the Form S-8 registration statements, eligible for resale in the public market without restriction, subject to Rule 144 limitations applicable to Affiliates and the Lock-up Agreements noted above, if applicable.

UNDERWRITING

The underwriters named below (the "Underwriters"), represented by NationsBanc Montgomery Securities, Inc., Donaldson, Lufkin & Jenrette Securities Corporation and PaineWebber Incorporated (the "Representatives"), have severally agreed, subject to the terms and conditions set forth in the Underwriting Agreement, to purchase from the Company the number of shares of Common Stock indicated below opposite their respective names at the initial public offering price less the underwriting discount set forth on the cover page of this Prospectus. The Underwriting Agreement provides that the obligations of the Underwriters are subject to certain terms and conditions precedent and that the Underwriters are committed to purchase all of such shares, if any are purchased.

| UNDERWRITER | NUMBER OF SHARES |
|--|---------------------|
| ----- | |
| NationsBanc Montgomery Securities, Inc. | |
| Donaldson, Lufkin & Jenrette Securities Corporation..... | |
| Painewebber Incorporated..... | |
| | ----- |
| Total..... | 4,000,000 ===== |

The Representatives have advised the Company that the Underwriters initially propose to offer the Common Stock to the public on the terms set forth on the cover page of this Prospectus. The Underwriters may allow to selected dealers a concession of not more than \$ per share, and the Underwriters may allow, and any other dealers may realow, a concession of not more than \$ per share to certain other dealers. After the initial public offering, the offering price and other selling terms may be changed by the Representatives. The Common Stock is offered subject to receipt and acceptance by the Underwriters and to certain other conditions, including the right to reject orders in whole or in part.

The Company has granted an option to the Underwriters, exercisable during the 30-day period after the date of this Prospectus, to purchase up to a maximum of 600,000 additional shares of Common Stock to cover over-allotments, if any, at the same price per share as the initial shares to be purchased by the Underwriters. To the extent the Underwriters exercise this option, each of the Underwriters will be committed, subject to certain conditions, to purchase such additional shares in approximately the same proportion as set forth in the above table. The Underwriters may purchase such shares only to cover overallotments made in connection with this offering.

All stockholders prior to this offering, as well as certain holders of options to purchase Common Stock, have agreed not to directly or indirectly sell, offer, contract or grant any option to sell, pledge, transfer, establish an open put equivalent position or otherwise dispose of any rights with respect to any shares of Common Stock, any options or warrants to purchase Common Stock, or any securities convertible or exchangeable for Common Stock, owned directly by such holders or with respect to which they have the power of disposition for a period of 180 days after the period of this Prospectus without the prior written consent of NationsBanc Montgomery Securities, Inc. NationsBanc Montgomery Securities, Inc. may, in its sole discretion and at any time without notice, release all or any portion of the securities subject to these lock-up agreements. In addition, the Company has agreed not to sell, offer to sell, contract to sell or otherwise sell or dispose of any shares of Common Stock or any rights to acquire Common Stock, other than pursuant to its stock plans or upon the exercise of outstanding options, for a period of 180 days after the date of this Prospectus without the prior consent of NationsBanc Montgomery Securities, Inc. See "Shares Eligible for Future Sale."

The Underwriting Agreement provides that the Company will indemnify the Underwriters against certain liabilities, including civil liabilities, under the Securities Act, or will contribute to payments the Underwriters may be required to make in respect thereof.

In connection with this offering, the Underwriters may engage in transactions that stabilize, maintain or otherwise affect the price of the Common Stock, including over-allotment, stabilization, syndicate covering transactions and imposition of penalty bids. In an over-allotment, the Underwriters would allot more shares of

Common Stock to their customers in the aggregate than are available for purchase by the Underwriters under the Underwriting Agreement. Stabilizing means the placing of any bid, or the effecting of any purchase, for the purpose of pegging, fixing or maintaining the price of a security. In a syndicate covering transaction, the Underwriters would place a bid or effect a purchase to reduce a short position created in connection with this offering. Pursuant to a penalty bid, NationsBanc Montgomery Securities, Inc. on behalf of the Underwriters, would be able to reclaim a selling concession from an Underwriter if shares of Common Stock originally sold by such Underwriter are purchased in syndicate covering transactions. These transactions may result in the price of the Common Stock being higher than the price that might otherwise prevail in the open market. These transactions may be effected on the Nasdaq National Market, in the over-the-counter market or otherwise, and, if commenced, may be discontinued at any time.

The Representatives have informed the Company that they do not expect to make sales to accounts over which they exercise discretionary authority in excess of 5% of the number of shares of Common Stock offered hereby.

Prior to this offering, there has been no public market for the Common Stock of the Company. Consequently, the initial public offering price has been determined through negotiations among the Company and the Representatives. Among the factors considered in such negotiations were the history of, and prospects for, the Company and the industry in which it competes, an assessment of the Company's management, the present state of the Company's development, the prospects for future earnings of the Company, the prevailing market conditions at the time of this offering, market valuations of publicly traded companies that the Company and the Representatives believe to be comparable to the Company, and other factors deemed relevant.

LEGAL MATTERS

The validity of the Common Stock offered hereby will be passed upon for the Company by Hale and Dorr LLP, Boston, Massachusetts. Certain legal matters in connection with this offering will be passed upon for the Underwriters by Ropes & Gray, Boston, Massachusetts.

EXPERTS

The consolidated balance sheets of MKS Instruments, Inc. as of December 31, 1995, 1996 and September 30, 1997 and the consolidated statements of income, stockholders' equity and cash flows for each of the three years in the period ended December 31, 1996 and for the nine month period ended September 30, 1997 included in this Prospectus have been included herein in reliance on the report of Coopers & Lybrand L.L.P., independent accountants, given upon the authority of that firm as experts in accounting and auditing.

ADDITIONAL INFORMATION

The Company has filed with the Commission a Registration Statement (which term shall include all amendments, exhibits, schedules and supplements thereto) on Form S-1 under the Securities Act with respect to the shares of Common Stock offered hereby. This Prospectus, which constitutes a part of the Registration Statement, does not contain all of the information set forth in the Registration Statement, certain parts of which are omitted in accordance with the rules and regulations of the Commission, to which Registration Statement reference is hereby made. Statements made in this Prospectus as to the contents of any contract, agreement or other document referred to are not necessarily complete. With respect to each such contract, agreement or other document filed as an exhibit to the Registration Statement, reference is made to the exhibit for a more complete description of the matter involved, and each such statement shall be deemed qualified in its entirety by such reference. The Registration Statement and the exhibits thereto may be inspected and copied at prescribed rates at the public reference facilities maintained by the Commission at Room 1024, Judiciary Plaza, 450 Fifth Street, N.W., Washington, D.C. 20549 and at the regional offices of the Commission located at Seven World Trade Center, 13th Floor, New York, New York 10048 and 500 West Madison Street, Suite 1400, Chicago, Illinois 60661. In addition, the Company is required to file

electronic versions to these documents with the Commission through the Commission's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. The Commission maintains a World Wide Web site at <http://www.sec.gov> that contains reports, proxy and information statements and other information regarding registrants that file electronically with the Commission.

The Company intends to distribute to its stockholders annual reports containing audited consolidated financial statements. The Company also intends to make available to its stockholders, within 45 days after the end of each fiscal quarter, reports for the first three quarters of each fiscal year containing interim unaudited financial information.

MKS INSTRUMENTS, INC.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

| | |
|---|-----|
| Report of Independent Accountants..... | F-2 |
| Consolidated Balance Sheets as of December 31, 1995 and 1996, and September 30, 1997..... | F-3 |
| Consolidated Statements of Income for the Years Ended December 31, 1994, 1995, and 1996, and for the Nine Months Ended September 30, 1996 (unaudited) and 1997..... | F-4 |
| Consolidated Statements of Stockholders' Equity for the Years Ended December 31, 1994, 1995, and 1996, and the Nine Months Ended September 30, 1997..... | F-5 |
| Consolidated Statements of Cash Flows for the Years Ended December 31, 1994, 1995, and 1996, and for the Nine Months Ended September 30, 1996 (unaudited) and 1997..... | F-6 |
| Notes to Consolidated Financial Statements..... | F-7 |

This is the form of the report that we expect to issue upon the filing of an amendment to the Company's Articles of Organization effecting the 2,110-for-1 stock split of the Company's outstanding Common Stock and increase in the number of authorized shares of Common Stock and the authorization of Preferred Stock as discussed in Note 2 of Notes to Consolidated Financial Statements:

COOPERS & LYBRAND L.L.P.

REPORT OF INDEPENDENT ACCOUNTANTS

To the Board of Directors and Stockholders of
MKS Instruments, Inc.:

We have audited the accompanying consolidated balance sheets of MKS Instruments, Inc. as of December 31, 1995 and 1996, and September 30, 1997, and the related consolidated statements of income, stockholders' equity, and cash flows for the years ended December 31, 1994, 1995 and 1996, and the nine month period ended September 30, 1997. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated financial position of MKS Instruments, Inc. as of December 31, 1995 and 1996, and September 30, 1997, and the consolidated results of its operations and its cash flows for the years ended December 31, 1994, 1995 and 1996, and the nine month period ended September 30, 1997, in conformity with generally accepted accounting principles.

Boston, Massachusetts
October 28, 1997

MKS INSTRUMENTS, INC.

CONSOLIDATED BALANCE SHEETS
(IN THOUSANDS, EXCEPT SHARE DATA)

| | DECEMBER 31, | | SEPTEMBER 30, 1997 | |
|---|--------------|----------|--------------------|-------------------------|
| | 1995 | 1996 | ACTUAL | PRO FORMA |
| | | | | (NOTE 2) (UNAUDITED) |
| ASSETS | | | | |
| Current assets: | | | | |
| Cash and cash equivalents..... | \$ 3,650 | \$ 3,815 | \$ 5,421 | \$ 5,421 |
| Marketable equity securities..... | 563 | 391 | 918 | 918 |
| Trade accounts receivable, net of allowance for doubtful accounts of \$542 and \$482 at December 31, 1995 and 1996, respectively, and \$618 at September 30, 1997..... | 28,804 | 21,734 | 32,018 | 32,018 |
| Inventories..... | 29,960 | 25,500 | 28,081 | 28,081 |
| Deferred tax asset..... | 348 | 513 | 658 | 658 |
| Other current assets..... | 3,755 | 541 | 462 | 462 |
| Total current assets..... | 67,080 | 52,494 | 67,558 | 67,558 |
| Property, plant and equipment, net..... | 33,210 | 38,007 | 34,343 | 34,343 |
| Other assets..... | 4,221 | 4,499 | 4,784 | 4,784 |
| Total assets..... | \$104,511 | \$95,000 | \$106,685 | \$ 106,685 |
| LIABILITIES AND STOCKHOLDERS' EQUITY | | | | |
| Current liabilities: | | | | |
| Short-term borrowings..... | \$ 12,264 | \$12,825 | \$ 13,171 | \$ 13,171 |
| Current portion of long-term debt..... | 2,203 | 2,258 | 2,153 | 2,153 |
| Current portion of capital lease obligations..... | 725 | 1,041 | 1,048 | 1,048 |
| Accounts payable..... | 8,895 | 4,776 | 7,999 | 7,999 |
| Accrued compensation..... | 5,133 | 5,115 | 7,597 | 7,597 |
| Other accrued expenses..... | 5,372 | 3,466 | 5,228 | 5,228 |
| Income taxes payable..... | 286 | 609 | 883 | 883 |
| Distribution payable..... | -- | -- | -- | 30,183 |
| Total current liabilities..... | 34,878 | 30,090 | 38,079 | 68,262 |
| Long-term debt..... | 18,617 | 16,278 | 14,436 | 14,436 |
| Long-term portion of capital lease obligations..... | 1,845 | 2,621 | 1,912 | 1,912 |
| Deferred tax liability..... | 214 | 109 | 126 | 126 |
| Other liabilities..... | 565 | 404 | 376 | 376 |
| Commitments and contingencies (Note 7) | | | | |
| Stockholders' equity: | | | | |
| Preferred stock, \$.01 par value; 2,000,000 shares authorized, no shares issued or outstanding..... | -- | -- | -- | -- |
| Common Stock, Class A, no par value; 25,000,000 shares authorized, 5,177,940 issued and outstanding..... | 40 | 40 | 40 | 40 |
| Common Stock, Class B (non voting) no par value; 25,000,000 shares authorized, 6,857,500 issued and outstanding..... | 73 | 73 | 73 | 73 |
| Additional paid-in capital..... | 48 | 48 | 48 | 48 |
| Unrealized gain on investments..... | 246 | 115 | 562 | 562 |
| Retained earnings..... | 45,550 | 43,553 | 50,045 | 19,862 |
| Cumulative translation adjustment..... | 2,435 | 1,669 | 988 | 988 |
| Total stockholders' equity..... | 48,392 | 45,498 | 51,756 | 21,573 |
| Total liabilities and stockholders' equity..... | \$104,511 | \$95,000 | \$106,685 | \$ 106,685 |

The accompanying notes are an integral part of the consolidated financial statements.

MKS INSTRUMENTS, INC.

CONSOLIDATED STATEMENTS OF INCOME
(IN THOUSANDS, EXCEPT PER SHARE DATA)

| | YEAR ENDED DECEMBER 31, | | | NINE MONTHS ENDED SEPTEMBER 30, | |
|---|-------------------------|-----------|------------|------------------------------------|------------|
| | 1994 | 1995 | 1996 | 1996 | 1997 |
| | | | | (UNAUDITED) | |
| Net sales..... | \$106,829 | \$157,164 | \$ 170,862 | \$ 136,097 | \$ 134,629 |
| Cost of sales..... | 59,813 | 87,703 | 102,008 | 81,078 | 78,456 |
| Gross profit..... | 47,016 | 69,461 | 68,854 | 55,019 | 56,173 |
| Research and development..... | 8,036 | 10,935 | 14,195 | 11,220 | 10,336 |
| Selling, general and administrative..... | 26,893 | 34,420 | 37,191 | 29,409 | 30,749 |
| Restructuring..... | -- | -- | 1,400 | 1,400 | -- |
| Income from operations..... | 12,087 | 24,106 | 16,068 | 12,990 | 15,088 |
| Interest expense..... | 1,330 | 1,576 | 2,378 | 1,963 | 1,610 |
| Interest income..... | 46 | 128 | 92 | 152 | 144 |
| Other income (expense), net... | -- | -- | (479) | (230) | 460 |
| Income before income taxes.... | 10,803 | 22,658 | 13,303 | 10,949 | 14,082 |
| Provision for income taxes.... | 800 | 1,000 | 800 | 658 | 1,190 |
| Net income..... | \$ 10,003 | \$ 21,658 | \$ 12,503 | \$ 10,291 | \$ 12,892 |
| Pro forma data (unaudited): | | | | | |
| Historical income before income taxes..... | | | \$ 13,303 | | \$ 14,082 |
| Pro forma provision for income taxes..... | | | 5,055 | | 5,351 |
| Pro forma net income..... | | | \$ 8,248 | | \$ 8,731 |
| Pro forma net income per share..... | | | \$ 0.59 | | \$ 0.62 |
| Pro forma weighted average common shares outstanding..... | | | 13,994 | | 14,134 |

The accompanying notes are an integral part of the consolidated financial statements.

MKS INSTRUMENTS, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
FOR THE YEARS ENDED DECEMBER 31, 1994, 1995 AND 1996 AND THE NINE MONTHS ENDED
SEPTEMBER 30, 1997
(IN THOUSANDS, EXCEPT SHARE DATA)

| | COMMON STOCK | | | | | | ADDITIONAL PAID-IN CAPITAL |
|--|-----------------|--------|-----------|--------|-----------|--------|----------------------------------|
| | PREFERRED STOCK | | CLASS A | | CLASS B | | |
| | SHARES | AMOUNT | SHARES | AMOUNT | SHARES | AMOUNT | |
| Balance at December 31, 1993..... | | | 5,177,940 | \$ 40 | 6,857,500 | \$ 73 | \$ 48 |
| Capital contribution..... | | | | | | | |
| Distributions to stockholders..... | | | | | | | |
| Foreign currency translation adjustment..... | | | | | | | |
| Net income..... | | | | | | | |
| Balance at December 31, 1994..... | -- | -- | 5,177,940 | 40 | 6,857,500 | 73 | 48 |
| Distributions to stockholders..... | | | | | | | |
| Foreign currency translation adjustment..... | | | | | | | |
| Unrealized gain on investments..... | | | | | | | |
| Net income..... | | | | | | | |
| Balance at December 31, 1995..... | -- | -- | 5,177,940 | 40 | 6,857,500 | 73 | 48 |
| Distributions to stockholders..... | | | | | | | |
| Foreign currency translation adjustment..... | | | | | | | |
| Unrealized loss on investments..... | | | | | | | |
| Net income..... | | | | | | | |
| Balance at December 31, 1996..... | -- | -- | 5,177,940 | 40 | 6,857,500 | 73 | 48 |
| Distributions to stockholders..... | | | | | | | |
| Foreign currency translation adjustment..... | | | | | | | |
| Unrealized gain on investments..... | | | | | | | |
| Net income..... | | | | | | | |
| Balance at September 30, 1997..... | -- | -- | 5,177,940 | \$ 40 | 6,857,500 | \$ 73 | \$ 48 |

| | UNREALIZED GAIN ON INVESTMENTS | RETAINED EARNINGS | CUMULATIVE TRANSLATION ADJUSTMENT | TOTAL STOCKHOLDERS' EQUITY |
|--|--------------------------------------|----------------------|---|----------------------------------|
| Balance at December 31, 1993..... | | \$27,200 | \$1,604 | \$ 28,965 |
| Capital contribution..... | | 14 | | 14 |
| Distributions to stockholders..... | | (2,575) | | (2,575) |
| Foreign currency translation adjustment..... | | | 865 | 865 |
| Net income..... | | 10,003 | | 10,003 |
| Balance at December 31, 1994..... | -- | 34,642 | 2,469 | 37,272 |
| Distributions to stockholders..... | | (10,750) | | (10,750) |
| Foreign currency translation adjustment..... | | | (34) | (34) |
| Unrealized gain on investments..... | \$ 246 | | | 246 |
| Net income..... | | 21,658 | | 21,658 |
| Balance at December 31, 1995..... | 246 | 45,550 | 2,435 | 48,392 |
| Distributions to stockholders..... | | (14,500) | | (14,500) |
| Foreign currency translation adjustment..... | | | (766) | (766) |
| Unrealized loss on investments..... | (131) | | | (131) |
| Net income..... | | 12,503 | | 12,503 |
| Balance at December 31, 1996..... | 115 | 43,553 | 1,669 | 45,498 |
| Distributions to stockholders..... | | (6,400) | | (6,400) |
| Foreign currency translation adjustment..... | | | (681) | (681) |
| Unrealized gain on investments..... | 447 | | | 447 |
| Net income..... | | 12,892 | | 12,892 |
| Balance at September 30, 1997..... | \$ 562 | \$50,045 | \$ 988 | \$ 51,756 |

The accompanying notes are an integral part of the consolidated financial statements.

MKS INSTRUMENTS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
(IN THOUSANDS)

| | YEAR ENDED DECEMBER 31, | | | NINE MONTHS ENDED SEPTEMBER 30, | |
|---|-------------------------|-----------|-----------|------------------------------------|-----------|
| | 1994 | 1995 | 1996 | 1996 | 1997 |
| | | | | (UNAUDITED) | |
| Cash flows from operating activities: | | | | | |
| Net income..... | \$ 10,003 | \$ 21,658 | \$ 12,503 | \$ 10,291 | \$ 12,892 |
| Adjustments to reconcile net income to net cash provided by operating activities: | | | | | |
| Depreciation and amortization of property, plant, and equipment..... | 3,027 | 3,925 | 5,920 | 4,339 | 4,267 |
| Loss on disposal of assets..... | -- | -- | -- | -- | 574 |
| Deferred taxes..... | (178) | (91) | (277) | (228) | (235) |
| Provision for doubtful accounts..... | 241 | 133 | (20) | 8 | 255 |
| Unrealized loss (gain) on investments.... | 37 | (37) | -- | -- | -- |
| Forward exchange contract loss..... | -- | -- | 302 | 44 | 431 |
| Stock option compensation..... | -- | -- | -- | -- | 40 |
| Changes in operating assets and liabilities: | | | | | |
| (Increase) decrease in trade accounts receivable..... | (5,637) | (6,771) | 6,119 | 2,624 | (11,432) |
| (Increase) decrease in inventories..... | (2,137) | (10,956) | 4,145 | (1,956) | (3,129) |
| (Increase) decrease in other current assets..... | (188) | (2,752) | 3,239 | 2,075 | 294 |
| Increase (decrease) in accrued compensation..... | 305 | 1,466 | (220) | 360 | 2,482 |
| Increase (decrease) in other accrued expenses..... | 970 | 3,135 | (1,520) | (447) | 1,724 |
| Increase (decrease) in accounts payable..... | 1,636 | 3,571 | (4,221) | (4,398) | 3,192 |
| Increase (decrease) in income taxes payable..... | (365) | (111) | 331 | 212 | 387 |
| Net cash provided by operating activities..... | 7,714 | 13,170 | 26,301 | 12,924 | 11,742 |
| Cash flows from investing activities: | | | | | |
| Purchase of investments..... | (1,231) | -- | -- | -- | -- |
| Proceeds from maturity of investments..... | -- | 1,000 | -- | -- | -- |
| Purchases of property, plant and equipment..... | (1,922) | (9,194) | (9,417) | (7,274) | (1,904) |
| Proceeds from sale of property, plant and equipment..... | -- | -- | -- | -- | 145 |
| Increase in other assets..... | (824) | (1,047) | (443) | (1,009) | (368) |
| Cash used to settle forward exchange contracts..... | -- | -- | (302) | (44) | (431) |
| Acquisition of business, net of cash acquired..... | -- | (3,926) | -- | -- | -- |
| Net cash used in investing activities..... | (3,977) | (13,167) | (10,162) | (8,327) | (2,558) |
| Cash flows from financing activities: | | | | | |
| Net (payments) borrowings on demand notes payable..... | (336) | 1,407 | 224 | 6,510 | 625 |
| Proceeds from short-term borrowings..... | 5,020 | 7,819 | 11,025 | 11,173 | 12,714 |
| Payments on short-term borrowings..... | (2,670) | (4,150) | (9,628) | (9,135) | (12,698) |
| Proceeds from long-term debt..... | -- | 7,000 | 400 | 138 | -- |
| Principal payments on long-term debt..... | (1,037) | (1,156) | (2,093) | (1,530) | (1,406) |
| Capital contributions..... | 14 | -- | -- | -- | -- |
| Cash distributions to stockholders..... | (2,575) | (10,750) | (14,500) | (11,500) | (6,400) |
| Principal payments under capital lease obligations..... | (722) | (587) | (982) | (704) | (702) |
| Net cash used in financing activities..... | (2,306) | (417) | (15,554) | (5,048) | (7,867) |
| Effect of exchange rate changes on cash and cash equivalents..... | 240 | 5 | (420) | 30 | 289 |
| Increase (decrease) in cash and cash equivalents..... | 1,671 | (409) | 165 | (421) | 1,606 |
| Cash and cash equivalents at beginning of period..... | 2,388 | 4,059 | 3,650 | 3,650 | 3,815 |
| Cash and cash equivalents at end of period.... | \$ 4,059 | \$ 3,650 | \$ 3,815 | \$ 3,229 | \$ 5,421 |
| Supplemental disclosure of cash flow information: | | | | | |
| Cash paid during the period for: | | | | | |
| Interest..... | \$ 1,313 | \$ 1,535 | \$ 2,363 | \$ 1,713 | \$ 1,385 |
| Income taxes..... | \$ 1,339 | \$ 1,194 | \$ 770 | \$ 936 | \$ 1,016 |
| Noncash transactions during the period: | | | | | |
| Equipment acquired under capital leases... | \$ 626 | \$ 1,612 | \$ 2,074 | \$ 1,852 | \$ 89 |

The accompanying notes are an integral part of the consolidated financial statements.

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
INFORMATION FOR THE NINE MONTHS ENDED
SEPTEMBER 30, 1996 IS UNAUDITED.

1. DESCRIPTION OF BUSINESS:

MKS Instruments, Inc. (the "Company") operates in one business segment. The Company is a worldwide supplier of instruments and components used to measure, control, analyze and isolate gases in semiconductor manufacturing processes, and in the manufacture of flat panel displays, magnetic and optical storage media, solar cells, fiber optic cables, optical coatings and other devices made possible through advances in materials science. The Company is subject to risks common to companies in the semiconductor industry including, but not limited to, the highly cyclical nature of the semiconductor industry leading to recurring periods of over supply, development by the Company or its competitors of new technological innovations, dependence on key personnel and the protection of proprietary technology.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES:

Basis of Presentation

The consolidated financial statements include the accounts of the Company and its subsidiaries. All significant intercompany accounts and transactions have been eliminated in consolidation. The Company has reflected the approximately 77.5% owned foreign subsidiaries as wholly-owned subsidiaries as the ownership interests are the same at the ultimate stockholder level. Upon the closing of the offering for which these financial statements are being prepared, the shares of the foreign subsidiaries owned directly by the ultimate stockholders will be contributed to the Company. Prior to the effectiveness of a registration statement relating to the initial public offering of the Common Stock of the Company, the Company will effect a 2,110-for-one stock split of its Common Stock, increase the number of authorized shares of Common Stock to 50,000,000 and authorize 2,000,000 shares of Preferred Stock. Accordingly, all share and per share amounts have been adjusted to reflect the stock split as though it had occurred at the beginning of the initial period presented.

Interim Financial Information

The consolidated financial statements of the Company as of and for the nine months ended September 30, 1996, and the related footnote information are unaudited. All adjustments (consisting only of normal recurring adjustments) have been made, which in the opinion of management, are necessary for a fair presentation. Results of operations for the nine months ended September 30, 1997 are not necessarily indicative of the results that may be expected for any future period.

Pro Forma Balance Sheet Presentation (Unaudited)

The Company intends to distribute the balance of its accumulated and undistributed S Corporation earnings (the "S Corporation Distribution") from the proceeds of the offering for which this registration statement is being prepared. The unaudited pro forma balance sheet has been prepared assuming an estimated \$30,183,000 distribution was payable as of September 30, 1997. The remaining balance in retained earnings represents accumulated earnings prior to the Company converting from a C Corporation to an S Corporation in 1987.

Pro Forma Net Income Per Share (Unaudited)

Pro forma net income per share is based upon the weighted average number of common and common equivalent shares (using the treasury stock method) outstanding. Common equivalent shares are included in the per share calculations where the effect of their inclusion would be dilutive. Common equivalent shares consist of outstanding stock options. Pursuant to Securities and Exchange Commission Staff Accounting

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
(TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
INFORMATION FOR THE NINE MONTHS ENDED
SEPTEMBER 30, 1996 IS UNAUDITED.

Bulletin No. 83, all common and common equivalent shares issued at prices less than the mid-point of the estimated initial public offering price range during the twelve-month period prior to the initial filing of the Registration Statement have been included in the calculation as if they were outstanding for all periods using the treasury stock method and the mid-point of the estimated initial public offering price.

Historical net income has been adjusted for the pro forma provision for income taxes calculated assuming the Company was subject to income taxation as a C Corporation, at a pro forma tax rate of 38%. In accordance with a regulation of the Securities and Exchange Commission, pro forma net income per share has been presented for the year ended December 31, 1996 and the nine months ended September 30, 1997 to reflect the affect of the assumed issuance of that number of shares of Common Stock of the Company necessary to be sold at the mid-point of the estimated initial public offering price in order to fund the intended distribution in the amount of the accumulated and undistributed S corporation earnings as of January 1, 1997. Pro forma fully diluted net income per share is not presented as it does not differ materially from pro forma net income per share.

Historical net income per share is not presented as it is not meaningful based upon the Company's planned conversion from an S Corporation to a C Corporation upon the closing of the offering for which these financial statements are being prepared.

Foreign Exchange

The functional currency of the Company's foreign subsidiaries is the applicable local currency. For those subsidiaries, assets and liabilities are translated to U.S. dollars at year-end exchange rates. Income and expense accounts are translated at the average exchange rates prevailing for the year. The resulting translation adjustments are accumulated in a separate component of consolidated stockholders' equity.

The Company enters into forward exchange contracts and local currency purchased options to mitigate its foreign currency exposures. Realized and unrealized gains and losses on forward exchange contracts and local currency purchased options that qualify for hedge accounting are recognized in earnings in the same period as the underlying hedged item. Realized and unrealized gains and losses on forward exchange contracts and local currency purchased option contract that do not qualify for hedge accounting are recognized immediately in earnings. The cash flows resulting from forward exchange contracts and local currency purchased options that qualify for hedge accounting are classified in the statement of cash flows as part of cash flows from operating activities. Cash flows resulting from forward exchange contracts and local currency purchased options that do not qualify for hedge accounting are classified in the statement of cash flows as investing activities.

Revenue Recognition

The Company recognizes revenue upon shipment. The Company accrues for anticipated returns and warranty costs upon shipment.

Cash and Cash Equivalents

All highly liquid investments with an original maturity of three months or less at the date of purchase are considered to be cash equivalents. Cash equivalents consist of money market instruments.

Investments

The appropriate classification of investments in debt and equity securities is determined at the time of purchase. Debt securities that the Company has both the intent and ability to hold to maturity are carried at

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
(TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
INFORMATION FOR THE NINE MONTHS ENDED
SEPTEMBER 30, 1996 IS UNAUDITED.

amortized cost. Debt securities that the Company does not have the intent and ability to hold to maturity or equity securities are classified either as "available-for-sale" or as "trading" and are carried at fair value. Marketable equity securities are carried at fair value and classified either as available for sale or trading. Unrealized gains and losses on securities classified as available-for-sale are carried as a separate component of stockholders' equity. Unrealized gains and losses on securities classified as trading are reported in earnings.

Inventories

Inventories are stated at the lower of cost or market. Cost is determined on the first-in, first-out method.

Property, Plant and Equipment

Property, plant and equipment are stated at cost. Equipment acquired under capital leases is recorded at the present value of the minimum lease payments required during the lease period. Expenditures for major renewals and betterments that extend the useful lives of property, plant and equipment are capitalized. Expenditures for maintenance and repairs are charged to expense as incurred. When assets are sold or otherwise disposed of, the cost and related accumulated depreciation are eliminated from the accounts and any resulting gain or loss is recognized in earnings.

Depreciation is provided on the straight-line method over the estimated useful lives of 20 years for buildings and three to five years for machinery and equipment. Leasehold improvements are amortized over the shorter of the lease term or the estimated useful life of the lease.

Research and Development

Research and development costs are expensed as incurred.

New Accounting Pronouncements

In February 1997, the Financial Accounting Standards Board (the "FASB") issued Statement of Financial Accounting Standards No. 128, "Earnings Per Share." This statement specifies the computation, presentation and disclosure requirements for earnings per share ("EPS"), to simplify the existing computational guidelines and increase comparability on an international basis. The statement will be effective for interim and annual reporting periods ending after December 15, 1997, and the Company will adopt its provisions during the fourth quarter of 1997. This statement will replace "primary" EPS with "basic" EPS, the principal difference being the exclusion of common stock equivalents in the computation of basic EPS. In addition, this statement will require the dual presentation of basic and diluted EPS on the face of the consolidated statements of income. The Company does not expect this statement to have a material impact on its net income per share as presented.

In June 1997, the FASB issued Statement of Financial Accounting Standards No. 130, "Reporting Comprehensive Income." This statement requires that changes in comprehensive income be shown in a financial statement that is displayed with the same prominence as other financial statements. The statement will be effective for fiscal years beginning after December 15, 1997 and the Company will adopt its provisions in 1998. Reclassification for earlier periods is required for comparative purposes. The Company is currently evaluating the impact this statement will have on its financial statements; however, because the statement requires only additional disclosure, the Company does not expect the statement to have a material impact on its financial position or results of operations.

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
 (TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
 INFORMATION FOR THE NINE MONTHS ENDED
 SEPTEMBER 30, 1996 IS UNAUDITED.

In June 1997, the FASB issued Statement of Financial Accounting Standards No. 131, "Disclosures about Segments of an Enterprise and Related Information." This statement supersedes Statement of Financial Accounting Standards No. 14, "Financial Reporting for Segments of a Business Enterprise." This statement includes requirements to report selected segment information quarterly and entity-wide disclosures about products and services, major customers, and the material countries in which the entity holds assets and reports revenues. The statement will be effective for fiscal years beginning after December 15, 1997 and the Company will adopt its provisions in 1998. Reclassification for earlier periods is required, unless impracticable, for comparative purposes. The Company is currently evaluating the impact this statement will have on its financial statements; however, because the statement requires only additional disclosure, the Company does not expect the statement to have a material impact on its financial position or results of operations.

Reclassification of Prior Year Balances

Certain reclassifications have been made to prior years' consolidated financial statements to conform to the current presentation.

3. FINANCIAL INSTRUMENTS AND RISK MANAGEMENT:

Foreign Exchange Risk Management

The Company uses forward exchange contracts and local currency purchased options in an effort to reduce its exposure to currency fluctuations on future U.S. dollar cash flows derived from foreign currency denominated sales associated with the intercompany purchases of inventory. The Company has entered into forward exchange contracts, and to a lesser extent, local currency purchased options to hedge a portion of its probable anticipated, but not firmly committed transactions. The Company plans to use local currency purchased options prospectively to hedge probable anticipated, but not firmly committed transactions. The Company has also used forward exchange contracts to hedge firm commitments. Market value gains and losses on forward exchange contracts are recognized immediately in earnings unless a firm commitment exists. Market value gains and premiums on local currency purchased options on probable anticipated transactions and market value gains and losses on forward exchange contracts hedging firm commitments are recognized when the hedged transaction occurs. These contracts, which relate primarily to Japanese and European currencies generally have terms of eighteen months or less. The Company does not hold or issue derivative financial instruments for trading purposes.

Forward exchange contracts with notional amounts totaling \$25,700,000, none, and \$8,200,000 to exchange foreign currencies for U.S. dollars, were outstanding at December 31, 1995 and 1996, and September 30, 1997, respectively. Local currency purchased options with notional amounts totaling none, \$3,722,000 and none to exchange foreign currencies for U.S. dollars were outstanding at December 31, 1995 and 1996 and September 30, 1997, respectively.

Foreign exchange losses of \$479,000 and foreign exchange gains of \$460,000 on forward exchange contracts that did not qualify for hedge accounting were recognized in earnings during 1996, and the nine months ended September 30, 1997, respectively, and are classified in other income. Gains on forward exchange contracts that qualify for hedge accounting of \$3,061,000 and \$978,000 were deferred and classified in other accrued expenses at December 31, 1995 and 1996, respectively. Gains of local currency purchased options deferred at December 31, 1996 that qualify for hedge accounting of \$200,000 were deferred in other accrued expenses. Gains on forward exchange contracts and local currency purchased options that qualify for hedge accounting are classified in cost of goods sold and totaled \$927,000, \$1,928,000, \$2,476,000, and \$1,554,000, and \$978,000 for the years ended December 31, 1994, 1995, 1996, and the nine months ended

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
(TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
INFORMATION FOR THE NINE MONTHS ENDED
SEPTEMBER 30, 1996 IS UNAUDITED.

September 30, 1996 and 1997, respectively. There are no forward exchange contracts outstanding at September 30, 1997 which qualify for hedge accounting.

The fair value of forward exchange contracts at September 30, 1997, determined by applying period end currency exchange rates to the notional contract amounts, amounted to \$525,000. The fair value of local currency purchased options at December 31, 1996, obtained through dealer quotes, totaled approximately \$200,000.

The market risk exposure from forward exchange contracts is assessed in light of the underlying currency exposures and is controlled by the initiation of additional or offsetting foreign currency contracts. The market risk exposure from options is limited to the cost of such investments. Credit risk exposure from forward exchange contract and local currency purchased option are minimized as these instruments are contracted with a major financial institution. The Company monitors the credit worthiness of this financial institution and full performance is anticipated.

Interest Rate Risk Management

The Company utilizes an interest rate swap to fix the interest rate on certain variable rate term loans in order to minimize the effect of changes in interest rates on earnings. In 1993, the Company entered into a five-year interest rate swap agreement with a major financial institution for the notional amount of \$5,000,000 equal to one half of the term loan described in Note 6. Under the agreement, the Company pays a fixed rate of 5.1% on the notional amount and receives the London Interbank Offering Rate ("LIBOR"). The interest differential paid or received on the swap agreement is recognized as an adjustment to interest expense. At September 30, 1997 the fair value of this interest rate swap, which represents the amount the Company would receive or pay to terminate the agreement, is a net receivable of \$15,000, based on dealer quotes.

The market risk exposure from the interest rate swap is assessed in light of the underlying interest rate exposures. Credit risk exposure from the swap is minimized as the agreement is with a major financial institution. The Company monitors the creditworthiness of this financial institution and full performance is anticipated.

Concentrations of Credit Risk

The Company's significant concentrations of credit risk consist principally of cash and cash equivalents and trade accounts receivable. The Company maintains cash and cash equivalents with financial institutions including the bank it has borrowings with. Concentrations of credit risk with respect to trade accounts receivable are limited due to the large number of geographically dispersed customers. Credit is extended for all customers based on financial condition and, collateral is not required.

Fair Value of Financial Instruments

The fair value of the term loans, including the current portion, approximates its carrying value given its variable rate interest provisions. The fair value of mortgage notes is based on borrowing rates for similar instruments and approximates its carrying value. For all other balance sheet financial instruments, the carrying amount approximates fair value because of the short period to maturity of these instruments.

Use of Estimates

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
(TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
INFORMATION FOR THE NINE MONTHS ENDED
SEPTEMBER 30, 1996 IS UNAUDITED.

disclosure of contingent assets and liabilities at the dates of the financial statements and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates.

4. INVENTORIES:

Inventories consist of the following:

| | DECEMBER 31, | | SEPTEMBER 30, 1997 |
|----------------------|--------------|-----------|-----------------------|
| | 1995 | 1996 | |
| Raw material..... | \$ 10,839 | \$ 10,337 | \$ 10,292 |
| Work in process..... | 8,833 | 6,177 | 7,066 |
| Finished goods..... | 10,288 | 8,986 | 10,723 |
| | ----- | ----- | ----- |
| | \$ 29,960 | \$ 25,500 | \$ 28,081 |
| | ===== | ===== | ===== |

5. PROPERTY, PLANT AND EQUIPMENT:

Property, plant and equipment consist of the following:

| | DECEMBER 31, | | SEPTEMBER 30, 1997 |
|---|--------------|-----------|-----------------------|
| | 1995 | 1996 | |
| Land..... | \$ 7,923 | \$ 8,295 | \$ 8,581 |
| Buildings..... | 22,728 | 26,885 | 26,387 |
| Machinery and equipment..... | 22,202 | 24,711 | 24,025 |
| Furniture and fixtures..... | 5,412 | 8,046 | 9,372 |
| Leasehold improvements..... | 816 | 1,184 | 896 |
| | ----- | ----- | ----- |
| | 59,081 | 69,121 | 69,261 |
| Less: accumulated depreciation and amortization..... | 25,871 | 31,114 | 34,918 |
| | ----- | ----- | ----- |
| | \$ 33,210 | \$ 38,007 | \$ 34,343 |
| | ===== | ===== | ===== |

6. DEBT:

Credit Agreements and Short-term Borrowings

In February 1996, the Company entered into a loan agreement with a bank which provides access to a revolving credit loan and term loan. This agreement has since been amended. The revolving credit facility provides for uncollateralized borrowings up to \$20,000,000, which expires on June 30, 1999. Interest on borrowings is payable quarterly at varying rates based, subject to the Company's option, at the bank's base rate, or money market rate, or LIBOR. At December 31, 1995 and 1996 and September 30, 1997, the interest rate in effect was the bank's base rate of 8.5%, 8.25%, and 8.5%, respectively. At December 31, 1995 and 1996 and September 30, 1997, the Company had \$1,525,000, \$1,875,000, and \$2,500,000, respectively, of borrowings, under this revolving credit loan.

Additionally, certain of the Company's foreign subsidiaries have lines of credit and short-term borrowing arrangements with various financial institutions which provide for aggregate borrowings as of September 30, 1997 of up to \$13,300,000, which generally expire and are renewed at six month intervals. At December 31, 1995 and 1996 and September 30, 1997, total borrowings outstanding under these arrangements were \$10,739,000, \$10,950,000, and \$10,671,000, respectively, at interest rates ranging from 1.3% to 13.7%, 1.3% to

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
 (TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
 INFORMATION FOR THE NINE MONTHS ENDED
 SEPTEMBER 30, 1996 IS UNAUDITED.

15.5%, and 1.3% to 14.5%, respectively. Foreign short-term borrowings are generally collateralized by certain trade accounts receivable and are guaranteed by a domestic bank.

Long-Term Debt

Long-term debt consists of the following:

| | DECEMBER 31, | | SEPTEMBER 30, 1997 |
|--|--------------|----------|-----------------------|
| | 1995 | 1996 | |
| Term loans..... | \$15,528 | \$13,861 | \$12,611 |
| Mortgage notes..... | 5,292 | 4,675 | 3,978 |
| Total long-term debt..... | 20,820 | 18,536 | 16,589 |
| Less: current portion..... | 2,203 | 2,258 | 2,153 |
| Long-term debt less current portion..... | \$18,617 | \$16,278 | \$14,436 |
| | ===== | ===== | ===== |

The term loan facility of the loan agreement entered into on November 1, 1993, provided for borrowings of \$10,000,000. Principal payments are payable in equal monthly installments of \$56,000 through October 1, 2000, with the remaining principal payment due on November 1, 2000. The loan is collateralized by certain land, buildings, and equipment.

On October 31, 1995, the Company entered a loan agreement with the same bank which provided additional uncollateralized term loan borrowings of \$7,000,000. Principal payments on the additional term loan borrowings are payable in equal monthly installments of \$83,000 through June 1, 2002, with the remaining principal payment due on June 30, 2002.

Interest on the term loan borrowings is payable monthly at varying rates based, subject to the Company's option, at the bank's base rate, or money market rate, or LIBOR. At December 31, 1995 and 1996 and September 30, 1997, the interest rates in effect for these borrowings were 7.1%, 7.375%, and 6.925%, respectively.

The terms of the loan agreements, as amended, contain, among other provisions, requirements for maintaining certain levels of tangible net worth and other financial ratios. The agreement also contains restrictions with respect to acquisitions. Under the most restrictive covenant, the operating cash flow to debt service ratio for a fiscal quarter shall not be less than 1.25 to 1.0. In the event of default of these covenants or restrictions, any obligation then outstanding under the loan agreement shall become payable upon demand by the bank. The Company was in compliance with these covenants and restrictions at September 30, 1997.

The Company has loans outstanding from various foreign banks in the form of mortgage notes at interest rates ranging from 2.1% to 10.75%. Principal and interest are payable in monthly installments through 2010. The loans are collateralized by mortgages on certain of the Company's foreign properties.

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
 (TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
 INFORMATION FOR THE NINE MONTHS ENDED
 SEPTEMBER 30, 1996 IS UNAUDITED.

Aggregate maturities of long-term debt over the next five years are as follows:

| | AGGREGATE MATURITIES |
|---|-------------------------|
| | ----- |
| October 1, 1997 to December 31, 1997..... | \$ 577 |
| Year ending December 31, 1998..... | 2,095 |
| Year ending December 31, 1999..... | 2,037 |
| Year ending December 31, 2000..... | 7,322 |
| Year ending December 31, 2001..... | 1,384 |
| Year ending December 31, 2002..... | 1,307 |
| Thereafter..... | 1,867 |
| | ----- |
| | \$ 16,589 |
| | ===== |

7. LEASE COMMITMENTS:

The Company leases certain of its facilities and machinery and equipment under capital and operating leases expiring in various years through 2002 and thereafter. Generally, the facility leases require the Company to pay maintenance, insurance and real estate taxes. Rental expense under operating leases totaled \$1,506,000, \$1,985,000 and \$2,487,000, for the years ended December 31, 1994, 1995 and 1996, respectively, and \$1,919,000 and \$1,876,000 for the nine month period ended September 30, 1996 and 1997, respectively.

Minimum lease payments under operating and capital leases are as follows:

| | OPERATING LEASES | | CAPITAL LEASES |
|--|------------------|-----------|-------------------|
| | REAL ESTATE | EQUIPMENT | EQUIPMENT |
| | ----- | ----- | ----- |
| October 1, 1997 to December 31, 1997..... | \$ 523 | \$ 149 | \$ 313 |
| Year ending December 31, 1998..... | 1,073 | 447 | 1,187 |
| Year ending December 31, 1999..... | 362 | 268 | 915 |
| Year ending December 31, 2000..... | 78 | 82 | 691 |
| Year ending December 31, 2001..... | 9 | 33 | 209 |
| Year ending December 31, 2002..... | -- | 19 | 9 |
| Thereafter..... | -- | 29 | -- |
| | ----- | ----- | ----- |
| Total minimum lease payments..... | \$ 2,045 | \$ 1,027 | 3,324 |
| | ===== | ===== | |
| Less: amounts representing interest..... | | | 364 |
| | | | ----- |
| Present value of minimum lease payments..... | | | 2,960 |
| Less: current portion..... | | | 1,048 |
| | | | ----- |
| Long-term portion..... | | | \$ 1,912 |
| | | | ===== |

8. STOCKHOLDERS' EQUITY:

Prior to the effectiveness of a registration statement relating to the initial public offering of Common Stock of the Company, the Company will effect a 2,110 to one stock split of its common stock, increase the number of authorized shares of common stock to 50,000,000 and will authorize 2,000,000 shares of \$0.01 par value Preferred Stock. Accordingly, all share data has been restated to reflect the Common Stock split.

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
 (TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
 INFORMATION FOR THE NINE MONTHS ENDED
 SEPTEMBER 30, 1996 IS UNAUDITED.

Common Stock

The Company has two classes of Common Stock. Stockholders of Class A Common Stock are entitled to voting rights with one vote for each share of Common Stock. Stockholders of Class B Common Stock are not entitled to voting rights.

Upon the closing of the offering for which this Registration Statement is being prepared each outstanding share of Class A and Class B Common Stock of the Company will be converted into an aggregate of 12,035,440 shares of Common Stock.

Stock Option Plans

The Company grants options to employees under the 1995 Stock Incentive Plan (the "Plan") and to Directors under the 1996 Directors' Stock Plan (the "Directors' Plan").

Under the Plan, options to purchase 1,804,050 shares of the Company's authorized but unissued Common Stock may be granted. Under the Director's Plan, 42,200 such options may be granted. Stock options are granted at 100% of the fair value of the Company's Common Stock as determined by the Board of Directors on the date of grant. In reaching the determination of fair value at the time of each grant, the Board considered a range of factors, including the Company's current financial position, its recent revenues, results of operations and cash flows, its assessment of the Company's competitive position in its markets and prospects for the future, the status of the Company's product development and marketing efforts, current valuations for comparable companies and the illiquidity of an investment in the Company's common stock. Generally, stock options under the Plan vest 20% after one year and 5% per quarter thereafter, and expire 10 years after the grant date. Under the Directors' Plan, the options granted in 1996 vest over three years and options granted in 1997 and later vest at the earlier of (a) the next annual meeting, (b) 13 months from date of grant or (c) the effective date of an acquisition as defined in the Directors' Plan.

The following table presents the activity for options under the Plan.

| | YEAR ENDED DECEMBER 31, 1995 | | YEAR ENDED DECEMBER 31, 1996 | | NINE MONTHS ENDED SEPTEMBER 30, 1997 | |
|--|---------------------------------|--|---------------------------------|--|---|--|
| | OPTIONS | WEIGHTED AVERAGE EXERCISE PRICE | OPTIONS | WEIGHTED AVERAGE EXERCISE PRICE | OPTIONS | WEIGHTED AVERAGE EXERCISE PRICE |
| Outstanding -- beginning of period.... | -- | -- | 405,513 | \$16.59 | 540,292 | \$ 6.64 |
| Granted..... | 405,513 | \$16.59 | 540,292 | 6.64 | 502,669 | 6.64 |
| Exercised..... | -- | -- | -- | -- | -- | -- |
| Forfeited or Expired..... | -- | -- | (405,513) | 16.59 | (21,100) | 6.64 |
| Outstanding -- end of period..... | 405,513 | \$16.59 | 540,292 | \$ 6.64 | 1,021,861 | \$ 6.64 |
| Exercisable at end of period..... | -- | -- | 76,521 | \$ 6.64 | 274,980 | \$ 6.64 |

At September 30, 1997, Plan options for 1,021,861 shares were outstanding at an exercise price of \$6.64. The weighted average remaining contractual life of these options was 8.5 years.

During 1996, 18,088 options were granted at an exercise price of \$6.64 per share under the Directors' Plan and were outstanding at December 31, 1996. Of these options, 3,016 were exercisable. During 1997, options for 2,412 shares were granted at an exercise price of \$6.64 per share. At September 30, 1997, 20,500 options were outstanding with 7,536 exercisable at the \$6.64 per share price.

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
(TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
INFORMATION FOR THE NINE MONTHS ENDED
SEPTEMBER 30, 1996 IS UNAUDITED.

The Company has adopted the disclosure-only provisions of Statement of Financial Accounting Standards No. 123 (SFAS No. 123), "Accounting for Stock-Based Compensation" for the year ended December 31, 1996. The Company has chosen to continue to account for stock-based compensation using the intrinsic value method prescribed in Accounting Principles Board Opinion No. 25, "Accounting for Stock Issued to Employees" and related interpretations. Accordingly, compensation cost for stock options is measured as the excess, if any, of the fair value of the Company's stock at the date of grant over the amount an employee must pay to acquire the stock.

The disclosures required under SFAS No. 123 have been omitted as they are not meaningful based upon the Company's planned conversion from an S Corporation to a C Corporation upon the closing of the offering for which these financial statements are being prepared.

9. INCOME TAXES:

The Company has elected to be taxed as an S Corporation for federal and certain states income tax purposes and, as a result, is not subject to Federal taxation but is subject to state taxation on income in certain states. The stockholders are liable for individual Federal and certain state income taxes on their allocated portions of the Company's taxable income.

The components of income before income taxes and the historical related provision for income taxes consist of the following:

| | YEAR ENDED DECEMBER 31, | | | NINE MONTHS ENDED |
|---------------------------------|-------------------------|----------|----------|-----------------------|
| | 1994 | 1995 | 1996 | SEPTEMBER 30, 1997 |
| Income before income taxes: | | | | |
| United States..... | \$ 9,888 | \$21,183 | \$11,953 | \$13,101 |
| Foreign..... | 915 | 1,475 | 1,350 | 981 |
| | ----- | ----- | ----- | ----- |
| | \$10,803 | \$22,658 | \$13,303 | \$14,082 |
| | ===== | ===== | ===== | ===== |
| Current taxes: | | | | |
| State..... | \$ 368 | \$ 434 | \$ 285 | \$ 853 |
| Foreign..... | 610 | 657 | 792 | 572 |
| | ----- | ----- | ----- | ----- |
| | 978 | 1,091 | 1,077 | 1,425 |
| | ----- | ----- | ----- | ----- |
| Deferred taxes: | | | | |
| State..... | (55) | (88) | (156) | (128) |
| Foreign..... | (123) | (3) | (121) | (107) |
| | ----- | ----- | ----- | ----- |
| | (178) | (91) | (277) | (235) |
| | ----- | ----- | ----- | ----- |
| Provision for income taxes..... | \$ 800 | \$ 1,000 | \$ 800 | \$ 1,190 |
| | ===== | ===== | ===== | ===== |

As the Company is not subject to Federal income taxes, a reconciliation of the effective tax rate to the Federal statutory rate is not meaningful.

MKS INSTRUMENTS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)
 (TABLES IN THOUSANDS EXCEPT PER SHARE DATA)
 INFORMATION FOR THE NINE MONTHS ENDED
 SEPTEMBER 30, 1996 IS UNAUDITED.

At December 31, 1995, 1996, and September 30, 1997 the components of the deferred tax asset and deferred tax liability were as follows:

| | DECEMBER 31, | | SEPTEMBER 30, |
|--|--------------|-------|---------------|
| | 1995 | 1996 | 1997 |
| | ---- | ---- | ----- |
| Deferred tax assets (liabilities): | | | |
| Inventory..... | \$143 | \$234 | \$ 314 |
| Intercompany profits..... | 125 | 160 | 193 |
| Compensation..... | 62 | 72 | 103 |
| Investment booked under the equity method..... | (17) | (28) | (41) |
| Other..... | (179) | (34) | (37) |
| | ---- | ---- | ---- |
| Total..... | \$134 | \$404 | \$ 532 |
| | ===== | ===== | ===== |

10. EMPLOYEE BENEFIT PLANS:

The Company has a 401(k) profit-sharing plan for U.S. employees meeting certain requirements in which eligible employees may contribute from 1% up to 12% of their compensation. The Company, at its discretion, may provide a matching contribution which will generally match up to the first 2% of each participant's compensation, plus 25% of the next 4% of compensation. At the discretion of the Board of Directors, the Company may also make additional contributions for the benefit of all eligible employees. The Company's contributions are generally paid annually, and were \$1,324,000, \$1,850,000, and \$2,170,000 for the years ended December 31, 1994, 1995, and 1996. Approximately \$2,100,000 has been accrued as the Company's contribution for the nine month period ended September 30, 1997 and is included in accrued compensation.

The Company maintains a bonus plan which provides cash awards to key employees, at the discretion of the Board of Directors, based upon operating results and employee performance. Bonus expense to key employees was \$1,231,000, \$764,000, and none, for the years ended December 31, 1994, 1995, and 1996, respectively, and none and \$956,000 for the nine months ended September 30, 1996 and 1997, respectively.

On September 30, 1995, the Board of Directors voted to terminate the Company's stock appreciation plan covering certain key employees. Performance shares awarded under the Plan entitled the employee to a pro rata share increase in the adjusted net book value of the Company. The Company recorded compensation expense of \$160,000 and \$199,000 under this plan for the years ended December 31, 1994 and 1995, respectively.

11. RESTRUCTURING:

In 1996, the Company recorded a restructuring charge of \$1,400,000, primarily related to reduction of personnel and the closure of facilities in Phoenix, AZ and San Jose, CA. These charges include \$425,000 of severance pay, \$710,000 of lease commitments, and \$265,000 for the write-off of leasehold improvements. The closure concluded during fiscal year 1997. The remaining balance of the restructuring charge of approximately \$400,000 for lease commitments is included in "Other Accrued Expenses" in the accompanying balance sheet as of September 30, 1997.

INSIDE BACK COVER (PG.5):

The inside back cover graphically depicts MKS Instruments' message of being a worldwide provider of process control solutions. It is produced in four-color process. In the center of the page is a photo of the Earth, with the tag line "Providing Solutions Around the Process, Around the World" wrapping around the photo. The background of the page is dark, with the MKS logo appearing at the top, knocking out to white. Photos of MKS products surround the globe image--above, below, left, and right--and include MKS Baratron Capacitance Manometers, a Throttling Poppet Valve, a Pressure Controller, Mass Flow Controllers, an In Situ Flow Verifier, a Direct Liquid Injection Subsystem, and a Residual Gas Analyzer.

=====

No dealer, sales representative or any other person has been authorized to give any information or to make any representations in connection with this Offering other than those contained in this Prospectus, and, if given or made, such information or representation must not be relied upon as having been authorized by the Company or the Underwriters. This Prospectus does not constitute an offer to sell or a solicitation of an offer to buy any of the securities other than the shares of Common Stock to which it relates or an offer to, or a solicitation of, any person in any jurisdiction in which such an offer or solicitation is unlawful. Neither the delivery of this Prospectus nor any sale made hereunder shall, under any circumstances, create any implication that there has been no change in the affairs of the Company or that the information contained herein is correct as of any time subsequent to the date hereof.

TABLE OF CONTENTS

| | PAGE |
|--|------|
| Prospectus Summary..... | 3 |
| Risk Factors..... | 5 |
| Use of Proceeds..... | 10 |
| S Corporation and Termination of S Corporation Status..... | 11 |
| Dividend Policy..... | 11 |
| Capitalization..... | 12 |
| Dilution..... | 13 |
| Selected Consolidated Financial Data..... | 14 |
| Management's Discussion and Analysis of Financial Condition and Results of Operations..... | 16 |
| Business..... | 23 |
| Management..... | 37 |
| Certain Transactions..... | 43 |
| Principal Stockholders..... | 44 |
| Description of Capital Stock..... | 45 |
| Shares Eligible for Future Sale..... | 47 |
| Underwriting..... | 48 |
| Legal Matters..... | 49 |
| Experts..... | 49 |
| Additional Information..... | 49 |
| Index to Consolidated Financial Statements..... | F-1 |

Until _____, 1998 (25 days after the date of this Prospectus), all dealers effecting transactions in the Common Stock, whether or not participating in this distribution, may be required to deliver a Prospectus. This is in addition to the obligation of dealers to deliver a Prospectus when acting as Underwriters and with respect to their unsold allotments or subscriptions

=====

4,000,000 SHARES
MKS INSTRUMENTS, INC.
COMMON STOCK

PROSPECTUS

NATIONSBANC MONTGOMERY
SECURITIES, INC.

DONALDSON, LUFKIN & JENRETTE

SECURITIES CORPORATION

PAINWEBBER INCORPORATED

_____, 1998

=====

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

ITEM 13. OTHER EXPENSES OF ISSUANCE AND DISTRIBUTION.

Estimated expenses payable in connection with the sale of the Common Stock offered hereby are as follows:

| | |
|---|----------|
| SEC Registration Fee..... | \$20,209 |
| NASD Filing Fee..... | 7,400 |
| Printing, Engraving and Mailing Expenses..... | * |
| Nasdaq Listing Fee..... | * |
| Legal Fees and Expenses..... | * |
| Accounting Fees and Expenses..... | * |
| Blue Sky Fees and Expenses..... | * |
| Transfer Agent and Registrar Fees..... | * |
| Miscellaneous..... | * |
| | ----- |
| Total..... | \$ * |
| | ===== |

- - - - -
 * To be filed by amendment

The Company will bear all expenses shown above.

ITEM 14. INDEMNIFICATION OF DIRECTORS AND OFFICERS.

Section 67 of Chapter 156B of the Massachusetts General Laws provides that a corporation may indemnify its directors and officers to the extent specified in or authorized by (i) the articles of organization; (ii) a by-law adopted by the stockholders; or (iii) a vote adopted by the holders of a majority of the shares of stock entitled to vote on the election of directors. In all instances, the extent to which a corporation provides indemnification to its directors and officers under Section 67 is optional. In its Amended and Restated Articles of Organization (the "Articles of Organization"), the Registrant has elected to commit to provide indemnification to its directors and officers in specified circumstances. Generally, Article 6 of the Registrant's Articles of Organization provides that the Registrant shall indemnify directors and officers of the Registrant against liabilities and expenses arising out of legal proceedings brought against them by reason of their status as directors or officers or by reason of their agreeing to serve, at the request of the Registrant, as a director or officer with another organization. Under this provision, a director or officer of the Registrant shall be indemnified by the Registrant for all costs and expenses (including attorneys' fees), judgments, liabilities and amounts paid in settlement of such proceedings, even if he is not successful on the merits, if he acted in good faith in the reasonable belief that his action was in the best interests of the Registrant. The Board of Directors may authorize advancing litigation expenses to a director or officer at his request upon receipt of an undertaking by any such director or officer to repay such expenses if it is ultimately determined that he is not entitled to indemnification for such expenses.

Article 6 of the Registrant's Articles of Organization eliminates the personal liability of the Registrant's directors to the Registrant or its stockholders for monetary damages for breach of a director's fiduciary duty, except to the extent Chapter 156B of the Massachusetts General Laws prohibits the elimination or limitation of such liability.

The Underwriting Agreement, a form of which is filed at Exhibit 1.1 to this Registration Statement on Form S-1 (the "Underwriting Agreement"), provides that the Underwriters are obligated under certain circumstances to indemnify directors, officers and controlling persons of the Registrant against certain liabilities, including liabilities under the Securities Act of 1933, as amended (the "Securities Act"). Reference is made to the form of Underwriting Agreement.

The Company has obtained directors and officers liability insurance for the benefit of its directors and certain of its officers.

ITEM 15. RECENT SALES OF UNREGISTERED SECURITIES.

In the three years preceding the filing of this Registration Statement, the Registrant has not sold any securities. The registrant has awarded to employees and directors options to purchase 1,042,361 shares of Common Stock. The grant of options were exempt from registration under the Securities Act by virtue of the provisions of Section 4(2) of the Securities Act or Rule 701 thereunder.

ITEM 16. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES.

(a) Exhibits:

| EX. NO. | DESCRIPTION |
|---------|---|
| 1.1 | Form of Underwriting Agreement |
| 3.1 | Restated Articles of Organization, as amended |
| *3.2 | Form of Amended and Restated Articles of Organization |
| 3.3 | By-laws, as amended |
| *3.4 | Form of Amended and Restated By-laws |
| *4.1 | Specimen certificate representing the Common Stock |
| *5.1 | Opinion of Hale and Dorr LLP |
| *10.1 | Amended and Restated 1995 Incentive Stock Option Plan |
| *10.2 | 1996 Director Stock Option Plan, as amended |
| *10.3 | 1997 Director Stock Option Plan |
| *10.4 | 1997 Employee Stock Purchase Plan |
| 10.5 | Amended and Restated Employment Agreement dated as of December 15, 1995 between Leo Berlinghieri and the Registrant |
| 10.6 | Amended and Restated Employment Agreement dated as of December 15, 1995 between John J. Sullivan and the Registrant |
| 10.7 | Amended and Restated Employment Agreement dated as of December 15, 1995 between Ronald C. Weigner and the Registrant |
| 10.8 | Amended and Restated Employment Agreement dated as of December 15, 1995 between William D. Stewart and the Registrant |
| 10.9 | Loan Agreement dated as of October 31, 1995, as amended February 23, 1996, by and between the First National Bank of Boston and the Registrant |
| 10.10 | Lease Agreement dated as of October 12, 1989, as extended October 14, 1994, by and between Aspen Industrial Park Partnership and HPS, a division of MKS Instruments, Inc. |
| 10.11 | Loan Agreement dated as of November 1, 1993, as last amended February 4, 1997 between the First National Bank of Boston and the Registrant |
| 10.12 | Lease dated as of September 21, 1995 by and between General American Life Insurance Company and the Registrant |
| 10.13 | Loan Agreement dated as of February 23, 1996, as last amended February 4, 1997 between the First National Bank of Boston, Chemical Bank and the Registrant |
| 10.14 | Revolving Credit Note (\$8,000,000) dated February 23, 1996 between Chemical Bank, The First National Bank of Boston and the Registrant |
| 10.15 | Revolving Credit Note (\$12,000,000) dated February 23, 1996 between Chemical Bank, The First National Bank of Boston and the Registrant |

| EX. NO. | DESCRIPTION |
|---------|---|
| 10.16 | Promissory Note dated as of August 1990 between Jefferson National Life Insurance Company and the Registrant |
| *10.17 | Purchase Agreement dated June 1, 1996 by and between Applied Materials, Inc. and the Registrant |
| 10.18 | Management Incentive Program |
| 10.19 | Lease dated as of December 21, 1989, as last amended December 1996, between the Registrant and Walpole Park South II Trust |
| 10.20 | Lease dated as of January 1, 1996 between MKS Japan, Inc., a subsidiary of the Registrant, and MiFuji Kanzai Co. Ltd. (covering Floor 5) |
| 10.21 | Lease dated as of April 21, 1997 between MKS Japan, Inc., a subsidiary of the Registrant, and MiFuji Kanzai Co. Ltd. (covering Floors 1 and 2) |
| 10.22 | Split-Dollar Agreement dated as of September 12, 1991 between the Registrant, John R. Bertucci and Claire R. Bertucci and Richard S. Chute, Trustees of the John R. Bertucci Insurance Trust of January 10, 1986 |
| 10.23 | Split-Dollar Agreement dated as of September 12, 1991 between the Registrant, John R. Bertucci and John R. Bertucci and Thomas H. Belknap, Trustees of the Claire R. Bertucci Insurance Trust of January 10, 1986 |
| *10.24 | Tax Indemnification and S Corporation Distribution Agreement |
| 11.1 | Statement re Computation of Per Share Earnings |
| 21.1 | Subsidiaries of the Registrant |
| *23.1 | Consent of Hale and Dorr LLP (contained in Exhibit 5.1) |
| 23.2 | Consent of Coopers & Lybrand L.L.P. |
| 24 | Power of Attorney (included on Page II-4) |
| 27 | Financial Data Schedule |

* To be filed by amendment.

** Confidential materials omitted and filed separately with the Securities and Exchange Commission.

(b) FINANCIAL STATEMENTS SCHEDULES

Report of Independent Accountants on Schedule II -- Valuation and Qualifying Accounts

Schedule II -- Valuation and Qualifying Accounts

ITEM 17. UNDERTAKINGS.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer and controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the questions whether such indemnification by it is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.

The undersigned registrant hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act of 1933, the information omitted from the form of prospectus filed as part of a registration statement in reliance upon Rule 430A and contained in the form of prospectus filed by the registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this registration statement as of the time it was declared effective.

(2) For the purpose of determining any liability under the Securities Act of 1933, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offer therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the Registrant has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Andover, Commonwealth of Massachusetts, on this 14 day of November, 1997.

MKS INSTRUMENTS, INC.

By: /s/ JOHN R. BERTUCCI

 JOHN R. BERTUCCI
 CHAIRMAN OF THE BOARD, PRESIDENT AND
 CHIEF EXECUTIVE OFFICER

POWER OF ATTORNEY

We, the undersigned officers and directors of MKS Instruments, Inc., hereby severally constitute and appoint John R. Bertucci, Ronald C. Weigner and Robert F. O'Brien and each of them singly, our true and lawful attorneys with full power to them, and each of them singly, to sign for us and in our names, in the capacities indicated below, the Registration Statement field herewith, and any and all amendments (including post-effective amendments) to said Registration Statement (or any other registration statement for the same offering that is to be effective upon filing pursuant to Rule 462(b) under the Securities Act of 1933) and generally to do all such things in our names and behalf in our capacities as officers and directors to enable MKS Instruments, Inc. to comply with the Securities Act of 1933, and all requirements of the Securities and Exchange Commission, hereby ratifying and confirming our signatures as they may be signed by our said attorneys, or any of them, to any such registration statement and any and all amendments thereto.

Witness our hands and common seal on the date set forth below.

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement has been signed by the following persons in the capacities and on the dates indicated.

| SIGNATURES | TITLE | DATE |
|---|---|-------------------|
| /s/ JOHN R. BERTUCCI ----- JOHN R. BERTUCCI | Chairman of the Board of Directors, President and Chief Executive Officer (Principal Executive Officer) | November 14, 1997 |
| /s/ RONALD C. WEIGNER ----- RONALD C. WEIGNER | Vice President and Chief Financial Officer (Principal Financial and Accounting Officer) | November 14, 1997 |
| /s/ RICHARD S. CHUTE ----- RICHARD S. CHUTE | Director | November 14, 1997 |
| /s/ OWEN W. ROBBINS ----- OWEN W. ROBBINS | Director | November 14, 1997 |
| /s/ ROBERT J. THERRIEN ----- ROBERT J. THERRIEN | Director | November 14, 1997 |
| /s/ LOUIS P. VALENTE ----- LOUIS P. VALENTE | Director | November 14, 1997 |

REPORT OF INDEPENDENT ACCOUNTANTS

To the Board of Directors and Stockholders
of MKS Instruments, Inc.:

In connection with our audits of the consolidated financial statements of MKS Instruments, Inc. as of December 31, 1995 and 1996, and September 30, 1997, and for each of the years ended December 31, 1994, 1995 and 1996 and the nine month period ended September 30, 1997, we have also audited the consolidated financial statement schedule listed in Item 16(b) herein.

In our opinion, the consolidated financial statement schedule, when considered in relation to the basic financial statements taken as a whole, presents fairly, in all material respects, the information required to be included therein.

COOPERS & LYBRAND L.L.P.

Boston, Massachusetts
October 28, 1997

SCHEDULE II

MKS INSTRUMENTS, INC.

VALUATION AND QUALIFYING ACCOUNTS
(IN THOUSANDS)

| | BALANCE AT BEGINNING OF PERIOD | PROVISION CHARGED TO EXPENSE | ACCOUNTS WRITTEN OFF | BALANCE AT END OF PERIOD |
|--------------------------------------|--------------------------------------|------------------------------------|-------------------------|-----------------------------------|
| | ----- | ----- | ----- | ----- |
| YEAR ENDED DECEMBER 31, 1994 | | | | |
| Allowance for Doubtful Accounts..... | \$261 | 241 | 83 | \$ 419 |
| YEAR ENDED DECEMBER 31, 1995 | | | | |
| Allowance for Doubtful Accounts..... | \$419 | 133 | 10 | \$ 542 |
| YEAR ENDED DECEMBER 31, 1996 | | | | |
| Allowance for Doubtful Accounts..... | \$542 | (20) | 40 | \$ 482 |
| NINE MONTHS ENDED SEPTEMBER 30, 1997 | | | | |
| Allowance for Doubtful Accounts..... | \$482 | 255 | 119 | \$ 618 |

CONSENT OF INDEPENDENT ACCOUNTANTS

We consent to the inclusion in this registration statement on Form S-1 (File No.) of our reports dated October 28, 1997, on our audits of the consolidated financial statements and financial statement schedule of MKS Instruments, Inc. We also consent to the reference to our firm under the caption "Experts" and "Selected Consolidated Financial Data."

COOPERS & LYBRAND L.L.P.

Boston, Massachusetts
November 12, 1997

NATIONSBANC MONTGOMERY SECURITIES, INC.
FORM UNDERWRITING AGREEMENT
Draft of October 29, 1997
[Execution Copy]
[Conformed Copy]

_____ Shares

MKS Instruments, Inc.

Common Stock

Underwriting Agreement

dated [___]

_____ Shares
 MKS INSTRUMENTS, INC.
 Common Stock
 UNDERWRITING AGREEMENT

____, 1998

NATIONSBANC MONTGOMERY SECURITIES, INC.
 DONALDSON, LUFKIN & JENRETTE SECURITIES CORPORATION
 PAINE WEBBER
 As Representatives of the several Underwriters
 c/o NATIONSBANC MONTGOMERY SECURITIES, INC.
 600 Montgomery Street
 San Francisco, California 94111

Ladies and Gentlemen:

Introductory. MKS Instruments, Inc., a Massachusetts corporation (the "Company"), proposes to issue and sell to the several underwriters named in Schedule A (the "Underwriters") an aggregate of [____] shares (the "Firm Common Shares") of its Common Stock, no par value per share (the "Common Stock"). In addition, the Company has granted to the Underwriters an option to purchase up to an additional [____] shares (the "Optional Common Shares") of Common Stock, as provided in Section 2. The Firm Common Shares and, if and to the extent such option is exercised, the Optional Common Shares are collectively called the "Common Shares". NationsBanc Montgomery Securities, Inc. ("NMSI"), Donaldson, Lufkin & Jenrette Securities Corporation ("DLJ") and Paine Webber have agreed to act as representatives of the several Underwriters (in such capacity, the "Representatives") in connection with the offering and sale of the Common Shares.

The Company has prepared and filed with the Securities and Exchange Commission (the "Commission") a registration statement on Form S-1 (File No. 333-[____]), which contains a form of prospectus to be used in connection with the public offering and sale of the Common Shares. Such registration statement, as amended, including the financial statements, exhibits and schedules thereto, in the form in which it was declared effective by the Commission under the Securities Act of 1933 and the rules and regulations promulgated thereunder (collectively, the "Securities Act"), including any information deemed to be a part thereof at the time of effectiveness pursuant to Rule 430A or Rule 434 under the Securities Act, is called the "Registration Statement". Any registration statement filed by the Company pursuant to Rule 462(b) under the Securities Act is called the "Rule 462(b) Registration Statement", and from and after the date and time of filing of the Rule 462(b) Registration Statement the term "Registration Statement" shall include the Rule 462(b) Registration Statement. Such prospectus, in the form first used by the Underwriters to confirm sales of the Common Shares, is called the "Prospectus"; provided, however, if the Company has, with the consent of NMSI, elected to rely upon Rule 434 under the Securities Act, the term "Prospectus" shall mean the Company's prospectus subject

to completion (each, a "preliminary prospectus") dated [____] (such preliminary prospectus is called the "Rule 434 preliminary prospectus"), together with the applicable term sheet (the "Term Sheet") prepared and filed by the Company with the Commission under Rules 434 and 424(b) under the Securities Act and all references in this Agreement to the date of the Prospectus shall mean the date of the Term Sheet. All references in this Agreement to the Registration Statement, the Rule 462(b) Registration Statement, a preliminary prospectus, the Prospectus or the Term Sheet, or any amendments or supplements to any of the foregoing, shall include any copy thereof filed with the Commission pursuant to its Electronic Data Gathering, Analysis and Retrieval System ("EDGAR").

The Company hereby confirms its agreements with the Underwriters as follows:

Section 1. Representations and Warranties of the Company. The Company hereby represents, warrants and covenants to each Underwriter as follows:

(a) Compliance with Registration Requirements. The Registration Statement and any Rule 462(b) Registration Statement have been declared effective by the Commission under the Securities Act. The Company has complied to the Commission's satisfaction with all requests of the Commission for additional or supplemental information. No stop order suspending the effectiveness of the Registration Statement or any Rule 462(b) Registration Statement is in effect and no proceedings for such purpose have been instituted or are pending or, to the best knowledge of the Company, are contemplated or threatened by the Commission.

Each preliminary prospectus and the Prospectus when filed complied in all material respects with the Securities Act and, if filed by electronic transmission pursuant to EDGAR (except as may be permitted by Regulation S-T under the Securities Act), was identical to the copy thereof delivered to the Underwriters for use in connection with the offer and sale of the Common Shares. Each of the Registration Statement, any Rule 462(b) Registration Statement and any post-effective amendment thereto, at the time it became effective and at all subsequent times up to and including the Closing Date, complied and will comply in all material respects with the Securities Act and did not and will not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading. The Prospectus, as amended or supplemented, as of its date and at all subsequent times up to and including the Closing Date, did not and will not contain any untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading. The representations and warranties set forth in the two immediately preceding sentences do not apply to statements in or omissions from the Registration Statement, any Rule 462(b) Registration Statement, or any post-effective amendment thereto, or the Prospectus, or any amendments or supplements thereto, made in reliance upon and in conformity with information relating to any Underwriter furnished to the Company in writing by the Representatives expressly for use therein. There are no contracts or other documents required to be described in the Prospectus or to be filed as exhibits to the Registration Statement which have not been described or filed as required.

(b) Offering Materials Furnished to Underwriters. The Company has delivered to the Representatives one complete manually signed copy of the Registration Statement and of each consent and certificate of experts filed as a part thereof, and conformed copies of the Registration Statement (without exhibits) and preliminary prospectuses and the Prospectus, as amended or supplemented, in such quantities and at such places as the Representatives have reasonably requested for each of the Underwriters.

(c) Distribution of Offering Material By the Company. The Company has not distributed and will not distribute, prior to the later of the Second Closing Date (as defined below) and the completion of the Underwriters' distribution of the Common Shares, any offering material in connection with the offering and sale of the Common Shares other than a preliminary prospectus, the Prospectus or the Registration Statement.

(d) The Underwriting Agreement. This Agreement has been duly authorized, executed and delivered by, and is a valid and binding agreement of, the Company, enforceable in accordance with its terms, except as rights to indemnification hereunder may be limited by applicable law and except as the enforcement hereof may be limited by bankruptcy, insolvency, reorganization, moratorium or other similar laws relating to or affecting the rights and remedies of creditors or by general equitable principles.

(e) Authorization of the Common Shares. The Common Shares to be purchased by the Underwriters from the Company have been duly authorized for issuance and sale pursuant to this Agreement and, when issued and delivered by the Company pursuant to this Agreement, will be validly issued, fully paid and nonassessable.

(f) No Applicable Registration or Other Similar Rights. There are no persons with registration or other similar rights to have any equity or debt securities registered for sale under the Registration Statement or included in the offering contemplated by this Agreement, except for such rights as have been duly waived.

(g) No Material Adverse Change. Except as otherwise disclosed in the Prospectus, subsequent to the respective dates as of which information is given in the Prospectus: (i) there has been no material adverse change, or any development that could reasonably be expected to result in a material adverse change, in the condition, financial or otherwise, or in the earnings, business, operations or prospects, whether or not arising from transactions in the ordinary course of business, of the Company and its subsidiaries, considered as one entity (any such change is called a "Material Adverse Change"); (ii) the Company and its subsidiaries, considered as one entity, have not incurred any material liability or obligation, indirect, direct or contingent, not in the ordinary course of business nor entered into any material transaction or agreement not in the ordinary course of business; and (iii) there has been no dividend or distribution of any kind declared, paid or made by the Company or, except for dividends paid to the Company or other subsidiaries, any of its subsidiaries on any class of capital stock or repurchase or redemption by the Company or any of its subsidiaries of any class of capital stock.

(h) Independent Accountants. Coopers & Lybrand L.L.P., who have expressed their opinion with respect to the financial statements (which term as used in this Agreement includes the related notes thereto) filed with the Commission as a part of the Registration Statement and included in the Prospectus, are independent public or certified public accountants as required by the Securities Act.

(i) Preparation of the Financial Statements. The financial statements filed with the Commission as a part of the Registration Statement and included in the Prospectus present fairly the consolidated financial position of the Company and its subsidiaries as of and at the dates indicated and the results of their operations and cash flows for the periods specified. Such financial statements [and supporting schedules] have been prepared in conformity with generally accepted accounting principles applied on a consistent basis throughout the periods involved, except as may be expressly stated in the

related notes thereto. No other financial statements or supporting schedules are required to be included in the Registration Statement. The financial data set forth in the Prospectus under the captions "Prospectus Summary--Summary Selected Financial Data", "Selected Financial Data" and "Capitalization" fairly present the information set forth therein on a basis consistent with that of the audited financial statements contained in the Registration Statement.

(j) Incorporation and Good Standing of the Company and its Subsidiaries. Each of the Company and its subsidiaries has been duly incorporated and is validly existing as a corporation in good standing under the laws of the jurisdiction of its incorporation and has corporate power and authority to own, lease and operate its properties and to conduct its business as described in the Prospectus and, in the case of the Company, to enter into and perform its obligations under this Agreement. Each of the Company and each subsidiary is duly qualified as a foreign corporation to transact business and is in good standing in each other jurisdiction in which such qualification is required, whether by reason of the ownership or leasing of property or the conduct of business, except for such jurisdictions where the failure to so qualify or to be in good standing would not, individually or in the aggregate, result in a Material Adverse Change. All of the issued and outstanding capital stock of each subsidiary has been duly authorized and validly issued, is fully paid and nonassessable and is owned by the Company, directly or through subsidiaries, free and clear of any security interest, mortgage, pledge, lien, encumbrance or claim. The Company does not own or control, directly or indirectly, any corporation, association or other entity other than the subsidiaries listed in Exhibit 21.1 to the Registration Statement.

(k) Capitalization and Other Capital Stock Matters. After giving effect to the assumptions set forth in the Prospectus, (i) the authorized, issued and outstanding capital stock of the Company is as set forth in the Prospectus under the caption "Capitalization" (other than for subsequent issuances, if any, pursuant to employee benefit plans described in the Prospectus or upon exercise of outstanding options described in the Prospectus), (ii) the Common Stock (including the Common Shares) conforms in all material respects to the description thereof contained in the Prospectus. All of the issued and outstanding shares of Common Stock have been duly authorized and validly issued, are fully paid and nonassessable and have been issued in compliance with federal and state securities laws. None of the outstanding shares of Common Stock were issued in violation of any preemptive rights, rights of first refusal or other similar rights to subscribe for or purchase securities of the Company. There are no authorized or outstanding options, warrants, preemptive rights, rights of first refusal or other rights to purchase, or equity or debt securities convertible into or exchangeable or exercisable for, any capital stock of the Company or any of its subsidiaries other than those accurately described in the Prospectus. The description of the Company's stock option, stock bonus and other stock plans or arrangements, and the options or other rights granted thereunder, set forth in the Prospectus accurately and fairly presents the information required to be shown with respect to such plans, arrangements, options and rights.

(l) Stock Exchange Listing. The Common Shares have been approved for listing on the Nasdaq National Market, subject only to official notice of issuance.

(m) Non-Contravention of Existing Instruments; No Further Authorizations or Approvals Required. Neither the Company nor any of its subsidiaries is in violation of its charter or by-laws or is in default (or, with the giving of notice or lapse of time, would be in default) ("Default") under any indenture, mortgage, loan or credit agreement, note, contract, franchise, lease or other instrument to which the Company or any of its subsidiaries is a party or by which it or any of them may be bound, or to which any of the property or assets of the Company or any of its subsidiaries is subject (each, an "Existing Instrument"), except for such Defaults as would not, individually or in the aggregate, result in

a Material Adverse Change. The Company's execution, delivery and performance of this Agreement and consummation of the transactions contemplated hereby and by the Prospectus (i) have been duly authorized by all necessary corporate action and will not result in any violation of the provisions of the charter or by-laws of the Company or any subsidiary, (ii) will not conflict with or constitute a breach of, or Default under, or result in the creation or imposition of any lien, charge or encumbrance upon any property or assets of the Company or any of its subsidiaries pursuant to, or require the consent of any other part to, any Existing Instrument, except for such conflicts, breaches, Defaults, liens, charges or encumbrances as would not, individually or in the aggregate, result in a Material Adverse Change and (iii) will not result in any violation of any law, administrative regulation or administrative or court decree applicable to the Company or any subsidiary. No consent, approval, authorization or other order of, or registration or filing with, any court or other governmental or regulatory authority or agency, is required for the Company's execution, delivery and performance of this Agreement and consummation of the transactions contemplated hereby and by the Prospectus, except such as have been obtained or made by the Company and are in full force and effect under the Securities Act, applicable state securities or blue sky laws and from the National Association of Securities Dealers, Inc. (the "NASD").

(n) No Material Actions or Proceedings. There are no legal or governmental actions, suits or proceedings pending or, to the best of the Company's knowledge, threatened (i) against or affecting the Company or any of its subsidiaries, (ii) which has as the subject thereof any officer or director of, or property owned or leased by, the Company or any of its subsidiaries or (iii) relating to environmental or discrimination matters, where in any such case (A) there is a reasonable possibility that such action, suit or proceeding might be determined adversely to the Company or such subsidiary and (B) any such action, suit or proceeding, if so determined adversely, would reasonably be expected to result in a Material Adverse Change or adversely affect the consummation of the transactions contemplated by this Agreement. No material labor dispute with the employees of the Company or any of its subsidiaries exists or, to the best of the Company's knowledge, is threatened or imminent.

(o) Intellectual Property Rights. The Company and its subsidiaries own or possess sufficient trademarks, trade names, patent rights, copyrights, licenses, approvals, trade secrets and other similar rights (collectively, "Intellectual Property Rights") reasonably necessary to conduct their businesses as now conducted; and the expected expiration of any of such Intellectual Property Rights would not result in a Material Adverse Change. Neither the Company nor any of its subsidiaries has received any notice of infringement or conflict with asserted Intellectual Property Rights of others, which infringement or conflict, if the subject of an unfavorable decision, would result in a Material Adverse Change.

(p) All Necessary Permits, etc. The Company and each subsidiary possess such valid and current certificates, authorizations or permits issued by the appropriate state, federal or foreign regulatory agencies or bodies necessary to conduct their respective businesses (other than any the absence of which would not, singly or in the aggregate, result in a Material Adverse Change, and neither the Company nor any subsidiary has received any notice of proceedings relating to the revocation or modification of, or non-compliance with, any such certificate, authorization or permit which, singly or in the aggregate, if the subject of an unfavorable decision, ruling or finding, could result in a Material Adverse Change.

(q) Title to Properties. The Company and each of its subsidiaries has good and marketable title to all the properties and assets reflected as owned in the financial statements referred to in Section (i) above (or elsewhere in the Prospectus), in each case, except as disclosed in the Prospectus, free and clear of any security interests, mortgages, liens, encumbrances, equities, claims and other defects, except

such as do not materially and adversely affect the value of such property and do not materially interfere with the use made or proposed to be made of such property by the Company or such subsidiary. The real property, improvements, equipment and personal property held under lease by the Company or any subsidiary are held under valid and enforceable leases, with such exceptions as are not material and do not materially interfere with the use made or proposed to be made of such real property, improvements, equipment or personal property by the Company or such subsidiary.

(r) Tax Law Compliance. The Company and its subsidiaries have filed all necessary federal, state and foreign income and franchise tax returns or have properly requested extensions thereof and have paid all taxes required to be paid by any of them and, if due and payable, any related or similar assessment, fine or penalty levied against any of them except as may be being contested in good faith and by appropriate proceedings. The Company has made adequate charges, accruals and reserves in the applicable financial statements referred to in Section 1(i) above in respect of all federal, state and foreign income and franchise taxes for all periods as to which the tax liability of the Company or any of its subsidiaries has not been finally determined.

(s) Company Not an "Investment Company". The Company has been advised of the rules and requirements under the Investment Company Act of 1940, as amended (the "Investment Company Act"). The Company is not, and after receipt of payment for the Common Shares will not be, an "investment company" within the meaning of Investment Company Act and will conduct its business in a manner so that it will not become subject to the Investment Company Act.

(t) Insurance. Each of the Company and its subsidiaries are insured by recognized, financially sound and reputable institutions with policies in such amounts and with such deductibles and covering such risks as the Company has reasonably deemed adequate and customary for their businesses including, but not limited to, policies covering real and personal property owned or leased by the Company and its subsidiaries against theft, damage, destruction, and acts of vandalism. The Company has no reason to believe that it or any subsidiary will not be able (i) to renew its existing insurance coverage as and when such policies expire or (ii) to obtain comparable coverage from similar institutions as may be necessary or appropriate to conduct its business as now conducted and at a cost that would not result in a Material Adverse Change. Neither of the Company nor any subsidiary has been denied any insurance coverage which it has sought or for which it has applied.

(u) No Price Stabilization or Manipulation. The Company has not taken and will not take, directly or indirectly, any action designed to or that might be reasonably expected to cause or result in stabilization or manipulation of the price of the Common Stock to facilitate the sale or resale of the Common Shares.

(v) Related Party Transactions. There are no business relationships or related-party transactions involving the Company or any subsidiary or any other person required to be described in the Prospectus which have not been described as required.

(w) No Unlawful Contributions or Other Payments. Neither the Company nor any of its subsidiaries nor, to the best of the Company's knowledge, any employee or agent of the Company or any subsidiary, has made any contribution or other payment to any official of, or candidate for, any federal, state or foreign office in violation of any law or of the character required to be disclosed in the Prospectus.

Any certificate signed by an officer of the Company and delivered to the Representatives or to counsel for the Underwriters shall be deemed to be a representation and warranty by the Company to each Underwriter as to the matters set forth therein.

Section 2. Purchase, Sale and Delivery of the Common Shares.

The Firm Common Shares. The Company agrees to issue and sell to the several Underwriters the Firm Common Shares upon the terms herein set forth. On the basis of the representations, warranties and agreements herein contained, and upon the terms but subject to the conditions herein set forth, the Underwriters agree, severally and not jointly, to purchase from the Company the respective number of Firm Common Shares set forth opposite their names on Schedule A. The purchase price per Firm Common Share to be paid by the several Underwriters to the Company shall be \$[___] per share.

The First Closing Date. Delivery of certificates for the Firm Common Shares to be purchased by the Underwriters and payment therefor shall be made at the offices of NMSI, 600

Montgomery Street, San Francisco, California (or such other place as may be agreed to by the Company and the Representatives) at 6:00 a.m. San Francisco time, on [___], or such other time and date not later than 10:30 a.m. San Francisco time, on [___] as the Representatives shall designate by notice to the Company (the time and date of such closing are called the "First Closing Date"). The Company hereby acknowledges that circumstances under which the Representatives may provide notice to postpone the First Closing Date as originally scheduled include, but are in no way limited to, any determination by the Company or the Representatives to recirculate to the public copies of an amended or supplemented Prospectus or a delay as contemplated by the provisions of Section 10.

The Optional Common Shares; the Second Closing Date. In addition, on the basis of the representations, warranties and agreements herein contained, and upon the terms but subject to the conditions herein set forth, the Company hereby grants an option to the several Underwriters to purchase, severally and not jointly, up to an aggregate of [___] Optional Common Shares from the Company at the purchase price per share to be paid by the Underwriters for the Firm Common Shares. The option granted hereunder is for use by the Underwriters solely in covering any over-allotments in connection with the sale and distribution of the Firm Common Shares. The option granted hereunder may be exercised at any time (but not more than once) upon notice by the Representatives to the Company, which notice may be given at any time within 30 days from the date of this Agreement. Such notice shall set forth (i) the aggregate number of Optional Common Shares as to which the Underwriters are exercising the option, (ii) the names and denominations in which the certificates for the Optional Common Shares are to be registered and (iii) the time, date and place at which such certificates will be delivered (which time and date may be simultaneous with, but not earlier than, the First Closing Date; and in such case the term "First Closing Date" shall refer to the time and date of delivery of certificates for the Firm Common Shares and the Optional Common Shares). Such time and date of delivery, if subsequent to the First Closing Date, is called the "Second Closing Date" and shall be determined by the Representatives and shall not be earlier than three nor later than five full business days after delivery of such notice of exercise. If any Optional Common Shares are to be purchased, each Underwriter agrees, severally and not jointly, to purchase the number of Optional Common Shares (subject to such adjustments to eliminate fractional shares as the Representatives may determine) that bears the same proportion to the total number of Optional Common Shares to be purchased as the number of Firm Common Shares set forth on Schedule A opposite the name of such Underwriter bears to the total number of Firm Common Shares. The Representatives may cancel the option at any time prior to its expiration by giving written notice of such cancellation to the Company.

Public Offering of the Common Shares. The Representatives hereby advise the Company that the Underwriters intend to offer for sale to the public, as described in the Prospectus, their respective portions of the Common Shares as soon after this Agreement has been executed and the Registration Statement has been declared effective as the Representatives, in their sole judgment, have determined is advisable and practicable.

Payment for the Common Shares. Payment for the Common Shares shall be made at the First Closing Date (and, if applicable, at the Second Closing Date) by wire transfer of immediately available funds to the order of the Company.

It is understood that the Representatives have been authorized, for their own account and the accounts of the several Underwriters, to accept delivery of and receipt for, and make payment of the purchase price for, the Firm Common Shares and any Optional Common Shares the Underwriters have agreed to purchase. NMSI, individually and not as the Representatives of the Underwriters, may (but

shall not be obligated to) make payment for any Common Shares to be purchased by any Underwriter whose funds shall not have been received by the Representatives by the First Closing Date or the Second Closing Date, as the case may be, for the account of such Underwriter, but any such payment shall not relieve such Underwriter from any of its obligations under this Agreement.

Delivery of the Common Shares. The Company shall deliver, or cause to be delivered, to the Representatives for the accounts of the several Underwriters certificates for the Firm Common Shares at the First Closing Date, against the irrevocable release of a wire transfer of immediately available funds for the amount of the purchase price therefor. The Company shall also deliver, or cause to be delivered, to the Representatives for the accounts of the several Underwriters, certificates for the Optional Common Shares the Underwriters have agreed to purchase at the First Closing Date or the Second Closing Date, as the case may be, against the irrevocable release of a wire transfer of immediately available funds for the amount of the purchase price therefor. The certificates for the Common Shares shall be in definitive form and registered in such names and denominations as the Representatives shall have requested at least two full business days prior to the First Closing Date (or the Second Closing Date, as the case may be) and shall be made available for inspection on the business day preceding the First Closing Date (or the Second Closing Date, as the case may be) at a location in New York City as the Representatives may designate. Time shall be of the essence, and delivery at the time and place specified in this Agreement is a further condition to the obligations of the Underwriters.

Delivery of Prospectus to the Underwriters. Not later than 12:00 p.m. on the second business day following the date the Common Shares are released by the Underwriters for sale to the public, the Company shall delivery or cause to be delivered copies of the Prospectus in such quantities and at such places as the Representatives shall request.

Section 3. Additional Covenants of the Company. The Company further covenants and agrees with each Underwriter as follows:

(a) Representatives' Review of Proposed Amendments and Supplements. During such period beginning on the date hereof and ending on the later of the First Closing Date or such date, as in the opinion of counsel for the Underwriters, the Prospectus is no longer required by law to be delivered in connection with sales by an Underwriter or dealer (the "Prospectus Delivery Period"), prior to amending or supplementing the Registration Statement (including any registration statement filed under Rule 462(b) under the Securities Act) or the Prospectus, the Company shall furnish to the Representatives for review a copy of each such proposed amendment or supplement, and the Company shall not file any such proposed amendment or supplement to which the Representatives reasonably object.

(b) Securities Act Compliance. After the date of this Agreement, the Company shall promptly advise the Representatives in writing (i) of the receipt of any comments of, or requests for additional or supplemental information from, the Commission, (ii) of the time and date of any filing of any post-effective amendment to the Registration Statement or any amendment or supplement to any preliminary prospectus or the Prospectus, (iii) of the time and date that any post-effective amendment to the Registration Statement becomes effective and (iv) of the issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement or any post-effective amendment thereto or of any order preventing or suspending the use of any preliminary prospectus or the Prospectus, or of any proceedings to remove, suspend or terminate from listing or quotation the Common Stock from any securities exchange upon which it is listed for trading or included or designated for quotation, or of

the threatening or initiation of any proceedings for any of such purposes. If the Commission shall enter any such stop order at any time, the Company will use its best efforts to obtain the lifting of such order at the earliest possible moment. Additionally, the Company agrees that it shall comply with the provisions of Rules 424(b), 430A and 434, as applicable, under the Securities Act and will use its reasonable efforts to confirm that any filings made by the Company under such Rule 424(b) were received in a timely manner by the Commission.

(c) Amendments and Supplements to the Prospectus and Other Securities Act Matters. If, during the Prospectus Delivery Period, any event shall occur or condition exist as a result of which it is necessary to amend or supplement the Prospectus in order to make the statements therein, in the light of the circumstances when the Prospectus is delivered to a purchaser, not misleading, or if in the opinion of the Representatives or counsel for the Underwriters it is otherwise necessary to amend or supplement the Prospectus to comply with law, the Company agrees to promptly prepare (subject to Section 3(a) hereof), file with the Commission and furnish at its own expense to the Underwriters and to dealers, amendments or supplements to the Prospectus so that the statements in the Prospectus as so amended or supplemented will not, in the light of the circumstances when the Prospectus is delivered to a purchaser, be misleading or so that the Prospectus, as amended or supplemented, will comply with law.

(d) Copies of any Amendments and Supplements to the Prospectus. The Company agrees to furnish the Representatives, without charge, during the Prospectus Delivery Period, as many copies of the Prospectus and any amendments and supplements thereto as the Representatives may request.

(e) Blue Sky Compliance. The Company shall cooperate with the Representatives and counsel for the Underwriters to qualify or register the Common Shares for sale under (or obtain exemptions from the application of) the state securities or blue sky laws or Canadian provincial Securities laws of those jurisdictions designated by the Representatives, shall comply with such laws and shall continue such qualifications, registrations and exemptions in effect so long as required for the distribution of the Common Shares. The Company shall not be required to qualify as a foreign corporation or to take any action that would subject it to general service of process in any such jurisdiction where it is not presently qualified or where it would be subject to taxation as a foreign corporation. The Company will advise the Representatives promptly of the suspension of the qualification or registration of (or any such exemption relating to) the Common Shares for offering, sale or trading in any jurisdiction or any initiation or threat of any proceeding for any such purpose, and in the event of the issuance of any order suspending such qualification, registration or exemption, the Company shall use its best efforts to obtain the withdrawal thereof at the earliest possible moment.

(f) Use of Proceeds. The Company shall apply the net proceeds from the sale of the Common Shares sold by it in the manner described under the caption "Use of Proceeds" in the Prospectus.

(g) Transfer Agent. The Company shall engage and maintain, at its expense, a registrar and transfer agent for the Common Stock.

(h) Earnings Statement. As soon as practicable, the Company will make generally available to its security holders and to the Representatives an earnings statement (which need not be audited) covering the twelve-month period ending [___] that satisfies the provisions of Section 11(a) of the Securities Act.

(i) Periodic Reporting Obligations. During the Prospectus Delivery Period the Company shall file, on a timely basis, with the Commission and the Nasdaq National Market all reports and documents required to be filed under the Exchange Act.

(j) Agreement Not To Offer or Sell Additional Securities During the period of 180 days following the date of the Prospectus, the Company will not, without the prior written consent of NMSI (which consent may be withheld at the sole discretion of NMSI), directly or indirectly, sell, offer, contract or grant any option to sell, pledge, transfer or establish an open "put equivalent position" within the meaning of Rule 16a-1(h) under the Exchange Act, or otherwise dispose of or transfer, or announce the offering of, or file any registration statement under the Securities Act in respect of, any shares of Common Stock, options or warrants to acquire shares of the Common Stock or securities exchangeable or exercisable for or convertible into shares of Common Stock (other than as contemplated by this Agreement with respect to the Common Shares); provided, however, that the Company may issue shares of its Common Stock or options to purchase its Common Stock, or Common Stock upon exercise of options, pursuant to any stock option, stock bonus or other stock plan or arrangement described in the Prospectus, (ii) file one or more Registration Statements on Form S-8, and (iii) issue shares in connection with any acquisition if recipients agree in writing not to sell, offer, dispose of or otherwise transfer any such shares during such 180 day period without the prior written consent of NMSI (which consent may be withheld at the sole discretion of the NMSI).

(k) Future Reports to the Representatives. During the period of five years hereafter the Company will furnish to the Representatives at [600 Montgomery Street, San Francisco, CA 94111] [9 West 57th Street, New York, NY 10022] [Two International Place, Boston, MA 02110] Attention:[]: (i) as soon as practicable after the end of each fiscal year, copies of the Annual Report of the Company containing the balance sheet of the Company as of the close of such fiscal year and statements of income, stockholders' equity and cash flows for the year then ended and the opinion thereon of the Company's independent public or certified public accountants; (ii) as soon as practicable after the filing thereof, copies of each proxy statement, Annual Report on Form 10-K, Quarterly Report on Form 10-Q, Current Report on Form 8-K or other report filed by the Company with the Commission, the NASD or any securities exchange; and (iii) as soon as available, copies of any report or communication of the Company mailed generally to holders of its capital stock.

Section 4. Payment of Expenses. The Company agrees to pay all costs, fees and expenses incurred in connection with the performance of its obligations hereunder and in connection with the transactions contemplated hereby, including without limitation (i) all expenses incident to the issuance and delivery of the Common Shares (including all printing and engraving costs), (ii) all fees and expenses of the registrar and transfer agent of the Common Stock, (iii) all necessary issue, transfer and other stamp taxes in connection with the issuance and sale of the Common Shares to the Underwriters, (iv) all fees and expenses of the Company's counsel, independent public or certified public accountants and other advisors, (v) all costs and expenses incurred in connection with the preparation, printing, filing, shipping and distribution of the Registration Statement (including financial statements, exhibits, schedules, consents and certificates of experts), each preliminary prospectus and the Prospectus, and all amendments and supplements thereto, and this Agreement, (vi) all filing fees, attorneys' fees and expenses incurred by the Company or the Underwriters in connection with qualifying or registering (or obtaining exemptions from the qualification or registration of) all or any part of the Common Shares for offer and sale under the state securities or blue sky laws or the provincial securities laws of Canada, and, if requested by the Representatives, preparing and printing a "Blue Sky Survey" or memorandum, and any supplements thereto, advising the Underwriters of such qualifications, registrations and exemptions,

(vii) the filing fees incident to, and the reasonable fees and expenses of counsel for the Underwriters in connection with, the NASD's review and approval of the Underwriters' participation in the offering and distribution of the Common Shares, (viii) the fees and expenses associated with [listing] the Common Shares on the Nasdaq National Market, and (ix) all other fees, costs and expenses referred to in Item 13 of Part II of the Registration Statement. Except as provided in this Section 4, Section 6, Section 8 and Section 9 hereof, the Underwriters shall pay their own expenses, including the fees and disbursements of their counsel.

Section 5. Conditions of the Obligations of the Underwriters. The obligations of the several Underwriters to purchase and pay for the Common Shares as provided herein on the First Closing Date and, with respect to the Optional Common Shares, the Second Closing Date, shall be subject to the accuracy of the representations and warranties on the part of the Company set forth in Section 1 hereof as of the date hereof and as of the First Closing Date as though then made and, with respect to the Optional Common Shares, as of the Second Closing Date as though then made, to the timely performance by the Company of its covenants and other obligations hereunder, and to each of the following additional conditions:

(a) Accountants' Comfort Letter. On the date hereof, the Representatives shall have received from Coopers & Lybrand LLP, independent public or certified public accountants for the Company, a letter dated the date hereof addressed to the Underwriters, in form and substance satisfactory to the Representatives, containing statements and information of the type ordinarily included in accountant's "comfort letters" to underwriters, delivered according to Statement of Auditing Standards No. 72 (or any successor bulletin), with respect to the audited and unaudited financial statements and certain financial information contained in the Registration Statement and the Prospectus (and the Representatives shall have received an additional [] conformed copies of such accountants' letter for each of the several Underwriters).

(b) Compliance with Registration Requirements; No Stop Order; No Objection from NASD. For the period from and after effectiveness of this Agreement and prior to the First Closing Date and, with respect to the Optional Common Shares, the Second Closing Date:

(i) the Company shall have filed the Prospectus with the Commission (including the information required by Rule 430A under the Securities Act) in the manner and within the time period required by Rule 424(b) under the Securities Act; or the Company shall have filed a post-effective amendment to the Registration Statement containing the information required by such Rule 430A, and such post-effective amendment shall have become effective; or, if the Company elected to rely upon Rule 434 under the Securities Act and obtained the Representatives' consent thereto, the Company shall have filed a Term Sheet with the Commission in the manner and within the time period required by such Rule 424(b);

(ii) no stop order suspending the effectiveness of the Registration Statement, any Rule 462(b) Registration Statement, or any post-effective amendment to the Registration Statement, shall be in effect and no proceedings for such purpose shall have been instituted or threatened by the Commission; and

(iii) the NASD shall have raised no objection to the fairness and reasonableness of the underwriting terms and arrangements.

(c) No Material Adverse Change or Ratings Agency Change. For the period from and after the date of this Agreement and prior to the First Closing Date and, with respect to the Optional Common Shares, the Second Closing Date:

(i) in the judgment of the Representatives there shall not have occurred any Material Adverse Change; and

(ii) there shall not have occurred any downgrading, nor shall any notice have been given of any intended or potential downgrading or of any review for a possible change that does not indicate the direction of the possible change, in the rating accorded any securities of the Company or any of its subsidiaries by any "nationally recognized statistical rating organization" as such term is defined for purposes of Rule 436(g)(2) under the Securities Act.

(d) Opinion of Counsel for the Company. On each of the First Closing Date and the Second Closing Date the Representatives shall have received the favorable opinion of Hale and Dorr, counsel for the Company, dated as of such Closing Date, reasonably satisfactory to the Representatives with respect to the matters set forth in attached as Exhibit A-1. On each of the First Closing Date and the Second Closing Date the Representatives shall have received the favorable opinion of Hill & Barlow, counsel for the Company, dated as of such Closing Date, reasonably satisfactory to the Representatives with respect to the matters set forth attached as Exhibit A-2. In each case, the Representatives shall have received an additional [___] conformed copies of such counsel's legal opinions for each of the several Underwriters.

(e) Opinion of Counsel for the Underwriters. On each of the First Closing Date and the Second Closing Date the Representatives shall have received the favorable opinion of Ropes & Gray, counsel for the Underwriters, dated as of such Closing Date, with respect to the matters set forth in paragraphs (i), (viii) (ix) and the next-to-last paragraph of Exhibit A (and the Representatives shall have received an additional [___] conformed copies of such counsel's legal opinion for each of the several Underwriters).

(f) Officers' Certificate. On each of the First Closing Date and the Second Closing Date the Representatives shall have received a written certificate executed by the Chairman of the Board, Chief Executive Officer or President of the Company and the Chief Financial Officer or Chief Accounting Officer of the Company, dated as of such Closing Date, to the effect set forth in subsections (b)(ii) and (c)(ii) of this Section 5, and further to the effect that:

(i) for the period from and after the date of this Agreement and prior to such Closing Date, there has not occurred any Material Adverse Change;

(ii) the representations, warranties and covenants of the Company set forth in Section 1 of this Agreement are true and correct with the same force and effect as though expressly made on and as of such Closing Date; and

(iii) the Company has complied with all the agreements and satisfied all the conditions on its part to be performed or satisfied at or prior to such Closing Date.

(g) Bring-down Comfort Letter. On each of the First Closing Date and the Second Closing Date the Representatives shall have received from Coopers & Lybrand, independent public or certified public accountants for the Company, a letter dated such date, in form and substance satisfactory to the

Representatives, to the effect that they reaffirm the statements made in the letter furnished by them pursuant to subsection (a) of this Section 5, except that the specified date referred to therein for the carrying out of procedures shall be no more than three business days prior to the First Closing Date or Second Closing Date, as the case may be (and the Representatives shall have received an additional [] conformed copies of such accountants' letter for each of the several Underwriters).

(h) Lock-Up Agreement from Stockholders and Optionholders of the Company. On the date hereof, the Company shall have furnished to the Representatives an agreement in the form of Exhibit B hereto from those stockholders and optionholders of the Company as agreed among the Company and the Representatives, and such agreement shall be in full force and effect on each of the First Closing Date and the Second Closing Date.

(i) Additional Documents. On or before each of the First Closing Date and the Second Closing Date, the Representatives and counsel for the Underwriters shall have received such information, documents and opinions as they may reasonably require for the purposes of enabling them to pass upon the issuance and sale of the Common Shares as contemplated herein, or in order to evidence the accuracy of any of the representations and warranties, or the satisfaction of any of the conditions or agreements, herein contained.

If any condition specified in this Section 5 is not satisfied when and as required to be satisfied, this Agreement may be terminated by the Representatives by notice to the Company at any time on or prior to the First Closing Date and, with respect to the Optional Common Shares, at any time prior to the Second Closing Date, which termination shall be without liability on the part of any party to any other party, except that Section 4, Section 6, Section 8 and Section 9 shall at all times be effective and shall survive such termination.

Section 6. Reimbursement of Underwriters' Expenses. If this Agreement is terminated by the Representatives pursuant to Section 5, Section 7, or Section 11 (iv) or 11(v), or if the sale to the Underwriters of the Common Shares on the First Closing Date is not consummated because of any refusal, inability or failure on the part of the Company to perform any agreement herein or to comply with any provision hereof, the Company agrees to reimburse the Representatives and the other Underwriters (or such Underwriters as have terminated this Agreement with respect to themselves), severally, upon demand for all out-of-pocket expenses that shall have been reasonably incurred by the Representatives and the Underwriters in connection with the proposed purchase and the offering and sale of the Common Shares, including but not limited to fees and disbursements of counsel, printing expenses, travel expenses, postage, facsimile and telephone charges.

Section 7. Effectiveness of this Agreement.

This Agreement shall not become effective until the later of (i) the execution of this Agreement by the parties hereto and (ii) notification by the Commission to the Company and the Representatives of the effectiveness of the Registration Statement under the Securities Act.

Prior to such effectiveness, this Agreement may be terminated by any party by notice to each of the other parties hereto, and any such termination shall be without liability on the part of (a) the Company to any Underwriter, except that the Company shall be obligated to reimburse the expenses of the Representatives and the Underwriters pursuant to Sections 4 and 6 hereof, (b) of any Underwriter to

the Company, or (c) of any party hereto to any other party except that the provisions of Section 8 and Section 9 shall at all times be effective and shall survive such termination.

Section 8. Indemnification.

(a) Indemnification of the Underwriters. The Company agrees to indemnify and hold harmless each Underwriter, its officers and employees, and each person, if any, who controls any Underwriter within the meaning of the Securities Act and the Exchange Act against any loss, claim, damage, liability or expense, as incurred, to which such Underwriter or such controlling person may become subject, under the Securities Act, the Exchange Act or other federal or state statutory law or regulation, or at common law or otherwise (including in settlement of any litigation, if such settlement is effected with the written consent of the Company), insofar as such loss, claim, damage, liability or expense (or actions in respect thereof as contemplated below) arises out of or is based (i) upon any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, or any amendment thereto, including any information deemed to be a part thereof pursuant to Rule 430A or Rule 434 under the Securities Act, or the omission or alleged omission therefrom of a material fact required to be stated therein or necessary to make the statements therein not misleading; or (ii) upon any untrue statement or alleged untrue statement of a material fact contained in any preliminary prospectus or the Prospectus (or any amendment or supplement thereto), or the omission or alleged omission therefrom of a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; or (iii) in whole or in part upon any inaccuracy in the representations and warranties of the Company contained herein; or (iv) in whole or in part upon any failure of the Company to perform its obligations hereunder or under law; or (v) any act or failure to act or any alleged act or failure to act by any Underwriter in connection with, or relating in any manner to, the Common Stock or the offering contemplated hereby, and which is included as part of or referred to in any loss, claim, damage, liability or action arising out of or based upon any matter covered by clause (i) or (ii) above, provided that the Company shall not be liable under this clause (v) to the extent that a court of competent jurisdiction shall have determined by a final judgment that such loss, claim, damage, liability or action resulted directly from any such acts or failures to act undertaken or omitted to be taken by such Underwriter through its bad faith or willful misconduct; and to reimburse each Underwriter and each such controlling person for any and all expenses (including the fees and disbursements of counsel chosen by NMSI) as such expenses are reasonably incurred by such Underwriter or such controlling person in connection with investigating, defending, settling, compromising or paying any such loss, claim, damage, liability, expense or action; provided, however, that the foregoing indemnity agreement shall not apply to any loss, claim, damage, liability or expense to the extent, but only to the extent, arising out of or based upon any untrue statement or alleged untrue statement or omission or alleged omission made in reliance upon and in conformity with written information furnished to the Company by the Representatives expressly for use in the Registration Statement, any preliminary prospectus or the Prospectus (or any amendment or supplement thereto); and provided, further, that with respect to any preliminary prospectus, the foregoing indemnity agreement shall not inure to the benefit of any Underwriter from whom the person asserting any loss, claim, damage, liability or expense purchased Common Shares, or any person controlling such Underwriter, if copies of the Prospectus were timely delivered to the Underwriter pursuant to Section 2 and a copy of the Prospectus (as then amended or supplemented if the Company shall have furnished any amendments or supplements thereto) was not sent or given by or on behalf of such Underwriter to such person, if required by law so to have been delivered, at or prior to the written confirmation of the sale of the Common Shares to such person, and if the Prospectus (as so amended or supplemented) would have cured the defect giving rise to such loss, claim,

damage, liability or expense. The indemnity agreement set forth in this Section 8(a) shall be in addition to any liabilities that the Company may otherwise have.

(b) Indemnification of the Company, its Directors and Officers. Each Underwriter agrees, severally and not jointly, to indemnify and hold harmless the Company, each of its directors, each of its officers who signed the Registration Statement and each person, if any, who controls the Company within the meaning of the Securities Act or the Exchange Act, against any loss, claim, damage, liability or expense, as incurred, to which the Company, or any such director, officer or controlling person may become subject, under the Securities Act, the Exchange Act, or other federal or state statutory law or regulation, or at common law or otherwise (including in settlement of any litigation, if such settlement is effected with the written consent of such Underwriter), insofar as such loss, claim, damage, liability or expense (or actions in respect thereof as contemplated below) arises out of or is based upon any untrue or alleged untrue statement of a material fact contained in the Registration Statement, any preliminary prospectus or the Prospectus (or any amendment or supplement thereto), or arises out of or is based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, in each case to the extent, but only to the extent, that such untrue statement or alleged untrue statement or omission or alleged omission was made in the Registration Statement, any preliminary prospectus, the Prospectus (or any amendment or supplement thereto), in reliance upon and in conformity with written information furnished to the Company by the Representatives expressly for use therein; and to reimburse the Company, or any such director, officer or controlling person for any legal and other expense reasonably incurred by the Company, or any such director, officer or controlling person in connection with investigating, defending, settling, compromising or paying any such loss, claim, damage, liability, expense or action. The Company hereby acknowledges that the only information that the Underwriters have furnished to the Company expressly for use in the Registration Statement, any preliminary prospectus or the Prospectus (or any amendment or supplement thereto) are the statements set forth (A) as the last [two] paragraphs on the inside front cover page of the Prospectus concerning stabilization [and passive market making] by the Underwriters and (B) in the table in the first paragraph and as the second paragraph [second and [] (1) paragraphs] under the caption "Underwriting" in the Prospectus; and the Underwriters confirm that such statements are correct. The indemnity agreement set forth in this Section 8(b) shall be in addition to any liabilities that each Underwriter may otherwise have.

(c) Notifications and Other Indemnification Procedures. Promptly after receipt by an indemnified party under this Section 8 of notice of the commencement of any action, such indemnified party will, if a claim in respect thereof is to be made against an indemnifying party under this Section 8, notify the indemnifying party in writing of the commencement thereof, but the omission so to notify the indemnifying party will not relieve it from any liability which it may have to any indemnified party for contribution or otherwise than under the indemnity agreement contained in this Section 8 or to the extent it is not prejudiced as a proximate result of such failure. In case any such action is brought against any indemnified party and such indemnified party seeks or intends to seek indemnity from an indemnifying party, the indemnifying party will be entitled to participate in, and, to the extent that it shall elect, jointly with all other indemnifying parties similarly notified, by written notice delivered to the indemnified party promptly after receiving the aforesaid notice from such indemnified party, to assume the defense thereof with counsel reasonably satisfactory to such indemnified party; provided, however, if the defendants in any such action include both the indemnified party and the indemnifying party and the indemnified party shall have reasonably concluded that a conflict may arise between the positions of the indemnifying party and the indemnified party in conducting the defense of any such action or that there may be legal defenses available to it and/or other indemnified parties which are different from or

additional to those available to the indemnifying party, the indemnified party or parties shall have the right to select separate counsel to assume such legal defenses and to otherwise participate in the defense of such action on behalf of such indemnified party or parties. Upon receipt of notice from the indemnifying party to such indemnified party of such indemnifying party's election so to assume the defense of such action and approval by the indemnified party of counsel, the indemnifying party will not be liable to such indemnified party under this Section 8 for any legal or other expenses subsequently incurred by such indemnified party in connection with the defense thereof unless (i) the indemnified party shall have employed separate counsel in accordance with the proviso to the next preceding sentence (it being understood, however, that the indemnifying party shall not be liable for the expenses of more than one separate counsel (together with local counsel), approved by the indemnifying party (NMSI in the case of Section 8(b) and Section 9), representing the indemnified parties who are parties to such action) or (ii) the indemnifying party shall not have employed counsel satisfactory to the indemnified party to represent the indemnified party within a reasonable time after notice of commencement of the action, in each of which cases the fees and expenses of counsel shall be at the expense of the indemnifying party.

(d) Settlements. The indemnifying party under this Section 8 shall not be liable for any settlement of any proceeding effected without its written consent, but if settled with such consent or if there be a final judgment for the plaintiff, the indemnifying party agrees to indemnify the indemnified party against any loss, claim, damage, liability or expense by reason of such settlement or judgment. Notwithstanding the foregoing sentence, if at any time an indemnified party shall have requested an indemnifying party to reimburse the indemnified party for fees and expenses of counsel as contemplated by Section 8(c) hereof, the indemnifying party agrees that it shall be liable for any settlement of any proceeding effected without its written consent if (i) such settlement is entered into more than 30 days after receipt by such indemnifying party of the aforesaid request and (ii) such indemnifying party shall not have reimbursed the indemnified party in accordance with such request prior to the date of such settlement. No indemnifying party shall, without the prior written consent of the indemnified party, effect any settlement, compromise or consent to the entry of judgment in any pending or threatened action, suit or proceeding in respect of which any indemnified party is or could have been a party and indemnity was or could have been sought hereunder by such indemnified party, unless such settlement, compromise or consent includes an unconditional release of such indemnified party from all liability on claims that are the subject matter of such action, suit or proceeding.

Section 9. Contribution.

If the indemnification provided for in Section 8 is for any reason held to be unavailable to or otherwise insufficient to hold harmless an indemnified party in respect of any losses, claims, damages, liabilities or expenses referred to therein, then each indemnifying party shall contribute to the aggregate amount paid or payable by such indemnified party, as incurred, as a result of any losses, claims, damages, liabilities or expenses referred to therein (i) in such proportion as is appropriate to reflect the relative benefits received by the Company, on the one hand, and the Underwriters, on the other hand, from the offering of the Common Shares pursuant to this Agreement or (ii) if the allocation provided by clause (i) above is not permitted by applicable law, in such proportion as is appropriate to reflect not only the relative benefits referred to in clause (i) above but also the relative fault of the Company, on the one hand, and the Underwriters, on the other hand, in connection with the statements or omissions or inaccuracies in the representations and warranties herein which resulted in such losses, claims, damages, liabilities or expenses, as well as any other relevant equitable considerations. The relative benefits received by the Company, on the one hand, and the Underwriters, on the other hand, in

connection with the offering of the Common Shares pursuant to this Agreement shall be deemed to be in the same respective proportions as the total net proceeds from the offering of the Common Shares pursuant to this Agreement (before deducting expenses) received by the Company, and the total underwriting discount received by the Underwriters, in each case as set forth on the front cover page of the Prospectus (or, if Rule 434 under the Securities Act is used, the corresponding location on the Term Sheet) bear to the aggregate initial public offering price of the Common Shares as set forth on such cover. The relative fault of the Company, on the one hand, and the Underwriters, on the other hand, shall be determined by reference to, among other things, whether any such untrue or alleged untrue statement of a material fact or omission or alleged omission to state a material fact or any such inaccurate or alleged inaccurate representation or warranty relates to information supplied by the Company, on the one hand, or the Underwriters, on the other hand, and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission.

The amount paid or payable by a party as a result of the losses, claims, damages, liabilities and expenses referred to above shall be deemed to include, subject to the limitations set forth in Section 8(c), any legal or other fees or expenses reasonably incurred by such party in connection with investigating or defending any action or claim. The provisions set forth in Section 8(c) with respect to notice of commencement of any action shall apply if a claim for contribution is to be made under this Section 9; provided, however, that no additional notice shall be required with respect to any action for which notice has been given under Section 8(c) for purposes of indemnification.

The Company and the Underwriters agree that it would not be just and equitable if contribution pursuant to this Section 9 were determined by pro rata allocation (even if the Underwriters were treated as one entity for such purpose) or by any other method of allocation which does not take account of the equitable considerations referred to in this Section 9.

Notwithstanding the provisions of this Section 9, no Underwriter shall be required to contribute any amount in excess of the underwriting commissions received by such Underwriter in connection with the Common Shares underwritten by it and distributed to the public. No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation. The Underwriters' obligations to contribute pursuant to this Section 9 are several, and not joint, in proportion to their respective underwriting commitments as set forth opposite their names in Schedule A. For purposes of this Section 9, each officer and employee of an Underwriter and each person, if any, who controls an Underwriter within the meaning of the Securities Act and the Exchange Act shall have the same rights to contribution as such Underwriter, and each director of the Company, each officer of the Company who signed the Registration Statement, and each person, if any, who controls the Company with the meaning of the Securities Act and the Exchange Act shall have the same rights to contribution as the Company.

Section 10. Default of One or More of the Several Underwriters. If, on the First Closing Date or the Second Closing Date, as the case may be, any one or more of the several Underwriters shall fail or refuse to purchase Common Shares that it or they have agreed to purchase hereunder on such date, and the aggregate number of Common Shares which such defaulting Underwriter or Underwriters agreed but failed or refused to purchase does not exceed 10% of the aggregate number of the Common Shares to be purchased on such date, the other Underwriters shall be obligated, severally, in the proportions that the number of Firm Common Shares set forth opposite their respective names on Schedule A bears to the aggregate number of Firm Common Shares set forth opposite the names of all such non-defaulting

Underwriters, or in such other proportions as may be specified by the Representatives with the consent of the non-defaulting Underwriters, to purchase the Common Shares which such defaulting Underwriter or Underwriters agreed but failed or refused to purchase on such date. If, on the First Closing Date or the Second Closing Date, as the case may be, any one or more of the Underwriters shall fail or refuse to purchase Common Shares and the aggregate number of Common Shares with respect to which such default occurs exceeds 10% of the aggregate number of Common Shares to be purchased on such date, and arrangements satisfactory to the Representatives and the Company for the purchase of such Common Shares are not made within 48 hours after such default, this Agreement shall terminate without liability of any party to any other party except that the provisions of Section 4, Section [] and Section 9 shall at all times be effective and shall survive such termination. In any such case either the Representatives or the Company shall have the right to postpone the First Closing Date or the Second Closing Date, as the case may be, but in no event for longer than seven days in order that the required changes, if any, to the Registration Statement and the Prospectus or any other documents or arrangements may be effected.

As used in this Agreement, the term "Underwriter" shall be deemed to include any person substituted for a defaulting Underwriter under this Section 10. Any action taken under this Section 10 shall not relieve any defaulting Underwriter from liability in respect of any default of such Underwriter under this Agreement.

Section 11. Termination of this Agreement. Prior to the First Closing Date this Agreement may be terminated by the Representatives by notice given to the Company if at any time (i) trading or quotation in any of the Company's securities shall have been suspended or limited by the Commission or by the Nasdaq Stock Market, or trading in securities generally on either the Nasdaq Stock Market or the New York Stock Exchange shall have been suspended or limited, or minimum or maximum prices shall have been generally established on any of such stock exchanges by the Commission or the NASD; (ii) a general banking moratorium shall have been declared by any of federal, New York or California authorities; (iii) there shall have occurred any outbreak or escalation of national or international hostilities or any crisis or calamity, or any change in the United States or international financial markets, or any substantial change or development involving a prospective substantial change in United States' or international political, financial or economic conditions, as in the judgment of the Representatives is material and adverse and makes it impracticable to market the Common Shares in the manner and on the terms described in the Prospectus or to enforce contracts for the sale of securities; (iv) in the judgment of the Representatives there shall have occurred any Material Adverse Change; or (v) the Company shall have sustained a loss by strike, fire, flood, earthquake, accident or other calamity of such character as in the judgment of the Representatives may interfere materially with the conduct of the business and operations of the Company regardless of whether or not such loss shall have been insured. Any termination pursuant to this Section 11 shall be without liability on the part of (a) the Company to any Underwriter, except that the Company shall be obligated to reimburse the expenses of the Representatives and the Underwriters pursuant to Sections 4 and 6 hereof, (b) any Underwriter to the Company, or (c) of any party hereto to any other party except that the provisions of Section 8 and Section 9 shall at all times be effective and shall survive such termination.

Section 12. Representations and Indemnities to Survive Delivery. The respective indemnities, agreements, representations, warranties and other statements of the Company, of its officers and of the several Underwriters set forth in or made pursuant to this Agreement will remain in full force and effect, regardless of any investigation made by or on behalf of any Underwriter or the Company or any of its or their partners, officers or directors or any controlling person, as the case may be, and will survive delivery of and payment for the Common Shares sold hereunder and any termination of this Agreement.

Section 13. All communications hereunder shall be in writing and shall be mailed, hand delivered or telecopied and confirmed to the parties hereto as follows:

If to the Representatives:

NationsBanc Montgomery Securities, Inc.
600 Montgomery Street
San Francisco, California 94111
Facsimile: 415-249-5558
Attention: Richard A. Smith

with copies to:

NationsBanc Montgomery Securities, Inc.
600 Montgomery Street
San Francisco, California 94111
Facsimile: (415) 249-5553
Attention: David A. Baylor, Esq.

and

Ropes & Gray
One International Place
Boston, MA 02110
Facsimile: (617) 951-7050
Attention: David C. Chapin

If to the Company:

MKS Instruments, Inc.
Six Shattuck Road
Andover, MA 01810
Facsimile: (978) 975-2350
Attention: President

with a copy to:

Hale and Dorr
60 State Street
Boston, MA 02109
Facsimile: (617) 526-5000
Attention: Mark G. Borden

Section 14. Successors. This Agreement will inure to the benefit of and be binding upon the parties hereto, including any substitute Underwriters pursuant to Section 10 hereof, and to the benefit of the employees, officers and directors and controlling persons referred to in Section 8 and Section 9, and in each case their respective successors, and no other person will have any right or obligation hereunder.

The term "successors" shall not include any purchaser of the Common Shares as such from any of the Underwriters merely by reason of such purchase.

Section 15. Partial Unenforceability. The invalidity or unenforceability of any Section, paragraph or provision of this Agreement shall not affect the validity or enforceability of any other Section, paragraph or provision hereof. If any Section, paragraph or provision of this Agreement is for any reason determined to be invalid or unenforceable, there shall be deemed to be made such minor changes (and only such minor changes) as are necessary to make it valid and enforceable.

Section 16. (a) Governing Law Provisions. THIS AGREEMENT SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE INTERNAL LAWS OF THE STATE OF NEW YORK APPLICABLE TO AGREEMENTS MADE AND TO BE PERFORMED IN SUCH STATE.

Section 17. General Provisions. This Agreement constitutes the entire agreement of the parties to this Agreement and supersedes all prior written or oral and all contemporaneous oral agreements, understandings and negotiations with respect to the subject matter hereof. This Agreement may be executed in two or more counterparts, each one of which shall be an original, with the same effect as if the signatures thereto and hereto were upon the same instrument. This Agreement may not be amended or modified unless in writing by all of the parties hereto, and no condition herein (express or implied) may be waived unless waived in writing by each party whom the condition is meant to benefit. The Table of Contents and the Section headings herein are for the convenience of the parties only and shall not affect the construction or interpretation of this Agreement.

Each of the parties hereto acknowledges that it is a sophisticated business person who was adequately represented by counsel during negotiations regarding the provisions hereof, including, without limitation, the indemnification provisions of Section 8 and the contribution provisions of Section 9, and is fully informed regarding said provisions. Each of the parties hereto further acknowledges that the provisions of Sections 8 and 9 hereto fairly allocate the risks in light of the ability of the parties to investigate the Company, its affairs and its business in order to assure that adequate disclosure has been made in the Registration Statement, any preliminary prospectus and the Prospectus (and any amendments and supplements thereto), as required by the Securities Act and the Exchange Act.

If the foregoing is in accordance with your understanding of our agreement, kindly sign and return to the Company the enclosed copies hereof, whereupon this instrument, along with all counterparts hereof, shall become a binding agreement in accordance with its terms.

Very truly yours,

MKS INSTRUMENTS, INC.

By: _____
President

The foregoing Underwriting Agreement is hereby confirmed and accepted by the Representatives in San Francisco, California as of the date first above written.

NATIONSBANC MONTGOMERY SECURITIES, INC.
DONALDSON, LUFKIN & JENRETTE SECURITIES CORPORATION
PAINE WEBBER

Acting as Representatives of the several Underwriters named in the attached
Schedule A.

By NATIONSBANC MONTGOMERY SECURITIES, INC.

By: _____
Partner

SCHEDULE A

Underwriters

Number of Firm Common Shares to be Purchased

NationsBanc Montgomery Securities, Inc.
Donaldson, Lufkin & Jenrette Securities Corporation
Paine Webber

EXHIBIT A-1

The final opinion in draft form should be attached as Exhibit A at the time this Agreement is executed.

Opinion of counsel for the Company to be delivered pursuant to Section 5(e) of the Underwriting Agreement.

References to the Prospectus in this Exhibit A include any supplements thereto at the Closing Date.

(i) The Company is validly existing as a corporation in good standing under the laws of The Commonwealth of Massachusetts.

(ii) The authorized, issued and outstanding capital stock of the Company (including the Common Stock) conform to the descriptions thereof set forth [or incorporated by reference] in the Prospectus. All of the outstanding shares of Common Stock have been duly authorized and validly issued, are fully paid and nonassessable. The form of certificate used to evidence the Common Stock is in due and proper form and complies with all applicable requirements of the charter and by-laws of the Company and The Commonwealth of Massachusetts. The description of the Company's stock option, stock bonus and other stock plans or arrangements, and the options or other rights granted and exercised thereunder, set forth in the Prospectus accurately and fairly presents the information required to be shown with respect to such plans, arrangements, options and rights.

(iii) The Underwriting Agreement has been duly authorized, executed and delivered by the Company.

(iv) The Common Shares to be purchased by the Underwriters from the Company have been duly authorized for issuance and sale pursuant to the Underwriting Agreement and, when issued and delivered by the Company pursuant to the Underwriting Agreement against payment of the consideration set forth therein, will be validly issued, fully paid and nonassessable.

(v) Based upon the advice of the staff of the SEC, each of the Registration Statement and the Rule 462(b) Registration Statement, if any, has been declared effective by the Commission under the Securities Act. To the knowledge of such counsel, no stop order suspending the effectiveness of either of the Registration Statement or the Rule 462(b) Registration Statement, if any, has been issued under the Securities Act and no proceedings for such purpose have been instituted or are pending or are contemplated or threatened by the Commission. Any required filing of the Prospectus and any supplement thereto pursuant to Rule 424(b) under the Securities Act has been made in the manner and within the time period required by such Rule 424(b).

(vi) The Registration Statement, including any Rule 462(b) Registration Statement, the Prospectus, and each amendment or supplement to the Registration Statement and the Prospectus, as of their respective effective or issue dates (other than the financial statements and supporting schedules included therein or in exhibits to or excluded from the Registration Statement, as to which no opinion need be rendered) comply as to form in all material respects with the applicable requirements of the Securities Act.

(vii) The Common Shares have been approved for listing on the Nasdaq National Market.

(viii) The statements (i) in the Prospectus under the captions "Certain Transactions" and "Shares Eligible for Future Sale" and (ii) in Item 14 and Item 15 of the Registration Statement, insofar as such statements constitute matters of law, summaries of legal matters, the Company's charter or by-law provisions, documents or legal proceedings, or legal proceedings, has been reviewed by such counsel and accurately summarize, in all material respects, the matters referred to therein.

(ix) To the knowledge of such counsel, there are no legal or governmental actions, suits or proceedings pending or overtly threatened which are required to be disclosed in the Registration Statement, other than those disclosed therein.

(x) To the best knowledge of such counsel, there are no Existing Instruments required to be described or referred to in the Registration Statement or to be filed as exhibits thereto other than those described or referred to therein or filed or incorporated by reference as exhibits thereto; and the descriptions thereof and references thereto are correct in all material respects.

(xi) No consent, approval, authorization or other order of, or registration or filing with, any court or other governmental authority or agency, is required for the Company's execution, delivery and performance of the Underwriting Agreement and consummation of the transactions contemplated thereby and by the Prospectus, except as required under the Securities Act, applicable state securities or blue sky laws and from the NASD.

(xii) The execution and delivery of the Underwriting Agreement by the Company and the performance by the Company of its obligations thereunder (other than performance by the Company of its obligations under the indemnification section of the Underwriting Agreement, as to which no opinion need be rendered) (i) have been duly authorized by all necessary corporate action on the part of the Company; (ii) will not result in any violation of the provisions of the charter or by-laws of the Company or any subsidiary; (iii) will not constitute a breach of, or Default under, or result in the creation or imposition of any lien, charge or encumbrance upon any property or assets of the Company pursuant to any Existing Instrument filed as an exhibit to the Registration Statement; or (iv) to the knowledge of such counsel, will not result in any violation of any law, administrative regulation or administrative or court decree applicable to the Company.

(xiii) The Company is not, and after receipt of payment for the Common Shares will not be, an "investment company" within the meaning of Investment Company Act.

In addition, such counsel shall state that they have participated in conferences with officers and other representatives of the Company, representatives of the independent public or certified public accountants for the Company and with representatives of the Underwriters at which the contents of the Registration Statement and the Prospectus, and any supplements or amendments thereto, and related matters were discussed and, although such counsel is not passing upon and does not assume any responsibility for the accuracy, completeness or fairness of the statements contained in the Registration Statement or the Prospectus (other than as specified above), and any supplements or amendments thereto, on the basis of the foregoing, nothing has come to their attention which would lead them to believe that either the Registration Statement or any amendments thereto, at the time the Registration Statement or such amendments became effective, contained an untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary to make the statements therein not misleading or that the Prospectus, as of its date or at the First Closing Date or the Second Closing Date, as the case may be, contained an untrue statement

of a material fact or omitted to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading (it being understood that such counsel need express no belief as to the financial statements or schedules or other financial or statistical data derived therefrom, included in the Registration Statement or the Prospectus or any amendments or supplements thereto).

In rendering such opinion, such counsel may rely (A) as to matters involving the application of laws of any jurisdiction other than the General Corporation Law of the State of Delaware, laws of the Commonwealth of Massachusetts or the federal law of the United States, to the extent they deem proper and specified in such opinion, upon the opinion (which shall be dated the First Closing Date or the Second Closing Date, as the case may be, shall be satisfactory in form and substance to the Underwriters, shall expressly state that the Underwriters may rely on such opinion as if it were addressed to them and shall be furnished to the Representatives) of other counsel of good standing whom they believe to be reliable and who are satisfactory to counsel for the Underwriters; provided, however, that such counsel shall further state that they believe that they and the Underwriters are justified in relying upon such opinion of other counsel, and (B) as to matters of fact, to the extent they deem proper, on certificates of responsible officers of the Company and public officials.

EXHIBIT A-2

The final opinion in draft form should be attached as Exhibit A at the time this Agreement is executed.

Opinion of counsel for the Company to be delivered pursuant to Section 5(e) of the Underwriting Agreement.

References to the Prospectus in this Exhibit A include any supplements thereto at the Closing Date.

(xiv) The Company has been duly incorporated.

(xv) The Company has corporate power and authority to own, lease and operate its properties and to conduct its business as described in the Prospectus and to enter into and perform its obligations under the Underwriting Agreement.

(xvi) The Company is duly qualified as a foreign corporation to transact business and is in good standing in each jurisdiction in which such qualification is required by reason of the ownership or leasing of property, except for such jurisdictions where the failure to so qualify or to be in good standing would not, individually or in the aggregate, result in a Material Adverse Change.

(xvii) Each significant subsidiary incorporated in the United States (as defined in Rule 405 under the Securities Act) has been duly incorporated and is validly existing as a corporation in good standing under the laws of the jurisdiction of its incorporation, has corporate power and authority to own, lease and operate its properties and to conduct its business as described in the Prospectus and, to the best knowledge of such counsel, is duly qualified as a foreign corporation to transact business and is in good standing in each jurisdiction in which such qualification is required, whether by reason of the ownership or leasing of property, except for such jurisdictions where the failure to so qualify or to be in good standing would not, individually or in the aggregate, result in a Material Adverse Change.

(xviii) All of the issued and outstanding capital stock of each such significant subsidiary incorporated in the United States has been duly authorized and validly issued, is fully paid and non-assessable and is owned by the Company, directly or through subsidiaries, to such counsel's knowledge, free and clear of any security interest, mortgage, pledge, lien, encumbrance or any pending or threatened claim.

(xix) No stockholder of the Company or any other person has any preemptive right, right of first refusal or other similar right to subscribe for or purchase securities of the Company arising (i) by operation of the charter or by-laws of the Company or (ii) to the best knowledge of such counsel, otherwise.

(xx) Except as disclosed in the Prospectus, to the knowledge of such counsel, there are no persons with registration or other similar rights to have any equity or debt securities registered for sale under the Registration Statement or included in the offering contemplated by the Underwriting Agreement, except for such rights as have been duly waived.

(xxi) To the knowledge of such counsel, the Company is not in violation of its charter or by-laws, except for such violations as would not, individually or in the aggregate, result in a Material Adverse Change.

In addition, such counsel shall state that they have participated in conferences with officers and other representatives of the Company, representatives of the independent public or certified public accountants for the Company and with representatives of the Underwriters at which the contents of the Registration Statement and the Prospectus, and any supplements or amendments thereto, and related matters were discussed and, although such counsel is not passing upon and does not assume any responsibility for the accuracy, completeness or fairness of the statements contained in the Registration Statement or the Prospectus (other than as specified above), and any supplements or amendments thereto, on the basis of the foregoing, nothing has come to their attention which would lead them to believe that either the Registration Statement or any amendments thereto, at the time the Registration Statement or such amendments became effective, contained an untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary to make the statements therein not misleading or that the Prospectus, as of its date or at the First Closing Date or the Second Closing Date, as the case may be, contained an untrue statement of a material fact or omitted to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading (it being understood that such counsel need express no belief as to the financial statements or schedules or other financial or statistical data derived therefrom, included [or incorporated by reference] in the Registration Statement or the Prospectus or any amendments or supplements thereto).

In rendering such opinion, such counsel may rely (A) as to matters involving the application of laws of any jurisdiction other than the General Corporation Law of the State of Delaware, laws of the Commonwealth of Massachusetts or the federal law of the United States, to the extent they deem proper and specified in such opinion, upon the opinion (which shall be dated the First Closing Date or the Second Closing Date, as the case may be, shall be satisfactory in form and substance to the Underwriters, shall expressly state that the Underwriters may rely on such opinion as if it were addressed to them and shall be furnished to the Representatives) of other counsel of good standing whom they believe to be reliable and who are satisfactory to counsel for the Underwriters; provided, however, that such counsel shall further state that they believe that they and the Underwriters are justified in relying upon such opinion of other counsel, and (B) as to matters of fact, to the extent they deem proper, on certificates of responsible officers of the Company and public officials.

November __, 1997

NationsBanc Montgomery Securities, Inc.
Donaldson, Lufkin & Jenrette Securities Corporation
Paine Webber

As Representatives of the Several Underwriters
c/o NationsBanc Montgomery Securities, Inc.
600 Montgomery Street
San Francisco, California 94111

RE: MKS Instruments Inc. (the "Company")

Ladies & Gentlemen:

The undersigned is an owner of record or beneficially of certain shares of Common Stock of the Company ("Common Stock") or securities convertible into or exchangeable or exercisable for Common Stock. The Company proposes to carry out a public offering of Common Stock (the "Offering") for which you will act as the representatives of the underwriters. The undersigned recognizes that the Offering will be of benefit to the undersigned and will benefit the Company [by, among other things, raising additional capital for its operations]. The undersigned acknowledges that you and the other underwriters are relying on the representations and agreements of the undersigned contained in this letter in carrying out the Offering and in entering into underwriting arrangements with the Company with respect to the Offering.

In consideration of the foregoing, the undersigned hereby agrees that the undersigned will not, without the prior written consent of NMSI (which consent may be withheld in its sole discretion), directly or indirectly, sell, offer, contract or grant any option to sell (including without limitation any short sale), pledge, transfer, establish an open "put equivalent position" within the meaning of Rule 16a-1(h) under the Securities Exchange Act of 1934, or otherwise dispose of any shares of Common Stock, options or warrants to acquire shares of Common Stock, or securities exchangeable or exercisable for or convertible into shares of Common Stock currently or hereafter owned either of record or beneficially (as defined in Rule 13d-3 under Securities Exchange Act of 1934, as amended) by the undersigned, or publicly announce the undersigned's intention to do any of the foregoing, for a period commencing on the date hereof and continuing through the close of trading on the date 180 days after the date of the Prospectus. The undersigned also agrees and consents to the entry of stop transfer instructions with the Company's transfer agent and registrar against the transfer of shares of Common Stock or securities convertible into or exchangeable or exercisable for Common Stock held by the undersigned except in compliance with the foregoing restrictions.

With respect to the Offering only, the undersigned waives any registration rights relating to registration under the Securities Act of any Common Stock owned either of record or beneficially by the undersigned, including any rights to receive notice of the Offering.

This agreement is irrevocable and will be binding on the undersigned and the respective successors, heirs, personal representatives, and assigns of the undersigned.

B-1

Printed Name of Holder

By:

Signature

Printed Name of Person Signing (and indicate capacity of person signing if signing as custodian, trustee, or on behalf of an entity)

LM

The Commonwealth of Massachusetts

EXHIBIT 3.1

Examiner

MICHAEL JOSEPH CONNOLLY
Secretary of State
ONE ASHBURTON PLACE, BOSTON, MASS. 02108

FEDERAL IDENTIFICATION No. 04-2277512

RESTATED ARTICLES OF ORGANIZATION

General Laws, Chapter 156B, Section 74

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of stockholders adopting the restated articles of organization. The fee for filing this certificate is prescribed by General Laws, Chapter 156B, Section 114. Make check payable to the Commonwealth of Massachusetts.

We, John R. Bertucci, President, and
Richard S. Chute, Clerk of

MKS Instruments, Inc.

(Name of Corporation)

located at 34 Third Avenue, Burlington, Massachusetts 01803

do hereby certify that the following restatement of the articles of organization of the corporation was duly adopted and authorized by unanimous written consent of all the Directors dated January 15, 1982.

1. The name by which the corporation shall be known is:
MKS Instruments, Inc.
2. The purposes for which the corporation is formed are as follows:
See Continuation Sheets 2A and 2B.

Note: If the space provided under any article or item on this form is insufficient, additions shall be set forth on separate 8 1/2 x 11 sheets of paper leaving a left hand margin of at least 1 inch for binding. Additions to more than one article may be continued on a single sheet so long as each article requiring each such addition is clearly indicated.

3. The total number of shares and the par value, if any, of each class of stock which the corporation is authorized to issue is as follows:

| CLASS OF STOCK | WITHOUT PAR VALUE | WITH PAR VALUE | |
|----------------|-------------------|------------------|-----------|
| | NUMBER OF SHARES | NUMBER OF SHARES | PAR VALUE |
| Preferred | None | None | None |
| Class A Common | 10,000 | None | None |
| Class B Common | 10,000 | None | None |

- *4. If more than one class is authorized, a description of each of the different classes of stock with, if any, the preferences, voting powers, qualifications, special or relative rights or privileges as to each class thereof and any series now established:

See Continuation Sheet 4A.

- *5. The restrictions, if any, imposed by the articles of organization upon the transfer of shares of stock of any class are as follows:

See Continuation Sheets 5A, 5B, 5C and 5D.

- *6. Other lawful provisions, if any, for the conduct and regulation of the business and affairs of the corporation, for its voluntary dissolution, or for limiting, defining, or regulating the powers of the corporation, or of its directors or stockholders, or of any class of stockholders:

See Continuation Sheet 6A.

*If there are no such provisions state "None".

2. The purposes for which the corporation is formed are as follows:

To design, manufacture, sell, lease and license instruments of all kinds, including electromechanical, electronic and mechanical gauges for the measurement of pressure, temperature, acceleration, flow and level of liquids and gases; to design, manufacture, sell, lease and license control systems incorporating measuring devices, and control systems separate from measuring devices, for the control of production processes and operations of all kinds; to design, manufacture, sell, lease and license instrumentation for military use; to design, manufacture, sell, lease and license instrumentation for use in research laboratories, in industry, in educational institutions, for medical purposes and for use elsewhere and for other purposes; and in general to design, manufacture, sell, lease and license electro-mechanical, electronic and mechanical devices of all kinds.

To buy and sell at wholesale and retail, or otherwise, to manufacture, produce, adapt, repair, dispose of, export, import and in any other manner to deal in goods, wares, merchandise, articles and things of manufacture or otherwise of all materials, supplies and other articles and things necessary or convenient for use in connection with any of said businesses or any other business or any part thereof; and to manufacture, repair, purchase, sell, lease, dispose of and otherwise deal in machinery, tools, and appliances which are or may be used in connection with the purchase, sale, production, adaptation, repair, disposition of, export, import or other dealings in said goods, wares, merchandise, articles and things.

To purchase, lease or otherwise acquire as a going concern or otherwise all or any part of the franchises, rights, property, assets, business, good will or capital stock of any persons, firm, corporation, trust or association engaged in whole or in part in any business in which this corporation is empowered to engage, or in any other business; to pay for the same in whole or in part in cash, stock, bonds, notes, securities or other evidence of indebtedness of this corporation or in any other manner; to assume as part of the consideration or otherwise any and all debts, contracts or liabilities, matured or unmatured, fixed or contingent, of any such person, firm or corporation, trust or association; and to operate, manage, develop and generally to carry on the whole or any part of any such business under any name or names which it may select or designate.

To construct, lease, hire, purchase or otherwise acquire and hold or maintain, and to rebuild, enlarge, improve, furnish, equip, alter, operate and dispose of warehouses, factories, offices and other buildings, real estate, structures or parts thereof, and appliances for the preparation, manufacture, purchase, sale and distribution of goods, wares, merchandise, things, and articles of all kinds.

To acquire, hold, use, sell, assign, lease, grant licenses in respect of, mortgage, or otherwise dispose of franchises, letters patent of the United States or of any foreign country, patent rights, licenses and privileges, inventions, improvements and processes, systems, copyrights, trade-marks and trade names, relating to, or useful in connection with, any business of this corporation.

To buy or otherwise acquire, to sell, assign, pledge, or otherwise dispose of and deal in stocks, bonds, securities, notes and other obligations of any person, firm or corporation, including this corporation, organized for or engaged in similar or cognate purposes; also stocks, bonds, securities, notes, and other obligations of any person, firm, or corporation, including this corporation, which it may be found or deemed necessary, valuable, or convenient for this corporation to acquire and deal in, in pursuance or furtherance of or in connection with the businesses herein specified, or any other business.

To borrow money and contract indebtedness for all proper corporate purposes, to issue bonds, notes, and other evidences of indebtedness, to secure the same by pledge, mortgage, or lien on all or any part of the property of the corporation, tangible or intangible; and to assume or guarantee or secure in like manner or otherwise, the leases, contracts, or other obligations, fixed or contingent, or the payment of any dividends on any stock or shares or of the principal or interest on any bonds, notes, or other evidences of indebtedness of any person, firm, corporation, trust, or association in which this corporation has a financial interest.

To enter into, make, and perform contracts of every name, nature, and kind with any person, firm, association, or corporation which may be deemed valuable, expedient, or convenient for this corporation in pursuance of or in furtherance of or in connection with any of the objects of incorporation of this corporation or in connection with any of the businesses or purposes herein specified.

The enumeration of specific powers herein shall not be construed as limiting or restricting in any way the general powers herein set forth, but nothing herein contained shall be construed as authorizing the business of banking.

4. If more than one class is authorized, a description of each of the different classes of stock with, if any, the preferences, voting powers, qualifications, special or relative rights or privileges as to each class thereof and any series now established:

The holders of shares of Class B Common stock of the corporation shall not be entitled to vote for the election of Officers or Directors or with respect to any other aspect of the business of the corporation, or any matter or thing which may come or be brought before any meeting of the Stockholders of the corporation; and said Class B Common stock shall not be deemed to be a class of stock entitled to vote for any purpose whatsoever. In all other respects, however, the Class B Common stock and the Class A Common stock of the corporation, and the respective rights and preferences thereof shall be equal, and neither class shall have any priority over the other with respect to the payment of dividends or to distributions in liquidation.

5. The restrictions, if any, imposed by the articles of organization upon the transfer of shares of stock of any class are as follows:

Section 5. Restrictions. None of the corporation's stock, of any class, may be transferred except as hereinafter provided:

(a) Before making any proposed disposition of any of the corporation's stock, the holder of the stock shall give written notice to the Board of Directors specifying in detail the nature of the proposed disposition and its terms, the class and number of the shares involved, and the consideration for the proposed disposition, if any. Such notice shall constitute an offer by the holder to sell the shares involved to the corporation at their Agreed Value, as determined hereunder, or, if such proposed disposition is one for a pecuniary consideration less than the Agreed Value of the shares involved, such notice shall constitute an offer to sell the shares to the corporation for such proposed pecuniary consideration.

(b) Within thirty days after receipt of such notice, the Board of Directors shall give written notice to the offering holder stating whether the corporation accepts or rejects the holder's offer. If the offer is accepted, such notice by the corporation shall state the price to be paid for the shares and shall specify whether the corporation elects to pay a part of the purchase price by means of the corporation's note, as provided for in subsection (d) hereof. The offering holder of such shares shall deliver the shares to the corporation, suitably endorsed, within ten days after receipt of the corporation's notice of acceptance, and upon receipt of the shares, the corporation shall make payment therefor in the manner hereinafter provided.

If such offer is rejected by the corporation, the Directors shall transmit forthwith such offer to the record owners of the Class A Common Stock of the corporation who shall, subject to the provisions of this subsection (b), have the right to purchase the offered shares, in amounts proportionate to their respective holdings of said Class A Common stock, upon all of the same terms and conditions upon which the corporation might have purchased said offered shares, except that payment for offered shares shall be made in cash unless otherwise agreed upon between the parties. Each such owner to whom such shares are offered shall have the right within thirty (30) days of such offer to purchase the entire number of shares apportioned to him as above or to purchase none, and such acceptance shall be extended by written notice to the Board of Directors given within such time. If any owner of Class A Common stock shall

not accept such offer, the Board of Directors shall forthwith notify the remaining shareholders of Class A Common stock that they may purchase in proportion to their respective holdings of such stock the shares which such owner was entitled to purchase. Each such shareholder to whom such shares are offered shall have the right within ten (10) days of such offer to purchase the entire number of shares apportioned to him as above or to purchase none. Within three days after the expiration of said ten-day period the Board of Directors shall give written notice to the offering holder advising him in detail of the elections made with respect to the offered shares by the owners of the Class A Common stock. If the offer has been accepted with respect to all of the offered shares, then the offering holder of such shares shall deliver the same to the corporation, suitably endorsed, for the account of the accepting owners, within ten days after receipt of said last-mentioned notice from the Board of Directors and upon receipt of the shares by the corporation the accepting owners of the Class A Common stock shall make payment therefor in accordance with the terms of their respective acceptances.

If such offer is rejected by the corporation and if such offer to the holders of the Class A Common stock is rejected, in whole or in part, the offering shareholder, at any time within six months after receipt of any such notice of rejection, may effect the disposition of the shares which was set forth in such offering shareholder's notice to the Board.

(c) The Agreed Value of the stock of the corporation shall be such as may from time to time be determined by the unanimous agreement in writing of the holders of the corporation's Class A Common stock, such determination to be reviewed and either confirmed or adjusted at reasonable intervals. The Agreed Value of the Class B Common stock shall be ninety (90) percent of the Agreed Value of the Class A Common stock, to reflect the fact that the Class B Common stock is not entitled to vote.

The Agreed Value of the stock of the corporation shall be reviewed as herein provided at six-month intervals following the adoption of this by-law and at the expiration of any such six-month period, if no agreement is arrived at, any owner of stock may demand from the owners of Class A Common stock that an agreement be reached and in the absence of such agreement within ten days thereafter, such value shall be determined by an arbitrator appointed by the President, or by some other appropriate official, of the American Arbitration Association, upon written request for such appointment made by any owner of stock of the corporation. The decision of such arbitrator shall be binding upon the parties, and may be enforced by any court having jurisdiction, but each owner of stock of the corporation shall

be entitled to appear before such arbitrator, to be represented by counsel, and to present evidence. The expenses of arbitration, other than expenses for counsel and witnesses, shall be borne pro rata, according to the number of shares held, by the owners of the stock of the corporation.

(d) In the event the corporation shall elect to accept the offer of the holder of its stock, as herein provided, the corporation may pay the full purchase price for such stock in cash at the time of the delivery of the stock to the corporation or, at the corporation's sole election, it may pay said purchase price partly in cash and partly in the form of an unsecured note of the corporation. If the corporation shall make the latter election, then in such event the corporation shall pay at least one-third (1/3) of the purchase price for the stock at the time the stock is delivered to the corporation, and the corporation shall then deliver to the selling shareholder the note of the corporation for the unpaid balance of the purchase price for the stock, bearing interest at the rate of 6% per annum on the unpaid principal balance and payable in or within two years from its date.

(e) Each share of stock of the corporation is subject to the requirements and restrictions upon the transfer of such shares set forth in this Section 5, and the same shall constitute a contract of each shareholder with the corporation, shall be binding upon each shareholder and his heirs, assigns, executors, administrators, or other legal representatives and upon all other persons succeeding to or standing in the place of or holding under the shareholder, whether by act of the shareholder or by operation of law. These provisions shall not be discharged by any transfer of shares which may be made in compliance with the provisions hereof, but shall apply anew to such shares in the hands of the new holder thereof. These provisions shall not restrict the making of a bona fide pledge of any shares to secure an indebtedness, but shall apply fully with respect to any proposed transfer from the name of the shareholder pursuant to such pledge, whether upon foreclosure or otherwise and whether to the pledgee or to any other person. These provisions shall not restrict the transfer of shares, without consideration, to the transferor's spouse or to the transferor's issue or to the spouses or the transferor's issue, or any of them (or to a form of joint ownership between the transferor and the transferees described next above, or any of them, or to a trust for the sole benefit of the transferor and the transferees described next above or any of them), but shall apply fully with respect to any proposed disposition by any such transferee, except as provided in this and the preceding sentence.

Continuation Sheet 5D

(f) The determination of the Board of Directors under the provisions of this Section 5 shall be made by majority vote except that no waiver of the provisions of this Section 5 in the case of any proposed disposition of stock shall be granted by the vote of less than eighty (80) percent of the members of the Board of Directors. No Director shall be disqualified from voting on any matter arising under the provisions of this Section 5 by reason of such Director's ownership of stock of the corporation which might, directly or indirectly, be affected by such vote.

(g) In the event of any breach of any of the provisions of this Section 5 by any holder of any of the corporation's stock, none of the rights or privileges attaching to such stock (including, without limitation, voting rights and rights to dividends) may be exercised or enjoyed with respect to such stock by such holder or by any purported transferee from such holder while such breach shall continue, but nothing herein contained shall be deemed to preclude lawful action by the corporation to enforce the provisions of this Section 5.

6. Other lawful provisions, if any, for the conduct and regulation of the business and affairs of the corporation, for its voluntary dissolution, or for limiting, defining, or regulating the powers of the corporation, or of its directors or stockholders, or of any class of stockholders:

Pre-Emptive Rights. No stockholder shall, by reason of ownership of stock of the corporation, have any pre-emptive right to purchase unissued stock of the corporation, or to subscribe to stock of the corporation, or to purchase stock of the corporation previously issued and held in the treasury of the corporation, and, subject to the provisions of applicable law, the authorized and unissued stock of the corporation shall be issued to such person, firm, corporation or other legal entity, in such amounts, at such times, and for such consideration as a majority of the Board of Directors may from time to time determine.

*We further certify that the foregoing restated articles of organization effect no amendments to the articles of organization of the corporation as heretofore amended,

None

(*If there are no such amendments, state "None".)

Briefly describe amendments in space below:

None

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this 15th day of January in the year 1982.

/s/ John R. Bertucci
----- President
John R. Bertucci

/s/ Richard S. Chute
----- Clerk
Richard S. Chute

THE COMMONWEALTH OF MASSACHUSETTS

RESTATED ARTICLES OF ORGANIZATION

(General Laws, Chapter 156B, Section 74)

I hereby approve the within restated articles of organization and, the filing fee in the amount of \$15.00 having been paid, said articles are deemed to have been filed with me this 19th day of January, 1982.

/s/ Michael Joseph Connolly

MICHAEL JOSEPH CONNOLLY
Secretary of State

TO BE FILLED IN BY CORPORATION
PHOTOCOPY OF RESTATED ARTICLES OF ORGANIZATION TO BE SENT

TO: Richard S. Chute, Esquire
Hill & Barlow
225 Franklin Street
Boston, Massachusetts 02110
Telephone 617/423-6200

Copy Mailed

[SEAL OF WILLIAM FRANCIS GALVIN
SECRETARY OF THE COMMONWEALTH
DATED 2/20/96]

THE COMMONWEALTH OF MASSACHUSETTS

MICHAEL JOSEPH CONNOLLY
SECRETARY OF STATE
ONE ASHBURTON PLACE
BOSTON, MASS. 02108

FEDERAL IDENTIFICATION
NO. 04-2277512

CG

EXAMINER

ARTICLES OF
MERGER OF PARENT AND SUBSIDIARY CORPORATIONS
PURSUANT TO GENERAL LAWS, CHAPTER 156B, SECTION 82

The fee for filing this certificate is
prescribed by General Laws, Chapter 156B, Section 114.
Make check payable to the Commonwealth of Massachusetts.

We, John R. Bertucci and Richard S. Chute, President*/and Clerk*/ of
MKS Instruments, Inc. 042277512

name of corporation
organized under the laws of the Commonwealth of Massachusetts and herein called
the parent corporation, do hereby certify as follows:

1. That the subsidiary corporation(s) to be merged into the parent
corporations is as follows*:

| Name | State of Organization | Date of Organization |
|--------------------------|--------------------------|-------------------------|
| MKS Disc, Inc. 046311363 | Massachusetts | 10/31/72 |

2. That the parent corporation owns at least ninety per cent of the outstanding
shares of each class of the stock of each subsidiary corporation to be merged
into the parent corporation.

3.

*Delete the inapplicable words. In case the parent corporation is organized
under the laws of a state other than Massachusetts these articles are to be
signed by officers having corresponding powers and duties.

4. That at a meeting of the directors of the parent corporation the following vote, pursuant to subsection (a) of General Laws, Chapter 156B, Section 82, was duly adopted:

VOTED: That MKS Disc, Inc., a Massachusetts corporation and a wholly-owned subsidiary corporation of the Corporation, be merged with and into the Corporation in accordance with the provisions of Section 82 of the Massachusetts Business Corporation Law, the effective date of the merger to be the date of filing of the Articles of Merger of Parent and Subsidiary Corporations with the State Secretary of the Commonwealth of Massachusetts; that the President and Clerk of the Corporation be and hereby are authorized in the name and on behalf of the Corporation to execute the Articles of Merger of Parent and Subsidiary Corporations attached hereto (the "Articles of Merger") and to file the Articles of Merger with the State Secretary of the Commonwealth of Massachusetts; and in furtherance thereof that the President, any Vice President, Treasurer, Clerk, and Assistant Clerk of the Corporation or any one or more of them be and hereby are authorized in the name and on behalf of the Corporation to execute and deliver any and all documents and instruments and to take any and all action as they or any one or more of them may deem necessary or appropriate to effectuate the merger of MKS Disc, Inc. with and into the Corporation.

5. The effective date of the merger as specified in the vote set out under Paragraph 4 is the date of filing of these articles of merger of parent and subsidiary corporations.

6.

IN WITNESS WHEREOF and under the penalties of perjury we have hereto signed our names this 15th day of December, 1986.

/s/ John R. Burtucci President*

/s/ Richard S. Chute Clerk*

*Delete the inapplicable words. In case the parent corporation is organized under the laws of a state other than Massachusetts these articles are to be signed by officers having corresponding powers and duties.

COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF MERGER OF PARENT AND SUBSIDIARY CORPORATIONS
(General Laws, Chapter 156B, Section 82)

I hereby approve the within articles of merger of parent and subsidiary corporations and, the filing fee in the amount of \$200.00 having been paid, said articles are deemed to have been filed with me this 15th day of December, 1986.

/s/ Michael J. Connolly

MICHAEL JOSEPH CONNOLLY
Secretary of State

TO BE FILLED IN BY CORPORATION
Photo Copy of Merger To Be Sent

TO: Richard S. Chute, Esquire

Hill & Barlow

225 Franklin Street

Boston, MA 02110

Telephone 617-423-6200

Copy Mailed [SEAL OF WILLIAM FRANCIS GALVIN
SECRETARY OF THE COMMONWEALTH
DATED 2/20/96]

THE COMMONWEALTH OF MASSACHUSETTS

MICHAEL JOSEPH CONNOLLY

FEDERAL IDENTIFICATION

Secretary of State

NO. 04-2277512

ONE ASHBURTON PLACE, BOSTON, MASS. 02108

ARTICLES OF AMENDMENT

GENERAL LAWS, CHAPTER 156B, SECTION 72

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of stockholders adopting the amendment. The fee for filing this certificate is prescribed by General Laws, Chapter 156B, Section 114. Make check payable to the Commonwealth of Massachusetts.

We, John R. Bertucci, President and
Richard S. Chute, Clerk of

MKS Instruments, Inc.

(Name of Corporation)

located at 34 Third Avenue, Burlington, Massachusetts 01803

- ----- do hereby certify that the following amendment to the restated
Name articles of organization of the corporation was duly adopted by
Approved written consent dated December 15, 1986, by vote of
2454 shares of Class A Common out of 2454 shares outstanding,
(Class of Stock)

CROSS OUT being all of each class outstanding and entitled to vote thereon.(2)
INAPPLICABLE
CLAUSE

C / /

P / /

M / /

- (1)For amendments adopted pursuant to Chapter 156B, Section 70.
- (2)For amendments adopted pursuant to Chapter 156B, Section 71.

4 Note: If the space provided under any Amendment or item on this form
is insufficient, additions shall be set forth on separate 8 1/2 - 11
- ----- sheets of paper leaving a left hand margin of at least 1 inch for
P.C. binding. Additions to more than one Amendment may be continued on a
single sheet so long as each Amendment requiring each such addition
is clearly indicated.

FOR INCREASE IN CAPITAL FILL IN THE FOLLOWING:

| | | |
|-----------------------------------|------------------------|---------------------|
| | (-----shares preferred |) with par value |
| | (-----shares common |) |
| The total amount of capital stock | | : |
| already authorized is | (-----shares preferred |) without par value |
| | (-----shares common |) |
| | (-----shares preferred |) with par value |
| | (-----shares common |) |
| The amount of additional capital | | : |
| stock authorized is | (-----shares preferred |) without par value |
| | (-----shares common |) |

Voted: That the Restated Articles of Organization of the Corporation be and hereby are amended by deleting and striking in their entirety the restrictions upon the transfer of shares of stock contained in article 5. of the Restated Articles of Organization of the Corporation so that there are no restrictions imposed by the articles of organization of the Corporation upon the transfer of shares of stock of any class of the Corporation; that the President and Clerk of the Corporation be and hereby are authorized in the name and on behalf of the Corporation to execute Articles of Amendment to effectuate such amendment of the Restated Articles of Organization of the Corporation, a copy of which is attached hereto (the "Articles of Amendment"), and to file the Articles of Amendment with the State Secretary of the Commonwealth of Massachusetts; and in furtherance thereof that the President, any Vice President, Treasurer, Clerk, and Assistant Clerk of the Corporation or any one or more of them be and hereby are authorized in the name and on behalf of the Corporation to execute and deliver any and all documents and instruments and to take any and all action as they or any one or more of them may deem necessary or appropriate to effectuate such amendment of the Restated Articles of Organization of the Corporation.

The foregoing amendment will become effective when these articles of amendment are filed in accordance with Chapter 156B, Section 6 of The General Laws unless these articles specify, in accordance with the vote adopting the amendment, a later effective date not more than thirty days after such filing, in which event the amendment will become effective on such later date.

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this 15th day of December, in the year 1986

/s/ John R. Bertucci President

 John R. Bertucci

/s/ Richard S. Chute Clerk

 Richard S. Chute

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF AMENDMENT

(General Laws, Chapter 156B, Section 72)

I hereby approve the within articles of amendment
and, the filing fee in the amount of \$75.00
having been paid, said articles are deemed to have
been filed with me this 16th
day of December, 1986.

/s/ Michael Joseph Connolly

MICHAEL JOSEPH CONNOLLY
Secretary of State

TO BE FILLED IN BY CORPORATION
PHOTO COPY OF AMENDMENT TO BE SENT

TO: Richard S. Chute
Hill & Sarlow

225 Franklin Street

Boston, MA 02110

Telephone 617-423-6200

Copy Mailed

[STATE SEAL]

THE COMMONWEALTH OF MASSACHUSETTS
OFFICE OF THE MASSACHUSETTS SECRETARY OF STATE
MICHAEL JOSEPH CONNOLLY, Secretary
ONE ASHBURTON PLACE, BOSTON, MASS. 02180

FEDERAL IDENTIFICATION
NO. 04-2277512

EXAMINER

N/A

Name
Approved

C []
P []
M []

4

P.C.

ARTICLES OF AMENDMENT

General Laws, Chapter 156B, Section 72

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of stockholders adopting the amendment. The fee for filing this certificate is prescribed by General Laws, Chapter 156B, Section 114. Make check payable to the Commonwealth of Massachusetts.

We, John R. Bertucci, President and
Richard S. Chute, Clerk of

MKS Instruments, Inc.

(Name of Corporation)

located at Six Shattuck Road, Andover, Massachusetts 01810

do hereby certify that the following amendment to the restated articles of organization of the corporation was duly adopted by written consent dated January 8, 1987, by vote of

2454 shares of Class A Common out of 2454 shares outstanding,
(Class of Stock)

3250 shares of Class B Common out of 3250 shares outstanding,
(Class of Stock)

being all of each class outstanding and entitled to vote thereon and of each class of series of stock whose rights are adversely affected thereby:

- (1) for amendments adopted pursuant in Chapter 156B, Section 70.
- (2) for amendments adopted pursuant to Chapter 156B, Section 71.

Note: If the space provided under any Amendment or item on this form is insufficient, additions shall be set forth on separate 8 1/2 x 11 sheets of paper leaving a left hand margin of at least 1 inch for binding. Additions to more than one Amendment may be continued on a single sheet so long as each Amendment requiring each such addition is clearly indicated

TO CHANGE the number of shares and the par value, if any, of each class of stock within the corporation fill in the following:

The total presently authorized is:

| KIND OF STOCK | NO PAR VALUE NUMBER OF SHARES | WITH PAR VALUE NUMBER OF SHARES | PAR VALUE |
|---------------|----------------------------------|------------------------------------|--------------|
| COMMON | | | |
| PREFERRED | | | |

CHANGE the total to:

| KIND OF STOCK | NO PAR VALUE NUMBER OF SHARES | WITH PAR VALUE NUMBER OF SHARES | PAR VALUE |
|---------------|----------------------------------|------------------------------------|--------------|
| COMMON | | | |
| PREFERRED | | | |

VOTED: That the Restated Articles of Organization of the Corporation be and hereby are amended by adding the following provision to article 6 of the Restated Articles of Organization of the Corporation so that article 6 of the Restated Articles of Organization of the Corporation shall contain the following provision:

"A director of the corporation shall not be personally liable to the corporation or its stockholders for monetary damages for breach of fiduciary duty as a director notwithstanding any provision of law imposing such liability, except for liability (i) for any breach of the director's duty of loyalty to the corporation or its stockholders, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) under Section 61 or 62 of the Massachusetts Business Corporation Law, or (iv) for any transaction from which the director derived an improper personal benefit.

If the Massachusetts Business Corporation Law is amended, after approval by the stockholders of the corporation of this provision, to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the corporation shall be eliminated or limited to the fullest extent permitted by the Massachusetts Business Corporation Law, as so amended. Any amendment, repeal, or modification of this provision by the stockholders of the corporation shall not adversely affect any right or protection of a director of the corporation existing at the time of such amendment, repeal, or modification."

; that the President and Clerk of the Corporation be and hereby are authorized in the name and on behalf of the Corporation to execute Articles of Amendment to effectuate such amendment of the Restated Articles of Organization of the Corporation, a copy of which is attached hereto (the "Articles of Amendment"), and to file the Articles of Amendment with the State Secretary of the Commonwealth of Massachusetts; and in furtherance thereof that the President, any Vice President, Treasurer, Clerk, and Assistant Clerk of the Corporation or any one or more of them be and hereby are authorized in the name and on behalf of the Corporation to execute and deliver any and all documents and instruments and to take any and all action as they or any one or more of them may deem necessary or appropriate to effectuate such amendment of the Restated Articles of Organization of the Corporation.

The foregoing amendment will become effective when these articles of amendment are filed in accordance with Chapter 156B, Section 6 of The General Laws unless these articles specify, in accordance with the vote adopting the amendment, a later effective date not more than thirty days after such filing, in which event the amendment will become effective on such later date.

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this 9th day of February, in the year 1987.

/s/ John R. Bertucci President

John R. Bertucci

/s/ Richard S. Chute Clerk

Richard S. Chute

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF AMENDMENT

(General Laws, Chapter 156B, Section 72)

I hereby approve the within articles of amendment and, the filing fee in the amount of \$75.00 having been paid, said articles are deemed to have been filed with me this 11th day of February, 1987.

/s/ Michael J. Connolly

MICHAEL JOSEPH CONNOLLY
Secretary of State

TO BE FILLED IN BY CORPORATION

PHOTO COPY OF AMENDMENT TO BE SENT

TO: Richard S. Chute, Esq.
Hill & Barlow

225 Franklin Street
Boston, MA 02110

Telephone (617) 423-6200

Copy Mailed

[SEAL OF WILLIAM FRANCIS GALVIN,
SECRETARY OF THE COMMONWEALTH
DATED 2/20/96]

The Commonwealth of Massachusetts
WILLIAM FRANCIS GALVIN
Secretary of the Commonwealth
ONE ASHBURTON PLACE
BOSTON, MASS. 02108

FEDERAL IDENTIFICATION NO. 004-2277512

ARTICLES OF
MERGER OF PARENT AND SUBSIDIARY CORPORATIONS
PURSUANT TO GENERAL LAWS, CHAPTER 156B, SECTION 82

The fee for filing this certificate is prescribed by
General Laws, Chapter 156B, Section 114.
Make check payable to the Commonwealth of Massachusetts.

* * * *

We, John R. Bertucci and Richard S. Chute, President* and Clerk* of
MKS Instruments, Inc.

name of corporation

organized under the laws of Massachusetts and herein called the parent
corporation, do hereby certify as follows:

1. That the subsidiary corporation(s) to be merged into the parent
corporations are/is as follows:

| Name | State of Organization | Date of Organization |
|-------------------------|-----------------------|----------------------|
| UTI Instruments Company | CA | 09/26/73 |

2. That the parent corporation owns at least ninety per cent of the
outstanding shares of each class of the stock of each subsidiary corporation to
be merged into the parent corporation.

3. That in the case of each of the above-named corporations the laws of
the state of its organization, if other than Massachusetts, permit the merger
herein provided for and that all action required under the laws of each such
state in connection with this merger has been duly taken. (If all the
corporations are organized under the laws of Massachusetts and if General Laws,
Chapter 156B is applicable to them, then Paragraph 3 may be deleted.)

* Delete the inapplicable words. In case the parent corporation is organized
under the laws of a state other than Massachusetts these articles are to be
signed by officers having corresponding powers and duties.

4. That at a meeting of the directors of the parent corporation the following vote, pursuant to subsection (a) of General Laws, Chapter 156B, Section 82, was duly adopted:

VOTED: That the Corporation merge into itself UTI
----- Instruments Company, a California corporation,
 with the Corporation surviving the merger
 (the "Merger"), in accordance with the
 provisions of Section 82 of Chapter 156B of the
 Massachusetts General Laws.

FURTHER
VOTED: That the effective date of the Merger shall be
----- the date of filing of appropriate Articles of
 Merger with the Secretary of State of Massachusetts.

FURTHER
VOTED: That any officer of the Corporation, acting singly,
----- be and he hereby is, authorized and directed to
 take any further actions, and to execute and deliver
 any further documents and certificates, which may
 be necessary or appropriate to effectuate the Merger
 described herein.

5. The effective date of the merger as specified in the vote set out under Paragraph 4 is

IN WITNESS WHEREOF and under the penalties of perjury we have hereto signed our names this 17th day of November, 1995.

/s/ John R. Bertucci
----- President*
John R. Bertucci

/s/ Richard S. Chute
----- Clerk*
Richard S. Chute

* Delete the inapplicable words. In case the parent corporation is organized under the laws of a state other than Massachusetts these articles are to be signed by officers having corresponding powers and duties.

COMMONWEALTH OF MASSACHUSETTS
ARTICLES OF MERGER OF PARENT AND SUBSIDIARY CORPORATIONS
(General Laws, Chapter 156B, Section 82)

I hereby approve the within articles of merger of parent and subsidiary corporations and, the filing fee in the amount of \$250 having been paid, said articles are deemed to have been filed with me this 17th day of November, 1995.

/s/ William Francis Galvin
William Francis Galvin
Secretary of the Commonwealth

TO BE FILLED IN BY CORPORATION
Photo Copy of Merger To Be Sent

TO: Terrence W. Mahoney, Esq.
Hill & Barlow

One International Place

Boston, MA 02110

Telephone 617-428-3000

BY-LAWS
OF
MKS INSTRUMENTS, INC.

ARTICLE I

Name, Location, Corporate Seal, and Fiscal Year

Section 1. Name. The name of the corporation is MKS Instruments, Inc.

Section 2. Location. The principal office of the corporation in Massachusetts shall be located at the place set forth on the form of the articles of organization or on a certificate filed with the State Secretary. The Board of Directors may change the location of the principal office in Massachusetts and establish such other offices as it deems appropriate.

Section 3. Corporate Seal. The Board of Directors may adopt and alter the form of seal of the corporation.

Section 4. Fiscal Year. Except as otherwise determined from time to time by the Board of Directors, the fiscal year of the corporation shall in each year end on December 31.

ARTICLE II

Stockholders

Section 1. Annual Meeting. The annual meeting of stockholders shall be held within six months after the end of

each fiscal year of the corporation on a date to be fixed by the Board of Directors or the President (which date shall not be a legal holiday in the place where the meeting is to be held) at the time and place to be fixed by the Board of Directors or the President and stated in the notice of the meeting. The purposes for which the annual meeting is to be held, in addition to those prescribed by law, by the articles of organization or by these by-laws, may be specified by the Board of Directors or the President. If no annual meeting is held in accordance with the foregoing provisions, a special meeting may be held in lieu of the annual meeting, and any action taken at that special meeting shall have the same effect as if it had been taken at the annual meeting, and in such case all references in these by-laws to the annual meeting of stockholders shall be deemed to refer to such special meeting.

Section 2. Special Meetings. Special meetings of the stockholders may be called by the President or by the Board of Directors, who shall state the purposes for which the meeting is to be held. The Clerk, or, in the case of the death, absence, incapacity or refusal of the Clerk, any other officer, shall call a special meeting upon written application of one or more stockholders holding at least one-tenth part in interest of the capital stock entitled to vote at the meeting, which application shall state the time, place and purposes of the proposed meeting. If notice of a special meeting shall have been duly waived by every stockholder entitled to notice thereof, or by his attorney

thereunto duly authorized, such meeting shall be deemed to have been duly called at the request of the stockholders.

Section 3. Time and Place of Meetings. All meetings of stockholders shall be held at a suitable time at the principal office of the corporation or at such other suitable place within Massachusetts or, to the extent permitted by the articles of organization, elsewhere in the United States, as shall be selected by the President or the Board of Directors in the case of an annual meeting and, in the case of a special meeting, by the President, the Board of Directors or the applying stockholders calling such meeting.

Section 4. Notice of Meetings. A written notice of each meeting of stockholders containing the place, date and hour, and the purposes for which it is to be held, shall be given by the Clerk or, in the case of the death, absence, incapacity, or refusal of the Clerk, by any other officer, at least seven days before the date of the meeting, to each stockholder entitled to vote at the meeting and to each stockholder who is otherwise entitled by law or by the articles of organization or these by-laws to such notice, by leaving such notice with him or at his residence or usual place of business or by mailing it postage prepaid and addressed to each stockholder at his address as it shall appear in the stock and transfer records of the corporation. Notice of a meeting need not be given to a stockholder if a written waiver of notice, executed before or after the meeting by such stockholder or his attorney thereunto authorized, is filed with the records of the meeting.

Section 5. Quorum. The holder or holders of a majority in interest of all stock issued, outstanding, and entitled to vote at a meeting, present in person or represented by proxy, shall constitute a quorum, but the majority of a lesser interest so present may, from time to time, postpone to a new time or place any meeting and the postponed meeting may be held without further notice.

Section 6. Voting and Proxies. Each stockholder entitled to vote shall have one vote, to be exercised in person or by proxy, for each share of stock held by him, and a proportionate vote for a fractional share. When a quorum is present at any meeting the vote of the holders of a majority in interest of the stock represented which is entitled to vote and voting shall decide any matter properly brought before the meeting, except in the case of elections by stockholders, which shall be decided by a plurality of the votes cast by stockholders entitled to vote at the election, and except when a larger vote is required by law, the articles of organization or these by-laws. No vote need be taken by ballot unless so requested by any stockholder entitled to vote thereon. Proxies must be in writing and filed with the clerk of the meeting before being voted. The person named in a proxy may vote at any adjournment of the meeting for which the proxy was given, but the proxy shall terminate after final adjournment of the meeting. No proxy dated more than six months before the meeting named in it shall be valid. A proxy purporting to be executed by or on behalf of a stockholder shall be deemed valid unless challenged at or prior to its exercise and

the burden of proving invalidity shall rest on the challenger. A proxy with respect to stock held in the name of two or more persons shall be valid if executed by any one of them unless at or prior to the exercise of the proxy the corporation receives a specific notice to the contrary from any one of them. Inspectors of election, if any, shall be appointed by the Board of Directors or, in the absence of such appointment, by the officer presiding at any meeting of the stockholders.

Section 7. Action by Consent. Any action required or permitted to be taken by stockholders may be taken without a meeting if all stockholders entitled to vote on the matter consent in writing to the action and such written consents are filed with the records of the meetings of stockholders. Such consents shall be treated for all purposes as a vote at a meeting.

ARTICLE III

The Board of Directors

Section 1. Composition. The number of directors which shall constitute the whole Board of Directors shall be determined by vote of the stockholders or the Board of Directors, but shall consist of not less than three directors (except that whenever there shall be only two stockholders the number of directors shall be not less than two and whenever there shall be only one stockholder or prior to the issuance of any stock, there shall be at least one director). The number of directors may be decreased at any time and from time to time either by the stockholders or by a majority of the directors then in office, but only to

eliminate vacancies existing by reason of the death, resignation, removal or expiration of the term of one or more directors.

Section 2. Election and Term. The directors, except as provided in the preceding section and Section 12 of this Article, shall be elected at the annual meeting of the stockholders. The directors, except as provided in Section 13 of this Article, shall hold office until the next annual meeting and until their successors are chosen and qualified. No director need be a stockholder.

Section 3. Powers. The business of the corporation shall be managed by the Board of Directors, which shall have and may exercise all the powers of the corporation except those powers reserved to the stockholders by these by-laws, by law or by the articles of organization.

Section 4. Annual Meeting. The annual meeting of the Board of Directors shall be held immediately after and at the same place as the annual meeting of stockholders, or any special meeting held in lieu thereof, without the necessity of notice. If such meeting is not then held, or if a quorum is not present, the annual meeting of the Board of Directors shall be called in the manner hereinafter provided for special meetings.

Section 5. Regular Meetings. Regular meetings of the Board of Directors may be held at such times and places as shall from time to time be fixed by vote of the Board of Directors and no notice need be given of regular meetings held at times and places so fixed, provided, however, that any vote relating to the holding of regular meetings shall remain in force only until the

next annual meeting of the Board of Directors, and that if at any meeting of the Board of Directors, at which a vote is adopted fixing the times or place or places for any regular meetings any director is absent no meeting shall be held pursuant to such vote until either each such absent director has in writing or by telegram approved the vote or seven days have elapsed after a copy of such vote certified by the Clerk has been mailed, postage prepaid, addressed to each such absent director at his last known home or business address.

Section 6. Special Meetings. Special meetings of the Board of Directors may be called by the chairman of the Board of Directors, or the President, or by any two directors and shall be held at the time and place designated by the person or persons calling such meeting.

Section 7. Notices. The Clerk of the corporation or, in the case of his death, absence, incapacity, or refusal, any other officer, shall give notice of any special meeting to each director (i) by written notice delivered in person, or by telegram sent to his business or home address, at least twenty-four hours before such meeting or (ii) by written notice mailed to his last known business or home address at least seventy-two hours before such meeting. Notice of a meeting need not be given to any director if he executes a written waiver of notice before or after the meeting or if he attends the meeting without protesting either prior thereto or at its commencement the lack of notice to him. A notice or waiver of notice of a

meeting of the Board of Directors need not specify the purposes of the meeting.

Section 8. Quorum and Voting. A majority of the directors then in office shall constitute a quorum. If a quorum is not present, a majority of those present at a meeting may, from time to time, postpone to a new time or place any meeting and the postponed meeting may be held without further notice. If a quorum is present, a majority of the directors present and voting may take any action unless a different vote is required by law, the articles of organization or these by-laws.

Section 9. Action by Consent. Any action required or permitted to be taken at any meeting of the Board of Directors may be taken without a meeting if all of the directors consent to the action in writing and such consents are filed with the records of the meetings of the Board of Directors. Such consents shall be treated for all purposes as a vote at a meeting.

Section 10. Chairman of Board of Directors. The Board of Directors may elect from its own number a chairman. If a chairman has been elected, he shall preside at all meetings of the stockholders and of the Board of Directors at which he is present and shall have such other duties and powers as the Board of Directors may decide.

Section 11. Executive and Other Committees. The Board of Directors may elect from its own number an executive committee and any other committees, and may delegate to the committees any or all of its powers except the power to (a) change the principal office of the corporation; (b) amend the by-laws; (c) issue

stock; (d) establish and designate series of stock and fix and determine the relative rights and preferences of any series of stock; (e) elect officers required by law to be elected by the stockholders or directors and fill vacancies in any such offices; (f) change the number of the Board of Directors; (g) remove officers or directors from office; (h) authorize the payment of any dividend or distribution to stockholders; (i) authorize the reacquisition for value of stock of the corporation; or (j) authorize a merger. The Board of Directors may decide the manner in which any such committees shall conduct their business. The Board of Directors shall have power to rescind any action of any committee, but such rescission shall not be retroactive.

Section 12. Vacancies. Except as may be otherwise provided in the articles of organization, a vacancy in the Board of Directors may be filled by the Board of Directors by the election of a successor to hold office for the unexpired term of the director whose place is vacant and until his successor is chosen and qualified. Any vacancy in the Board of Directors may also be filled by the stockholders and the person so chosen shall displace any successor chosen by the Board of Directors.

Section 13. Removal. A director may be removed from office with or without cause by the stockholders, provided that the directors elected by a particular class of stockholders may be removed with or without cause only by the stockholders of such class. A director may be removed at any time for cause by the vote of a majority of the directors then in office. A director

may be removed for cause only after reasonable notice and opportunity to be heard before the body proposing to remove him.

Section 14. Resignation. Any director may at any time resign his office by delivering a written resignation to the Board of Directors, the President or the Clerk. Such resignation, unless a later time is specified therein, shall take effect upon receipt by the addressee or at the principal office of the corporation, and acceptance thereof shall not be necessary to make it effective.

ARTICLE IV

Officers

Section 1. Designation and Qualification. The officers of the corporation shall consist of a President, a Treasurer, a Clerk, and such other officers including one or more Vice Presidents, Assistant Treasurers and Assistant Clerks as the Board of Directors may elect. No officer need be a stockholder or a director. The Clerk shall be a resident of the Commonwealth of Massachusetts unless the corporation has a resident agent appointed to accept service of process. A person may hold more than one office at the same time provided that the President and Clerk may not be the same person except when there is only one stockholder. Any officer may be required by the Board of Directors to give bond for the faithful performance of his duties to the corporation in such amount and with such sureties as the Board of Directors may determine.

Section 2. Election and Term. The President, Treasurer and Clerk shall be elected annually by the Board of Directors at the

annual meeting of the Board of Directors and shall hold office until the next annual meeting of the Board of Directors and until their respective successors are chosen and qualified. All other officers may be elected by the Board of Directors at any time and shall hold office for such term as the Board of Directors determines.

Section 3. President. The President shall be the chief executive officer of the corporation, except as the Board of Directors may otherwise provide, and shall have general supervision and control of the business of the corporation subject to the direction of the Board of Directors. The President shall also have such other powers and duties as the Board of Directors may decide. It shall be his duty, and he shall have the power, to see that all orders and resolutions of the directors are carried into effect. In the absence of a chairman of the Board of Directors, the President shall preside at all meetings of the stockholders and at all meetings of the Board of Directors. Unless otherwise directed by the Board of Directors, the President may on behalf of the corporation vote or consent to any action with respect to or in connection with any interest that the corporation may hold or have in any other corporation or in any partnership, joint venture, association, trust, proprietorship, business entity or common undertaking whatsoever, and may appoint any other person or persons to act as proxy or attorney-in-fact for the corporation, with or without power of substitution. The Board of Directors may from time to time confer like powers upon any other officer.

Section 4. Vice President. The Vice President or Vice Presidents, if any, shall have such powers and perform such duties as may be assigned to them by the Board of Directors or the President. In the absence of the President or in the event of his inability to act, the Vice President, if any, or, if there is more than one Vice President, the First Vice President, or, if no First Vice President has been designated, the Vice President senior in office, shall have and may exercise all the powers and duties of the President.

Section 5. Treasurer and Assistant Treasurers. The Treasurer shall have, subject to the direction of the Board of Directors, general charge of the financial affairs of the corporation and shall keep full and accurate records thereof, which shall always be open to the inspection of the President or of any director. He shall render to the President or to the Board of Directors, whenever either may require it, a statement of the accounts of his transactions as Treasurer and of the financial condition of the corporation. The Treasurer shall perform such duties and have such powers additional to the foregoing as the directors may designate.

Any Assistant Treasurer shall have such powers and duties as the Board of Directors may decide.

Section 6. Clerk and Assistant Clerks. The Clerk shall record in books kept for that purpose all votes, consents, and the proceedings of all meetings of the stockholders and of the Board of Directors. Record books of stockholders' meetings shall be open at all reasonable times to the inspection of any

stockholder. The Clerk shall notify the stockholders and directors of all meetings in accordance with the by-laws.

In the absence of the Clerk from any meeting of the stockholders or from any meeting of the directors, the Assistant Clerk, if one be elected, or, if there be more than one, the one designated for the purpose by the directors, and otherwise a temporary clerk designated by the person presiding at the meeting, shall perform the duties of the Clerk.

Any Assistant Clerks shall have such other powers and duties as the Board of Directors may decide.

Section 7. Vacancies. A vacancy in any office may be filled by the Board of Directors by the election of a successor to hold office for the unexpired term of the officer whose place is vacant and until his successor is chosen and qualified.

Section 8. Removal. All officers may be removed from their respective offices with or without cause by vote of a majority of the directors then in office. An officer may be removed for cause only after a reasonable notice and opportunity to be heard before the Board of Directors.

Section 9. Resignation. Any officer may at any time resign his office by delivering a written resignation to the Board of Directors, the President or the Clerk. Such resignation, unless a later date is specified therein, shall take effect upon receipt by the addressee or at the principal office of the corporation, and acceptance thereof shall not be necessary to make it effective.

ARTICLE V

Capital Stock

Section 1. Certificates of Stock. Each stockholder shall be entitled to a certificate in the form approved by the Board of Directors stating the number, class, and designation of series, if any, of the shares held by him. Such certificate shall be signed by the President or a Vice President and by the Treasurer or an Assistant Treasurer. Such signatures may be facsimiles if the certificate is countersigned by a transfer agent, or by a registrar of transfers, other than a director, officer or employee of the corporation.

Every certificate for shares of stock subject to any restriction on transfer pursuant to the articles of organization, these by-laws, or any agreement to which the corporation is a party shall have the restriction noted conspicuously on the certificate and shall also set forth on the face or back either the full text of the restriction or a statement of the existence of such restriction and a statement that the corporation will furnish a copy to the holder of such certificate upon written request and without charge. If the corporation is authorized to issue more than one class or series of stock, every certificate issued shall set forth on its face or back either the full text of the preferences, voting powers, qualifications and special and relative rights of the shares of each class and series authorized to be issued or a statement of the existence of such preferences, powers, qualification and rights, and a statement that the

corporation will furnish a copy thereof to the holder of such certificate upon written request and without charge.

Section 2. Transfer. Shares of stock shall be transferred of record on the books of the corporation only upon the surrender to the corporation or its transfer agent of the certificate therefor properly endorsed for transfer (or accompanied by a written assignment and power of attorney properly executed for transfer), and only upon compliance with provisions, if any, respecting restrictions on transfer contained in the articles of organization, these by-laws or any agreement to which the corporation is a party. The corporation may require proof of the genuineness of the signature and the capacity of the party presenting the certificate for transfer.

Section 3. Interests Not Recognized. The corporation shall be entitled to treat the holder of record of any share or shares of stock as the holder in fact thereof and shall not be bound to recognize any other claim to or interest in such share or shares on the part of any other person except as may be otherwise expressly provided by law.

Section 4. Lost, Mutilated, or Destroyed Certificates. Subject to Section 8-405 of the Massachusetts Uniform Commercial Code, as amended from time to time, the Board of Directors may determine the conditions upon which a new certificate of stock may be issued in place of any certificate alleged to have been lost, mutilated or destroyed. It may, in its discretion, require the owner of a lost, mutilated or destroyed certificate, or his legal representative, to give a bond, with or without surety,

sufficient in its opinion to indemnify the corporation against any loss, claim or expense which may arise by reason of the issuance of a new certificate in place of such lost, mutilated or destroyed stock certificate.

Section 5. Transfer Agent and Registrar. The Board of Directors may appoint a transfer agent or a registrar, or both, and require all stock certificates to bear the signature or facsimile thereof of any such transfer agent or registrar. Unless the Board of Directors shall appoint a transfer agent, registrar or other officer or officers for the purpose, the Clerk shall be charged with the duty of keeping, or causing to be kept, accurate records of all stock outstanding, stock certificates issued, and stock transfers. Subject to any other rules which may be adopted from time to time by the Board of Directors, such records may be kept solely in the stock certificate books.

Section 6. Setting Record Date and Closing Transfer Records. The Board of Directors may fix in advance a time not more than sixty days before (i) the date of any meeting of the stockholders or (ii) the date for the payment of any dividend or the making of any distribution to stockholders or (iii) the last day on which the consent or dissent of stockholders may be effectively expressed for any purpose, as the record date for determining the stockholders having the right to notice of, and to vote at such meeting or any adjournment thereof, or the right to receive such dividend or distribution, or the right to give such consent or dissent. If a record date is fixed by the Board of Directors, only stockholders of record on such date shall have

such rights notwithstanding any transfer of stock on the records of the corporation after such date. Without fixing such record date, the Board of Directors may close the transfer records of the corporation for all or any part of such sixty-day period.

If no record date is fixed and the transfer books are not closed, then the record date for determining stockholders having the right to notice of or to vote at a meeting of stockholders shall be at the close of business on the day next preceding the day on which notice is given, and the record date for determining stockholders for any other purpose shall be at the close of business on the date on which the Board of Directors acts with respect thereto.

Section 7. Issue of Stock. The Board of Directors may, from time to time, issue any of the authorized capital stock of the corporation for cash, property, services or expenses, or as a stock dividend, and on any terms permitted by law and the articles of organization. No stock shall be issued unless the cash, so far as due, or the property, services or expenses for which it was authorized to be issued, has been actually received or incurred by, or conveyed or rendered to, the corporation, or is in its possession as surplus.

ARTICLE VI

Inspection of Records

The original, or attested copies of the articles of organization, by-laws and records of all meetings of the incorporators and stockholders, and the stock and transfer records, which shall contain the names of all stockholders and

the record address and the amount of stock held by each, shall be kept in the Commonwealth of Massachusetts at the principal office of the corporation, or at an office of its transfer agent or of the Clerk or of its resident agent. Said copies and records need not all be kept in the same office. They shall be available at all reasonable times to the inspection of any stockholder for any proper purpose but not to secure a list of stockholders for the purpose of selling said list or copies thereof or of using the same for a purpose other than in the interest of the applicant, as a stockholder, relative to the affairs of the corporation.

ARTICLE VII

Checks, Notes, Drafts and Other Instruments

Checks, notes, drafts and other instruments for the payment of money drawn or endorsed in the name of the corporation may be signed by any officer or officers or person or persons authorized by the directors to sign the same. No officer or person shall sign any such instrument as aforesaid unless authorized by the directors to do so.

ARTICLE VIII

Amendments

These by-laws may at any time be amended by the stockholders, provided that notice of the substance of the proposed amendment is stated in the notice of any meeting at which action is to be taken on the amendment.

ARTICLE IX

Indemnification

Except as provided below, any director or officer of the corporation, and any person who serves at the request of the corporation as a director or officer of another organization or who serves at the request of the corporation in any capacity with respect to any employee benefit plan, shall be indemnified in full by the corporation against expenses, including attorneys' fees, and against the amount of any judgment, money decree, fine, or penalty, or against the amount of any settlement deemed reasonable by the Board of Directors, necessarily paid or incurred by such person in connection with or arising out of any claim made against such person, or any civil or criminal action, suit, or proceeding of whatever nature brought against such person or in which such person is made a party or in which such person is otherwise involved, by reason of being or having been a director or officer of the corporation or a director or officer of another organization at the request of the corporation or serving in any capacity with respect to any employee benefit plan at the request of the corporation. Such indemnification shall be provided although such person at the time of such claim, action, suit, or proceeding is no longer a director or officer of the corporation or of such other organization or no longer serves with respect to any such employee benefit plan.

No indemnification shall be provided for any person with respect to any matter as to which such person shall have been adjudicated in any proceeding not to have acted in good faith in

the reasonable belief that such person's action was in the best interests of the corporation or, to the extent that such matter relates to service with respect to an employee benefit plan, in the best interests of the participants or beneficiaries of such employee benefit plan. If such person has not been so adjudicated, such person shall be entitled to indemnification unless the Board of Directors decides that such person did not act in good faith in the reasonable belief that such person's action was in the best interests of the corporation or, to the extent that such matter relates to service with respect to an employee benefit plan, in the best interests of the participants or beneficiaries of such employee benefit plan. Expenses reasonably incurred in defending any claim, action, suit, or proceeding of the character described in the preceding paragraph may, if the Board of Directors so decides, be advanced by the corporation in advance of the final disposition of such claim, action, suit, or proceeding, upon receipt of an undertaking by the recipient to repay all such advances in the event such person is adjudicated in any proceeding not to have acted, or the Board of Directors decides that such person did not act, in good faith in the reasonable belief that such person's action was in the best interests of the corporation or, to the extent that such matter relates to service with respect to an employee benefit plan, in the best interests of the participants or beneficiaries of such employee benefit plan, which undertaking may be accepted without reference to the financial ability of such person to make repayment.

Any rights of indemnification hereunder shall not be exclusive, shall be in addition to any other right which a director or officer of the corporation and any person serving at the request of the corporation as a director or officer of another organization or in any capacity with respect to any employee benefit plan may have or obtain, and shall accrue to such person's estate.

Any agent or employee of or for the corporation may be indemnified in such manner as the Board of Directors decides.

AMENDED & RESTATED EMPLOYMENT AGREEMENT

EMPLOYMENT AGREEMENT dated December 15, 1995 (the "Employment Agreement") by and between MKS Instruments, Inc., a Massachusetts Corporation (the "Corporation"), and Leo Berlinghieri of Billerica, MA (the "Employee").

WHEREAS, the Corporation and the Employee entered into an Employment Agreement dated August 24, 1981 (the "Original Employment Agreement"); and

WHEREAS, the Corporation has adopted a new Management Incentive Program and the Employee desires to be eligible to participate in such Management Incentive Program; and

WHEREAS, the Corporation and the Employee desire to make certain other amendments to the Original Employment Agreement as more particularly set forth herein; and

WHEREAS, for convenience of reference, the Corporation and the Employee desire to amend and restate the Original Employment Agreement in its entirety;

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein, and for other good and valuable considerations, the receipt and sufficiency of which are hereby acknowledged, the Corporation and the Employee hereby agree that the Original Employment Agreement is hereby amended and restated to read in its entirety as follows:

(1) TERM OF EMPLOYMENT: The Corporation hereby employs the Employee, and the Employee hereby accepts employment with the Corporation, for a period commencing as of December 15, 1995 and continuing from month to month thereafter until terminated as provided in this Section (1). Either the Corporation or the Employee may terminate the employment of the Employee under this Employment Agreement any time after December 15, 1995 by giving written notice to the other party stating or his election to terminate the employment of the Employee under this Employment Agreement. The employment of the Employee under this Employment Agreement shall terminate thirty (30) days after the date of receipt by the other party of such notice; provided, however, that the employment of the Employee under this Employment Agreement is subject to prior termination as hereinafter provided in Section (5).

(2) CAPACITY: The Employee shall serve in such capacity as may be assigned to him consistent with his training and experience for the term of employment under this Employment Agreement and shall have such authority as is delegated to him by the President of the Corporation, or his designee.

(3) EXTENT OF SERVICES: During the term of employment of the Employee under this Employment Agreement, the Employee shall devote his full time to, and use his best efforts in the furtherance of, the business of the Corporation and shall not engage in any other business activity, whether or not such business activity is pursued for gain or any other pecuniary advantage, without the prior written consent of the Corporation.

(4) COMPENSATION: In consideration of the services to be rendered by the Employee under this Employment Agreement, the Corporation agrees to pay, and the Employee agrees to accept, the following compensation:

(a) BASE SALARY: A base salary at the rate of \$125,000 per year for the term of employment of the Employee under this Employment Agreement. The base salary shall be payable in equal weekly, biweekly, or bimonthly installments subject to usual withholding requirements. Base salary will be reviewed according to the established practices of the corporation. No overtime pay will be paid to the Employee by the Corporation.

(b) INCENTIVE: For each calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement, the Employee shall be entitled to participate in a Management Incentive Program pursuant to the terms of which the Employee may receive compensation in addition to his base salary in an amount equal to a specified percentage of his base salary if the Corporation attains its consolidated financial goals during such calendar year of the Corporation. The Management Incentive Program, including the consolidated financial goals established by the Corporation for the calendar year and the formula to be used to determine the payment of amounts under the Management Incentive Program, will be communicated to the Employee in writing prior to the beginning of each calendar year of the Corporation. The first calendar year of the Corporation for purposes of the Management Incentive Program will commence on January 1, 1996 and end on December 31, 1996. If the term of employment of the Employee under this Employment Agreement shall include a portion of a calendar year of the Corporation commencing after January 1, 1996, the Corporation shall not pay the Employee, and the Employee shall not be entitled to receive, any amount under the Management Incentive Program.

If there shall be any disagreement between the Corporation and the Employee as to the calculation of the Management Incentive Bonus in any calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement, the decision of the independent Public Accounting firm of the Corporation as to the amount of the Management Incentive Bonus of the Corporation shall be conclusive and binding on the Corporation and the Employee. The Employee shall have no right to inspect any of the books, papers or records of the

Corporation, except that the Employee shall be entitled to inspect any certificate of such independent public accounting firm as to the calculation of the Management Incentive Bonus of the Corporation in any calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement.

Incentive payments shall be payable to the Employee on or before March 31 after the end of each calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement.

(c) MKS INSTRUMENTS, INC. PROFIT SHARING AND RETIREMENT SAVINGS PLAN: The Employee shall be eligible to participate in the MKS Instruments, Inc. Profit Sharing and Retirement Savings Plan upon satisfaction of the conditions set forth therein

(d) VACATION: The Employee shall be entitled to an annual vacation leave of days at full pay during each calendar year during the term of employment of the Employee under this Employment Agreement, subject to the Employee arranging such vacation so as not to affect adversely the ability of the Corporation to transact its necessary business.

(e) LIFE INSURANCE: The Corporation shall provide, and pay all of the premiums for, term life insurance for the Employee during the term of employment of the Employee under this Employment Agreement in accordance with the term life insurance plan of the Corporation.

(f) MEDICAL/DENTAL INSURANCE: The Corporation shall provide group medical/dental insurance for the Employee under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement.

(g) OTHER BENEFITS: The Corporation shall provide other benefits for the employee under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement.

(5) TERMINATION: The employment of the Employee under this Employment Agreement shall terminate:

(a) On the expiration of the period of employment as provided in Section (1)

(b) Upon the death of the Employee.

(c) At the election of the Corporation (i) if the Employee shall fail, or refuse, to perform the services required of him under this Employment

Agreement, or (ii) if the Employee shall fail, or refuse, to perform the other covenants and agreements required of him under this Employment Agreement, or (iii) for "cause", which term shall mean acts or actions detrimental to the best interests of the Corporation.

(6) PAYMENT UPON TERMINATION:

(a) If the employment of the Employee is terminated on the expiration of the period of employment as provided in Section (1), the Employee shall not be entitled to any compensation, and the Corporation shall have no obligation to pay the Employee any compensation, except as is provided in this Employment Agreement.

(b) If the employment of the Employee is terminated by death, the Corporation shall pay to the estate of the Employee the compensation which would otherwise be payable to the Employee at the end of the month in which his death occurs.

(c) In the event the employment of the Employee is terminated at the election of the Corporation pursuant to Section (5) (c) hereof, the Employee shall only be entitled to his base salary through the last day of actual employment or the date of termination, whichever is earlier.

(7) TRADE SECRETS: The Employee covenants and agrees that he will communicate to the Corporation, and will not divulge or communicate to any other person, partnership, corporation or other entity without the prior written consent of the Corporation, any trade secrets of the Corporation or confidential information relating to the business of the Corporation or any one connected with the Corporation, and that such trade secrets and confidential information shall not be used by the Employee either on his own behalf or for the benefit of others or disclosed by the Employee to any one, except to the Corporation, during or after the term of employment of the Employee under this Employment Agreement. "Trade secrets of the Corporation" shall include, but not be limited to, Inventions, trade secrets, files, records, drawings, specifications, processes, lists of material, lists of customers, sales and marketing strategies, product development plans, financial information, and information on research and development.

(8) INVENTIONS AND PATENTS:

(a) The Employee shall make prompt full disclosure in writing to the Corporation of all inventions, improvements and discoveries, whether or not patentable, which the Employee conceives, devises, makes, discovers, develops, perfects or first reduces to practice, either alone or jointly with others, during the term of employment of the Employee under this Employment Agreement, which

relate in any way to the fields, products or business of the Corporation, including development and research, whether during or out of the usual hours of work or on or off the premises of the Corporation or by use of the facilities of the Corporation or otherwise and whether at the request or suggestion of the Corporation or otherwise (all such inventions, improvements and discoveries being hereinafter called the "Inventions"), including any Inventions, whether or not patentable, conceived, devised, made, discovered, developed, perfected or first reduced to practice by the Employee after the employment of the Employee under this Employment Agreement is terminated if the Inventions were conceived by the Employee during the term of employment of the Employee under this Employment Agreement. Any Inventions, whether or not patentable, conceived, devised, made, discovered, developed, perfected or first reduced to practice by the Employee within six (6) months of the date of termination of the employment of the Employee under this Employment Agreement shall be conclusively presumed to have been conceived during the term of employment of the Employee under this Employment Agreement.

(b) The Employee agrees that the Inventions shall be the sole and exclusive property of the Corporation.

(c) The Employee agrees to assist the Corporation and its nominees in every reasonable way (entirely at its or their expense) to obtain for the benefit of the Corporation letters patent for the Inventions and trademarks, trade names and copyrights relating to the Inventions, and any renewals, extensions or reissues thereof, in any and all countries, and agrees to make, execute, acknowledge and deliver, at the request of the Corporation, all written applications for letters patent, trademarks, trade names and copyrights relating to the Inventions and any renewals, extensions or reissues thereof, in any and all countries, and all documents with respect thereto, and all powers of attorney relating thereto and, without further compensation, to assign to the Corporation or its nominees all the right, title and interest of the Employee in and to such applications and to any patents, trademarks, trade names or copyrights which shall thereafter issue on any such applications, and to execute, acknowledge and deliver all other documents deemed necessary by the Corporation to transfer to or vest in the Corporation all of the right, title and interest of the Employee in and to the Inventions, and to such trademarks, trade names, patents and copyrights together with exclusive rights to make, use, license and sell them throughout the world.

(d) The Employee agrees that even though his employment is terminated under this Employment Agreement he will, at any time after such termination of employment, carry out and perform all of the agreements of Subsections (8) (a) and (8) (c) above, and will at any time and at all times cooperate with the Corporation in the prosecution and/or defense of any litigation which may arise in connection with the Inventions, provided, however, that should such services be rendered after termination of employment of the Employee under this

Employment Agreement, the Employee shall be paid reasonable compensation on a per diem basis.

(e) The Employee agrees to make and maintain adequate and current written records of all Inventions in the form of notes, sketches, drawings, or reports relating thereto, which records shall be and remain the property of, and available to, the Corporation at all times.

(f) The Employee agrees that he will, upon leaving the employment of the Corporation, promptly deliver to the Corporation all originals and copies of disclosures, drawings, prints, letters, notes, and reports either typed, handwritten or otherwise memorialized, belonging to the Corporation which are in his possession or under his control and the Employee agrees that he will not retain or give away or make copies of the originals or copies of any such disclosures, drawings, prints, letters, notes or reports.

(9) PROPERTY OF CORPORATION: All files, records, reports, documents, drawings, specifications, equipment, and similar items relating to the business of the Corporation, whether prepared by the Employee or otherwise coming into his possession, shall remain the exclusive property of the Corporation and shall not be removed by the Employee from the premises of the Corporation under any circumstances whatsoever without the prior written consent of the Corporation.

(10) NON-COMPETITION:

(a) In order to protect the good will of the Corporation and in order to protect the trade secrets of the Corporation referred to in Section (7) of this Employment Agreement, the Employee hereby agrees that during the term of employment of the Employee under this Employment Agreement, and during a period of one (1) year after termination of employment of the Employee under this Employment Agreement without regard to the cause of termination of employment and whether or not such termination of employment was caused by the Employee or by the Corporation, (i) the Employee shall not engage, either directly or indirectly, in any manner or capacity, in any business or activity which is competitive with any business or activity conducted by the Corporation; (ii) the Employee shall not work for or employ, directly or indirectly, or cause to be employed by another, any person who was an employee, officer or agent of the Corporation or of any of its subsidiaries at any time during a period of twelve (12) months prior to the termination of the employment of the Employee under this Employment Agreement nor shall the Employee form any partnership with, or establish any business venture in cooperation with, any such person which is competitive with any business or activity of the Corporation; (iii) the Employee shall not give, sell or lease any goods or services competitive with the goods or services of the Corporation or its subsidiaries to any person, partnership, corporation or other entity who purchased goods or

services from the Corporation or its subsidiaries within one (1) year before the termination of the employment of the Employee under this Employment Agreement; (iv) the Employee shall not have any financial interest, or participate as a director, officer, stockholder, partner, employee, consultant or otherwise, in any corporation, partnership or other entity which is competitive with any business or activity conducted by the Corporation.

(b) The Corporation and the Employee agree that the services of the Employee are of a personal, special, unique and extraordinary character, and cannot be replaced by the Corporation without great difficulty, and that the violation by the Employee of any of his agreements under this Section (10) would damage the goodwill of the Corporation and cause the Corporation irreparable harm which could not reasonably or adequately be compensated in damages in an action at law, and that the agreements of the Employment under this Section (1) may be enforced by the Corporation in equity by an injunction or restraining order in addition to being enforced by the Corporation at law.

(c) In the event that this Section (10) shall be determined by any court of competent jurisdiction to be unenforceable by reason of its extending for too long a period of time or over too great a range of activities, it shall be interpreted to extend only over the maximum period of time or range of activities as to which it may be enforceable.

(11) NOTICE: Any and all notices under this Employment Agreement shall be in writing and, if to the Corporation, shall be duly given if sent to the Corporation by registered or certified mail, postage prepaid, return receipt requested, at the address of the Corporation set forth under its name below or at such other address as the Corporation may hereafter designate to the Employee in writing for the purpose, and if to the Employee, shall be duly given if delivered to the Employee by hand or if sent to the Employee by registered or certified mail, postage prepaid, return receipt requested, at the address of the Employee set forth under his name below or at such other address as the Employee may hereafter designate to the Corporation in writing for the purpose.

(12) ASSIGNMENT: The rights and obligations of the Corporation under this Employment Agreement shall inure to the benefit of, and shall be binding upon, the successors and assigns of the Corporation. The rights and obligations of the Employee under this Employment Agreement shall inure to the benefit of, and shall be binding upon, the heirs, executors and legal representatives of the Employee.

(13) ENTIRE AGREEMENT AND SEVERABILITY:

(a) This Employment Agreement supersedes any and all other agreements, either oral or in writing, between the parties hereto with respect to the

employment of the Employee by the Corporation and contains all of the covenants and agreements between the parties with respect to such employment. Each party to this Employment Agreement acknowledges that no representations, inducements, promises or agreements, oral or otherwise, have been made by any party, or anyone acting on behalf of any party, which are not embodied herein, and that no other agreement, statement or promise not contained in this Employment Agreement shall be valid and binding. Any modification of this Employment Agreement will be effective only if it is in writing signed by both parties to this Employment Agreement.

(b) If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall nevertheless continue in full force and effect without being impaired or invalidated in any way.

(c) All pronouns used herein shall include the masculine, feminine, and neuter gender as the context requires.

(14) GOVERNING LAW AND JURISDICTIONS: This Employment Agreement shall be governed by, and construed in accordance with, the laws of The Commonwealth of Massachusetts applicable to contracts made and to be performed entirely within The Commonwealth of Massachusetts (without reference to conflict of laws principles). Any action or proceeding arising from or in connection with this Employment Agreement may be brought against the Employee in a court of record of The Commonwealth of Massachusetts, Middlesex County, or in the United States District Court for the District of Massachusetts, the Employee hereby consenting to the jurisdiction thereof over its person; and service of process may be made upon the Employee by mailing a copy of the summons and any complaint to the Employee by registered or certified mail, postage prepaid, return receipt requested, at the address to be used for the giving of notice to the Employee as provided in this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Employment Agreement as a sealed instrument in the Commonwealth of Massachusetts, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: _____
 John R. Bertucci, President
 Six Shattuck Road
 Andover, MA 01810

Employee Signature

Leo Berlinghieri

Employee Name

Address:
15 Olney Street
Billerica, MA 01821

AMENDED & RESTATED EMPLOYMENT AGREEMENT

EMPLOYMENT AGREEMENT dated December 15, 1995 (the "Employment Agreement") by and between MKS Instruments Inc., a Massachusetts Corporation (the "Corporation"), and John J. Sullivan of Milton, MA (the "Employee").

WHEREAS, the Corporation and the Employee entered into an Employment Agreement dated April 3, 1982 (the "Original Employment Agreement"); and

WHEREAS, the Corporation has adopted a new Management Incentive Program and the Employee desires to be eligible to participate in such Management Incentive Program; and

WHEREAS, the Corporation and the Employee desire to make certain other amendments to the Original Employment Agreement as more particularly set forth herein; and

WHEREAS, for convenience of reference, the Corporation and the Employee desire to amend and restate the Original Employment Agreement in its entirety:

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein, and for other good and valuable considerations, the receipt and sufficiency of which are hereby acknowledged, the Corporation and the Employee hereby agree that the Original Employment Agreement is hereby amended and restated to read in its entirety as follows:

(1) TERM OF EMPLOYMENT: The Corporation hereby employs the Employee, and the Employee hereby accepts employment with the Corporation, for a period commencing as of December 15, 1995 and continuing from month to month thereafter until terminated as provided in this Section (1). Either the Corporation or the Employee may terminate the employment of the Employee under this Employment Agreement at any time after December 15, 1995 by giving written notice to the other party stating or his election to terminate the employment of the Employee under this Employment Agreement. The employment of the Employee under this Employment Agreement shall terminate thirty (30) days after the date of receipt by the other party of such notice; provided, however, that the employment of the Employee under this Employment Agreement is subject to prior termination as hereinafter provided in Section (5).

(2) CAPACITY: The Employee shall serve in such capacity as may be assigned to him consistent with his training and experience for the term of employment under this Employment Agreement and shall have such authority as is delegated to him by the President of the Corporation, or his designee.

(3) EXTENT OF SERVICES: During the term of employment of the Employee under this Employment Agreement, the Employee shall devote his full time to, and use his best efforts in the furtherance of, the business of the Corporation and shall not engage in any other business activity, whether or not such business activity is pursued for gain or any other pecuniary advantage, without the prior written consent of the Corporation.

(4) COMPENSATION: In consideration of the services to be rendered by the Employee under this Employment Agreement, the Corporation agrees to pay, and the Employee agrees to accept, the following compensation:

(a) BASE SALARY: A base salary at the rate of \$140,000 per year for the term of employment of the Employee under this Employment Agreement. The base salary shall be payable in equal weekly, biweekly, or bimonthly installments subject to usual withholding requirements. Base salary will be reviewed according to the established practices of the corporation. No overtime pay will be paid to the Employee by the Corporation.

(b) INCENTIVE: For each calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement, the Employee shall be entitled to participate in a Management Incentive Program pursuant to the terms of which the Employee may receive compensation in addition to his base salary in an amount equal to a specified percentage of his base salary if the Corporation attains its consolidated financial goals during such calendar year of the Corporation. The Management Incentive Program, including the consolidated financial goals established by the Corporation for the calendar year and the formula to be used to determine the payment of amounts under the Management Incentive Program, will be communicated to the Employee in writing prior to the beginning of each calendar year of the Corporation. The first calendar year of the Corporation for purposes of the Management Incentive Program will commence on January 1, 1996 and end on December 31, 1996. If the term of employment of the Employee under this Employment Agreement shall include a portion of a calendar year of the Corporation commencing after January 1, 1996, the Corporation shall not pay the Employee, and the Employee shall not be entitled to receive, any amount under the Management Incentive Program.

If there shall be any disagreement between the Corporation and the Employee as to the calculation of the Management Incentive Bonus in any calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement, the decision of the independent Public Accounting firm of the Corporation as to the amount of the Management Incentive Bonus of the Corporation shall be conclusive and binding on the Corporation and the Employee. The Employee shall have no right to inspect any of the books, papers or records of the Corporation except that the Employee shall be entitled to inspect any certificate of

such independent public accounting firm as to the calculation of the Management Incentive Bonus of the Corporation in any calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement.

Incentive payments shall be payable to the Employee on or before March 31 after the end of each calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement.

(c) MKS INSTRUMENTS, INC. PROFIT SHARING AND RETIREMENT SAVINGS PLAN: The Employee shall be eligible to participate in the MKS Instruments, Inc. Profit Sharing and Retirement Savings Plan upon satisfaction of the conditions set forth therein.

(d) VACATION: The Employee shall be entitled to an annual vacation leave of 20 days at full pay during each calendar year during the term of employment of the Employee under this Employment Agreement, subject to the Employee arranging such vacation so as not to affect adversely the ability of the Corporation to transact its necessary business.

(e) LIFE INSURANCE: The Corporation shall provide, and pay all of the premiums for, term life insurance for the Employee during the term of employment of the Employee under this Employment Agreement in accordance with the term life insurance plan of the Corporation.

(f) MEDICAL/DENTAL INSURANCE: The Corporation shall provide group medical/dental insurance for the Employee under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement.

(g) OTHER BENEFITS: The Corporation shall provide other benefits for the employee under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement.

(5) TERMINATION: The employment of the Employee under this Employment Agreement shall terminate:

(a) On the expiration of the period of employment as provided in Section (1).

(b) Upon the death of the Employee.

(c) At the election of the Corporation (i) if the Employee shall fail, or refuse, to perform the services required of him under this Employment Agreement, or (ii) if the Employee shall fail, or refuse, to perform the other covenants and

agreements required of him under this Employment Agreement, or (iii) for "cause," which term shall mean acts or actions detrimental to the best interests of the Corporation

(6) PAYMENT UPON TERMINATION:

(a) If the employment of the Employee is terminated on the expiration of the period of employment as provided in Section (1), the Employee shall not be entitled to any compensation, and the Corporation shall have no obligation to pay the Employee any compensation, except as is provided in this Employment Agreement.

(b) If the employment of the Employee is terminated by death, the Corporation shall pay to the estate of the Employee the compensation which would otherwise be payable to the employee at the end of the month in which his death occurs.

(c) In the event the employment of the Employee is terminated at the election of the Corporation pursuant to Section (5) (c) hereof, the Employee shall only be entitled to his base salary through the last day of actual employment or the date of termination, whichever is earlier.

(7) TRADE SECRETS: The Employee covenants and agrees that he will communicate to the Corporation, and will not divulge or communicate to any other person, partnership, corporation or other entity without the prior written consent of the Corporation, any trade secrets of the Corporation or confidential information relating to the business of the Corporation or any one connected with the Corporation, and that such trade secrets and confidential information shall not be used by the Employee either on his own behalf or for the benefit of others or disclosed by the Employee to any one, except to the Corporation, during or after the term of employment of the Employee under this Employment Agreement. "Trade secrets of the Corporation" shall include, but not be limited to, Inventions, trade secrets, files, records, drawings, specifications, processes, lists of material, lists of customers, sales and marketing strategies, product development plans, financial information, and information on research and development.

(8) INVENTIONS AND PATENTS:

(a) The Employee shall make prompt full disclosure in writing to the Corporation of all inventions, improvements and discoveries, whether or not patentable, which the Employee conceives, devises, makes, discovers, develops, perfects or first reduces to practice, either alone or jointly with others, during the term of employment of the Employee under this Employment Agreement, which relate in any way to the fields, products or business of the Corporation, including

development and research, whether during or out of the usual hours of work or on or off the premises of the Corporation or by use of the facilities of the Corporation or otherwise and whether at the request or suggestion of the Corporation or otherwise (all such inventions, improvements and discoveries being hereinafter called the "Inventions"), including any Inventions, whether or not patentable, conceived, devised, made, discovered, developed, perfected or first reduced to practice by the Employee after the employment of the Employee under this Employment Agreement is terminated if the Inventions were conceived by the Employee during the term of employment of the Employee under this Employment Agreement. Any Inventions, whether or not patentable, conceived, devised, made, discovered, developed, perfected or first reduced to practice by the Employee within six (6) months of the date of termination of the employment of the Employee under this Employment Agreement shall be conclusively presumed to have been conceived during the term of employment of the Employee under this Employment Agreement.

(b) The Employee agrees that the Inventions shall be the sole and exclusive property of the Corporation.

(c) The Employee agrees to assist the Corporation and its nominees in every reasonable way (entirely at its or their expense) to obtain for the benefit of the Corporation letters patent for the Inventions and trademarks, trade names and copyrights relating to the Inventions, and any renewals, extensions or reissues thereof, in any and all countries, and agrees to make, execute, acknowledge and deliver, at the request of the Corporation, all written applications for letters patent, trademarks, trade names and copyrights relating to the Inventions and any renewals, extensions or reissues thereof, in any and all countries, and all documents with respect thereto, and all powers of attorney relating thereto and, without further compensation, to assign to the Corporation or its nominees all the right, title and interest of the Employee in and to such applications and to any patents, trademarks, trade names or copyrights which shall thereafter issue on any such applications, and to execute, acknowledge and deliver all other documents deemed necessary by the Corporation to transfer to or vest in the Corporation all of the right, title and interest of the Employee in and to the Inventions, and to such trademarks, trade names, patents and copyrights together with exclusive rights to make, use, license and sell them throughout the world.

(d) The Employee agrees that even though his employment is terminated under this Employment Agreement he will, at any time after such termination of employment, carry out and perform all of the agreements of Subsections (8) (a) and (8) (c) above, and will at any time and at all times cooperate with the Corporation in the prosecution and/or defense of any litigation which may arise in connection with the Inventions, provided however, that should such services be rendered after termination of employment of the Employee under this

Employment Agreement, the Employee shall be paid reasonable compensation on a per diem basis.

(e) The Employee agrees to make and maintain adequate and current written records of all Inventions in the form of notes, sketches, drawings, or reports relating thereto, which records shall be and remain the property of, and available to, the Corporation at all times.

(f) The Employee agrees that he will, upon leaving the employment of the Corporation, promptly deliver to the Corporation all originals and copies of disclosures, drawings, prints, letters, notes, and reports either typed, handwritten or otherwise memorialized, belonging to the Corporation which are in his possession or under his control and the Employee agrees that he will not retain or give away or make copies of the originals or copies of any such disclosures drawings prints, letters, notes or reports.

(9) PROPERTY OF CORPORATION: All files, records, reports, documents, drawings, specifications, equipment, and similar items relating to the business of the Corporation, whether prepared by the Employee or otherwise coming into his possession, shall remain the exclusive property of the Corporation and shall not be removed by the Employee from the premises of the Corporation under any circumstances whatsoever without the prior written consent of the Corporation.

(10) NON-COMPETITION:

(a) In order to protect the good will of the Corporation and in order to protect the trade secrets of the Corporation referred to in Section (7) of this Employment Agreement, the Employee hereby agrees that during the term of employment of the Employee under this Employment Agreement, and during a period of one (1) year after termination of employment of the Employee under this Employment Agreement without regard to the cause of termination of employment and whether or not such termination of employment was caused by the Employee or by the Corporation, (i) the Employee shall not engage, either directly or indirectly, in any manner or capacity, in any business or activity which is competitive with any business or activity conducted by the Corporation; (ii) the Employee shall not work for or employ, directly or indirectly, or cause to be employed by another, any person who was an employee officer or agent of the Corporation or of any of its subsidiaries at any time during a period of twelve (12) months prior to the termination of the employment of the Employee under this Employment Agreement nor shall the Employee form any partnership with, or establish any business venture in cooperation with, any such person which is competitive with any business or activity of the Corporation; (iii) the Employee shall not give sell or lease any goods or services competitive with the goods or services of the Corporation or its subsidiaries to any person, partnership, corporation or other entity who purchased goods or

services from the Corporation or its subsidiaries within one (1) year before the termination of the employment of the Employee under this Employment Agreement; (iv) the Employee shall not have any financial interest, or participate as a director, officer, stockholder, partner, employee, consultant or otherwise, in any corporation partnership or other entity which is competitive with any business or activity conducted by the Corporation.

(b) The Corporation and the Employee agree that the services of the Employee are of a personal, special, unique and extraordinary character, and cannot be replaced by the Corporation without great difficulty, and that the violation by the Employee of any of his agreements under this Section (10) would damage the goodwill of the Corporation and cause the Corporation irreparable harm which could not reasonably or adequately be compensated in damages in an action at law, and that the agreements of the Employee under this Section (10) may be enforced by the Corporation in equity by an injunction or restraining order in addition to being enforced by the Corporation at law.

(c) In the event that this Section (10) shall be determined by any court of competent jurisdiction to be unenforceable by reason of its extending for too long a period of time or over too great a range of activities, it shall be interpreted to extend only over the maximum period of time or range of activities as to which it may be enforceable.

(11) NOTICE: Any and all notices under this Employment Agreement shall be in writing and, if to the Corporation, shall be duly given if sent to the Corporation by registered or certified mail, postage prepaid, return receipt requested, at the address of the Corporation set forth under its name below or at such other address as the Corporation may hereafter designate to the Employee in writing for the purpose, and if to the Employee, shall be duly given if delivered to the Employee by hand or if sent to the Employee by registered or certified mail, postage prepaid, return receipt requested, at the address of the Employee set forth under his name below or at such other address as the Employee may hereafter designate to the Corporation in writing for the purpose.

(12) ASSIGNMENT: The rights and obligations of the Corporation under this Employment Agreement shall inure to the benefit of, and shall be binding upon, the successors and assigns of the Corporation. The rights and obligations of the Employee under this Employment Agreement shall inure to the benefit of, and shall be binding upon, the heirs, executors and legal representatives of the Employee.

(13) ENTIRE AGREEMENT AND SEVERABILITY:

(a) This Employment Agreement supersedes any and all other agreements, either oral or in writing, between the parties hereto with respect to the

employment of the Employee by the Corporation and contains all of the covenants and agreements between the parties with respect to such employment. Each party to this Employment Agreement acknowledges that no representations, inducements, promises or agreements, oral or otherwise, have been made by any party or any one acting on behalf of any party, which are not embodied herein, and that no other agreement, statement or promise not contained in this Employment Agreement shall be valid and binding. Any modification of this Employment Agreement will be effective only if it is in writing signed by both parties to this Employment Agreement.

(b) If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall nevertheless continue in full force and effect without being impaired or invalidated in any way.

(c) All pronouns used herein shall include the masculine, feminine, and neuter gender as the context requires.

(14) GOVERNING LAW AND JURISDICTIONS: This Employment Agreement shall be governed by, and construed in accordance with, the laws of the Commonwealth of Massachusetts applicable to contracts made and to be performed entirely within the Commonwealth of Massachusetts (without reference to conflict of laws principles). Any action or proceeding arising from or in connection with this Employment Agreement may be brought against the Employee in a court of record of the Commonwealth of Massachusetts, Middlesex County, or in the United States District Court for the District of Massachusetts, the Employee hereby consenting to the jurisdiction thereof over its person; and service of process may be made upon the Employee by mailing a copy of the summons and any complaint to the Employee by registered or certified mail, postage prepaid, return receipt requested, at the address to be used for the giving of notice to the Employee as provided in this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Employment Agreement as a sealed instrument in the Commonwealth of Massachusetts, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: _____
John R. Bertucci, President

Six Shattuck Road
Andover, MA 01810

Employee Signature

John J. Sullivan

Employee Name

Address:

=====

AMENDED & RESTATED EMPLOYMENT AGREEMENT

EMPLOYMENT AGREEMENT dated December 15, 1995 (the "Employment Agreement") by and between MKS Instruments, Inc., a Massachusetts Corporation (the "Corporation"), and Ronald Weigner of Sudbury, MA (the "Employee").

WHEREAS, the Corporation and the Employee entered into an Employment Agreement dated October 7, 1981 (the "Original Employment Agreement"); and

WHEREAS, the Corporation has adopted a new Management Incentive Program and the Employee desires to be eligible to participate in such Management Incentive Program; and

WHEREAS, the Corporation and the Employee desire to make certain other amendments to the Original Employment Agreement as more particularly set forth herein; and

WHEREAS, for convenience of reference, the Corporation and the Employee desire to amend and restate the Original Employment Agreement in its entirety:

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein, and for other good and valuable considerations, the receipt and sufficiency of which are hereby acknowledged, the Corporation and the Employee hereby agree that the Original Employment Agreement is hereby amended and restated to read in its entirety as follows:

(1) TERM OF EMPLOYMENT: The Corporation hereby employs the Employee, and the Employee hereby accepts employment with the Corporation, for a period commencing as of December 15, 1995 and continuing from month to month thereafter until terminated as provided in this Section (1). Either the Corporation or the Employee may terminate the employment of the Employee under this Employment Agreement at any time after December 15, 1995 by giving written notice to the other party stating its or his election to terminate the employment of the Employee under this Employment Agreement. The employment of the Employee under this Employment Agreement shall terminate thirty (30) days after the date of receipt by the other party of such notice; provided, however, that the employment of the Employee under this Employment Agreement is subject to prior termination as hereinafter provided in Section (5).

(2) CAPACITY: The Employee shall serve in such capacity as may be assigned to him consistent with his training and experience for the term of employment under this Employment Agreement and shall have such authority as is delegated to him by the President of the Corporation, or his designee.

(3) EXTENT OF SERVICES: During the term of employment of the Employee under this Employment Agreement, the Employee shall devote his full time to, and use his best efforts in the furtherance of, the business of the Corporation and shall not engage in any other business activity, whether or not such business activity is pursued for gain or any other pecuniary advantage, without the prior written consent of the Corporation.

(4) COMPENSATION: In consideration of the services to be rendered by the Employee under this Employment Agreement, the Corporation agrees to pay, and the Employee agrees to accept, the following compensation:

(a) BASE SALARY: A base salary at the rate of \$155,000 per year for the term of employment of the Employee under this Employment Agreement. The base salary shall be payable in equal weekly, biweekly, or bimonthly installments subject to usual withholding requirements. Base salary will be reviewed according to the established practices of the corporation. No overtime pay will be paid to the Employee by the Corporation.

(b) INCENTIVE: For each calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement, the Employee shall be entitled to participate in a Management Incentive Program pursuant to the terms of which the Employee may receive compensation in addition to his base salary in an amount equal to a specified percentage of his base salary if the Corporation attains its consolidated financial goals during such calendar year of the Corporation. The Management Incentive Program, including the consolidated financial goals established by the Corporation for the calendar year and the formula to be used to determine the payment of amounts under the Management Incentive Program, will be communicated to the Employee in writing prior to the beginning of each calendar year of the Corporation. The first calendar year of the Corporation for purposes of the Management Incentive Program will commence on January 1, 1996 and end on December 31, 1996. If the term of employment of the Employee under this Employment Agreement shall include a portion of a calendar year of the Corporation commencing after January 1, 1996, the Corporation shall not pay the Employee, and the Employee shall not be entitled to receive, any amount under the Management Incentive Program.

If there shall be any disagreement between the Corporation and the Employee as to the calculation of the Management Incentive Bonus in any calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement, the decision of the independent Public Accounting firm of the Corporation as to the amount of the Management Incentive Bonus of the Corporation shall be conclusive and binding on the Corporation and the Employee. The Employee shall have no right to inspect any of the books, papers or records of the Corporation, except that the Employee shall be entitled to inspect any certificate of

such independent public accounting firm as to the calculation of the Management Incentive Bonus of the Corporation in any calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement.

Incentive payments shall be payable to the Employee on or before March 31 after the end of each calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement.

(c) MKS INSTRUMENTS, INC. PROFIT SHARING AND RETIREMENT SAVINGS PLAN: The Employee shall be eligible to participate in the MKS Instruments, Inc. Profit Sharing and Retirement Savings Plan upon satisfaction of the conditions set forth therein.

(d) VACATION: The Employee shall be entitled to an annual vacation leave of 20 days at full pay during each calendar year during the term of employment of the Employee under this Employment Agreement, subject to the Employee arranging such vacation so as not to affect adversely the ability of the Corporation to transact its necessary business.

(e) LIFE INSURANCE: The Corporation shall provide, and pay all of the premiums for, term life insurance for the Employee during the term of employment of the Employee under this Employment Agreement in accordance with the term life insurance plan of the Corporation.

(f) MEDICAL/DENTAL INSURANCE: The Corporation shall provide group medical/dental insurance for the Employee under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement.

(g) OTHER BENEFITS: The Corporation shall provide other benefits for the employee under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement.

(5) TERMINATION: The employment of the Employee under this Employment Agreement shall terminate:

(a) On the expiration of the period of employment as provided in Section (1).

(b) Upon the death of the Employee.

(c) At the election of the Corporation (i) if the Employee shall fail, or refuse, to perform the services required of him under this Employment Agreement, or (ii) if the Employee shall fail, or refuse, to perform the other covenants and

agreements required of him under this Employment Agreement, or (iii) for "cause," which term shall mean acts or actions detrimental to the best interests of the Corporation.

(6) PAYMENT UPON TERMINATION:

(a) If the employment of the Employee is terminated on the expiration of the period of employment as provided in Section (1), the Employee shall not be entitled to any compensation, and the Corporation shall have no obligation to pay the Employee any compensation, except as is provided in this Employment Agreement.

(b) If the employment of the Employee is terminated by death, the Corporation shall pay to the estate of the Employee the compensation which would otherwise be payable to the Employee at the end of the month in which his death occurs.

(c) In the event the employment of the Employee is terminated at the election of the Corporation pursuant to Section (5) (c) hereof, the Employee shall only be entitled to his base salary through the last day of actual employment or the date of termination, whichever is earlier.

(7) TRADE SECRETS: The Employee covenants and agrees that he will communicate to the Corporation, and will not divulge or communicate to any other person, partnership, corporation or other entity without the prior written consent of the Corporation, any trade secrets of the Corporation or confidential information relating to the business of the Corporation or any one connected with the Corporation, and that such trade secrets and confidential information shall not be used by the Employee either on his own behalf or for the benefit of others or disclosed by the Employee to any one, except to the Corporation, during or after the term of employment of the Employee under this Employment Agreement. "Trade secrets of the Corporation" shall include, but not be limited to, Inventions, trade secrets, files, records, drawings, specifications, processes, lists of material, lists of customers, sales and marketing strategies, product development plans, financial information, and information on research and development.

(8) INVENTIONS AND PATENTS:

(a) The Employee shall make prompt full disclosure in writing to the Corporation of all inventions, improvements and discoveries, whether or not patentable, which the Employee conceives, devises, makes, discovers, develops, perfects or first reduces to practice, either alone or jointly with others, during the term of employment of the Employee under this Employment Agreement, which relate in any way to the fields, products or business of the Corporation, including

development and research, whether during or out of the usual hours of work or on or off the premises of the Corporation or by use of the facilities of the Corporation or otherwise and whether at the request or suggestion of the Corporation or otherwise (all such inventions, improvements and discoveries being hereinafter called the "Inventions"), including any Inventions, whether or not patentable, conceived, devised, made, discovered, developed, perfected or first reduced to practice by the employee after the employment of the Employee under this Employment Agreement is terminated if the Inventions were conceived by the Employee during the term of employment of the Employee under this Employment Agreement. Any Inventions, whether or not patentable, conceived, devised, made, discovered, developed, perfected or first reduced to practice by the Employee within six (6) months of the date of termination of the employment of the Employee under this Employment Agreement shall be conclusively presumed to have been conceived during the term of employment of the Employee under this Employment Agreement.

(b) The Employee agrees that the Inventions shall be the sole and exclusive property of the Corporation.

(c) The Employee agrees to assist the Corporation and its nominees in every reasonable way (entirely at its or their expense) to obtain for the benefit of the Corporation letters patent for the Inventions and trademarks, trade names and copyrights relating to the Inventions, and any renewals, extensions or reissues thereof, in any and all countries, and agrees to make, execute, acknowledge and deliver, at the request of the Corporation, all written applications for letters patent, trademarks, trade names and copyrights relating to the Inventions and any renewals, extensions or reissues thereof, in any and all countries, and all documents with respect thereto, and all powers of attorney relating thereto and, without further compensation, to assign to the Corporation or its nominees all the right, title and interest of the Employee in and to such applications and to any patents, trademarks, trade names or copyrights which shall thereafter issue on any such applications, and to execute, acknowledge and deliver all other documents deemed necessary by the Corporation to transfer to or vest in the Corporation all of the right, title and interest of the Employee in and to the Inventions, and to such trademarks, trade names, patents and copyrights together with exclusive rights to make, use, license and sell them throughout the world.

(d) The Employee agrees that even though his employment is terminated under this Employment Agreement he will, at any time after such termination of employment, carry out and perform all of the agreements of Subsections (8) (a) and (8) (c) above, and will at any time and at all times cooperate with the Corporation in the prosecution and/or defense of any litigation which may arise in connection with the Inventions, provided, however, that should such services be rendered after termination of employment of the Employee under this

Employment Agreement, the Employee shall be paid reasonable compensation on a per diem basis.

(e) The Employee agrees to make and maintain adequate and current written records of all Inventions in the form of notes, sketches, drawings, or reports relating thereto, which records shall be and remain the property of, and available to, the Corporation at all times.

(f) The Employee agrees that he will, upon leaving the employment of the Corporation, promptly deliver to the Corporation all originals and copies of disclosures, drawings, prints, letters, notes, and reports either typed, handwritten or otherwise memorialized, belonging to the Corporation which are in his possession or under his control and the Employee agrees that he will not retain or give away or make copies of the originals or copies of any such disclosures, drawings, prints, letters, notes or reports.

(9) PROPERTY OF CORPORATION: All files, records, reports, documents, drawings, specifications, equipment, and similar items relating to the business of the Corporation, whether prepared by the Employee or otherwise coming into his possession, shall remain the exclusive property of the Corporation and shall not be removed by the Employee from the premises of the Corporation under any circumstances whatsoever without the prior written consent of the Corporation.

(10) NON-COMPETITION:

(a) In order to protect the good will of the Corporation and in order to protect the trade secrets of the Corporation referred to in Section (7) of this Employment Agreement, the Employee hereby agrees that during the term of employment of the Employee under this Employment Agreement, and during a period of one (1) year after termination of employment of the Employee under this Employment Agreement without regard to the cause of termination of employment and whether or not such termination of employment was caused by the Employee or by the Corporation, (i) the Employee shall not engage, either directly or indirectly, in any manner or capacity, in any business or activity which is competitive with any business or activity conducted by the Corporation; (ii) the Employee shall not work for or employ, directly or indirectly, or cause to be employed by another any person who was an employee, officer or agent of the Corporation or of any of its subsidiaries at any time during a period of twelve (12) months prior to the termination of the employment of the Employee under this Employment Agreement nor shall the Employee form any partnership with, or establish any business venture in cooperation with, any such person which is competitive with any business or activity of the Corporation; (iii) the Employee shall not give, sell or lease any goods or services competitive with the goods or services of the Corporation or its subsidiaries to any person, partnership, corporation or other entity who purchased goods or

services from the Corporation or its subsidiaries within one (1) year before the termination of the employment of the Employee under this Employment Agreement; (iv) the Employee all not have any financial interest, or participate as a director, officer, stockholder, partner, employee, consultant or otherwise, in any corporation, partnership or other entity which is competitive with any business or activity conducted by the Corporation.

(b) The Corporation and the Employee agree that the services of the Employee are of a personal, special unique and extraordinary character, and cannot be replaced by the Corporation without great difficulty, and that the violation by the Employee of any of his agreements under this Section (10) would damage the goodwill of the Corporation and cause the Corporation irreparable harm which could not reasonably or adequately be compensated in damages in an action at law, and that the agreements of the Employee under this Section (10) may be enforced by the Corporation in equity by an injunction or restraining order in addition to being enforced by the Corporation at law.

(c) In the event that this Section (10) shall be determined by any court of competent jurisdiction to be unenforceable by reason of its extending for too long a period of time or over too great a range of activities, it shall be interpreted to extend only over the maximum period of time or range of activities as to which it may be enforceable.

(11) NOTICE: Any and all notices under this Employment Agreement shall be in writing and, if to the Corporation, shall be duly given if sent to the Corporation by registered or certified mail, postage prepaid, return receipt requested, at the address of the corporation set forth under its name below or at such other address as the Corporation may hereafter designate to the Employee in writing for the purpose, and if to the Employee, shall be duly given if delivered to the Employee by hand or if sent to the Employee by registered or certified mail, postage prepaid, return receipt requested, at the address of the Employee set forth under his name below or at such other address as the Employee may hereafter designate to the Corporation in writing for the purpose.

(12) ASSIGNMENT: The rights and obligations of the Corporation under this Employment Agreement shall insure to the benefit of, and shall be binding upon, the successors and assigns of the Corporation. The rights and obligations of the Employee under this Employment Agreement shall insure to the benefit of, and shall be binding upon, the heirs, executors and legal representatives of the Employee.

(13) ENTIRE AGREEMENT AND SEVERABILITY:

(a) This Employment Agreement supersedes any and all other agreements, either oral or in writing, between the parties hereto with respect to the

employment of the Employee by the Corporation and contains all of the covenants and agreements between the parties with respect to such employment. Each party to this Employment Agreement acknowledges that no representations, inducements, promises or agreements, oral or otherwise, have been made by any party, or any one acting on behalf of any party, which are not embodied herein, and that no other agreement, statement or promise not contained in this Employment Agreement shall be valid and binding. Any modification of this Employment Agreement will be effective only if it is in writing signed by both parties to this Employment Agreement.

(b) If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall nevertheless continue in full force and effect without being impaired or invalidated in any way.

(c) All pronouns used herein shall include the masculine, feminine, and neuter gender as the context requires.

(14) GOVERNING LAW AND JURISDICTIONS: This Employment Agreement shall be governed by, and construed in accordance with, the laws of The Commonwealth of Massachusetts applicable to contracts made and to be performed entirely within The Commonwealth of Massachusetts (without reference to conflict of laws principles). Any action or proceeding arising from or in connection with this Employment Agreement may be brought against the Employee in a court of record of The Commonwealth of Massachusetts, Middlesex County, or in the United States District Court for the District of Massachusetts, the Employee hereby consenting to the jurisdiction thereof over its person; and service of process may be made upon the Employee by mailing a copy of the summons and any complaint to the Employee by registered or certified mail, postage prepaid, return receipt requested, at the address to be used for the giving of notice to the Employee as provided in this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Employment Agreement as a sealed instrument in the Commonwealth of Massachusetts, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: _____
John R. Bertucci, President

Six Shattuck Road
Andover, MA 01810

Employee Signature

Ronald Weigner
Employee Name

Address:

AMENDED & RESTATED EMPLOYMENT AGREEMENT

EMPLOYMENT AGREEMENT dated December 15, 1995 (the "Employment Agreement") by and between MKS Instruments, Inc., a Massachusetts Corporation (the "Corporation"), and William Stewart of Boulder, CO (the "Employee").

WHEREAS, the Corporation and the Employee entered into an Employment Agreement dated October 31, 1986 (the "Original Employment Agreement"); and

WHEREAS, the Corporation has adopted a new Management Incentive Program and the Employee desires to be eligible to participate in such Management Incentive Program; and

WHEREAS, the Corporation and the Employee desire to make certain other amendments to the Original Employment Agreement as more particularly set forth herein; and

WHEREAS, for convenience of reference, the Corporation and the Employee desire to amend and restate the Original Employment Agreement in its entirety:

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein, and for other good and valuable considerations, the receipt and sufficiency of which are hereby acknowledged, the Corporation and the Employee hereby agree that the Original Employment Agreement is hereby amended and restated to read in its entirety as follows:

(1) TERM OF EMPLOYMENT: The Corporation hereby employs the Employee, and the Employee hereby accepts employment with the Corporation, for a period commencing as of December 15, 1995 and continuing from month to month thereafter until terminated as provided in this Section (1). Either the Corporation or the Employee may terminate the employment of the Employee under this Employment Agreement at any time after December 15, 1995 by giving written notice to the other party stating its or his election to terminate the employment of the Employee under this Employment Agreement. The employment of the Employee under this Employment Agreement shall terminate thirty (30) days after the date of receipt by the other party of such notice; provided, however, that the employment of the Employee under this Employment Agreement is subject to prior termination as hereinafter provided in Section (5).

(2) CAPACITY: The Employee shall serve in such capacity as may be assigned to him consistent with his training and experience for the term of employment under this Employment Agreement and shall have such authority as is delegated to him by the President of the Corporation, or his designee.

(3) EXTENT OF SERVICES: During the term of employment of the Employee under this Employment Agreement, the Employee shall devote his full time to, and use his best efforts in the furtherance of, the business of the Corporation and shall not engage in any other business activity, whether or not such business activity is pursued for gain or any other pecuniary advantage, without the prior written consent of the Corporation.

(4) COMPENSATION: In consideration of the services to be rendered by the Employee under this Employment Agreement, the Corporation agrees to pay, and the Employee agrees to accept, the following compensation:

(a) BASE SALARY: A base salary at the rate of \$170,000 per year for the term of employment of the Employee under this Employment Agreement. The base salary shall be payable in equal weekly, biweekly, or bimonthly installments subject to usual withholding requirements. Base salary will be reviewed according to the established practices of the corporation. No overtime pay will be paid to the Employee by the Corporation.

(b) INCENTIVE: For each calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement, the Employee shall be entitled to participate in a Management Incentive Program pursuant to the terms of which the Employee may receive compensation in addition to his base salary in an amount equal to a specified percentage of his base salary if the Corporation attains its consolidated financial goals during such calendar year of the Corporation. The Management Incentive Program, including the consolidated financial goals established by the Corporation for the calendar year and the formula to be used to determine the payment of amounts under the Management Incentive Program, will be communicated to the Employee in writing prior to the beginning of each calendar year of the Corporation. The first calendar year of the Corporation for purposes of the Management Incentive Program will commence on January 1, 1996 and end on December 31, 1996. If the term of employment of the Employee under this Employment Agreement shall include a portion of a calendar year of the Corporation commencing after January 1, 1996, the Corporation shall not pay the Employee, and the Employee shall not be entitled to receive, any amount under the Management Incentive Program.

If there shall be any disagreement between the Corporation and the Employee as to the calculation of the Management Incentive Bonus in any calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement, the decision of the independent Public Accounting firm of the Corporation as to the amount of the Management Incentive Bonus of the Corporation shall be conclusive and binding on the Corporation and the Employee. The Employee shall have no right to inspect any of the books, papers or records of the Corporation, except that the Employee shall be entitled to inspect any certificate

of such independent public accounting firm as to the calculation of the Management Incentive Bonus of the Corporation in any calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement.

Incentive payments shall be payable to the Employee on or before March 31 after the end of each calendar year of the Corporation during the term of employment of the Employee under this Employment Agreement.

(c) MKS INSTRUMENTS, INC. PROFIT SHARING AND RETIREMENT SAVINGS PLAN: The Employee shall be eligible to participate in the MKS Instruments, Inc. Profit Sharing and Retirement Savings Plan upon satisfaction of the conditions set forth therein.

(d) VACATION: The Employee shall be entitled to an annual vacation leave of 20 days at pay during each calendar year during the term of employment of the Employee under this Employment Agreement in accordance with policy under plans of the Corporation applicable to the Employee, subject to the Employee arranging such vacation so as not to affect adversely the ability of the Corporation to transact its necessary business.

(e) LIFE INSURANCE: The Corporation shall provide, and pay all of the premiums for, term life insurance for the Employee during the term of employment of the Employee under this Employment Agreement in accordance with the term life insurance plan of the Corporation.

(f) MEDICAL/DENTAL INSURANCE: The Corporation shall provide group medical/dental insurance for the Employee under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement.

(g) OTHER BENEFITS: The Corporation shall provide other benefits for the employee under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement.

(5) TERMINATION: The employment of the Employee under this Employment Agreement shall terminate:

(a) On the expiration of the period of employment as provided in Section (1).

(b) Upon the death of the Employee.

(c) At the election of the Corporation (i) if the Employee shall fail, or refuse, to perform the services required of him under this Employment Agreement,

or (ii) if the Employee shall fail, or refuse, to perform the other covenants and agreements required of him under this Employment Agreement, or (iii) for "cause," which term shall mean acts or actions detrimental to the best interests of the Corporation.

(6) PAYMENT UPON TERMINATION:

(a) If the employment of the Employee is terminated on the expiration of the period of employment as provided in Section (1), the Employee shall not be entitled to any compensation, and the Corporation shall have no obligation to pay the Employee any compensation, except as is provided in this Employment Agreement.

(b) If the employment of the Employee is terminated by death, the Corporation shall pay to the estate of the Employee the compensation which would otherwise be payable to the Employee at the end of the month in which his death occurs.

(c) In the event the employment of the Employee is terminated at the election of the Corporation pursuant to Section (5) (c) hereof, the Employee shall only be entitled to his base salary through the last day of actual employment or the date of termination, whichever is earlier.

(7) TRADE SECRETS: The Employee covenants and agrees that he will communicate to the Corporation, and will not divulge or communicate to any other person, partnership, corporation or other entity without the prior written consent of the Corporation, any trade secrets of the Corporation or confidential information relating to the business of the Corporation or any one connected with the Corporation, and that such trade secrets and confidential information shall not be used by the Employee either on his own behalf or for the benefit of others or disclosed by the Employee to any one, except to the Corporation, during or after the term of employment of the Employee under this Employment Agreement. "Trade secrets of the Corporation" shall include, but not be limited to, Inventions, trade secrets, files, records, drawings, specifications, processes, lists of material, lists of customers, sales and marketing strategies, product development plans, financial information, and information on research and development.

(8) INVENTIONS AND PATENTS:

(a) The Employee shall make prompt full disclosure in writing to the Corporation of all inventions, improvements and discoveries, whether or not patentable which the Employee conceives, devises, makes, discovers, develops, perfects or first reduces to practice, either alone or jointly with others, during the term of employment of the Employee under this Employment Agreement, which

relate in any way to the fields, products or business of the Corporation, including development and research, whether during or out of the usual hours of work or on or off the premises of the Corporation or by use of the facilities of the Corporation or otherwise and whether at the request or suggestion of the Corporation or otherwise (all such inventions, improvements and discoveries being hereinafter called the "Inventions"), including any Inventions, whether or not patentable, conceived, devised, made, discovered, developed, perfected or first reduced to practice by the Employee after the employment of the Employee under this Employment Agreement is terminated if the Inventions were conceived by the Employee during the term of employment of the Employee under this Employment Agreement. Any Inventions, whether or not patentable, conceived, devised, made, discovered, developed, perfected or first reduced to practice by the Employee within six (6) months of the date of termination of the employment of the Employee under this Employment Agreement shall be conclusively presumed to have been conceived during the term of employment of the Employee under this Employment Agreement.

(b) The Employee agrees that the Inventions shall be the sole and exclusive property of the Corporation.

(c) The Employee agrees to assist the Corporation and its nominees in every reasonable way (entirely at its or their expense) to obtain for the benefit of the Corporation letters patent for the Inventions and trademarks, trade names and copyrights relating to the Inventions, and any renewals, extensions or reissues thereof, in any and all countries, and agrees to make, execute, acknowledge and deliver, at the request of the Corporation, all written applications for letters patent, trademarks, trade names and copyrights relating to the Inventions and any renewals, extensions or reissues thereof, in any and all countries, and all documents with respect thereto, and all powers of attorney relating thereto and, without further compensation, to assign to the Corporation or its nominees all the right, title and interest of the Employee in and to such applications and to any patents, trademarks, trade names or copyrights which shall thereafter issue on any such applications, and to execute, acknowledge and deliver all other documents deemed necessary by the Corporation to transfer to or vest in the Corporation all of the right, title and interest of the Employee in and to the Inventions, and to such trademarks, trade names, patents and copyrights together with exclusive rights to make, use, license and sell them throughout the world.

(d) The Employee agrees that even though his employment is terminated under this Employment Agreement he will, at any time after such termination of employment, carry out and perform all of the agreements of Subsections (8)(a) and (8)(c) above, and will at any time and at all times cooperate with the Corporation in the prosecution and/or defense of any litigation which may arise in connection with the Inventions, provided, however, that should such services be rendered after termination of employment of the Employee under this

Employment Agreement, the Employee shall be paid reasonable compensation on a per diem basis.

(e) The Employee agrees to make and maintain adequate and current written records of all Inventions in the form of notes, sketches, drawings, or reports relating thereto, which records shall be and remain the property of, and available to, the Corporation at all times.

(f) The Employee agrees that he will, upon leaving the employment of the Corporation, promptly deliver to the Corporation all originals and copies of disclosures, drawings, prints, letters, notes, and reports either typed, handwritten or otherwise memorialized, belonging to the Corporation which are in his possession or under his control and the Employee agrees that he will not retain or give away or make copies of the originals or copies of any such disclosures, drawings, prints, letters, notes or reports.

(9) PROPERTY OF CORPORATION: All files, records, reports, documents, drawings, specifications, equipment, and similar items relating to the business of the Corporation, whether prepared by the Employee or otherwise coming into his possession, shall remain the exclusive property of the Corporation and shall not be removed by the Employee from the premises of the Corporation under any circumstances whatsoever without the prior written consent of the Corporation.

(10) NON-COMPETITION:

(a) In order to protect the good will of the Corporation and in order to protect the trade secrets of the Corporation referred to in Section (7) of this Employment Agreement, the Employee hereby agrees that during the term of employment of the Employee under this Employment Agreement, and during a period of one (1) year after termination of employment of the Employee under this Employment Agreement without regard to the cause of termination of employment and whether or not such termination of employment was caused by the Employee or by the Corporation, (i) the Employee shall not engage, either directly or indirectly, in any manner or capacity, in any business or activity which is competitive with any business or activity conducted by the Corporation; (ii) the Employee shall not work for or employ, directly or indirectly, or cause to be employed by another, any person who was an employee, officer or agent of the Corporation or of any of its subsidiaries at any time during a period of twelve (12) months prior to the termination of the employment of the Employee under this Employment Agreement nor shall the Employee form any partnership with or establish any business venture in cooperation with, any such person which is competitive with any business or activity of the Corporation; (iii) the Employee shall not give, sell or lease any goods or services competitive with the goods or services of the Corporation or its subsidiaries to any person, partnership, corporation or other entity who purchased goods or services

from the Corporation or its subsidiaries within one (1) year before the termination of the employment of the Employee under employment Agreement; (iv) the Employee shall not have any financial interest, or participate as a director, officer, stockholder, partner, employee, consultant or otherwise, in any corporation, partners or other entity which is competitive with any business or activity conducted by the Corporation.

(b) The Corporation and the Employee agree that the services of the Employee are of a personal, special, unique and extraordinary character, and cannot be replaced by the Corporation without great difficulty, and that the violation by the Employee of any of his agreements under this Section (10) would damage the goodwill of the Corporation and cause the Corporation irreparable harm which could not reasonably or adequately be compensated in damages in an action at law, and that the agreements of the Employee under this Section (10) may be enforced by the Corporation in equity by an injunction or restraining order in addition to being enforced by the Corporation at law.

(c) In the event that this Section (10) shall be determined by any court of competent jurisdiction to be unenforceable by reason of its extending for too long a period of time or over too great a range of activities, it shall be interpreted to extend only over the maximum period of time or range of activities as to which it may be enforceable.

(11) NOTICE: Any and all notices under this Employment Agreement shall be in writing and, if to the Corporation, shall be duly given if sent to the Corporation by registered or certified mail, postage prepaid, return receipt requested, at the address of the Corporation set forth under its name below or at such other address as the Corporation may hereafter designate to the Employee in writing for the purpose, and if to the Employee, shall be duly given if delivered to the Employee by hand or if sent to the Employee by registered or certified mail, postage prepaid, return receipt requested, at the address of the Employee set forth under his name below or at such other address as the Employee may hereafter designate to the Corporation in writing for the purpose.

(12) ASSIGNMENT: The rights and obligations of the Corporation under this Employment Agreement shall inure to the benefit of, and shall be binding upon, the successors and assigns of the Corporation. The rights and obligations of the Employee under this Employment Agreement shall inure to the benefit of, and shall be binding upon, the heirs, executors and legal representatives of the Employee.

(13) ENTIRE AGREEMENT AND SEVERABILITY:

(a) This Employment Agreement supersedes any and all other agreements, either oral or in writing, between the parties hereto with respect to the

employment of the Employee by the Corporation and contains all of the covenants and agreements between the parties with respect to such employment. Each party to this Employment Agreement acknowledges that no representations, inducements, promises or agreements, oral or otherwise, have been made by any party, or any one acting one half of any party, which are not embodied herein, and that no other agreement, statement or promise not contained in this Employment Agreement shall be valid and binding. Any modification of this Employment Agreement will be effective only if it is in writing signed by both parties to this Employment Agreement.

(b) If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall nevertheless continue in full force and effect without being impaired or invalidated in any way.

(c) All pronouns used herein shall include the masculine, feminine, and neuter gender as the context requires.

(14) GOVERNING LAW AND JURISDICTIONS: This Employment Agreement shall be governed by, and construed in accordance with, the laws of The Commonwealth of Massachusetts applicable to contracts made and to be performed entirely within The Commonwealth of Massachusetts (without reference to conflict of laws principles). Any action or proceeding arising from or in connection with this Employment Agreement may be brought against the Employee in a court of record of The Commonwealth of Massachusetts, Middlesex County, or in the United States District Court for the District of Massachusetts, the Employee hereby consenting to the jurisdiction thereof over its person; and service of process may be made upon the Employee by mailing a copy of the summons and any complaint to the Employee by registered or certified mail, postage prepaid, return receipt requested, at the address to be used for the giving of notice to the Employee as provided in this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Employment Agreement as a sealed instrument in the Commonwealth of Massachusetts, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: _____
John R. Bertucci, President

Six Shattuck Road
Andover, MA 01810

Employee Signature

William Stewart

Employee Name

Address:

LOAN AGREEMENT

This Loan Agreement (the "Agreement") is entered into as of the 31st day of October, 1995, by and between The First National Bank of Boston ("Lender") and MKS Instruments, Inc., a Massachusetts corporation ("Borrower").

PREMISES:

WHEREAS, the Borrower has requested that the Lender make loans to it; and

WHEREAS, the Lender is willing to lend funds to the Borrower on the terms and conditions hereinafter set forth;

NOW, THEREFORE, in consideration of the premises and for other good and valuable consideration, the adequacy and receipt of which are hereby acknowledged, the parties hereto hereby agree as follows:

ARTICLE I

DEFINITIONS

1.1 Definitions. In addition to terms defined elsewhere in this Agreement, the following terms shall have the meanings indicated, which meanings shall be equally applicable to both the singular and plural forms of such terms:

1.1.1 "Affiliate" of any Person shall mean any other Person which, directly or indirectly, controls, or is controlled by, or is under common control with, such Person. For purposes of this definition, "control" of any Person shall mean the power, directly or indirectly, either to (i) vote 10% or more of the securities having ordinary voting power for the election of directors of such Person or (ii) direct the management and policies of such Person, whether by contract or otherwise. As to the Borrower, the term "Affiliate" shall include, without limitation, any partnership or joint venture of which the Borrower or any Affiliate of the Borrower is a general partner or is a limited partner with more than a ten percent (10%) interest, and any director or executive officer of the Borrower.

1.1.2 "Base Rate" shall mean the rate of interest announced by the Lender at its head office from time to time as its "Base Rate".

1.1.3 "Base Rate Loan" shall mean a portion of the Term Loan as to which the Borrower elects to pay interest at the Base Rate as provided in Section 2.2.

1.1.4 "Business Day" shall mean a day on which commercial banks are required to be open for business in Boston, Massachusetts.

1.1.5 "Cash Flow Ratio" shall have the meaning set forth in Section 7.7(c).

1.1.6 "Closing Date" shall mean the date of this Agreement.

1.1.7 "Compliance Certificate" shall have the meaning set forth in Section 6.1(c).

1.1.8 "Consolidated Debt Service" shall mean for any period the sum (without duplication) of Interest Expense, the interest portion of Financing Lease Obligations and required principal payments on long-term debt of the Borrower and its Subsidiaries, determined on a consolidated basis.

1.1.9 "Consolidated Indebtedness" shall mean the Indebtedness of the Borrower and its Subsidiaries, determined on a consolidated basis.

1.1.10 "Consolidated Net Income" shall mean for any period the net income (or loss) for such period (before extraordinary items and excluding the net income of any business entity that is not a Subsidiary in which the Borrower or one of its Subsidiaries has an ownership interest unless such net income shall have actually been received by such company in the form of cash distributions) of the Borrower and its Subsidiaries after deducting all operating expenses, depreciation and amortization, Interest Expense, the interest portion of Financing Lease Obligations, all taxes in respect of income and profits paid or payable (including accrued Sub S distributions required to make shareholder tax payments) and all other proper deductions, all determined on a consolidated basis.

1.1.11 "Consolidated Operating Cash Flow" shall mean for any period, the net income (or loss) for such period (before extraordinary items and excluding the net income of any business entity that is not a Subsidiary in which the Borrower or one of its Subsidiaries has an ownership interest unless such net income shall have actually been received by such company in the form of cash distributions) of the Borrower and its Subsidiaries before deducting Interest Expense and taxes and after restoring thereto depreciation of real and personal property and leasehold improvements and amortization and after deducting cash taxes paid, Sub S distributions required to make shareholder tax payments, and capital expenditures incurred, provided that capital expenditures shall not include real estate purchases funded by debt.

1.1.12 "Consolidated Tangible Net Worth" shall mean, at any time, net stockholders' equity of the Borrower and its Subsidiaries determined in accordance with generally accepted accounting principles including the book amount of all minority interests in MKS International, Inc. but excluding the book amount of all minority interests in other Affiliates and any foreign exchange translation adjustment, with no upward adjustments due to a reevaluation of assets (other than any such upward adjustment as may be required under generally accepted accounting principles in connection with the acquisition by the Borrower or any Subsidiary of another company or entity) minus the following items (without duplication of deductions) appearing on the balance sheet of the Borrower and its Subsidiaries:

(a) the book amount of all assets (including, without limitation, goodwill, patents, trademarks, copyrights, organizational expense and unamortized debt discount) that would be treated as intangibles under generally accepted accounting principles;

(b) treasury stock; and

(c) any write-up in the book amount of any asset or Investment subsequent to the Closing Date, resulting from a reevaluation or reappraisal thereof from the amount entered in accordance with generally accepted accounting principles by the Borrower or any Subsidiary on its books with respect to its acquisition of the asset or Investment.

1.1.13 "Costs" shall have the meaning set forth in Section 9.4.

1.1.14 "Debt-to-Net Worth Ratio" shall have the meaning set forth in Section 7.7(b).

1.1.15 "Default" shall mean any event that, with the lapse of time, the giving of notice, or both, would become an Event of Default hereunder.

1.1.16 "Event of Default" shall have the meaning set forth in Section 8.1 hereof.

1.1.17 "Financing Lease" shall mean any lease of the Borrower or a Subsidiary, as lessee, that is shown or is required to be shown in accordance with generally accepted accounting principles as a liability on the balance sheet of the lessee thereunder.

1.1.18 "Financing Lease Obligation" shall mean for any period the monetary obligation of the lessee under a Financing Lease. The amount of a Financing Lease Obligation at any date is the amount at which the lessee's liability under the Financing Lease would be required to be shown on its balance sheet at such date.

1.1.19 "Hazardous Substances" shall mean any hazardous waste, as defined by 42 U.S.C. Section 6903(5), any hazardous substances, as defined by 42 U.S.C. Section 9601(14), any pollutant or contaminant, as defined by 42 U.S.C. Section 9601(33), or any toxic substance, oil or hazardous materials or other chemicals or substances regulated by any laws or regulations relating to the discharge of air pollutants, water pollutants or processed wastewater.

1.1.20 "Indebtedness" shall mean, for any Person, (a) all obligations of such Person that in accordance with generally accepted accounting principles would be reflected on the balance sheet of such Person as a liability, (b) all obligations of any other Person the payment or collection of which such Person has guaranteed (except by reason of endorsement for collection in the ordinary course of business) or in respect of which such Person is liable, contingently or otherwise, including, without limitation, liable by way of agreement to purchase, to provide funds for payment, to supply funds to or otherwise to invest in such other Person, or otherwise to assure a creditor against loss, (c) all obligations of any other Person for borrowed money or for the deferred purchase price of property or services secured by (or for which the holder of such indebtedness has an existing right, contingent or otherwise, to be secured by) any mortgage, or other encumbrance upon or in property (including, without limitation, accounts and contract rights) owned by such Person, whether or not such Person has assumed or become liable for the payment of such indebtedness or obligations, and (d) Financing Lease Obligations of such Person.

1.1.21 "Interest Expense" shall mean for any period the aggregate amount of interest recorded, in accordance with generally accepted accounting principles, on the financial statements for that period by the Borrower and its Subsidiaries in respect of Consolidated Indebtedness incurred for borrowed money.

1.1.22 "Interest Period" shall mean the period designated by the Borrower as such in the Interest Rate Change Notice for any portion of the Term Loan pursuant to and subject to the limitations set forth in Section 2.2.

1.1.23 "Interest Rate Change Notice" shall have the meaning set forth in Section 2.2.

1.1.24 "Interest Rate Determination Date" shall mean the third Business Day prior to the first day of the related Interest Period for a LIBOR Loan.

1.1.25 "Interim Maturity Date" shall mean the last day of any Interest Period.

1.1.26 "Investments" shall have the meaning set forth in Section 7.4.

1.1.27 "LIBOR Loan" shall mean a portion of the Term Loan as to which the Borrower elects to pay interest using the LIBOR Rate as provided in Section 2.2.

1.1.28 "LIBOR Rate" shall mean for any Interest Rate Determination Date, the rate obtained by dividing (i) the quotation offered by the Lender in the interbank Eurodollar market for U.S. dollar deposits of amounts in immediately available funds comparable to the portion of the Term Loan for which the LIBOR Rate is being determined with a maturity comparable to the Interest Period for which such LIBOR Rate will apply as of approximately noon (Boston time) three Business Days prior to the commencement of such Interest Period by (ii) a percentage equal to 100% minus the stated maximum rate of all reserves required to be maintained against "Eurocurrency liabilities" as specified in Regulation D (or against any other category of liabilities that includes deposits by reference to which the interest rate on LIBOR Loans is determined) as applicable on such date to any member bank of the Federal Reserve System.

1.1.29 "Licenses" shall have the meaning set forth in Section 4.8.

1.1.30 "Lien" shall mean any interest in property securing an obligation owed to, or a claim by, a Person other than the owner of the property, whether the interest is based on common law, statute or contract (including the security interest lien arising from a mortgage, encumbrance, pledge, conditional sale or trust receipt or a lease, consignment or bailment for security purposes). For the purposes of this Agreement, the Borrower or a subsidiary shall be deemed to be the owner of any property that it has acquired or holds subject to a Financing Lease or a conditional sale agreement or other arrangement pursuant to which title to the property has been retained by or vested in some other Person for security purposes, and such retention or vesting shall be deemed to be a Lien.

1.1.31 "Loan Documents" shall mean each of this Agreement, the Note, and any other document or instrument executed by the Borrower in favor of the Lender in connection with the transactions contemplated hereby.

1.1.32 "Obligations" shall mean, without limitation, any and all liabilities, debts, and obligations of the Borrower to the Lender, of each and every kind, nature and description, including but not limited to those arising under this Agreement, any other Loan Document, the Loan Agreement between the Borrower and the Lender dated as of November 1, 1993, as amended, the Foreign Exchange Agreement between the Lender and the Borrower dated June 14, 1991, and any

interest rate swap agreement, whether now existing or hereafter incurred. "Obligations" also means, without limitation, any and all obligations of the Borrower to act or to refrain from acting in accordance with the terms, provisions and covenants of this Agreement or of any other Loan Document.

1.1.33 "Permitted Liens" shall have the meaning set forth in Section 7.2.

1.1.34 "Person" shall mean any natural person, corporation, unincorporated organization, trust, joint-stock company, joint venture, association, company, partnership or government, or any agency or political subdivision of any government.

1.1.35 "Subsidiary" shall mean any Person of which the Borrower at the time owns, directly or indirectly, through another Subsidiary or otherwise, 50% or more of the equity interests.

1.1.36 "Term Loan" shall have the meaning set forth in Section 2.1.

1.1.37 "Term Loan Maturity Date" shall mean June 30, 2002.

1.1.38 "Term Note or Note" shall have the meaning set forth in Section 2.1.

1.1.39 "Term Loan Account" shall mean the account on the books of the Lender in the name of the Borrower in which the following shall be recorded: the principal outstanding and interest accrued under the Term Loan; all Costs with respect to the Term Loan; all payments made by the Borrower on account of indebtedness evidenced by the Term Note; and other appropriate debits and credits.

1.2 Accounting Terms. Accounting terms not specifically defined in this Agreement shall have the meanings given to them under generally accepted accounting principles.

1.3 Other Definitional Provisions. The words "hereof," "herein" and "hereunder," and words of similar import when used in this Agreement shall refer to this Agreement as a whole and not any particular provision of this Agreement. Any Article, Section, Exhibit or Schedule references are to this Agreement unless otherwise specified.

ARTICLE II

TERM LOAN

2.1 The Lender hereby agrees to make a seven-year term loan (the "Term Loan") in the principal amount of \$7,000,000 to the Borrower. The Term Loan shall be evidenced by a term note (the "Term Note") payable to the Bank in the form of Exhibit A hereto. Amortization of the Term Note shall be calculated on the basis of a 7-year schedule of level monthly payments of principal with the entire unpaid principal balance and all accrued and unpaid interest absolutely due and payable on the Maturity Date.

2.2 Interest.

2.2.1 Borrower agrees to pay interest in respect of the unpaid principal amount of the Term Loan from the date of this Agreement until paid in full as follows. The Term Loan shall bear interest at the Base Rate unless the Borrower desires to pay interest on all or a portion of the Term Loan at the following rate:

(i) During any period in which the Borrower maintains a Debt-to-Net Worth Ratio not in excess of 1.35 to 1:

(a) and a Cash Flow Ratio of from 1.35 to 1 to and including 1.75 to 1, the LIBOR Rate plus 1.60%;

(b) and a Cash Flow Ratio of from 1.76 to 1 to and including 2.0 to 1, the LIBOR Rate plus 1.30%;

(c) and a Cash Flow Ratio of from 2.01 to 1 to and including 3.0 to 1, the LIBOR Rate plus 1.10%; or

(d) and a Cash Flow Ratio in excess of 3.0 to 1, the LIBOR Rate plus .90%; or

(ii) During any period in which the Borrower maintains a Debt-to-Net Worth Ratio of 1.35 to 1 or more or a Cash Flow Ratio of less than 1.35 to 1, the LIBOR Rate plus 2.00%.

2.2.2 Whenever the Borrower desires to obtain the LIBOR Rate, it may request that the Lender provide quotes as of any specified Interest Rate Determination Date as to the LIBOR Rate for any or all Interest Periods, and the Lender shall promptly provide such quotes. The Borrower shall give the Lender prior telecopied or telephone notice (given not later than 10:00 a.m. (Boston time)) at least three Business Days prior to the day the Interest Period is to begin with respect to use of the LIBOR Rate. Each such notice (each an "Interest Rate Change Notice") shall specify the desired interest rate, the amount of the Term Loan to which such interest rate shall apply and the initial Interest Period applicable thereto. If such notice is given by telephone, it shall be immediately confirmed in writing.

2.2.3 Upon the Interim Maturity Date of any LIBOR Loan, unless the Borrower shall have given the Lender an Interest Rate Change Notice in accordance with Section 2.2.2 requesting a new LIBOR Loan be made on such Interim Maturity Date, the Borrower shall be deemed to have elected to pay interest on such amount of the Term Loan at the Base Rate.

2.2.4 At the time the Borrower gives any Interest Rate Change Notice, the Borrower shall elect the Interest Period for which the interest rate elected shall apply, which Interest Period shall, at the option of the Borrower, be a period of one, two, three, four, five or six months (as to a LIBOR Loan). Notwithstanding anything to the contrary contained herein:

(i) if any Interest Period begins on a day for which there is no numerically corresponding day in the calendar month at the end of such Interest Period, such Interest Period shall end on the last Business Day of such calendar month;

(ii) if any Interest Period would otherwise expire on a day that is not a Business Day, such Interest Period shall expire on the next succeeding Business Day; provided that if any Interest Period would otherwise expire on the day that is not a Business Day but is a day of the month after which no further Business Day occurs in such month, such Interest Period shall expire on the next preceding Business Day;

(iii) no Interest Period shall extend beyond the Term Loan Maturity Date.

2.3 Term Loan Account. The principal and the amounts of all payments on the Term Note shall be recorded by the Lender in the Term Loan Account of the Borrower. All statements regarding the Term Loan Account shall be deemed to be accurate absent manifest error or unless objected to by the Borrower within 30 days after receipt. The Borrower agrees to review each such statement promptly after receipt and to bring any errors or discrepancies to the Lender's attention promptly.

ARTICLE III

ADDITIONAL TERMS

3.1 Payments.

3.1.1 The Borrower shall have the right to prepay the Note, in whole at any time or in part from time to time, without premium or penalty, provided that, except as set forth in Section 3.3, no portion of the Term Loan may be prepaid on the first day of an Interest Period with respect thereto. The Borrower shall give notice (by telex or telecopier, or by telephone (confirmed in writing promptly thereafter)) to the Lender of each proposed prepayment hereunder prior to 10:00 a.m. (Boston time), (x) with respect to Base Rate Loans, upon the Business Day of the proposed prepayment and (y) with respect to LIBOR Loans, at least three Business Days prior to the Business Day of the proposed prepayment, which notice in each case shall specify the proposed prepayment date (which shall be a Business Day), the aggregate principal amount of the proposed prepayment and which portions of the Term Loan are to be prepaid. LIBOR Loans that are voluntarily prepaid before the last day of the applicable Interest Period shall be subject to the additional compensation requirements set forth in Section 3.3, and each prepayment of a LIBOR Loan shall be in an aggregate principal amount of not less than the total principal amount outstanding at such time under such LIBOR Loan.

3.1.2 All payments of principal and interest due under the Note (including prepayments), and any other amounts owing to the Lender under this Agreement, shall be made by the Borrower not later than 3:00 p.m., Boston time, on the day due in lawful money of the United States of America, to the Lender at its Boston, Massachusetts office in immediately available funds. The Borrower hereby authorizes the Lender to charge such payments as they become due, if not otherwise paid by the Borrower, to any account of the Borrower with the Lender as the Lender may elect.

3.1.3 Whenever any payment to be made hereunder or under any other Loan Document shall be stated to be due on a day that is not a Business Day, such payment may be made on the next succeeding Business Day, and such extension of time shall in such case be included in computing interest or other fees or charges provided for under this Agreement or any other Loan Document; provided, however, that with respect to LIBOR Loans, if the next succeeding Business Day falls in another calendar month, such payment shall be made on the next preceding Business Day.

3.1.4 All payments made by the Borrower on the Note shall be applied by the Lender (a) first, to the payment of Costs with respect to the Note, (b) second, to the payment of accrued and unpaid interest on the Note, in such order as the Borrower shall direct, until all such accrued interest has been paid, and (c) third, to the payment of the unpaid principal amount of the Note in such order as the Borrower shall direct.

3.2 Capital Adequacy.

3.2.1 If, after the date of this Agreement, the Lender shall have reasonably determined in good faith that the adoption or effectiveness after the date hereof of any applicable law, rule or regulation regarding capital adequacy, or any change therein, or any change in the interpretation or administration thereof by any governmental authority, central bank or comparable agency charged with the interpretation or administration thereof, or compliance by the Lender with any request or directive regarding capital adequacy (whether or not having the force of law) of any such authority, central bank or comparable agency, has or would have the effect of materially reducing the rate of return on the Lender's capital or assets as a consequence of its commitments or obligations hereunder to a level below that which the Lender could have achieved but for such adoption, effectiveness, change or compliance (taking into consideration the Lender's then current policies with respect to capital adequacy), then from time to time, subject to Section 3.2.2, within 15 days after demand by the Lender the Borrower shall pay to the Lender such additional amount or amounts as will compensate the Lender for such reduction (after the Lender shall have allocated the same fairly and equitably among all of its customers or any class generally affected thereby).

3.2.2 The Lender will notify the Borrower of any event occurring after the date of this Agreement that will entitle the Lender to any additional payment under this Section 3.2 as promptly as practicable and shall be entitled to such payment (a) in the case of a Base Rate Loan, only for costs incurred from and after the date that the Lender gives such notice, and (b) in the case of a LIBOR Loan, only for costs incurred in connection with Loans made pursuant to an Interest Rate Change Notice issued after the date that the Lender gives such notice. The Lender will furnish to the Borrower with such notice a certificate signed by an officer thereof certifying that the Lender is entitled to payment under this Section 3.2 and setting forth the basis (in reasonable detail) and the amount of each request by the Lender for any additional payment pursuant to this Section 3.2.

3.3 Special Provisions Governing LIBOR Loans. Notwithstanding any other provisions of this Agreement, the following provisions shall govern with respect to LIBOR Loans as to the matters covered:

3.3.1 Increased Costs, Illegality etc. (a) In the event that the Lender shall have determined (which determination shall, if made in good faith and absent manifest error, be final, conclusive and binding upon all parties):

(i) on any Interest Rate Determination Date, that by reason of any changes arising after the date of this Agreement affecting the interbank Eurodollar market, adequate and fair means do not exist for ascertaining the applicable interest rate on the basis provided for in the definition of LIBOR Rate; or

(ii) at any time during any Interest Period, that the Lender shall incur increased costs or reductions in the amounts received or receivable hereunder with respect to a LIBOR Loan by reason of (x) any change since the Interest Rate Determination Date for the Interest Period in question in any applicable law or governmental rule, regulation, guideline or order (or any interpretation thereof and including the introduction of any new law or governmental rule, regulation, guideline or order) (such as, for example but not limited to, a change in official reserve requirements, but excluding reserve requirements that have been included in calculating the LIBOR Rate for such Interest Period) and/or (y) other circumstances affecting the Lender, the interbank Eurodollar market or the position of the Lender in the relevant market; or

(iii) at any time, that the making or continuance of any LIBOR Loan has become unlawful by compliance by the Lender in good faith with any law, governmental rule, regulation, guideline or order, or has become impracticable as a result of a contingency occurring after the date of this Agreement;

then and in any such event, the Lender shall promptly after making such determination give notice (by telephone confirmed in writing) to the Borrower of such determination. Thereafter (x) in the case of clause (i) above, any Interest Rate Change Notice given by the Borrower with respect to a LIBOR Loan that has not yet been incurred shall be deemed rescinded by the Borrower and LIBOR Loans shall no longer be available until such time as the Lender notifies the Borrower that the circumstances giving rise to such notice no longer exist or that, notwithstanding such circumstances, LIBOR Loans will again be made available hereunder, (y) in the case of clause (ii), the Borrower shall pay to the Lender, upon written demand therefor (but only with respect to any LIBOR Loan made pursuant to an Interest Rate Change Notice issued after the giving of the written notice that LIBOR Loans will again be made available hereunder referred to in clause (x) above), such additional amounts (in the form of an increased rate of, or a different method of calculating, interest or otherwise as the Lender in its sole discretion shall determine) as shall be required to compensate the Lender for such increased cost or reduction in amount received (a written notice as to additional amounts owed the Lender, showing the basis for such calculation thereof, shall be given to the Borrower by the Lender and shall, absent manifest error, be final, conclusive and binding upon the parties hereto), and (z) in the case of clause (iii), the Borrower shall take one of the actions specified in Section 3.3.1(b) as promptly as possible and, in any event, within the time period required by law.

(a) At any time that any LIBOR Loan is affected by the circumstances described in Section 3.3.1(a)(ii) or (iii), the Borrower may (and in the case of a LIBOR Loan affected pursuant to Section 3.3.1(a) (iii) shall) either (x) if the affected LIBOR Loan is then being made, withdraw the related Interest Rate Change Notice by giving the Lender telephonic (confirmed in writing) notice thereof on the same date that the Borrower was notified by the Lender pursuant to Section 3.3.1(a), or (y) if the affected LIBOR Loans are then outstanding, upon at least three Business Days' written notice to the Lender, require the Lender to convert each LIBOR Loan so affected into a Base Rate Loan.

3.3.2 Compensation. The Borrower shall compensate the Lender, upon its written request (which request shall set forth the basis for requesting such amounts), for all reasonable losses, expenses and liabilities (including, without limitation, any interest paid by the Lender to lenders of funds borrowed by it to make or carry its LIBOR Loans to the extent not recovered by the Lender in connection with the re-employment of such funds) and any loss sustained by the Lender in connection with the re-employment of the funds (including, without limitation, a return on such re-employment that would result in the Lender's receiving less than it would have received had such LIBOR Loan remained outstanding until the last day of the Interest Period applicable to such LIBOR Loan) that the Lender may sustain: (i) if for any reason (other than a default by or negligence of the Lender) a LIBOR Loan is not advanced on a date specified therefor in an Interest Rate Change Notice (unless timely withdrawn pursuant to Section 3.3.1(b)(x) above), (ii) if any payment or prepayment of any LIBOR Loans occurs for any reason whatsoever (including, without limitation, by reason of Section 3.3.1(b)) on a date that is prior to the last day of an Interest Period applicable thereto, (iii) if any prepayment of any of its LIBOR Loans is not made on the date specified in a notice of payment given by the Borrower pursuant to Section 3.1 or (iv) as a consequence of an election made by the Borrower pursuant to Section 3.3.1(b) (y) .

ARTICLE IV

REPRESENTATIONS AND WARRANTIES OF THE BORROWER

In order to induce the Lender to enter into this Agreement and to make the loans provided for herein, the Borrower makes the following representations and warranties to the Lender, all of which shall survive the execution and delivery of this Agreement and the Note.

4.1 Organization, Existence and Power. The Borrower is duly incorporated, validly existing and in good standing under the laws of the jurisdiction of its incorporation. The Borrower has the corporate power necessary to conduct the business in which it is engaged, to own the properties owned by it and to

consummate the transactions contemplated by the Loan Documents. The Borrower is duly qualified or licensed to transact business in all places where the nature of the properties owned by it or the business conducted by it makes such qualification necessary and where the failure to be so qualified or licensed would have a material adverse effect upon the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole.

4.2 Authorization of Loan Documents; Binding Effect. The execution and delivery of this Agreement and the other Loan Documents and the performance of the transactions contemplated hereby and thereby have been duly authorized by all necessary corporate actions of the Borrower. Each of the Loan Documents constitutes the legal, valid and binding obligation of the Borrower that is a party thereto, enforceable against the Borrower in accordance with its terms.

4.3 Authority. The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under the Loan Documents. Neither the authorization, execution, delivery, or performance by the Borrower of this Agreement or of any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

4.4 Capital Structure. The number of shares of stock of which the Borrower's authorized capital stock consists, the par value per share of such stock, the number of shares of such stock that have been issued and are outstanding and the number of shares that have been issued and are held by the Borrower as treasury shares are all disclosed on the Disclosure Schedule. Set forth in the Disclosure Schedule is a complete and accurate list of all Subsidiaries of the Borrower. The Disclosure Schedule indicates the jurisdiction of incorporation or organization of each of the Subsidiaries, the number of shares or units of each class of capital stock or other equity of the Subsidiaries authorized, and the number of such shares or units outstanding and the percentage of each class of such equity owned (directly or indirectly) by the Borrower. No shares of stock or units of equity interests of the Borrower or any of its Subsidiaries are covered by outstanding options, warrants, rights of conversion or purchase or similar rights granted or created by the Borrower except as set forth on the Disclosure Schedule. All the outstanding capital stock of the Borrower has been validly issued and is fully paid and nonassessable. All the stock or units of equity interests of the Borrower's Subsidiaries that are owned by the Borrower or any Subsidiary of the Borrower are owned free and clear of all

mortgages, deeds of trust, pledges, liens, security interests and other charges or encumbrances.

4.5 Financial Condition. The audited consolidated balance sheet of the Borrower and its Subsidiaries dated as of December 31, 1994 and the audited statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for and as of the end of the period ending on that date, including any related notes (the "Audited Financial Statements"), and the unaudited consolidated financial statements of the Borrower and its Subsidiaries (the "Unaudited Financial Statements") dated as of July 1, 1995 (the "Balance Sheet Date"), all of which (collectively, the "Financial Statements") were heretofore furnished to the Lender, are true, correct and complete in all material respects and fairly present in all material respects the financial condition of the Borrower and its Subsidiaries as of the date of each such statement and have been prepared in accordance with generally accepted accounting principles (subject, in the case of the Unaudited Financial Statements, to the addition of notes and to normal year-end adjustments that individually and in the aggregate are not expected to be material) consistently applied throughout the periods involved. Other than as reflected in such Financial Statements and except for liabilities incurred in the ordinary course of business since the date thereof, the Borrower has no Indebtedness that is or would be material to the financial condition of the Borrower, nor any material unrealized or unanticipated losses from any commitments. Since the Balance Sheet Date there has been no material adverse change in the consolidated financial condition (as set forth in the Unaudited Financial Statements) or results of operations of the Borrower and its Subsidiaries taken as a whole.

4.6 Pending Litigation. Except as set forth in the Disclosure Schedule, there are no suits or proceedings pending or, to the knowledge of the Borrower, threatened before any court or arbitration tribunal or by or before any governmental or regulatory authority, commission, bureau or agency or public regulatory body against the Borrower that if adversely determined would have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole.

4.7 Certain Agreements; Material Contracts. The Borrower is not a party to any agreement or instrument or subject to any court order or governmental decree adversely affecting in any material respect the business, properties, assets or financial condition of the Borrower and its Subsidiaries taken as a whole.

4.8 Authorization, Etc. All authorizations, consents, approvals, accreditations, certifications and licenses required under the corporate charter or by-laws of the Borrower or under applicable law or regulation for the ownership or operation of the property owned or operated by the Borrower or the conduct of any business or activity conducted by the Borrower, including provision of services for

which reimbursement is made by third party payors, other than authorizations, consents, approvals, accreditations, certifications or licenses the failure to obtain and/or maintain which would not have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole (collectively, "Licenses") have been duly issued and are in full force and effect. The Borrower has fulfilled and performed all of its material obligations with respect to such Licenses (to the extent now required to be fulfilled or performed) and no event has occurred that would allow, with or without the passage of time or the giving of notice or both, revocation or termination thereof or would result in any other material impairment of the rights of the holder of any such License. All filings or registrations with any governmental or regulatory authority required for the conduct of the business or activity conducted by the Borrower have been made, other than any such filings or registrations as to which the failure to make same would not have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries, taken as a whole. Except as expressly contemplated hereby, no approval, consent or authorization of or filing or registration with any governmental commission, bureau or other regulatory authority or agency is required with respect to the execution, delivery or performance of any of the Loan Documents.

4.9 No Violation. The execution, delivery and performance by the Borrower of the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower. The Borrower is not in default, nor has any event occurred that with the passage of time or the giving of notice, or both, would constitute a default, in the performance, observance or fulfillment of any of the obligations, covenants or conditions contained in any agreement, instrument or other document to which the Borrower is a party, which default would have a material adverse effect on the consolidated assets, financial condition or results of operations of the Borrower and its Subsidiaries, taken as a whole. The Borrower is not in violation of any applicable federal, state or local law, rule or regulation or any writ, order or decree, which violation would have a material adverse effect on the consolidated assets, financial condition or results of operations of the Borrower and its Subsidiaries, taken as a whole. Except as otherwise set forth in the Disclosure Schedule under the caption "Litigation," the Borrower has not received notice of any violation of any federal, state or local environmental law, rule or regulation or assertion that the Borrower has any obligation to clean up or contribute to the cost of cleaning up any waste or pollutants.

4.10 Payment of Taxes. The Borrower and its Subsidiaries have properly prepared and filed or caused to be properly prepared and filed all federal tax returns and all material state and local tax returns that are required to be filed and have paid all taxes shown thereon to be due and all other taxes, assessments and governmental charges or levies imposed upon the Borrower and its Subsidiaries, their income or

profits or any properties belonging to the Borrower. No extensions of any statute of limitations are in effect with respect to any tax liability of the Borrower or any Subsidiary of the Borrower. No deficiency assessment or proposed adjustment of the federal income taxes of the Borrower or any Subsidiary of the Borrower is pending and the Borrower has no knowledge of any proposed liability of a substantial nature for any tax to be imposed upon any of its properties or assets.

4.11 Transactions With Affiliates, Officers, Directors and 1% Shareholders. Except as set forth on the Disclosure Schedule, the Borrower has no Indebtedness to or material contractual arrangement or understanding with any Affiliate, officer or director of the Borrower, nor any shareholder holding of record at least 1% of the equity of the Borrower nor, to the best of the Borrower's knowledge (without independent inquiry), any of their respective relatives.

4.12 ERISA. The Borrower has never established or maintained any funded employee pension benefit plan as defined under Section 3(2) (A) of the Employee Retirement Income Security Act of 1974, as amended and in effect on the date hereof ("ERISA"), other than the plans described on the Disclosure Schedule. No employee benefit plan established or maintained, or to which contributions have been made, by the Borrower or any Subsidiary of the Borrower that is subject to Part 3 of Title I-B of ERISA, had an accumulated funding deficiency (as such term is defined in Section 302 of ERISA) as of the last day of the fiscal year of such plan ended most recently prior to the date hereof, or would have had an accumulated funding deficiency (as so defined) on such day if such year were the first year of the plan to which Part 3 of Title I-B of ERISA applied. No material liability to the Pension Benefit Guaranty Corporation has been incurred or is expected by the Borrower to be incurred by it or any Subsidiary of the Borrower with respect to any such plan or otherwise. The execution, delivery and performance of this Agreement and the other Loan Documents will not involve on the part of the Borrower any prohibited transaction within the meaning of ERISA or Section 4975 of the Internal Revenue Code. The Borrower has never maintained, contributed to or been obligated to contribute to any "multiemployer plan," as defined in Section 3(37) of ERISA. The Borrower has never incurred any "withdrawal liability" calculated under Section 4211 of ERISA, and there has been no event or circumstance that would cause it to incur any such liability.

4.13 Ownership of Properties; Liens. The Borrower has good and marketable title to all its material properties and assets, real and personal, that are now carried on its books, including, without limitation, those reflected in the Financial Statements (except those disposed of in the ordinary course since the date thereof), and has valid leasehold interests in its properties and assets, real and personal, which it purports to lease, subject in either case to no mortgage, security interest, pledge, lien, charge, encumbrance or title retention or other security agreement or arrangement of any nature whatsoever other than Permitted Liens and those specified in the Disclosure

Schedule. All of the Borrower's material leasehold interests and material obligations with respect to real property are described on the Disclosure Schedule.

4.14 Employment Matters. Except as set forth on the Disclosure Schedule, there are no material grievances, disputes or controversies pending or, to the knowledge of the Borrower, threatened between the Borrower and its employees, nor is any strike, work stoppage or slowdown pending or threatened against the Borrower.

4.15 Insurance. The Borrower maintains in force fire, casualty, comprehensive liability and other insurance covering its properties and business that is adequate and customary for the type and scope of its properties and business.

4.16 Indebtedness. Except as reflected in the Financial Statements or set forth in the Disclosure Schedule, and other than Indebtedness incurred in the ordinary course of business since the Balance Sheet Date, the Borrower has no outstanding Indebtedness.

4.17 Securities Law Compliance. The Borrower is not an "investment company" as defined in the Investment Company Act of 1940, as amended. All of the Borrower's outstanding stock was offered, issued and sold in compliance with all applicable state and federal securities laws.

4.18 Accuracy of Information. None of the information furnished to the Lender by or on behalf of the Borrower for purposes of this Agreement or any Loan Document or any transaction contemplated hereby or thereby contains, and none of such information hereinafter furnished will contain, any material misstatement of fact, nor does or will any such information omit any material fact necessary to make such information not misleading at such time.

ARTICLE V

CONDITIONS TO TERM LOAN

The obligations of the Lender to fund the Term Loan are subject to the following conditions precedent, each of which shall have been met or performed on or before the Closing Date:

5.1 No Default. No Default or Event of Default shall have occurred and be continuing or will occur upon the making of the Term Loan.

5.2 Correctness of Representations. The representations and warranties made by the Borrower in this Agreement shall be true and correct with the same force and effect as though such representations and warranties had been made on

and as of the Closing Date (i) except to the extent that the representations and warranties set forth in Article IV of this Agreement are untrue as a result of circumstances that have changed subsequent to the date hereof, which change has caused no non-compliance by the Borrower with the covenants, conditions and agreements in this Agreement and (ii) except that the references in Section 4.5 of this Agreement to the financial statements and the term "Balance Sheet Date" are deemed to refer to the most recent financial statements (inclusive of consolidated balance sheets and statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries) furnished to the Lender pursuant to Section 6.1(a) and (b) of this Agreement and the date of such financial statements, respectively.

5.3 No Litigation; Certain Other Conditions. There shall be no suit or proceeding (other than suits or proceedings disclosed on the Disclosure Schedule on the date of this Agreement) pending or threatened before any court or arbitration tribunal or by or before any governmental or regulatory authority, commission, bureau or agency or public regulatory body that, if determined adversely to the Borrower or any Subsidiary of the Borrower, is reasonably likely to have a material adverse effect on the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole.

5.4 No Material Adverse Change. There shall have been no material adverse change in the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole since the Balance Sheet Date.

5.5 Loan Documents. All Loan Documents shall be in full force and effect.

5.6 Opinion of Counsel. The Lender shall have received from independent counsel to the Borrower an opinion or opinions, in form and substance satisfactory to the Lender and its counsel.

5.7 Certificates of Legal Existence and Authority to do Business. The Borrower shall have delivered to the Lender certificates as to its legal existence and good standing under the laws of The Commonwealth of Massachusetts, and the Borrower shall have delivered to the Lender certificates as to its authority to do business as a foreign corporation in the States of California, Colorado, Connecticut, Florida, Illinois, Maryland, Michigan, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Texas, and Arizona, each dated as of a recent date.

5.8 Clerk's Certificate. The Borrower shall have delivered to the Lender a certificate of its Clerk as to (i) its charter documents and by-laws, as amended, (ii) corporate votes authorizing the execution and delivery of the Loan Documents, and (iii) incumbency of the officers authorized to execute the Loan Documents on behalf of the Borrower.

5.9 Note. The Term Note, duly executed by the Borrower and otherwise completed, shall have been delivered to the Lender.

5.10 Borrower's Certificate. The Borrower shall have furnished to the Lender a certificate duly executed by the Borrower's chief financial officer dated the Closing Date to the effect that each of the conditions set forth in this Article V has been met as of such date.

5.11 Insurance. The Borrower shall have furnished to the Lender copies of all its property insurance policies.

5.12 Environmental Site Assessment. The Borrower shall have delivered to the Lender an environmental site assessment, in form and substance acceptable to the Lender, from a consulting firm acceptable to the Lender, in which the consultant shall have certified and opined that for the foreseeable future the condition of the property in Methuen, Massachusetts that the Borrower has purchased poses no significant risk to human health or the environment and no further remedial action or investigation is necessary in accordance with federal and state laws.

5.13 Merger Agreement. The Borrower shall have delivered to the Lender a copy of a fully-executed Merger Agreement between the Borrower and UTI Instruments Company.

5.14 All Proceedings Satisfactory. All corporate and other proceedings taken prior to or on the Closing Date in connection with the transactions contemplated by this Agreement, and all documents and exhibits related thereto, shall be reasonably satisfactory in form and substance to the Lender and its counsel.

5.15 Additional Documents. The Borrower shall have delivered to the Lender all additional opinions, documents and certificates that the Lender or its counsel may reasonably require.

ARTICLE VI

AFFIRMATIVE COVENANTS OF THE BORROWER

The Borrower covenants and agrees that from the date of execution of this Agreement and until the payment in full of the principal of and interest upon the Note and payment and performance of all other Obligations:

6.1 Reporting Requirements. The Borrower shall, unless the Lender shall otherwise consent in writing, furnish to the Lender:

(a) As soon as available and in any event within sixty days after the end of each of the first three quarters of each fiscal year of the Borrower and its Subsidiaries, (i) a consolidated and consolidating balance sheet of the Borrower and its Subsidiaries as of the end of such quarter and (ii) consolidated and consolidating statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for the period commencing at the end of the previous fiscal year and ending with the end of such quarter, all in reasonable detail and duly certified by the chief financial officer of the Borrower as having been prepared in accordance with generally accepted accounting principles consistently applied (subject to addition of notes and ordinary year-end audit adjustments), together with a certificate of the chief financial officer of the Borrower stating that no Default or Event of Default has occurred and is continuing or, if a Default or an Event of Default has occurred and is continuing, a statement as to the nature thereof and the action that the Borrower proposes to take with respect thereto;

(b) As soon as available and in any event within ninety days after the end of each fiscal year of the Borrower, the audited consolidated balance sheet of the Borrower and its Subsidiaries as of the end of such fiscal year and the audited consolidated statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for such fiscal year, in each case accompanied by the unqualified opinion with respect thereto of the Borrower's independent public accountants and a certification by such accountants stating that they have reviewed this Agreement and whether, in making their audit, they have become aware of any Default or Event of Default and if so, describing its nature, along with the related unaudited consolidating balance sheet of the Borrower and its Subsidiaries as of the end of such fiscal year and the unaudited consolidating statements of operations, cash flows' and stockholders' equity of the Borrower and its Subsidiaries for such fiscal year;

(c) Not later than sixty days following the end of each fiscal quarter a certificate signed by the chief financial officer of the Borrower substantially in the form of Exhibit 6.1(c) hereto (the "Compliance Certificate");

(d) Not later than thirty days after the end of each fiscal year of the Borrower, the Borrower's representative forecast for the next fiscal year on a consolidated basis, including, at a minimum, projected statements of profit and loss and projected cash flow, prepared in accordance with generally accepted accounting principles consistently applied;

(e) Promptly upon receipt thereof, one copy of each other report submitted to the Borrower or any Subsidiary by independent accountants in connection with any annual, interim or special audit made by them of the books of the Borrower or any Subsidiary;

(f) Promptly after the commencement thereof, notice of all actions, suits and proceedings before any court, arbitration tribunal or governmental regulatory authority, commission, bureau, agency or public regulatory body that, if determined adversely to the Borrower or any Subsidiary of the Borrower, would be reasonably likely to have a material adverse effect on the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole;

(g) As soon as possible, and in any event within five days after the Borrower shall know of the occurrence of any Default or Event of Default, the written statement of the chief financial officer of the Borrower setting forth details of such Default or Event of Default and action that the Borrower proposes to take with respect thereto;

(h) As soon as possible, and in any event within five days after the occurrence thereof, written notice as to any other event of which the Borrower becomes aware that with the passage of time, the giving of notice or otherwise, is reasonably likely to result in a material adverse change in the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole; and

(i) Such other information respecting the business or properties or the condition or operations, financial or otherwise, of the Borrower as the Lender may from time to time reasonably request.

6.2 Loan Proceeds. The Borrower shall use the proceeds of the Term Loan only for general corporate purposes including, but not limited to, funding the acquisition of UTI Instruments Company and refinancing the purchase of certain real property located in Methuen, Massachusetts.

6.3 Maintenance of Business and Properties; Insurance.

(a) The Borrower will continue to engage in business of the same general nature as the business currently engaged in by the Borrower. The Borrower will at all times maintain, preserve and protect all material franchises and trade names and preserve all the Borrower's material tangible property used or useful in the conduct of its business and keep the same in good repair, working order and condition, ordinary wear and tear excepted, and from time to time make all needful and proper repairs, renewals, replacements, betterments, and improvements thereto so that the business carried on in connection therewith may be conducted properly and advantageously at all times.

(b) The Borrower will keep all of its insurable properties now or hereafter owned adequately Insured at all times against loss or damage by fire or

other casualty to the extent customary with respect to like properties of companies conducting similar businesses and to the extent available at commercially reasonable rates; and will maintain public liability and workmen's compensation insurance insuring the Borrower to the extent customary with respect to companies conducting similar businesses and to the extent available at commercially reasonable rates, all by financially sound and reputable insurers. All property insurance policies shall name the Lender as a loss payee and shall contain a provision requiring at least 15 days' written notice to the Lender prior to the cancellation or modification of each such policy. The Borrower shall furnish to the Lender from time to time at the Lender's request copies of all such insurance policies and certificates evidencing such insurance coverage. Notwithstanding the foregoing, the Borrower may self-insure workmen's compensation to the extent permitted by law and may also self-insure other risks to the extent reasonably deemed prudent by the Borrower.

6.4 Payment of Taxes. The Borrower shall pay and discharge, or cause to be paid and discharged, all material taxes, assessments, and governmental charges or levies imposed upon the Borrower and its Subsidiaries or their income or profits, or upon any other properties belonging to the Borrower prior to the date on which penalties attach thereto, and all lawful claims that, if unpaid, might become a lien or charge upon any material properties of the Borrower, except for such taxes, assessments, charges, levies or claims as are being contested by the Borrower in good faith by appropriate proceedings promptly initiated and diligently prosecuted, for which adequate book reserves have been established in accordance with generally accepted accounting principles, as to which no foreclosure, distraint, sale or other similar proceedings shall have been commenced, or, if commenced, have been effectively stayed.

6.5 Compliance with Laws, etc. The Borrower shall comply with the requirements of all applicable laws, rules, regulations and orders of any governmental authority, and obtain or maintain all Licenses required under applicable law or regulation for the operation of the Borrower's business, where noncompliance or failure to obtain or maintain would have a material adverse effect on the consolidated financial condition, assets, or results of operations of the Borrower and its Subsidiaries taken as a whole; provided, however, that such compliance or the obtaining of such Licenses may be delayed while the applicability or validity of any such law, rule, regulation or order or the necessity for obtaining any such License is being contested by the Borrower in good faith by appropriate proceedings promptly initiated and diligently prosecuted.

6.6 Books, Records and Accounts. The Borrower shall keep true and correct books, records and accounts, in which entries will be made in accordance with generally accepted accounting principles consistently applied, and that shall comply with the requirements of the Foreign Corrupt Practices Act of 1977 to the extent applicable to the Borrower. The Lender or its representatives shall upon reasonable

notice to the Borrower be afforded, during normal business hours, access to and the right to examine and copy any such books, records and accounts and the right to inspect the Borrower's premises and business operations. All financial and other information with respect to the Borrower and/or any of its Subsidiaries now or hereafter obtained by the Lender under this Agreement or otherwise in connection with any of the transactions contemplated hereunder shall be held in confidence and shall not be released or made available to any other Person, except (i) to governmental agencies (and examiners employed by same) having oversight over the affairs of the Lender, (ii) pursuant to subpoena or similar process issued by a court or governmental agency of competent jurisdiction, or (iii) as otherwise directed by order of any court or governmental agency of competent jurisdiction.

6.7 Further Assurances. The Borrower shall execute and deliver, at the Borrower's expense, all notices and other instruments and documents and take all actions, including, but not limited to, making all filings and recordings, that the Lender shall reasonably request in order to assure to the Lender all rights given to the Lender hereby or under any other Loan Document.

6.8 Bank Accounts. The Borrower shall maintain with the Lender a deposit account and, at the written request of the Lender, shall give the Lender written notice of any other accounts maintained by the Borrower, including the types of accounts and names and addresses of the institutions with which such accounts are maintained.

ARTICLE VII

NEGATIVE COVENANTS OF THE BORROWER

The Borrower covenants and agrees that from the date of execution of this Agreement and until the payment in full of the principal of and interest upon the Note and payment and performance of all other Obligations:

7.1 Sale of Assets; Mergers, Etc.

(a) Sale of Assets. The Borrower will not, except in the ordinary course of business, sell, transfer, or otherwise dispose of, to any Person any assets (including the securities of any Subsidiary).

(b) Mergers, Etc. Other than the merger of a Subsidiary into UTI Instruments Company, neither the Borrower nor any Subsidiary will consolidate with or merge into any other Person or permit any other Person to consolidate with or merge into it, or acquire all or substantially all of the assets of any Person, or sell, assign, lease or otherwise dispose of (whether in one transaction or in a series of transactions) all or substantially all of its assets to any Person, except that

(1) a Subsidiary may consolidate with or merge into the Borrower or another Subsidiary; and

(2) the Borrower or any of its Subsidiaries may acquire all or substantially all of the assets of any Person provided the aggregate purchase price liability, including all contingent liabilities, when aggregated with all such acquisitions and any Investments permitted under Section 7.4(2) shall not exceed a total of \$5,000,000 in each calendar year during the term of this Agreement beginning with calendar year 1995.

7.2 Liens and Encumbrances.

(a) Neither the Borrower nor any Subsidiary will (a) cause or permit or (b) agree or consent to cause or permit in the future (upon the happening of a contingency or otherwise), any of its real or personal property, whether now owned or subsequently acquired, to be subject to any Lien other than Liens described below (which may herein be referred to as "Permitted Liens"):

(1) Liens securing the payment of taxes, assessments or governmental charges or levies or the demands of suppliers, mechanics, carriers, warehousemen, landlords and other like Persons, which payments are not yet due and payable or (as to taxes) may be paid without interest or penalty; provided, that, if such payments are due and payable, such Liens shall be permitted hereunder only to the extent that (A) all claims that the Liens secure are being actively contested in good faith and by appropriate proceedings, (B) adequate book reserves have been established with respect thereto to the extent required by generally accepted accounting principles, and (C) such Liens do not in the aggregate materially interfere with the owning company's use of property necessary or material to the conduct of the business of the Borrower and its Subsidiaries taken as a whole;

(2) Liens incurred or deposits made in the ordinary course of business (A) in connection with worker's compensation, unemployment insurance, social security and other like laws, or (B) to secure the performance of letters of credit, bids, tenders, sales contracts, leases, statutory obligations, surety, appeal and performance bonds and other similar obligations, in each case not incurred in connection with the borrowing of money, the

obtaining of advances or the payment of the deferred purchase price of property;

(3) Liens not otherwise described in Section 7.2(a)(1) or (2) that are incurred in the ordinary course of business and are incidental to the conduct of its business or ownership of its property, were not incurred in connection with the borrowing of money, the obtaining of advances or the payment of the deferred purchase price of property and do not in the aggregate materially detract from the value of, or materially interfere with the owning company's use of, property necessary or material to the conduct of the business of the Borrower and its Subsidiaries taken as a whole;

(4) Liens in favor of the Lender or any of its affiliates;

(5) Judgment liens or attachments that shall not have been in existence for a period longer than 30 days after the creation thereof, or if a stay of execution shall have been obtained, for a period longer than 30 days after the expiration of such stay or if such an attachment is being actively contested in good faith and by appropriate proceedings, for a period longer than 30 days after the creation thereof;

(6) Liens existing as of the Closing Date and disclosed on the Disclosure Schedule hereto;

(7) Liens provided for in equipment or Financing Leases (including financing statements and undertakings to file financing statements) provided that they are limited to the equipment subject to such leases and the proceeds thereof;

(8) Leases or subleases with third parties or licenses and sublicenses granted to third parties not interfering in any material respect with the business of the Borrower or any Subsidiary of the Borrower;

(9) Any Lien on any asset of any corporation existing at the time such corporation is merged into or consolidated with the Borrower or a Subsidiary of the Borrower and not created in contemplation of such event;

(10) Any Lien existing on any asset prior to the acquisition thereof by the Borrower or any Subsidiary of the Borrower and not created in contemplation of such event;

(11) Liens in respect of any purchase money obligations for tangible property used in its business that at any time shall not exceed \$2,000,000, provided that any such encumbrances shall not extend to property and assets of the Borrower or any Subsidiary not financed by such a purchase money obligation;

(12) Easements, rights of way, restrictions and other similar charges or Liens relating to real property and not interfering in a material way with the ordinary conduct of its business; and

(13) Liens on its property or assets created in connection with the refinancing of Indebtedness secured by Permitted Liens on such property, provided that the amount of Indebtedness secured by any such Lien shall not be increased as a result of such refinancing and no such Lien shall extend to property and assets of the Borrower or any Subsidiary not encumbered prior to any such refinancing.

(b) In case any property is subjected to a Lien in _____ of Section 7.2(a), the Borrower will make or cause to _____ provision whereby the Note will be secured equally and _____ with all other obligations secured by such property, and _____ case the Note shall have the benefit, to the full extent _____ holders may be entitled thereto under applicable law, of _____ Lien equally and ratably securing the Note. Such _____ of Section 7.2(a) shall constitute an Event of Default _____ whether or not any such provision is made pursuant to _____ 7.2(b);

7.3 Sales and Leasebacks. The Borrower and its _____ will not sell or transfer any of their property and _____ or indirectly, liable as the lessee under a lease of such property (other than such transactions between Subsidiaries).

7.4 Investments. Neither the Borrower nor any Subsidiary will make or maintain any investments, made in cash or by delivery of property or assets, (a) in any Person, whether by acquisition of capital stock, Indebtedness, or other obligations or securities, or by loan or capital contribution, or otherwise, or (b) in any property, whether real or personal, (items (a) and (b) being herein called "Investments"), except the following:

(1) Investments in direct obligations of, or guaranteed by, the United States government, its agencies or any public instrumentality thereof and backed by the full faith and credit of the United States government with maturities not to exceed (or an unconditional right to compel purchase within) one year from the date of acquisition;

(2) Investments in or to any Subsidiary or other Person provided any such Investment when aggregated with all such other Investments permitted under this Section 7.4(2) and any acquisitions permitted under Section 7.1(b) shall not exceed a total of \$5,000,000 in each calendar year during the term of this Agreement beginning with calendar year 1993;

(3) Investments and obligations issued by any state of the United States or any political subdivision of any such state or any public instrumentality thereof with maturities not to exceed (or an unconditional right to compel purchase within) 180 days of the date of acquisition that are rated in one of the top two rating classifications by at least one nationally recognized rating agency;

(4) Investments in demand and time deposits with, Eurodollar deposits with, certificates of deposit issued by, or obligations or securities fully backed by letters of credit issued by (x) any bank organized under the laws of the United States, any state thereof, the District of Columbia or Canada having combined capital and surplus aggregating at least \$100,000,000, or (y) any other bank organized under the laws of a state that is a member of the European Economic Community (or any political subdivision thereof), Japan, the Cayman Islands, or British West Indies having as of any date of determination combined capital and surplus of not less than \$500,000,000 or the equivalent thereof (determined in accordance with generally accepted accounting principles) ("Permitted Banks");

(5) Shares of money market mutual funds registered under the Investment Company Act of 1940, as amended;

(6) Foreign currency swaps and hedging arrangements entered into in the ordinary course of business to protect against currency losses, and interest rate swaps and caps entered into in the ordinary course of business to protect against interest rate exposure on Indebtedness bearing interest at a variable rate;

(7) Investments in publicly traded companies and mutual funds (other than money market mutual funds) that in the aggregate shall not exceed \$5,000,000; and

(8) Other Investments existing on the Closing Date and listed on the Disclosure Schedule.

7.5 Transactions with Affiliates. Neither the Borrower nor any Subsidiary will enter into any transaction (including the purchase, sale or exchange of property or the rendering of any service) with any Affiliate except upon fair and reasonable terms that are at least as favorable to the Borrower or the Subsidiary as would be obtained in a comparable arm's-length transaction with a non-Affiliate.

7.6 ERISA Compliance. Neither the Borrower nor any of its Subsidiaries will at any time permit any employee pension benefit plan (as such term is defined in Section 3 of ERISA) maintained the Borrower or any of its Subsidiaries or in which employees of the Borrower or any of its Subsidiaries is entitled to participate to:

(a) engage in any "prohibited transaction" as such term is defined in Section 4975 of the Internal Revenue Code of 1986, as amended, or described in Section 406 of ERISA;

(b) incur any "accumulated funding deficiency" as such term is defined in Section 302 of ERISA, whether or not waived; or

(c) terminate under circumstances that could result in the imposition of a Lien on the property of the Borrower or any Subsidiary of the Borrower pursuant to Section 4068 of ERISA.

7.7 Financial Covenants. The Borrower covenants and _____ that:

(a) Consolidated Tangible Net Worth. The Consolidated Net Worth as of the end of each fiscal quarter of the _____ shall not be less than the sum of (i) \$30,777,703, and (ii) 50% of Consolidated Net Income (excluding losses) for each consecutive fiscal quarter of the Borrower beginning with the quarter ending September 30, 1995, on a cumulative basis.

(b) Consolidated Indebtedness. The ratio ("Debt-to-Net Worth Ratio") of the Consolidated Indebtedness (excluding all guaranties except guaranties with respect to borrowed money) as of the end of each fiscal quarter of the Borrower beginning with the fiscal quarter ending September 30, 1995 to its Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower beginning with the fiscal quarter ending September 30, 1995 shall not exceed 1.5 to 1.

(c) Consolidated Debt Service. The ratio (the "Cash Flow Ratio") as of the end of each fiscal quarter of the Borrower of (i) Consolidated Operating Cash Flow for the four consecutive fiscal quarters then ended to (ii)

Consolidated Debt Service determined for the four consecutive fiscal quarters then ended shall not be less than 1.25 to 1.00.

7.8 Contracts Prohibiting Compliance with Agreement. The Borrower will not without the prior written consent of the Lender enter into any contract or other agreement that would prohibit or in any way restrict the ability of the Borrower to comply with any provision of this Agreement.

ARTICLE VIII

EVENTS OF DEFAULT

8.1 Default. If any one of the following events ("Events of Default") shall occur:

(a) Any representation or warranty made by the Borrower herein or in any other Loan Document, or in any certificate or report furnished by the Borrower hereunder or thereunder, shall prove to have been incorrect in any material respect when made;

(b) Payment of any principal or interest due under the Note shall not be made on or before the date due;

(c) A final judgment in excess of \$2,000,000 shall be rendered against the Borrower or any of its Subsidiaries for the payment of money that, after deducting the amount of any insurance proceeds paid or payable to or on behalf of the Borrower or its Subsidiary in connection with such judgment, is in excess of \$2,000,000, and the same shall remain undischarged for a period of thirty (30) days, during which period execution shall not effectively be stayed. If a dispute exists with respect to the liability of any insurance underwriter under any insurance policy of the Borrower or its Subsidiary, no deduction under this subsection shall be made for the insurance proceeds that are the subject of such dispute;

(d) The Borrower or any Subsidiary shall (1) voluntarily terminate operations or apply for or consent to the appointment of, or the taking of possession by, a receiver, custodian, trustee or liquidator of such Person or of all or a substantial part of the assets of such Person, (2) admit in writing its inability, or be generally unable, to pay its debts as the debts become due, (3) make a general assignment for the benefit of its creditors, (4) commence a voluntary case under the Federal Bankruptcy Code (as now or hereafter in effect), (5) file a petition seeking to take advantage of any other law relating to bankruptcy, insolvency, reorganization, winding-up, or composition or adjustment of debts, (6) fail to controvert in a timely and appropriate manner, or acquiesce in writing to, any petition filed against it in an involuntary case under the Federal Bankruptcy Code or applicable state bankruptcy

laws or (7) take any corporate action for the purpose of effecting any of the foregoing;

(e) Without its application, approval or consent, a proceeding shall be commenced, in any court of competent jurisdiction, seeking in respect of the Borrower or any Subsidiary: the liquidation, reorganization, dissolution, winding-up, or composition or readjustment of debt, the appointment of a trustee, receiver, liquidator or the like of such Person or of all or any substantial part of the assets of such Person, or other like relief in respect of such Person under any law relating to bankruptcy, insolvency, reorganization, winding-up, or composition or adjustment of debts; and, if the proceeding is being contested in good faith by such Person, the same shall continue undismitted, or unstayed and in effect for any period of 45 consecutive days, or an order for relief against such Person shall be entered in any case under the Federal Bankruptcy Code or applicable state bankruptcy laws;

(f) Any foreclosure or other proceedings shall be commenced to enforce, execute or realize upon any lien, encumbrance, attachment, trustee process, mortgage or security interest for payment of an amount in excess of \$250,000 against the Borrower or any Subsidiary;

(g) Default shall be made in the due observance or performance of any covenant or agreement under Article VII;

(h) Default shall be made in the due observance or performance of any covenant or agreement contained herein (and not constituting an Event of Default under any other clause in this Article VIII) or in any other Loan Document or in any other agreement between the Lender and the Borrower evidencing or securing borrowed monies and such default shall continue and shall not have been remedied within thirty days after the date on which such default occurred;

(i) The Borrower or any of its Subsidiaries shall fail to make any payment of principal or interest beyond the period of grace contained in any instrument or agreement evidencing any indebtedness (other than to the Lender) for money borrowed in excess of \$100,000 (unless such default is the result of a good faith dispute arising under such agreement or instrument and the other party or parties thereto have not accelerated the maturity of such indebtedness), or default shall be made by the Borrower or any of its Subsidiaries in the performance of any other covenant or agreement contained in any such agreement or instrument as a result of which the other party thereto proceeds to accelerate the maturity of the indebtedness of such Person under such agreement or instrument;

(j) There shall occur any material adverse change in the financial condition of the Borrower;

(k) There shall occur any Event of Default under the Loan Agreement between the Borrower and the Lender dated as of November 1, 1993;

then, in the case of any such event, other than an event described in subsection (d) or (e) of this Section 8.1, the Lender may, at its option immediately declare any Obligations to it not otherwise due and payable at such time to be forthwith due and payable, whereupon the same shall become forthwith due and payable without further presentment, demand, protest, or other notice of any kind, all of which are hereby expressly waived, anything contained herein or in the Note to the contrary notwithstanding; and, in the case of any event described in subsection (d) or (e) of this Section 8.1, any Obligation not otherwise due and payable at such time shall become immediately due and payable without presentment, demand, protest, or other notice of any kind, all of which are hereby expressly waived, anything contained herein or in the Note to the contrary notwithstanding; and, further, in each and every such occurrence the Lender may proceed to protect and enforce its rights by suit in equity, action at law and/or other appropriate proceedings either for specific performance of any covenant or condition contained in this Agreement or in any instrument delivered to the Lender pursuant to this Agreement, or in aid of the exercise of any power granted in this Agreement or any such instrument.

8.2 Lender's Further Rights and Remedies. Upon the occurrence and during the unremedied continuation of an Event of Default, the Lender shall have the right to require the Borrower to provide the Lender with cash collateral or other collateral of a type and value satisfactory to the Lender in an amount equal to the Borrower's outstanding Obligations to the Lender. With respect to such collateral (the "Collateral"), the Lender shall have the rights and remedies of a secured party under the Uniform Commercial Code ("UCC") and the Borrower agrees to execute and deliver to the Lender such security agreements and financing statements under the UCC as the Lender may require, and to pay the cost of filing the same. Any deposits or other sums at any time credited by or due from the Lender to the Borrower shall at all times constitute Collateral for the Obligations. The Lender may apply the net proceeds of any disposition of Collateral or set-off to the Obligations in such order as the Lender may determine, whether or not due. With respect to Obligations not yet due, including contingent Obligations, the Lender may at its option hold Collateral (including any proceeds thereof) until all such Obligations have been paid in full.

ARTICLE IX

MISCELLANEOUS

9.1 No Waiver, Remedies Cumulative. No failure on the part of the Lender to exercise and no delay in exercising any right hereunder shall operate as a waiver

thereof, nor shall any single or partial exercise of any right hereunder preclude any other or further exercise thereof or the exercise of any other right. The remedies herein provided are cumulative and are not exclusive of any remedies provided by law. Any condition or restriction imposed in this Agreement with respect to the Borrower may be waived, modified or suspended by the Lender but only on the Lender's prior action in writing and only as so expressed in such writing and not otherwise.

9.2 Survival of Representations, Etc. All representations, warranties and covenants made herein or in any Loan Document shall survive the delivery of the Note and the consummation of all other transactions contemplated hereby or thereby.

9.3 Right of Setoff. In addition to any rights now or hereafter granted under applicable law or otherwise and not by way of limitation of any such rights, upon the occurrence and during the unremedied continuation of an Event of Default, the Lender is hereby authorized at any time or from time to time, without presentment, demand, protest or other notice of any kind to the Borrower or to any other Person, any such notice being hereby expressly waived, to set off and to appropriate and apply any and all deposits (general or special) and any other indebtedness at any time held or owing by the Lender to or for the credit or the account of the Borrower against and on account of the Obligations and liabilities of the Borrower to the Lender under this Agreement or under any of the other Loan Documents, and all other claims of any nature or description arising out of or connected with this Agreement or any other Loan Document, irrespective of whether or not the Lender shall have made any demand hereunder and although said Obligations, liabilities or claims, or any of them, shall be contingent or unmatured.

9.4 Indemnity; Costs, Expenses and Taxes. The Borrower hereby agrees to indemnify the Lender and its legal representatives, successors, assigns and agents against, and agrees to protect, save and keep harmless each of them from and to pay upon demand, any and all liabilities, obligations, taxes (including any and all stamp and other taxes payable or determined to be payable in connection with the execution and delivery of any Loan Documents), liens, charges, losses, damages, penalties, claims, actions, suits, costs, indemnities, expenses and disbursements (including, without limitation, reasonable legal fees, costs and expenses, including without limitation reasonable costs of attending and preparing for depositions and other court proceedings), of whatsoever kind and nature, imposed upon, incurred by or asserted against such indemnified party in any way relating to or arising out of any of the transactions contemplated hereunder or in any of the Loan Documents (all of the foregoing, collectively, "Costs") except to the extent arising by reason of the Lender's gross negligence, misconduct or breach hereof. Without limiting the foregoing, the Borrower agrees to pay on demand (a) all out-of-pocket costs and expenses of the Lender in connection with the preparation, execution and delivery of this Agreement and any other Loan Documents, including without limitation the reasonable fees and

out-of-pocket expenses of Foley, Hoag & Eliot, special counsel for the Lender, with respect thereto, as well as (b) the reasonable fees and all out-of-pocket expenses of legal counsel, independent public accountants and other outside experts retained by the Lender in connection with any request by the Borrower for consents, waivers or other action or forbearance by the Lender hereunder, for the modification or amendment hereof, or other like matters relating to the administration of this Agreement; and (c) all reasonable costs and expenses, if any, of the Lender incurred after the occurrence of any Event of Default hereunder in connection with the enforcement of any of the Loan Documents or the protection of any of the Lender's rights thereunder, including, without limitation, any internal costs, including personnel costs of the Lender incurred in connection with such administration and enforcement or protection.

9.5 Notices.

(a) Unless telephonic notice is specifically permitted pursuant to the terms of this Agreement, any notice or other communication hereunder to any party hereto shall be by telegram, telecopier, telex, delivery in hand or by courier, or registered or certified mail (return receipt requested) and shall be deemed to have been given or made when telegraphed, telexed, telecopied (and confirmed received), delivered in hand or by courier, or three days after being deposited in the mails, postage prepaid, registered or certified, addressed to the party as follows (or at any other address that such party may hereafter specify to the other parties in writing):

(a) If to the Lender:

The First National Bank of Boston
100 Federal Street
Boston, Massachusetts 02110
Attn: Ms. Sharon A. Stone, Director
Telecopier No. (617) 434-4048

with a copy to:

Arlene L. Bender, Esq.
Foley, Hoag & Eliot
One Post Office Square
Boston, Massachusetts 02109
Telecopier No. (617) 832-7000

(b) If to the Borrower:

MKS Instruments, Inc.
Six Shattuck Road
Andover, Massachusetts 01810
Attn: Mr. Robert F. O'Brien, Treasurer
Telecopier No. (508) 975-3756

with a copy to:

Richard S. Chute, Esq.
Hill & Barlow
One International Place
Boston, Massachusetts 02110
Telecopier No. (617) 428-3500

9.6 MASSACHUSETTS LAW. THIS AGREEMENT AND EACH OF THE LOAN DOCUMENTS SHALL BE DEEMED A CONTRACT MADE UNDER THE LAW OF THE COMMONWEALTH OF MASSACHUSETTS AND SHALL BE GOVERNED BY, AND CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE INTERNAL LAWS OF SAID STATE (WITHOUT REGARD TO ITS PRINCIPLES OF CONFLICT OF LAWS).

9.7 Successors and Assigns. This Agreement shall be binding upon and shall inure to the benefit of the Borrower and the Lender, and their respective legal representatives, successors and assigns; provided that the Lender may assign its rights hereunder, but the Borrower may not assign any of its rights hereunder.

9.8 Counterparts. This Agreement may be executed in any number of counterparts and by different parties hereto in separate counterparts, each of which when so executed and delivered shall be deemed an original and all of which when taken together shall constitute one and the same instrument.

9.9 JURISDICTION, SERVICE OF PROCESS.

(a) ANY SUIT, ACTION OR PROCEEDING AGAINST THE BORROWER WITH RESPECT TO ANY OF THE LOAN DOCUMENTS OR ANY JUDGMENT ENTERED BY ANY COURT IN RESPECT OF ANY THEREOF SHALL BE BROUGHT IN THE COURTS OF THE COMMONWEALTH OF MASSACHUSETTS LOCATED IN SUFFOLK COUNTY OR IN THE UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF MASSACHUSETTS, AS THE LENDER (IN ITS SOLE DISCRETION) MAY ELECT, AND THE BORROWER HEREBY ACCEPTS THE EXCLUSIVE JURISDICTION OF SUCH COURTS FOR THE PURPOSE OF ANY SUIT,

ACTION OR PROCEEDING AND AGREES NOT TO ASSERT ANY CLAIM THAT IT IS NOT PERSONALLY SUBJECT TO THE JURISDICTION OF SUCH COURTS.

(b) IN ADDITION, THE BORROWER HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY LAW, ANY OBJECTION IT MAY NOW OR HEREAFTER HAVE TO THE LAYING OF VENUE OF ANY SUIT, ACTION OR PROCEEDING ARISING OUT OF OR RELATING TO ANY OF THE LOAN DOCUMENTS OR ANY JUDGMENT ENTERED BY ANY COURT IN RESPECT THEREOF BROUGHT IN SUFFOLK COUNTY IN THE COMMONWEALTH OF MASSACHUSETTS, AND HEREBY FURTHER IRREVOCABLY WAIVES ANY CLAIM THAT ANY SUIT, ACTION OR PROCEEDING BROUGHT IN SUFFOLK COUNTY IN THE COMMONWEALTH OF MASSACHUSETTS HAS BEEN BROUGHT IN AN INCONVENIENT FORUM.

9.10 Limit on Interest. It is the intention of the Lender and the Borrower to comply strictly with all applicable usury laws; and, accordingly, in no event and upon no contingency shall the Lender ever be entitled to receive, collect, or apply as interest under the Note any interest, fees, charges or other payments equivalent to interest, in excess of the maximum rate that the Lender may lawfully charge under applicable statutes and laws from time to time in effect; and, in the event that the Lender ever receives, collects or applies as interest on the Note, any such excess, such amount that, but for this provision, would be excessive interest shall be applied to the reduction of the principal amount of the indebtedness evidenced by the Note; and, if the principal amount of indebtedness evidenced by the Note, and all lawful interest thereon, is paid in full, any remaining excess shall forthwith be paid to the Borrower, or other party lawfully entitled thereto. In determining whether or not the interest paid or payable, under any specific contingency exceeds the highest contract rate permitted by applicable law from time to time in effect, the Borrower and the Lender shall, to the maximum extent permitted under applicable law, characterize any non-principal payment as a reasonable loan charge, rather than as interest. Any provision of the Note, or of any other agreement between the Lender and the Borrower, that operates to bind, obligate, or compel the Borrower to pay interest in excess of such maximum lawful contract rate shall be construed to require the payment of the maximum rate only. The provisions of this Section 9.10 shall be given precedence over any other provisions contained in the Note or in any other agreement between the Lender and the Borrower that is in conflict with the provisions of this Section 9.10.

9.11 Amendments, Modifications, Waivers. Any term of this Agreement or of the Note may be amended and the observance of any term of this Agreement or of the Note may be waived (either generally or in a particular instance and either

retroactively or prospectively) only with the written consent of the Borrower and the Lender.

9.12 Headings. The headings of this Agreement are for convenience only and are not to affect the construction of or to be taken into account in interpreting the substance of this Agreement.

9.13 WAIVER OF NOTICE, ETC. THE BORROWER WAIVES DEMAND, NOTICE, PROTEST, NOTICE OF ACCEPTANCE OF THIS AGREEMENT, NOTICE OF LOANS MADE, CREDIT EXTENDED, COLLATERAL RECEIVED OR DELIVERED OR OTHER ACTION TAKEN IN RELIANCE HEREON AND ALL OTHER DEMANDS AND NOTICE OF ANY DESCRIPTION, EXCEPT AS REQUIRED HEREBY. WITH RESPECT BOTH TO THE OBLIGATIONS AND COLLATERAL, THE BORROWER ASSENTS TO ANY EXTENSION OR POSTPONEMENT OF THE TIME OF PAYMENT OR ANY OTHER INDULGENCE, TO ANY SUBSTITUTION, EXCHANGE OR RELEASE OF COLLATERAL, TO THE ADDITION OR RELEASE OF ANY PARTY OR PERSONS PRIMARILY OR SECONDARILY LIABLE, TO THE ACCEPTANCE OF PRETRIAL PAYMENT THEREON AND THE SETTLEMENT, COMPROMISING OR ADJUSTING OF ANY THEREOF, ALL IN SUCH MANNER AND AT SUCH TIME OR TIMES AS THE LENDER MAY DEEM ADVISABLE. THE BORROWER AGREES THAT NO ACTIONS TAKEN BY ANY PERSON EXCEPT THE LENDER SHALL IMPAIR OR OTHERWISE AFFECT ITS OBLIGATIONS HEREUNDER UNTIL ALL OBLIGATIONS OF THE BORROWER HEREUNDER ARE SATISFIED IN FULL.

9.14 WAIVER OF TRIAL BY JURY. THE BORROWER WAIVES ANY AND ALL RIGHTS THAT IT MAY HAVE TO A TRIAL BY JURY ON ANY CLAIM OR ACTION, OF ANY NATURE WHATSOEVER, RELATING TO OR ARISING OUT OF THIS AGREEMENT OR ANY OF THE OTHER LOAN DOCUMENTS.

9.15 Severability. In the event that any one or more of the provisions contained in this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Agreement, but this Agreement shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

9.16 Entire Agreement. This Agreement and the other Loan Documents constitute the full and entire understanding and agreement between the parties with regard to the subject matter hereof and thereof and shall supersede all prior agreements and understandings, whether written or oral, between the parties with respect to the subject matter hereof and thereof.

9.17 Compliance with Covenants. All computations determining compliance with Sections 6 and 7 shall utilize accounting principles in conformity with those used in the preparation of the financial statements referred to in Section 4.5. If any subsequent financial reports of the Borrower shall be prepared in accordance with accounting principles different from those used in the preparation of the financial statements referred to in Section 4.5, the Borrower shall inform the Lender of the changes in accounting principles and shall provide to the Lender with such reports, such supplemental reconciling financial information as may be required to ascertain compliance by the Borrower with the covenants contained in this document.

9.18 Termination. This Agreement may be terminated by the Borrower at any time upon written notice of such termination to Lender; provided, however, that, unless and until the Term _____ made by the Lender hereunder and all other obligations _____ of the Borrower to the Lender existing (whether or not _____ as of the time of the receipt of such notice by the Lender _____ have been paid in full, such termination shall in no way _____ the rights and powers granted to the Lender in connection _____ this Agreement, and until such payment in full all rights _____ hereby granted to the Lender hereunder shall be and _____ in full force and effect.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as an agreement under seal as of the _____ above written.

MKS INSTRUMENTS, INC.

By: _____
Title:

THE FIRST NATIONAL BANK OF
BOSTON

By: _____
Title:

MKS INSTRUMENTS, INC.

FIRST AMENDMENT

TO LOAN AGREEMENT

This First Amendment (the "Amendment") dated as of February 23, 1996 amends the Loan Agreement dated as of October 31, 1995, as amended (the "Loan Agreement"), between MKS Instruments, Inc. (the "Borrower") and The First National Bank of Boston (the "Lender"), capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower, the Lender and Chemical Bank shall enter into a loan agreement (the "1996 Loan Agreement") on the date hereof; and

WHEREAS, the Lender and the Borrower agree that certain terms of the Loan Agreement should be made consistent with similar terms in the 1996 Loan Agreement;

NOW, THEREFORE, the Lender and the Borrower agree as follows:

Section 1. Amendment to the Loan Agreement.

(a) Section 3.2.2. of the Loan Agreement is hereby amended by deleting the existing language and substituting the following:

3.2.2. The Lender will notify the Borrower of any event occurring after the date of this Agreement that will entitle the Lender to any additional payment under this Section 3.2 as promptly as practicable. The Lender will furnish to the Borrower with such notice a certificate signed by an officer of the Lender certifying that the Lender is entitled to payment under this Section 3.2 and setting forth the basis (in reasonable detail) and the amount of each request by the Lender for any additional payment pursuant to this Section 3.2. Such certificate shall be conclusive in the absence of manifest error. The Borrower shall not be obligated to compensate the Lender pursuant to this Section for amounts accruing prior to the date that is 180 days before the Lender notifies the Borrower of its obligations to compensate the Lender for such amounts.

(b) Sections 6.1(a) and 6.1(c) of the Loan Agreement are hereby amended by replacing the word "sixty" in each with the word "forty-five".

(c) Section 7.1(b) of the Loan Agreement is hereby amended by deleting the existing language and substituting the following:

7.1(b) Mergers, Etc. Neither the Borrower nor any Subsidiary will consolidate with or merge into any other Person or permit any other Person to consolidate with or merge into it, or acquire all or substantially all of the assets of any Person, or sell, assign, lease or otherwise dispose of (whether in one transaction or in a series of transactions) all or substantially all of its assets to any Person, except that

(1) a Subsidiary may consolidate with or merge into the Borrower or another Subsidiary; and

(2) the Borrower or any of its Subsidiaries may acquire all or substantially all of the assets of any Person provided (i) such Person is engaged in a line of business substantially similar to one or more of Borrower's existing lines of business, (ii) the aggregate purchase price liability incurred in any calendar year, including all contingent liabilities, when aggregated with all such acquisitions and any Investments permitted under Section 7.4(2) in any calendar year shall not exceed 25% of Consolidated Tangible Net Worth as of the end of the most recent fiscal quarter or, if 80% or more of the purchase price is paid in capital stock of the Borrower, 40% of Consolidated Tangible Net Worth as of the end of the most recent fiscal quarter and (iii) based on a pro forma calculation of the ratios set forth in Section 7.7 as of the date such acquisition is closed, assuming consolidation of the acquired business with the Borrower for the four full fiscal quarters ended immediately preceding such closing and pro forma debt and debt service payments based on scheduled principal payments, including acquisition borrowings, if any, and pro forma interest on total debt at then prevailing borrowing rates, Borrower is in compliance with the financial covenants set forth in Section 7.7.

(d) Section 7.2 of the Loan Agreement is hereby amended by deleting the existing clause (11) and substituting the following:

(11) Liens in respect of any purchase money obligations for tangible property used in its business, which obligations shall not at any time exceed 5% of Consolidated Tangible Net Worth, provided that any such encumbrances shall not extend to property and assets of the Borrower or any Subsidiary not financed by such a purchase money obligation;

(e) Section 7.3 of the Loan Agreement is hereby amended by adding the following words to the end thereof prior to the close parenthesis: "and transfers of capital equipment that will be leased pursuant to Financing Leases".

(f) Section 7.4 of the Loan Agreement is hereby amended by deleting the existing clause (2) and substituting the following:

(2) Investments in or to any Subsidiary or other Person, provided Borrower remains in compliance with Section 7.1(b);

and by deleting from clause (4) the word "\$100,000,000" and replacing it with the word "\$500,000,000".

(g) Section 7.7 of the Loan Agreement is hereby amended by deleting subsection (a) and replacing it with the following:

(a) Consolidated Tangible Net Worth. The Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower shall:

(A) prior to an IPO, not be less than the sum of (i) \$38,000,000, and (ii) 50% of Consolidated Net Income (excluding losses) for each consecutive fiscal quarter of the Borrower beginning with the quarter ending March 31, 1996, on a cumulative basis; and

(B) after an IPO, not be less than the sum of (i) the amount required by clause (A) above immediately prior to such IPO plus (ii) the net proceeds to the Borrower of the IPO less (iii) the Sub S Dividends.

For purposes of the foregoing, the following terms shall have the meanings indicated:

"IPO" shall mean the initial underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended, covering the offer and sale of the Borrower's Common Stock for the account of the Borrower.

"Sub S Dividends" shall mean one or more distributions by the Borrower to its shareholders who were shareholders prior to the IPO in an aggregate amount equal to the Borrower's "accumulated adjustments account", as defined in Section 1368(a)(1) if the Internal Revenue Code of 1986, as of the date of the IPO.

(h) Section 8.1 of the Loan Agreement is hereby amended by replacing existing clause (i) with the following:

(i) There shall occur any default under any instrument or agreement evidencing any indebtedness for money borrowed in excess of \$100,000 by the Borrower or any of its Subsidiaries;

and by adding the following clauses (1) and (m) after clause (k):

(l) There shall occur any Event of Default under any other loan or credit agreement to which the Borrower and the Lender are parties;

(m) The transfer by John R. Bertucci and/or his Affiliates of securities of the Borrower or the voting power related to such securities as a result of which the power to elect, appoint or cause the election or appointment of at least a majority of the members of the board of directors of the Borrower shall no longer be held by John R. Bertucci and/or his Affiliates;

Section 2. Representations and Warranties. The Borrower hereby represents and warrants as follows:

(a) The execution and delivery of this Amendment and the performance of this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 3. Conditions to Effectiveness. The effectiveness of this Amendment is conditioned on the following:

(a) The Borrower and the Lender shall each have executed and delivered a counterpart of this Amendment;

(b) The representations and warranties contained in Article IV of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof; and

(c) No Default or Event of Default under the Loan Agreement shall have occurred and be continuing.

Section 4. Miscellaneous.

(a) On and after the date hereof, each reference in the Loan Agreement to "this Agreement" or the words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of The Commonwealth of Massachusetts.

(d) This Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same document.

IN WITNESS WHEREOF, the parties have caused this Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____
Title: _____

THE FIRST NATIONAL BANK OF BOSTON

By: _____
Title: _____

LEASE AGREEMENT

1. PARTIES. This Lease, dated for reference purposes only, October 12, 1989, is made by and between ASPEN INDUSTRIAL PARK PARTNERSHIP, a Colorado limited partnership, (herein called "Landlord") and HPS, DIVISION OF MKS INDUSTRIES, INC. (herein called "Tenant").

2. PREMISES. Landlord does hereby lease unto Tenant the following described premises containing approximately 39,032 square feet measured to the outside of the exterior walls, including overhangs, canopies and loading docks, and to approximately one-half the thickness of common walls; commonly known as 5330 Sterling Drive, in the City of Boulder, County of Boulder, State of Colorado; as shown on the plans attached hereto as Exhibit "A".

Said Lease is subject to the terms, covenants and conditions herein set forth and the Tenant covenants as a material part of the consideration for this Lease to keep and perform each and all of said terms, covenants and conditions by it to be kept and performed and that this Lease is made upon the conditions of said performance.

3. TERM. The terms of this Lease shall be for five (5) years, commencing on November 1, 1989.

4. POSSESSION.

a. If the Landlord, for any reason whatsoever, cannot deliver possession of the said Premises to the Tenant at the commencement of the term hereof, this Lease shall not be void or voidable, nor shall Landlord be liable to Tenant for any loss or damage resulting therefrom, nor shall the expiration date of the above term be in any way extended, but in that event, all rent shall be abated during the period between the commencement of said term and the time when Landlord delivers possession.

b. In the event that Landlord shall permit Tenant to occupy the Premises prior to the commencement date of the term, such occupancy shall be subject to all the provisions of this Lease. Said early possession shall not advance the termination date hereinabove provided.

5. RENT. The Tenant shall pay for the full five (5) year term of this Lease, a reserve minimum rent of One Million Five Hundred Fifty-Four Thousand One Hundred Ninety-Seven Dollars (\$1,554,197.00). The total minimum reserve rent shall be payable as follows:

a. The Tenant covenants and agrees to pay minimum rent for the Leased Premises for the first Lease Year of Two Hundred Ninety-Two Thousand Seven Hundred Forty Dollars (\$292,740.00), which amount shall be payable in equal monthly installments of Twenty-Four Thousand Three Hundred Ninety-Five Dollars

(\$24,395.00) per month; for the second Lease Year, the sum of Three Hundred One Thousand Five Hundred Twenty-Two Dollars (\$301,522.00), payable in equal monthly installments of Twenty- Five Thousand One Hundred Twenty-Six and 83/100ths Dollars per month (\$25,126.83); for the third Lease Year, the sum of Three Hundred Ten Thousand Five Hundred Sixty-Eight Dollars (\$310,568.00) payable in equal monthly installments of Twenty- Five Thousand Eight Hundred Eighty and 67/100ths Dollars (\$25,880.67) per month; for the fourth Lease Year, the sum of Three Hundred Nineteen Thousand Eight Hundred Eighty-Five Dollars (\$319,885.00), payable in equal monthly installments of Twenty- Six Thousand Six Hundred Fifty-Seven and 08/100ths Dollars (\$26,657.08); and for the fifth Lease Year, the sum of Three Hundred Twenty-Nine Thousand Four Hundred Eighty Two Dollars (\$329,482.00), payable in equal monthly installments of Twenty- Seven Thousand Four Hundred Fifty Six and 83/100ths Dollars (\$27,456.83) per month.

b. All minimum rent payable hereunder shall be paid without setoff or deduction, in advance, on or before the first day of each month during the term of this Lease at the address of the Landlord first written above, or such other address or addresses as Landlord may hereafter determine by notice to the Tenant.

c. Rent for any period during the term hereof which is for less than one (1) month shall be a prorated portion of the monthly installment herein, based on a thirty (30) day month.

6. SECURITY DEPOSIT. Tenant shall deposit with Landlord the sum of _____ None _____ upon commencement of the term of this Lease. Said sum shall be held by Landlord as security for the faithful performance by Tenant of all the terms, covenants, and conditions of this Lease to be kept and performed by Tenant during the term hereof. If Tenant defaults with respect to any provision of this Lease, including, but not limited to the provisions relating to the payment of rent, Landlord may (but shall not be required to) use, apply or retain rent or any other sum in default or for the payment of any amount of Tenant's default. If any portion of said deposit is so used or applied, Tenant shall within five days after written demand therefor, deposit cash with Landlord in an amount sufficient to restore the security deposit to its original amount and Tenant's failure to do so shall be a material breach of this Lease. Landlord shall not be required to keep this security deposit separate from its general funds, and Tenant shall not be entitled to interest on such deposit. If Tenant shall fully and faithfully perform every provision of this Lease to be performed by it, the security deposit or any balance thereof shall be _____ Tenant (or, at Landlord's option, to the last assignee of Tenant's interest hereunder) at the expiration of the Lease term. In the event of termination of Landlord's interest in this Lease, Landlord shall transfer said deposit to Landlord's successor in interest.

7. OPERATING EXPENSE ADJUSTMENTS. For the purposes of this Article, the term Direct Expenses is defined as follows:

All direct costs of operation and maintenance, as determined by standard practices, and shall include the following costs by way of illustration, but not be limited to: real property taxes and assessments; rent taxes, gross receipt taxes, (whether assessed against the Landlord or assessed against the Tenant and collected by the Landlord, or both); water and sewer charges; Insurance premiums; utilities; janitorial services; labor; window cleaning; costs incurred in the management of the Building, if any; air conditioning and heating; elevator maintenance; supplies; materials, equipment; and tools; including maintenance, costs, and upkeep of all common areas, and all building repairs except repair of structural defects ("Direct Expenses" shall not include depreciation on the Building of which the Premises are a part or equipment therein, loan payments, executive salaries or real estate brokers' commissions.)

Tenant shall pay one hundred percent (100%) of Direct Expenses paid or incurred by the Landlord for the operation or maintenance of the Building of which the Premises are a part.

Even though the term has expired and Tenant has vacated the Premises, when the final determination is made of Tenant's share of Direct Expenses for the year in which this Lease terminates, Tenant shall immediately pay any increase due over the estimated expenses paid and conversely any overpayment made in the event of said expenses decrease shall be immediately rebated by Landlord to Tenant.

8. USE. Tenant shall use the Premises for office-warehouse and/or manufacturing purposes, and shall not use or permit the Premises to be used for any other purpose without the prior written consent of Landlord.

Tenant shall not do or permit anything to be done in or about the Premises nor bring or keep anything herein which will in any way increase the existing rate or affect any fire or other insurance upon the Building or any of its contents, or cause cancellation of any insurance policy covering said Building or any part thereof or any of its contents. Tenant shall not do or permit anything to be done in or about the Premises which will in any way obstruct or interfere with the rights of other tenants or occupants of the building or injure or annoy them or use or allow the Premises to be used for any improper, immoral, unlawful or objectionable purpose, nor shall Tenant cause, maintain or permit any nuisance in, on or about the Premises. Tenant shall not commit or suffer to be committed any waste in or upon the Premises.

9. COMPLIANCE WITH LAW. Tenant shall not use the Premises or permit anything to be done in or about the Premises which will in any way conflict with any law, statute, ordinance or governmental rule or regulation now in force or which may

hereafter be enacted or promulgated. Tenant shall, at its sole costs and expense, promptly comply with all laws, statutes, ordinances and governmental rules, regulations or requirements now in force or which may hereafter be in force, and with the requirements of any board of fire insurance underwriters or other similar bodies now or hereafter constituted, relating to, or affecting the condition, use or occupancy of the Premises, excluding structural changes not related to or affected by Tenant's improvements or acts. The judgment against Tenant, whether the Landlord be a party thereto or not, that tenant has violated any law, statute, ordinance or governmental rule, regulation or requirement, shall be conclusive of that fact as between the Landlord and Tenant.

10. ALTERATIONS AND ADDITIONS. Tenant shall not make or suffer to be made any alterations, additions or improvements to or of the Premises or any part thereof without the consent of Landlord first had and obtained, and any alterations, additions or improvements to or of said Premises, including, but not limited to, wall covering, paneling and built-in cabinet work, but excepting movable furniture and trade fixtures, shall on the expiration of the term become a part of the realty and belong to the Landlord and shall be surrendered with the Premises. In the event Landlord consents to the making of any alterations, additions or improvements to the Premises by Tenant, the same shall be made by Tenant at Tenant's sole cost and expense, and a contractor or person selected by Tenant to make the same must first be approved by the Landlord. Upon the expiration or earlier termination of the term hereof, Tenant shall, prior to the written demand by the Landlord, given at least thirty (30) days prior to the end of the term, at Tenant's sole cost and expense, forthwith and with all due diligence, remove any alterations, additions, or improvements made which have been designated by the Landlord to be removed, and repair any damage to the Premises caused by such removal.

11. REPAIRS.

a. By taking possession of the Premises, Tenant shall be deemed to have accepted the Premises as being in good, sanitary order, condition and repair. Tenant shall, at Tenant's sole cost and expense, keep the Premises and every part thereof in good condition and repair, damage thereto from causes beyond the reasonable control of Tenant and ordinary wear and tear excepted. Tenant shall upon the expiration or sooner termination of this Lease hereof surrender the Premises to the Landlord in good condition, ordinary wear and tear and damage from causes beyond the reasonable control of Tenant excepted. Except as specifically provided in an addendum, if any, to this Lease, Landlord shall have no obligation whatsoever to alter, remodel, improve, repair, decorate or paint the Premises or any part thereof, and the parties hereto affirm that Landlord has made no representations to Tenant respecting the condition of the Premises or the Building except as specifically herein set forth.

12. LIENS. Tenant shall keep the Premises and property in which the Premises are situated free from any liens out of any work performed, materials furnished or obligations incurred by Tenant. Landlord may require, at Landlord's sole option, that Tenant shall provide to Landlord, at Tenant's sole cost and expense, a lien and completion bond in an amount equal to one and one-half (1 1/2) times any and all estimated cost of improvements, additions, or alterations in the Premises, to insure Landlord against any liability for mechanics' and materialmen's liens and to insure completion of the work.

13. ASSIGNMENT AND SUBLETTING. Tenant shall not either voluntarily or by operation of law, assign, transfer, mortgage, pledge, hypothecate or encumber this Lease or any interest therein, and shall not sublet the said Premises or any part thereof, or any right or privilege appurtenant thereto, or suffer any other person (the employees, agents, servants and invitees of Tenant excepted) to occupy or use the said Premises, or any portion thereof, without the written consent of Landlord first had and obtained, which consent shall not be unreasonably withheld, and a consent to one assignment, subletting, occupation or use by any other person shall not be deemed to be a consent to any subsequent assignment, subletting, occupation or use by another person. Any such assignment or subletting without such consent shall be void, and shall, at the option of the Landlord, constitute a default under this Lease.

14. HOLD HARMLESS. Tenant shall identify and hold harmless Landlord against and from any and all claims arising from Tenant's use of the Premises for the conduct of its business or from any activity, work, or other thing done, permitted or suffered by the Tenant in or about the Building, and shall further indemnify and hold harmless Landlord against and from any and all claims arising from any breach or default in the performance of any obligations on Tenant's part to be performed under the terms of this lease, or arising from any act or negligence of the Tenant, or any officer, agent, employee, guest, or invitee of Tenant, and from all and against all cost, attorney's fees, expenses and liabilities incurred in or about any such claim or action or proceeding be brought against Landlord by reason of any such claim, Tenant, upon notice from Landlord shall defend the same at Tenant's expense by counsel reasonably satisfactory to Landlord. Tenant as a material part of the consideration to Landlord hereby assumes all risk of damage to property or injury to persons, in, upon or about the Premises, from any cause other than Landlord's negligence, and Tenant hereby waives all claims in respect thereof against Landlord.

Landlord or its agents shall not be liable for any damage to property entrusted to employees of the Building, nor for loss or damage to any property by theft or otherwise, nor for any injury to or damage to persons or property resulting from fire, explosion, falling plaster, steam, gas, electricity, water or rain which may leak from any part of the Building or from the pipes, appliances or plumbing works therein or from the roof, street or subsurface or from any other place resulting from dampness or any other cause whatsoever, unless caused by or due to the negligence of

Landlord, its agents, servants or employees. Landlord or its agents shall not be liable for interference with the light or incorporeal hereditaments, loss of business by Tenant, nor shall Landlord be liable for any latent defects in the Premises or in the Building. Tenant shall give prompt notice to Landlord in cause of fire or accidents in the Premises or in the Building or of defects therein or in the fixtures or equipment.

15. SUBROGATION. As long as their respective Insurers so permit, Landlord and Tenant hereby mutually waive their respective rights of recovery against each other for any loss insured by fire, extended coverage and other property insurance policies existing for the benefit of the respective parties. Each party shall obtain any special endorsements, if required by their insurer to evidence compliance with the aforementioned waiver.

16. INSURANCE. Tenant shall not install any electrical equipment that overloads the wiring panels, etc. in the leased premises. Tenant shall make at his own expense whatever changes are necessary to relieve any overload condition and to comply with the requirements of the insurance Underwriters or the governmental authorities having jurisdiction. Tenant agrees to carry general liability insurance in the minimum total amount or amounts of Five Hundred Thousand Dollars (\$500,000.00), for each occurrence of bodily injury and One Hundred Thousand Dollars (\$100,000.00) property damage. Tenant shall supply to Landlord certificates of insurance showing the liability insurance coverage, and throughout the term hereof, certificates of renewals of such policies. Said certificate shall provide that the insurer shall have given Landlord ten (10) days written notice prior to cancellation of said policy. In the event Tenant fails to secure such insurance or to give evidence to Landlord of such insurance by depositing with Landlord certificates as above provided, Landlord may purchase such insurance in Tenant's name and charge Tenant the premiums therefor. Building insurance for damage caused by fire and all other perils is the responsibility of the Landlord. Premiums for such coverage shall be paid by the Landlord. Said insurance policy will add MKS Instruments, Inc. as an additional insured.

17. PROPERTY TAXES. Tenant shall pay, or cause to be paid, before delinquency, any and all taxes levied or assessed and which become payable during the term thereof upon all Tenant's leasehold improvements, equipment, furniture, fixtures and personal property located in the premises; except that which has been paid for by Landlord, and is the standard of the Building. In the event any or all of Tenant's leasehold improvements, equipment, furniture, fixtures and personal property shall be assessed and taxed with the building. Tenant shall pay to Landlord its share of such taxes within ten (10) days after delivery to Tenant by Landlord of a statement in writing setting forth the amount of such taxes applicable to Tenant's property.

18. RULES AND REGULATIONS. Tenant shall faithfully observe and comply with the rules and regulations that Landlord shall from time to time promulgate.

Landlord reserves the right from time to time to make all reasonable modifications to said rules. The additions and modifications to those rules shall be binding upon Tenant upon delivery of a copy of them to Tenant. Landlord shall not be responsible to Tenant for the nonperformance of any said rules by any other tenants or occupants.

19. HOLDING OVER. If Tenant remains in possession of the Premises or any part after the expiration of the term hereof, with the express written consent of Landlord, such occupancy shall be a tenancy from month-to-month at a rental in the amount of the last monthly rental, plus all other charges payable hereunder, and upon all terms hereof applicable to a month-to-month tenancy.

20. ENTRY BY LANDLORD. Landlord reserves and shall at any and all times have the right to enter the Premises, inspect the same, supply janitorial service and any other service to be provided by Landlord to Tenant hereunder, to submit said Premises and responsibility, and to alter, improve or repair the Premises and any portion of the Building of which the Premises are a part that Landlord may deem necessary or desirable, without abatement of rent and may for that purpose erect scaffolding and other necessary structures where reasonably required by the character of the work to be performed, always providing that the entrance to the Premises shall not be blocked thereby, and further providing that the business of the Tenant shall not be interfered with unreasonably. Tenant hereby waives any claim for damages or for any injury or inconvenience to interference with Tenant's business, any loss of occupancy or quiet enjoyment of the Premises, and any other loss occasioned thereby. For each of the aforesaid purposes, Landlord shall at all times have and retain a key with which to unlock all of the doors in, upon and about the Premises, excluding Tenant's vaults, safes, and files, and Landlord shall have the right to use any and all means which Landlord may deem proper to open said doors in an emergency, in order to obtain entry to the Premises without liability to Tenant except for any failure to exercise due care for Tenant's property. Any entry to the Premises obtained by Landlord by any of said means, or otherwise shall not under any circumstances be construed or deemed to be a forcible or unlawful entry into, or a detainer of, the Premises, or an eviction of Tenant from the Premises or any portion thereof.

21. RECONSTRUCTION. In the event the Premises or the Building of which the Premises are a part are damaged by fire or other perils covered by extended coverage insurance, Landlord agrees to forthwith repair the same; and this Lease shall remain in full force and effect, except that the Tenant shall be entitled to a proportionate reduction of the rent while such repairs are being made, such proportionate reduction to be based upon the extent to which the making of such repairs shall materially interfere with the business carried on by the Tenant in the Premises. If the damage is due to the fault or neglect of Tenant or its employees, there shall be no abatement of rent.

In the event the Premises or the Building of which the Premises are a part are damaged as a result of any cause other than the perils covered by fire and extended coverage insurance, then Landlord shall forthwith repair the same, provided the extent of the destruction be less than ten percent (10%) of the then full replacement cost of the Premises or the Building of which the Premises are a part. In the event the destruction of the Premises or the Building is to an extent greater than ten percent (10%) of the then full replacement cost, then Landlord shall have the option: (1) to repair or restore such damage, this Lease continuing in full force and effect, but the rest to be proportionately reduced as hereinabove in this Article provided; or (2) give notice to Tenant at any time within sixty (60) days after such damage terminating this Lease as of the date specified in such notice, which date shall be no less than thirty (30) and no more than sixty (60) days after the giving of such notice. In the event of such notice, this Lease shall expire and all interest of the Tenant in the Premises shall terminate on the date so specified in such notice and the Rent, reduced by a proportionate amount, based upon the extent, if any, to which such damage materially interfered with the business carried on by the Tenant in the Premises, shall be paid up to date of said such termination.

Notwithstanding anything to the contrary contained in this Article, Landlord shall not have any obligation whatsoever to repair, reconstruct or restore the Premises when the damage resulting from any casualty covered under this Article occurs during the last twelve (12) months of the term of this Lease or any extension thereof.

Landlord shall not be required to repair any injury or damage by fire or other cause, or to make any repairs or replacements of any panels, decoration, office fixtures, railings, floor coverings, partitions, or any other property installed in the Premises by Tenant.

The Tenant shall not be entitled to any compensation or damages from Landlord for loss of the use of the whole any part of the Premises, Tenant's personal property or any inconvenience or annoyance occasioned by such damage, repair, reconstruction or restoration.

22. DEFAULT. The occurrence of any one or more of the following events shall constitute a default and breach of this Lease by Tenant.

a. The vacating or abandonment of the Premises by Tenant.

b. The failure by Tenant to make any payment of rent or any other payment required to be made by Tenant hereunder, as and when due, where such failure shall continue for a period of three (3) days after written notice thereof by Landlord to Tenant.

c. The failure by tenant to observe any of the covenants, conditions or provisions of this Lease to be observed or performed by the Tenant, other than as described in Article 23.b above, where such failure shall continue for a period of thirty (30) days after written notice thereof by Landlord to Tenant; provided, however, that if the nature of Tenant's default is such that more than thirty (30) days are reasonably required for its cure, then Tenant shall not be deemed to be in default if Tenant commences such cure within said thirty (30) day period and thereafter diligently prosecutes such cure to completion.

d. The making by Tenant of any general assignment or general arrangements for the benefit of creditors; or the filing by or against Tenant of a petition to have Tenant adjudged a bankrupt, or a petition or reorganization or arrangement under any law relating to bankruptcy (unless, in the case of a petition filed against Tenant, the same is dismissed within sixty [60] days); or the appointment of a trustee or a receiver to take possession of substantially all of Tenant's assets located at the Premises or of Tenant's interest in this Lease, where possession is not restored to Tenant within thirty (30) days; or the attachment, execution or other judicial seizure of substantially all of Tenant's assets located at the Premises or of Tenant's interest in this Lease, where such seizure is not discharged in thirty (30) days.

23. REMEDIES IN DEFAULT. In the event of any such material default or breach by Tenant, Landlord may at any time thereafter, with or without notice or demand, and without limiting Landlord in the exercise of a right or remedy which Landlord may have by reason of such default or breach:

a. Terminate Tenant's right to possession of the Premises by any lawful means, in which case this Lease shall terminate and Tenant shall immediately surrender possession of the Premises to Landlord. In such event Landlord shall be entitled to recover from Tenant all damages incurred by Landlord by reason of Tenant's default including, but not limited to, the cost of recovering possession of the Premises; expenses of reletting, including necessary renovation and alteration of the Premises, reasonable attorney's fees, any real estate commission actually paid; the worth at the time of award by the court having jurisdiction thereof of the amount by which the unpaid rent for the balance of the term after the time of such award exceeds the amount of such rental loss for the same period that Tenant proves could be reasonably avoided; that portion of the leasing commission paid by Landlord and applicable to the unexpired term of this Lease. Unpaid installments of rent or other sums shall bear interest from the due date at the rate of twenty percent (20%) per annum. In the event Tenant shall have abandoned the Premises, Landlord shall have the option of (a) taking possession of the Premises and recovering from Tenant the amount specified in this paragraph, or (b) proceeding under the provisions of the following Article 23.b.

b. Maintain Tenant's right to possession, in which case this Lease shall continue in effect whether or not Tenant shall have abandoned the Premises. In such event, Landlord shall be entitled to enforce all of Landlord's rights and remedies under this Lease, including the right to recover the rent as it becomes due hereunder.

c. Pursue any other remedy now or hereafter available to Landlord under the laws or judicial decision of the State in which the Premises are located.

24. EMINENT DOMAIN. If more than twenty-five percent (25%) of the Premises shall be taken or appropriated by any public or quasi-public authority under the power of eminent domain, either party hereto shall have the right, at its option, to terminate this Lease, and Landlord shall be entitled to any and all income, rent, award, or any interest therein whatsoever which may be paid or made in connection with such public or quasi-public use or purpose, and Tenant shall have no claim against Landlord for the value of any unexpired term of this Lease. If either less than or more than twenty-five percent (25%) of the Premises is taken, and neither party elects to terminate as herein provided, the rental thereafter to be paid shall be equitable reduced. If any part of the Building other than the Premises may be so taken or apportioned, Landlord shall have the right, at its option to terminate this Lease and shall be entitled to the entire award as above provided.

25. ESTOPPEL CERTIFICATE. Tenant shall at any time and from time to time upon not less than ten (10) days' prior written notice from Landlord, execute, acknowledge, and deliver to Landlord a statement in writing, (a) certifying that this Lease is unmodified and full force and effect (or, if modified, stating the nature of such modification and certifying that this Lease as so modified, is in full force and effect), and the date to which the rental and other charges are paid in advance, if any, and (b) acknowledging that there are not, to Tenant's knowledge, any uncured defaults on the part of the Landlord hereunder, or specifying such defaults if any are claimed. Any such statement may be relied upon by any prospective purchaser or encumbrancer of all or any portion of the real property of which the Premises are a part. The failure of Tenant to timely deliver such statement, or a statement specifically setting forth any items which would be exceptions from such certification, shall be conclusive evidence that Tenant has certified to the matters set forth herein.

26. AUTHORITY OF PARTIES.

a. Corporate Authority. If Tenant is a corporation, each individual executing this Lease on behalf of said corporation represents and warrants that he is duly authorized to execute and deliver this Lease on behalf of the corporation, in accordance with a duly adopted resolution of the board of directors of said corporation or in accordance with the by-laws of said corporation, and that this Lease is binding upon said corporation in accordance with its terms.

b. Limited Partnerships. If the Landlord herein is a limited partnership, it is understood and agreed that any claims by Tenant on Landlord shall be limited to the assets of the limited partnership, and furthermore, Tenant expressly waives any and all rights to proceed against the individual partners or the officers, directors or shareholders of any corporate partner, except to the extent of their interest in said limited partnership.

27. GENERAL PROVISIONS.

a. Plats and Riders. Clauses, plats and riders, if any, signed by the Landlord and the Tenant endorsed on or affixed to this Lease are a part hereof.

b. Waiver. The waiver by Landlord of any term, covenant, or condition herein contained shall not be deemed to be a waiver of such term, covenant or condition or any subsequent breach of the same or any other term, covenant or condition herein contained. The subsequent acceptance of rent hereunder by Landlord shall not be deemed to be a waiver of any preceding breach by Tenant of any term, covenant or condition of this Lease, other than the failure of the Tenant to pay the particular rental so accepted, regardless of Landlord's knowledge of such preceding breach at the time of the acceptance of such rent.

c. Notices. All notices and demands which may or are to be required or permitted to be given by either party to the other hereunder shall be in writing. All notices and demands by the Landlord to the Tenant shall be sent by United States Mail, postage prepaid, addressed to the Tenant at the Premises, or to such other place as Tenant may from time to time designate in a notice to the Landlord. All notices and demands by the Tenant to the Landlord shall be sent by United States Mail, postage prepaid, addressed to the Landlord at the Office of the Building, or to such other person or place as the Landlord may from time to time designate in a notice to the Tenant.

d. Joint Obligation. If there be more than one Tenant, the obligations hereunder imposed upon Tenants shall be joint and several.

e. Marginal Headings. The original headings and Article titles to the Articles of this Lease are not a part of this Lease and shall have no effect upon the construction or interpretation of any part hereof.

f. Time. Time is of the essence of this Lease and each and all of its provisions in which performance is a factor.

g. Recordation. Neither the Landlord nor Tenant shall record this Lease or a short form memorandum hereof without the prior written consent of the other party.

h. Quiet Possession. Upon Tenant paying the rent reserved hereunder and observing and performing all of the covenants, conditions and provisions on Tenant's part to be observed and performed hereunder, Tenant shall have quiet possession of the Premises for the entire term hereof, subject to all the provisions of this Lease.

i. Late Charges. Tenant hereby acknowledges that late payment by Tenant to Landlord of rent or other sums due hereunder will cause Landlord to incur costs not contemplated by this Lease, the exact amount of which will be extremely difficult to ascertain. Such costs include, but are not limited to, processing and accounting charges, and late charges which may be imposed upon Landlord by terms of any mortgage or trust deed covering the Premises. Accordingly, if any installment of rent or of a sum due from Tenant shall not be received by Landlord or Landlord's designee within ten (10) days after written notice that said amount is past due, then Tenant shall pay to Landlord a late charge equal to ten percent (10%) of such overdue amount. The parties hereby agree that such late charges represent a fair and reasonable estimate of the cost that Landlord will incur by reason of the late payment by Tenant. Acceptance of such late charges by the Landlord shall, in no event, constitute a waiver of Tenant's default with respect to such overdue amount, nor prevent Landlord from exercising any of the other rights and remedies granted hereunder.

j. Prior Agreements. This Lease contains all of the agreements of the parties hereto with respect to any matter covered or mentioned in this Lease, and no prior agreements or understanding pertaining to any such matters shall be effective for any purpose. No provision of this may be amended or added to except by an agreement in writing signed by the parties hereto or their respective successors in interest. This Lease shall not be effective or binding on any party until fully executed by both parties hereto.

k. Attorney's Fees. In the event of any action or proceeding brought by either party against the other under this Lease, the prevailing party shall be entitled to recover all costs and expenses including the fees of its attorney in such action or proceeding in such amount as the court may adjudge reasonable as attorney's fees.

l. Sales of Premises by Landlord. In the event of any sale of the building, Landlord shall be and is hereby entirely freed and relieved of, all liability under any and all of its covenants and obligations contained in or derived from this Lease arising out of any act, occurrence or omission occurring after the consummation of such sale; and the purchaser, at such sale or any subsequent sale of the Premises shall be deemed, without any further agreement between the parties or their successors in interest or between the parties and any such purchaser, to have assumed and agreed to carry out any and all of the covenants and obligations of the Landlord under this Lease.

m. Subordination Attornment. Upon request of the Landlord, Tenant will, in writing, subordinate its rights hereunder to the lien of any first mortgage or first deed of trust to any bank, insurance company or other lending institution, now or hereafter in force against the land and Building of which the Premises are a part, and upon any building hereafter placed upon the land of which the Premises are a part, and to all advances made or hereafter to be made upon the security thereof.

In the event any proceedings are brought for foreclosure or in the event of the exercises of the power of sale under any mortgage or deed of trust made by the Landlord covering the Premises, the Tenant shall attorn to the purchaser upon any such foreclosure of sale and recognize such purchases as the Landlord under this Lease.

The provisions of this Article to the contrary notwithstanding, and so long as Tenant is not in default hereunder, this Lease shall remain in full force and effect for the full term hereof.

n. Name. Tenant shall not use the name of the Building or of the development in which the Building is situated for any purpose other than as an address of the business to be conducted by the Tenant in the Premises.

o. Separability. Any provision of the Lease which shall prove to be invalid, void or illegal shall in no way affect, impair or invalidate any other provision hereof and such other provision shall remain in full force and effect.

p. Cumulative Remedies. No remedy or election hereunder shall be deemed exclusive but shall, wherever possible, be cumulative with all other remedies at law or in equity.

q. Choice of Law. This Lease shall be governed by the laws of the State in which the Premises are located.

r. Signs and Auctions. Tenant shall not place any sign upon the Premises or Building or conduct any auction thereon without Landlord's prior written consent.

28. BROKERS. Tenant warrants that it has had no dealings with any real estate brokers or agents in connection with the negotiation of this Lease, and it knows or no other real estate broker or agent who is entitled to a commission in connection with this Lease.

29. LIEN OF LANDLORD. Tenant hereby grants to the Landlord a lien upon all the furniture, fixtures, equipment, or other property belonging to the Tenant located on or within the leased premises at any time during the Lease term, to secure the

performance of the Tenant's obligations under this Lease, said lien to be prior to any other lien on such property except a lien in favor of the seller of such property to secure the unpaid purchase price thereof. This Landlord's lien may be foreclosed in the same manner as a security agreement, and the filing of this Lease or a memorandum thereof, or a financing statement in the security interest records of Boulder County, Colorado, shall constitute full lawful notice of this lien. If the Landlord also has a lien on such property, or any portion thereof, by virtue of any other instrument, or by operation of law, the lien under this Lease shall be in addition thereto, and the Landlord shall have alternate remedies at his option.

The parties hereto have executed this Lease at the place and on the dates specified immediately adjacent to their respective signatures.

If this Lease has been filled in, it has been prepared for submission to your attorney for his approval. No representation or recommendation is made by the real estate broker or its agents or employees as to the legal sufficiency, legal effect, or tax consequences of this Lease, or the transactions relating thereto.

LANDLORD:

ASPEN INDUSTRIAL PARK
PARTNERSHIP, a Colorado
limited partnership

TENANT:

MKS INSTRUMENTS, INC.

By: _____
William D. Stewart III,
General Partner

By: _____
Robert F. O'Brien
Treasurer

EXHIBIT "A"

Lots 2 and 3, Aspen Industrial Park, A subdivision in the City and County of Boulder, State of Colorado.

THIS LEASE EXTENSION AGREEMENT is between Aspen Industrial Park Partnership, a Colorado limited partnership ("Landlord") and HPS, DIVISION OF MKS INDUSTRIES, INC. ("Tenant").

30. Premises

a. Lease Agreement. Landlord and Tenant entered into a lease agreement for Lots 2 and 3, Aspen Industrial Park, a subdivision in the City and County of Boulder, State of Colorado, commonly known as 5330 Sterling Drive, Boulder, Colorado, dated October 12, 1989 for a term of five years commencing on November 1, 1989 (the "Lease Agreement").

b. Term of Lease. Landlord and Tenant desire to extend the Lease Agreement on the same terms and conditions for a period of four (4) additional years commencing on November 1, 1994 (the "Extended Term") and to agree on the rent for the period of the Extended Term.

31. Extended Term and Rent

a. Lease Extension. Landlord and Tenant hereby agree to extend the Lease Agreement for a period of four years commencing November 1, 1994 under all of the same terms and conditions as set forth in the Lease Agreement except for the rent adjustment set forth in paragraph 2.2 below.

b. Minimum Rent. The minimum rent for the full four-year Extended Term of the Lease Agreement shall be One Million Three Hundred Sixty-Six Thousand One Hundred Nineteen and 84/100 Dollars (\$1,366,119.84) payable in equal monthly installments of Twenty-Eight Thousand Four Hundred Sixty and 83/100 Dollars (\$28,460.83).

32. Confirmation of Lease Agreement

a. Except as specifically modified in Article II above, Landlord and Tenant hereby ratify and confirm all of the terms and conditions of the Lease Agreement and agree that all such terms and conditions shall be in full force and effect in their entirety during the Extended Term.

Dated this 14th day of October, 1994

LANDLORD:

TENANT:

ASPEN INDUSTRIAL PARK PARTNERSHIP,
a Colorado limited partnership

MKS INSTRUMENTS, INC.

By: /s/ William D. Stewart III

By: /s/ Robert F. O'Brien

William D. Stewart, III
General Partner

Robert F. O'Brien
Treasurer

LOAN AGREEMENT

This Loan Agreement (the "Agreement") is entered into as of the day of November, 1993, by and between The First National Bank of Boston ("Lender") and MKS Instruments, Inc., a Massachusetts corporation ("Borrower").

PREMISES:

WHEREAS, the Borrower has requested that the Lender make loans to it; and

WHEREAS, the Lender is willing to lend funds to the Borrower on the terms and conditions hereinafter set forth;

NOW, THEREFORE, in consideration of the premises and for other good and valuable consideration, the adequacy and receipt of which are hereby acknowledged, the parties hereby agree as follows:

ARTICLE I

DEFINITIONS

1.1 Definitions. In addition to terms defined elsewhere in this Agreement, the following terms shall have the meanings indicated, which meanings shall be equally applicable to both the singular and plural forms of such terms:

1.1.1. "Advance" shall mean the drawing down by the Borrower of a Base Rate Loan, a LIBOR Loan or a Money Market Rate Loan on any given Advance Date.

1.1.2. "Advance Date" shall mean the date as of which an Advance is consummated.

1.1.3. "Affiliate" of any Person shall mean any other Person which, directly or indirectly, controls, or is controlled by, or is under common control with, such Person. For purposes of this definition, "control" of any Person shall mean the power, directly or indirectly, either to (i) vote 10% or more of the securities having ordinary voting power for the election of directors of such Person or (ii) direct the management and policies of such Person, whether by contract or otherwise. As to the Borrower, the term "Affiliate" shall include, without limitation, any partnership or joint venture of which the Borrower or any Affiliate of the Borrower is a general partner or is a limited partner with more than a ten percent (10%) interest, and any director or executive officer of the Borrower.

1.1.4. "Base Rate" shall mean the rate of interest announced by the Lender at its head office from time to time as its "Base Rate".

1.1.5. "Base Rate Loan" shall mean an Advance that is specified as such in the Notice of Borrowing with respect to such Advance and that bears interest as provided in Section 2.4.1 or a portion of the Term Loan as to which the Borrower elects to pay interest at the Base Rate as provided in Section 3.2.

1.1.6. "Borrowing" shall mean the incurrence of one or more Advances on a given date.

1.1.7. "Business Day" shall mean a day on which commercial banks are required to be open for business in Boston, Massachusetts.

1.1.8. "Cash Flow Ratio" shall have the meaning set forth in Section 8.7(c).

1.1.9. "Closing Date" shall mean the date of this Agreement.

1.1.10. "Compliance Certificate" shall have the meaning set forth in Section 7.1(c).

1.1.11. "Consolidated Debt Service" shall mean for any period the sum (without duplication) of Interest Expense, the interest portion of Financing Lease Obligations and required principal payments on long-term debt of the Borrower and its Subsidiaries, determined on a consolidated basis.

1.1.12. "Consolidated Indebtedness" shall mean the Indebtedness of the Borrower and its Subsidiaries, determined on a consolidated basis.

1.1.13. "Consolidated Net Income" shall mean for any period the net income (or loss) for such period (before extraordinary items and excluding the net income of any business entity that is not a Subsidiary in which the Borrower or one of its Subsidiaries has an ownership interest unless such net income shall have actually been received by such company in the form of cash distributions) of the Borrower and its Subsidiaries after deducting all operating expenses, depreciation and amortization, Interest Expense, the interest portion of Financing Lease Obligations, all taxes in respect of income and profits paid or payable (including accrued Sub S distributions required to make shareholder tax payments) and all other proper deductions, all determined on a consolidated basis.

1.1.14. "Consolidated Operating Cash Flow" shall mean for any period, the net income (or loss) for such period (before extraordinary items and excluding the net income of any business entity that is not a Subsidiary in which the Borrower or one of its Subsidiaries has an ownership interest unless such net income shall have actually been received by such company in the form of cash distributions) of the

Borrower and its Subsidiaries before deducting Interest Expense and taxes and after restoring thereto depreciation of real and personal property and leasehold improvements and amortization and after deducting cash taxes paid, Sub S distributions required to make shareholder tax payments, and capital expenditures incurred.

1.1.15. "Consolidated Tangible Net Worth" shall mean, at any time, net stockholders' equity of the Borrower and its Subsidiaries determined in accordance with generally accepted accounting principles including the book amount of all minority interests in MKS International, Inc. but excluding the book amount of all minority interests in other Affiliates and any foreign exchange translation adjustment, with no upward adjustments due to a reevaluation of assets (other than any such upward adjustment as may be required under generally accepted accounting principles in connection with the acquisition by the Borrower or any Subsidiary of another company or entity) minus the following items (without duplication of deductions) appearing on the balance sheet of the Borrower and its Subsidiaries:

(a) the book amount of all assets (including, without limitation, goodwill, patents, trademarks, copyrights, organizational expense and unamortized debt discount) that would be treated as intangibles under generally accepted accounting principles;

(b) treasury stock; and

(c) any write-up in the book amount of any asset or Investment subsequent to the Closing Date, resulting from a reevaluation or reappraisal thereof from the amount entered in accordance with generally accepted accounting principles by the Borrower or any Subsidiary on its books with respect to its acquisition of the asset or Investment.

1.1.16. "Costs" shall have the meaning set forth in Section 10.4.

1.1.17. "Debt-to-Net Worth Ratio" shall have the meaning set forth in Section 8.7(b).

1.1.18. "Default" shall mean any event that, with the lapse of time, the giving of notice, or both, would become an Event of Default hereunder.

1.1.19. "Event of Default" shall have the meaning set forth in Section 9.1 hereof.

1.1.20. "Financing Lease" shall mean any lease of the Borrower or a Subsidiary, as lessee, that is shown or is required to be shown in accordance with

generally accepted accounting principles as a liability on the balance sheet of the lessee thereunder.

1.1.21. "Financing Lease Obligation" shall mean for any period the monetary obligation of the lessee under a Financing Lease. The amount of a Financing Lease Obligation at any date is the amount at which the lessee's liability under the Financing Lease would be required to be shown on its balance sheet at such date.

1.1.22. "Hazardous Substances" shall mean any hazardous waste, as defined by 42 U.S.C. Section 6903(5), any hazardous substances, as defined by 42 U.S.C. Section 9601(14), any pollutant or contaminant, as defined by 42 U.S.C. Section 9601(33), or any toxic substance, oil or hazardous materials or other chemicals or substances regulated by any laws or regulations relating to the discharge of air pollutants, water pollutants, or processed wastewater.

1.1.23. "Indebtedness" shall mean, for any Person, (a) all obligations of such Person that in accordance with generally accepted accounting principles would be reflected on the balance sheet of such Person as a liability, (b) all obligations of any other Person the payment or collection of which such Person has guaranteed (except by reason of endorsement for collection in the ordinary course of business) or in respect of which such Person is liable, contingently or otherwise, including, without limitation, liable by way of agreement to purchase, to provide funds for payment, to supply funds to or otherwise to invest in such other Person, or otherwise to assure a creditor against loss, (c) all obligations of any other Person for borrowed money or for the deferred purchase price of property or services secured by (or for which the holder of such indebtedness has an existing right, contingent or otherwise, to be secured by) any mortgage, or other encumbrance upon or in property (including, without limitation, accounts and contract rights) owned by such Person, whether or not such Person has assumed or become liable for the payment of such indebtedness or obligations, and (d) Financing Lease Obligations of such Person.

1.1.24. "Interest Expense" shall mean for any period the aggregate amount of interest recorded, in accordance with generally accepted accounting principles, on the financial statements for that period by the Borrower and its Subsidiaries in respect of Consolidated Indebtedness incurred for borrowed money.

1.1.25. "Interest Period" shall mean the period designated by the Borrower as such in the Notice of Borrowing with respect to any LIBOR Loan or Money Market Rate Loan pursuant to and subject to the limitations set forth in Section 2.5 or in the Interest Rate Change Notice for any portion of the Term Loan pursuant to and subject to the limitations set forth in Section 3.2.

1.1.26. "Interest Rate Change Notice" shall have the meaning set forth in Section 3.2.

1.1.27. "Interest Rate Determination Date" shall mean the third Business Day prior to the first day of the related Interest Period for a LIBOR Loan and the first day of the related Interest Period for a Money Market Rate Loan or the determination of the Long Term Funds Rate.

1.1.28. "Interim Maturity Date" shall mean the last day of any Interest Period.

1.1.29. "Investments" shall have the meaning set forth in Section 8.4.

1.1.30. "LIBOR Loan" shall mean an Advance that is specified as such in the Notice of Borrowing with respect to such Advance and that bears interest at the rate provided in Section 2.4.2. or a portion of the Term Loan as to which the Borrower elects to pay interest using the LIBOR Rate as provided in Section 3.2.

1.1.31. "LIBOR Rate" shall mean for any Interest Rate Determination Date, the rate obtained by dividing (i) the quotation offered by the Lender in the interbank Eurodollar market for U.S. dollar deposits of amounts in immediately available funds comparable to the principal amount of the LIBOR Loan or the portion of the Term Loan for which the LIBOR Rate is being determined with a maturity comparable to the Interest Period for which such LIBOR Rate will apply as of approximately noon (Boston time) three Business Days prior to the commencement of such Interest Period by (ii) a percentage equal to 100% minus the stated maximum rate of all reserves required to be maintained against "Eurocurrency liabilities" as specified in Regulation D (or against any other category of liabilities that includes deposits by reference to which the interest rate on LIBOR Loans is determined) as applicable on such date to any member bank of the Federal Reserve System.

1.1.32. "Licenses" shall have the meaning set forth in Section 5.8.

1.1.33. "Lien" shall mean any interest in property securing an obligation owed to, or a claim by, a Person other than the owner of the property, whether the interest is based on common law, statute or contract (including the security interest lien arising from a mortgage, encumbrance, pledge, conditional sale or trust receipt or a lease, consignment or bailment for security purposes). For the purposes of this Agreement, the Borrower or a Subsidiary shall be deemed to be the owner of any property that it has acquired or holds subject to a Financing Lease or a conditional sale agreement or other arrangement pursuant to which title to the property has been retained by or vested in some other Person for security purposes, and such retention or vesting shall be deemed to be a Lien.

1.1.34. "Loan Documents" shall mean each of this Agreement, the Notes, the Mortgage and any other document or instrument executed by the Borrower in favor of the Lender in connection with the transactions contemplated hereby.

1.1.35. "Long Term Funds Loan" shall mean the portion of the Term Loan as to which the Borrower elects to pay interest using the Long Term Funds Rate as provided in Section 3.2.

1.1.36. "Long Term Funds Rate" shall mean for any Interest Rate Determination Date, the rate of interest quoted by the Lender in Boston on such date in its sole discretion (it being understood that the Lender is under no obligation to quote such rates) to the Borrower as the fixed rate of interest at which it is willing to make a Long Term Funds Loan in the amount equal to the portion of the Term Loan for which this rate is requested by the Borrower with a maturity equal to the Interest Period requested.

1.1.37. "Money Market Rate" shall mean for any Interest Rate Determination Date, the rate of interest quoted by the Lender in Boston on such date in its sole discretion (it being understood that the Lender is under no obligation to quote such rates) to the Borrower as the fixed rate of interest at which it is willing to make a Money Market Rate Loan in the amount and for the Interest Period requested by the Borrower.

1.1.38. "Money Market Rate Loan" shall mean an Advance that is specified as such in the Notice of Borrowing with respect to such Advance and that bears interest at the rate provided in Section 2.4.3 hereof.

1.1.39. "Notes" shall mean the Revolving Credit Note and the Term Note.

1.1.40. "Mortgage" shall have the meaning set forth in Section 6.2.

1.1.41. "Notice of Borrowing" shall have the meaning set forth in Section 2.2.1.

1.1.42. "Obligations" shall mean, without limitation, any and all liabilities, debts, and obligations of the Borrower to the Lender, of each and every kind, nature and description, under this Agreement, any other Loan Document, the Foreign Exchange Agreement, and any interest rate swap agreement, whether now existing or hereafter incurred. "Obligations" also means, without limitation, any and all obligations of the Borrower to act or to refrain from acting in accordance with the terms, provisions and covenants of this Agreement or of any other Loan Document.

1.1.43. "Permitted Liens" shall have the meaning set forth in Section 8.2.

1.1.44. "Person" shall mean any natural person, corporation, unincorporated organization, trust, joint-stock company, joint venture, association, company, partnership or government, or any agency or political subdivision of any government.

1.1.45. "Property" shall have the meaning set forth in Section 6.2(f).

1.1.46. "Revolver Termination Date" shall mean June 30, 1994 or any subsequent anniversary thereof if the Revolving Credit Loan shall have been renewed by the Lender.

1.1.47. "Revolving Credit Loan" shall mean the demand discretionary revolving credit loan in an amount up to the amount of \$7,000,000 extended or to be extended by the Lender to the Borrower on the terms and conditions set forth herein.

1.1.48. "Revolving Credit Note" shall have the meaning set forth in Section 2.3.

1.1.49. "Revolving Loan Account" shall mean the account on the books of the Lender in the name of the Borrower in which the following shall be recorded: Advances made by the Lender to and for the account of the Borrower pursuant to Section 2 of this Agreement; all other charges, expenses and other items properly chargeable to the Borrower with respect to such Advances; all Costs with respect to such Advances; all payments made by the Borrower on account of indebtedness evidenced by the Revolving Credit Note; and other appropriate debits and credits.

1.1.50. "Subsidiary" shall mean any Person of which the Borrower at the time owns, directly or indirectly, through another Subsidiary or otherwise, 50% or more of the equity interests.

1.1.51. "Term Loan" shall have the meaning set forth in Section 3.1.

1.1.52. "Term Loan Maturity Date" shall mean the seventh anniversary of the date of this Agreement.

1.1.53. "Term Note" shall have the meaning set forth in Section 3.1.

1.1.54. "Term Loan Account" shall mean the account on the books of the Lender in the name of the Borrower in which the following shall be recorded: the principal outstanding and interest accrued under the Term Loan; all Costs with

respect to the Term Loan; all payments made by the Borrower on account of indebtedness evidenced by the Term Note; and other appropriate debits and credits.

1.2 Accounting Terms. Accounting terms not specifically defined in this Agreement shall have the meanings given to them under generally accepted accounting principles.

1.3 Other Definitional Provisions. The words "hereof," "herein" and "hereunder," and words of similar import when used in this Agreement shall refer to this Agreement as a whole and not any particular provision of this Agreement. Any Article, Section, Exhibit or Schedule references are to this Agreement unless otherwise specified.

ARTICLE II

REVOLVING CREDIT LOAN

2.1 Revolving Credit. Subject to the terms and conditions of this Agreement, the Lender hereby agrees to make Advances from time to time to the Borrower during the period from the date hereof to the Revolver Termination Date (or such earlier date on which the Lender shall have demanded payment of the Revolving Credit Note) in an aggregate outstanding amount not to exceed at any time \$7,000,000. The Lender shall have the absolute discretion to make such Advances as it deems appropriate and to demand re-payment of Advances at any time. Each Advance shall, at the option of the Borrower, be a Base Rate Loan, a LIBOR Loan or a Money Market Rate Loan provided, however, that no LIBOR Loan or Money Market Rate Loan shall be made at any time in a principal amount of less than \$1,000,000.

2.2 Notice of Borrowing.

2.2.1. Whenever the Borrower desires to obtain a LIBOR Loan or a Money Market Rate Loan hereunder, it may request that the Lender provide quotes as of any specified Interest Rate Determination Date as to the LIBOR Rate and/or the Money Market Rate for any or all Interest Periods, and the Lender shall promptly provide such quotes. The Borrower shall give the Lender prior telecopied or telephone notice (given not later than 10:00 a.m. (Boston time)) on the day of any Borrowing with respect to a Base Rate Loan or a Money Market Rate Loan and at least three Business Days prior to, the day of any Borrowing with respect to a LIBOR Loan. Each such notice (each a "Notice of Borrowing") shall specify the principal amount of each Advance to be made, the date of the Borrowing (which shall be a Business Day), whether each Advance being made is to be initially maintained as a Base Rate Loan, a LIBOR Loan or a Money Market Rate Loan and, in the case of a LIBOR Loan or Money Market Rate Loan, the initial Interest Period applicable

thereto. If such notice is given by telephone, it shall be immediately confirmed in writing. No more than one Base Rate Loan shall be outstanding at any time, but the Borrower may increase the principal amount of any Base Rate Loan at any time by giving a Notice of Borrowing as set forth above.

2.2.2. Upon the Interim Maturity Date of any LIBOR Loan or Money Market Rate Loan, unless the Borrower (i) shall have given the Lender a Notice of Borrowing in accordance with Section 2.2.1 requesting that a new LIBOR Loan or Money Market Rate Loan be made on such Interim Maturity Date or (ii) shall have repaid such LIBOR Loan or Money Market Rate Loan on such Interim Maturity Date, the Borrower shall be deemed to have requested that the Lender make a Base Rate Loan to the Borrower on such Interim Maturity Date in an aggregate principal amount equal to the aggregate principal amount of the LIBOR Loan or Money Market Rate Loan maturing on such Interim Maturity Date.

2.3 Revolving Loan Account. The Advances made by the Lender from time to time to the Borrower under this Agreement shall be evidenced by the Revolving Credit Note in the form of Exhibit A hereto (the "Revolving Credit Note"). The Advances and the amounts of all payments on the Revolving Credit Note shall be recorded by the Lender in the Revolving Loan Account of the Borrower. The debit balance of the Revolving Loan Account shall represent the amount of the Borrower's indebtedness to the Lender from time to time by reason of Advances and other appropriate charges hereunder. All statements regarding the Revolving Loan Account shall be deemed to be accurate absent manifest error or unless objected to by the Borrower within 30 days after receipt. The Borrower agrees to review each such statement promptly after receipt and to bring any errors or discrepancies to the Lender's attention promptly.

2.4 Interest.

2.4.1. The Borrower agrees to pay interest in respect of the unpaid principal amount of each Base Rate Loan from the date the proceeds thereof are made available to the Borrower until maturity (whether by acceleration, voluntary prepayment or otherwise) at a rate per annum that shall be the Base Rate in effect from time to time.

2.4.2. The Borrower agrees to pay interest in respect of the unpaid principal amount of each LIBOR Loan from the date the proceeds thereof are made available to the Borrower until maturity (whether by acceleration, voluntary prepayment or otherwise) at a rate per annum equal to the LIBOR Rate plus 1.25%.

2.4.3. The Borrower agrees to pay interest in respect of the unpaid principal amount of each Money Market Rate Loan from the date the proceeds thereof are made available to the Borrower until maturity (whether by acceleration,

voluntary prepayment or otherwise) at a rate per annum equal to the Money Market Rate.

2.4.4. Overdue principal and (to the extent permitted by law) overdue interest in respect of each Base Rate Loan, each LIBOR Loan and each Money Market Rate Loan (to the extent not converted into a Base Rate Loan) shall bear interest, payable on demand, after as well as before judgment, at a rate per annum equal to the Base Rate in effect from time to time plus 3% per annum.

2.4.5. Interest shall accrue from and including the date of any Advance and shall be payable by the Borrower monthly in arrears on the last day of each month and on any prepayment (on the amount prepaid), at maturity (whether by acceleration, voluntary prepayment or otherwise), and after such maturity, on demand. Interest shall be calculated on the basis of actual days elapsed and a 360-day year.

2.5 Interest Periods. At the time it gives any Notice of Borrowing with respect to a LIBOR Loan or a Money Market Rate Loan, the Borrower shall elect the Interest Period applicable to the related Advance, which Interest Period shall, at the option of the Borrower, be a period of 30, 60, 90, 120, 150 or 180 days (as to a LIBOR Loan) or any period up to 90 days (as to a Money Market Rate Loan). Notwithstanding anything to the contrary contained herein:

(i) if any Interest Period begins on a day for which there is no numerically corresponding day in the calendar month at the end of such Interest Period, such Interest Period shall end on the last Business Day of such calendar month;

(ii) if any Interest Period would otherwise expire on a day that is not a Business Day, such Interest Period shall expire on the next succeeding Business Day; provided that if any Interest Period would otherwise expire on the day that is not a Business Day but is a day of the month after which no further Business Day occurs in such month, such Interest Period shall expire on the next preceding Business Day;

(iii) no Interest Period shall extend beyond the Revolver Termination Date.

2.6 Termination of Existing Loans. On the Closing Date the letter agreement between the Borrower and the Lender dated as of July 15, 1992, as amended, shall terminate and be of no further force and effect.

ARTICLE III

TERM LOAN

3.1 Refinancing. The Lender shall refinance its existing loans to the Borrower evidenced by Floating Rate Mortgage Notes dated May 20, 1987, January 6, 1988 and January 30, 1989, under which a total of \$9,550,090.75 in principal plus accrued but unpaid interest is currently outstanding by converting such Loans into a seven-year term loan (the "Term Loan") in the principal amount of \$10,000,000. The Lender shall advance the difference between \$10,000,000 and \$9,432,124.08 to the Borrower on the Closing Date. The Term Loan shall be evidenced by a term note (the "Term Note") payable to the Bank in the form of Exhibit B hereto. Amortization of the Term Note shall be calculated on the basis of a 15-year schedule of level monthly payments of principal with the entire unpaid principal balance and all accrued and unpaid interest absolutely due and payable on the Maturity Date.

3.2 Interest.

3.2.1. The Borrower agrees to pay interest in respect of the unpaid principal amount of the Term Loan from the date of this Agreement until paid in full as follows. The Term Loan shall bear interest at the Base Rate unless the Borrower desires to pay interest on all or a portion of the Term Loan at one of the following rates:

(i) During any period in which the Borrower maintains a Cash Flow Ratio in excess of 1.35 to 1 and a Debt-to-Net Worth Ratio not in excess of 1.35 to 1:

- (a) the LIBOR Rate Plus 1.75% or
- (b) the Long Term Funds Rate plus 1.75%.

(ii) During any period in which the Borrower maintains a Cash Flow Ratio of 1.35 to 1 or less or a Debt-to-Net Worth Ratio of 1.35 to 1 or more:

- (a) the LIBOR Rate plus 2.10% or
- (b) the Long Term Funds Rate plus 2.10%.

3.2.2. Whenever the Borrower desires to obtain an interest rate other than the Base Rate, it may request that the Lender provide quotes as of any specified Interest Rate Determination Date as to the LIBOR Rate and/or the Long Term Funds

Rate for any or all Interest Periods, and the Lender shall promptly provide such quotes. The Borrower shall give the Lender prior telecopied or telephone notice (given not later than 10:00 a.m. (Boston time)) on the day the Interest Period is to begin with respect to use of the Long Term Funds Rate and at least three Business Days prior to the day the Interest Period is to begin with respect to use of the LIBOR Rate. Each such notice (each an "Interest Rate Change Notice") shall specify the desired interest rate, the amount of the Term Loan to which such interest rate shall apply and the initial Interest Period applicable thereto. If such notice is given by telephone, it shall be immediately confirmed in writing.

3.2.3. Upon the Interim Maturity Date of any LIBOR Loan or Long Term Funds Loan, unless the Borrower shall have given the Lender an Interest Rate Change Notice in accordance with Section 3.2.2 requesting a new LIBOR Loan or Long Term Funds Loan be made on such Interim Maturity Date, the Borrower shall be deemed to have elected to pay interest on such amount of the Term Loan at the Base Rate.

3.2.4. At the time the Borrower gives any Interest Rate Change Notice, the Borrower shall elect the Interest Period for which the interest rate elected shall apply, which Interest Period shall, at the option of the Borrower, be a period of 30, 60, 90, 120, 150 or 180 days (as to a LIBOR Loan) or any period (as to a Long Term Funds Loan). Notwithstanding anything to the contrary contained herein, the provisions set forth in subparagraphs (i) - (iii) of Section 2.5 shall apply to the determination of an Interest Period.

3.3 Term Loan Account. The principal and the amounts of all payments on the Term Note shall be recorded by the Lender in the Term Loan Account of the Borrower. All statements regarding the Term Loan Account shall be deemed to be accurate absent manifest error or unless objected to by the Borrower within 30 days after receipt. The Borrower agrees to review each such statement promptly after receipt and to bring any errors or discrepancies to the Lender's attention promptly.

ARTICLE IV

ADDITIONAL TERMS

4.1 Payments.

4.1.1. The Borrower shall have the right to prepay the Notes, in whole at any time or in part from time to time, without premium or penalty, provided that, no Money Market Loan may be prepaid and, except as set forth in Section 4.3, no other Advance, either in whole or in part, may be prepaid on the Advance Date of such Advance and no portion of the Term Loan may be prepaid on the first day of an Interest Period with respect thereto. The Borrower shall give notice (by telex or

telecopier, or by telephone (confirmed in writing promptly thereafter)) to the Lender of each proposed pre-payment hereunder prior to 10:00 a.m. (Boston time), (x) with respect to Base Rate Loans and Long Term Funds Loans, upon the Business Day of the proposed prepayment and (y) with respect to LIBOR Loans, at least three Business Days prior to the Business Day of the proposed prepayment, which notice in each case shall specify the proposed prepayment date (which shall be a Business Day), the aggregate principal amount of the proposed prepayment and which Advances or portions of the Term Loan, as the case may be, are to be prepaid. LIBOR Loans and Long Term Funds Loans that are voluntarily prepaid before the last day of the applicable Interest Period shall be subject to the additional compensation requirements set forth in Sections 4.3 and 4.4, and each prepayment of a LIBOR Loan or a Long Term Funds Loan shall be in an aggregate principal amount of not less than the total principal amount outstanding at such time under such Loan. If at any time the outstanding principal amount of the Advances exceeds \$7,000,000, the Borrower will immediately prepay the Advances by the amount of such excess.

4.1.2. All payments of principal and interest due under the Notes (including prepayments), and any other amounts owing to the Lender under this Agreement shall be made by the Borrower not later than 3:00 p.m., Boston time, on the day due in lawful money of the United States of America to the Lender at its Boston, Massachusetts office in immediately available funds. The Borrower hereby authorizes the Lender to charge such payments as they become due, if not otherwise paid by the Borrower, to any account of the Borrower with the Lender as the Lender may elect.

4.1.3. Whenever any payment to be made hereunder or under any other Loan Document shall be stated to be due on a day that is not a Business Day, such payment may be made on the next succeeding Business Day, and such extension of time shall in such case be included in computing interest or other fees or charges provided for under this Agreement or any other Loan Document; provided, however, that with respect to LIBOR Loans, if the next succeeding Business Day falls in another calendar month, such payment shall be made on the next preceding Business Day.

4.1.4. All payments made by the Borrower on each Note shall be applied by the Lender (a) first, to the payment of Costs with respect to such Note, (b) second, to the payment of accrued and unpaid interest on such Note, in such order as the Borrower shall direct, until all such accrued interest has been paid, and (c) third, to the payment of the unpaid principal amount of such Note in such order as the Borrower shall direct.

4.2 Capital Adequacy.

4.2.1. If, after the date of this Agreement, the Lender shall have reasonably determined in good faith that the adoption or effectiveness after the date

hereof of any applicable law, rule or regulation regarding capital adequacy, or any change therein, or any change in the interpretation or administration thereof by any governmental authority, central bank or comparable agency charged with the interpretation or administration thereof, or compliance by the Lender with any request or directive regarding capital adequacy (whether or not having the force of law) of any such authority, central bank or comparable agency, has or would have the effect of materially reducing the rate of return on the Lender's capital or assets as a consequence of its commitments or obligations hereunder to a level below that which the Lender could have achieved but for such adoption, effectiveness, change or compliance (taking into consideration the Lender's then current policies with respect to capital adequacy), then from time to time, subject to Section 4.2.2, within 15 days after demand by the Lender the Borrower shall pay to the Lender such additional amount or amounts as will compensate the Lender for such reduction (after the Lender shall have allocated the same fairly and equitably among all of its customers or any class generally affected thereby).

4.2.2. The Lender will notify the Borrower of any event occurring after the date of this Agreement that will entitle the Lender to any additional payment under this Section 4.2 as promptly as practicable and shall be entitled to such payment (a) in the case of a Base Rate Loan, only for costs incurred from and after the date that the Lender gives such notice, and (b) in the case of a Money Market Rate Loan, LIBOR Loan or Long Term Funds Loan, only for costs incurred in connection with Loans made pursuant to a Notice of Borrowing or Interest Rate Change Notice issued after the date that the Lender gives such notice. The Lender will furnish to the Borrower with such notice a certificate signed by an officer thereof certifying that the Lender is entitled to payment under this Section 4.2 and setting forth the basis (in reasonable detail) and the amount of each request by the Lender for any additional payment pursuant to this Section 4.2.

4.3 Special Provisions Governing LIBOR Loans. Notwithstanding any other provisions of this Agreement, the following provisions shall govern with respect to LIBOR Loans as to the matters covered:

4.3.1. Increased Costs, Illegality. etc.

(a) In the event that the Lender shall have determined (which determination shall, if made in good faith and absent manifest error, be final, conclusive and binding upon all parties):

(i) on any Interest Rate Determination Date, that by reason of any changes arising after the date of this Agreement affecting the interbank Eurodollar market, adequate and fair means do not exist for ascertaining the applicable interest rate on the basis provided for in the definition of LIBOR Rate; or

(ii) at any time during any Interest Period, that the Lender shall incur increased costs or reductions in the amounts received or receivable hereunder with respect to a LIBOR Loan by reason of (x) any change since the Interest Rate Determination Date for the Interest Period in question in any applicable law or governmental rule, regulation, guideline or order (or any interpretation thereof and including the introduction of any new law or governmental rule, regulation, guideline or order) (such as, for example but not limited to, a change in official reserve requirements, but excluding reserve requirements that have been included in calculating the LIBOR Rate for such Interest Period) and/or (y) other circumstances affecting the Lender, the interbank Eurodollar market or the position of the Lender in the relevant market; or

(iii) at any time, that the making or continuance of any LIBOR Loan has become unlawful by compliance by the Lender in good faith with any law, governmental rule, regulation, guideline or order, or has become impracticable as a result of a contingency occurring after the date of this Agreement;

then and in any such event, the Lender shall promptly after making such determination give notice (by telephone confirmed in writing) to the Borrower of such determination. Thereafter (x) in the case of clause (i) above, any Notice of Borrowing given by the Borrower with respect to a LIBOR Loan that has not yet been incurred shall be deemed rescinded by the Borrower and LIBOR Loans shall no longer be available until such time as the Lender notifies the Borrower that the circumstances giving rise to such notice no longer exist or that, notwithstanding such circumstances, LIBOR Loans will again be made available hereunder, (y) in the case of clause (ii), the Borrower shall pay to the Lender, upon written demand therefor (but only with respect to any LIBOR Loan made pursuant to a Notice of Borrowing issued after the giving of the written notice that LIBOR Loans will again be made available hereunder referred to in clause (x) above), such additional amounts (in the form of an increased rate of, or a different method of calculating, interest or otherwise as the Lender in its sole discretion shall determine) as shall be required to compensate the tender for such increased cost or reduction in amount received (a written notice as to additional amounts owed the Lender, showing the basis for such calculation thereof, shall be given to the Borrower by the Lender and shall, absent manifest error, be final, conclusive and binding upon the parties hereto), and (z) in the case of clause (iii), the Borrower shall take one of the actions specified in Section 4.3.1(b) as promptly as possible and, in any event, within the time period required by law.

(b) At any time that any LIBOR Loan is affected by the circumstances described in Section 4.3.1(a)(ii) or (iii), the Borrower may (and in the case of a LIBOR

Loan affected pursuant to Section 4.3.1(a)(iii) shall) either (x) if the affected LIBOR Loan is then being made, withdraw the related Notice of Borrowing by giving the Lender telephonic (confirmed in writing) notice thereof on the same date that the Borrower was notified by the Lender pursuant to Section 4.3.1(a), or (y) if the affected LIBOR Loans are then outstanding, upon at least three Business Days' written notice to the Lender, require the Lender to convert each LIBOR Loan so affected into a Base Rate Loan.

4.3.2. Compensation. The Borrower shall compensate the Lender, upon its written request (which request shall set forth the basis for requesting such amounts), for all reasonable losses, expenses and liabilities (including, without limitation, any interest paid by the Lender to lenders of funds borrowed by it to make or carry its LIBOR Loans to the extent not recovered by the Lender in connection with the re-employment of such funds) and any loss sustained by the Lender in connection with the re-employment of the funds (including, without limitation, a return on such re-employment that would result in the Lender's receiving less than it would have received had such LIBOR Loan remained outstanding until the last day of the Interest Period applicable to such LIBOR Loan) that the Lender may sustain: (i) if for any reason (other than a default by or negligence of the Lender) a LIBOR Loan is not advanced on a date specified therefor in a Notice of Borrowing (unless timely withdrawn pursuant to Section 4.3.1(b)(x) above), (ii) if any payment or prepayment of any LIBOR Loans occurs for any reason whatsoever (including, without limitation, by reason of Section 4.3.1(b)) on a date that is prior to the last day of an Interest Period applicable thereto, (iii) if any prepayment of any of its LIBOR Loans is not made on the date specified in a notice of payment given by the Borrower pursuant to Section 4.1 or (iv) as a consequence of an election made by the Borrower pursuant to Section 4.3.1(b)(y).

4.4 Special Provisions Governing Money Market Rate Loans and Long Term Funds Loans. Notwithstanding other provisions of this Agreement, the following provisions shall govern with respect to Money Market Rate Loans and Long Term Funds Loans as to the matters covered:

4.4.1. Costs of Lender. In the event that at any time the Money Market Rate or the Long Term Funds Rate does not reflect the cost to the Lender of the maintenance of reserves in respect of any Money Market Rate Loan or Long Term Funds Loan, as the case may be (including, without limitation, any marginal, emergency, supplemental, special or other reserves but excluding reserves required under Regulation D to the extent included in the computation of such interest rate), then upon delivery of a certificate signed by an officer of the Lender certifying that the Lender is entitled to payment under this Section 4.4.1 and showing the basis in reasonable detail for the Lender's request, the Borrower shall pay to the Lender with respect to any Money Market Rate Loan or Long Term Funds Loan made pursuant to a Notice of Borrowing or Interest Rate Change Notice, as the case may be, issued

after the date of delivery of such certificate additional interest in such amounts as shall be required to compensate the Lender for the additional cost as determined by the Lender with respect to such Money Market Rate Loan or Long Term Funds Loan. A certificate of the Lender as to any amount payable pursuant to this paragraph shall, absent manifest error, be final, conclusive and binding upon all parties hereto.

4.4.2. Compensation. The Borrower shall compensate the Lender, upon written request by the Lender (which request shall set forth the basis for requesting such compensation), for all reasonable losses, expenses and liabilities (including, without limitation, any loss, expense or liability incurred by reason of the liquidation or reemployment of deposits or other funds required by the Lender to fund its Money Market Rate Loans and/or Long Term Funds Loans to the Borrower), which the Lender may sustain with respect to Money Market Rate Loans and/or Long Term Funds Loans to the Borrower: (i) if for any reason (other than a default by the Lender) a borrowing of any Money Market Rate Loan or Long Term Funds Loan does not occur on a date specified therefor in a Notice of Borrowing or Interest Rate Change Notice, as the case may be (whether or not withdrawn by the Borrower or because an Event of Default is then in existence), (ii) if any repayment or conversion of any Money Market Rate Loan or Long Term Funds Loan occurs on a date that is prior to the last day of the Interest Period applicable to that Loan, or (iii) if any prepayment of any Long Term Funds Loan is not made on any date specified in a notice of prepayment given by the Borrower.

ARTICLE V

REPRESENTATIONS AND WARRANTIES OF THE BORROWER

In order to induce the Lender to enter into this Agreement and to make the loans provided for herein, the Borrower makes the following representations and warranties to the Lender, all of which shall survive the execution and delivery of this Agreement and the Notes.

5.1 Organization, Existence and Power. The Borrower is duly incorporated, validly existing and in good standing under the laws of the jurisdiction of its incorporation. The Borrower has the corporate power necessary to conduct the business in which it is engaged, to own the properties owned by it and to consummate the transactions contemplated by the Loan Documents. The Borrower is duly qualified or licensed to transact business in all places where the nature of the properties owned by it or the business conducted by it makes such qualification necessary and where the failure to be so qualified or licensed would have a material adverse effect upon the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole.

5.2 Authorization of Loan Documents; Binding Effect. The execution and delivery of this Agreement and the other Loan Documents and the performance of the transactions contemplated hereby and thereby have been duly authorized by all necessary corporate actions of the Borrower. Each of the Loan Documents constitutes the legal, valid and binding obligation of the Borrower that is a party thereto, enforceable against the Borrower in accordance with its terms.

5.3 Authority. The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under the Loan Documents. Neither the authorization, execution, delivery, or performance by the Borrower of this Agreement or of any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

5.4 Capital Structure. The number of shares of stock of which the Borrower's authorized capital stock consists, the par value per share of such stock, the number of shares of such stock that have been issued and are outstanding and the number of shares that have been issued and are held by the Borrower as treasury shares are all disclosed on the Disclosure Schedule. Set forth in the Disclosure Schedule is a complete and accurate list of all Subsidiaries of the Borrower. The Disclosure Schedule indicates the jurisdiction of incorporation or organization of each of the Subsidiaries, the number of shares or units of each class of capital stock or other equity of the Subsidiaries authorized, and the number of such shares or units outstanding and the percentage of each class of such equity owned (directly or indirectly) by the Borrower. No shares of stock or units of equity interests of the Borrower or any of its Subsidiaries are covered by outstanding options, warrants, rights of conversion or purchase or similar rights granted or created by the Borrower except as set forth on the Disclosure Schedule. All the outstanding capital stock of the Borrower has been validly issued and is fully paid and nonassessable. All the stock or units of equity interests of the Borrower's Subsidiaries that are owned by the Borrower or any Subsidiary of the Borrower are owned free and clear of all mortgages, deeds of trust, pledges, liens, security interests and other charges or encumbrances.

5.5 Financial Condition. The audited consolidated balance sheet of the Borrower and its Subsidiaries dated as of December 31, 1992 and the audited statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for and as of the end of the period ending on that date, including any related notes (the "Audited Financial Statements"), and the unaudited consolidated

financial statements of the Borrower and its Subsidiaries (the "Unaudited Financial Statements") dated as of July 3, 1993 (the "Balance Sheet Date"), all of which (collectively, the "Financial Statements") were heretofore furnished to the Lender, are true, correct and complete in all material respects and fairly present in all material respects the financial condition of the Borrower and its Subsidiaries as of the date of each such statement and have been prepared in accordance with generally accepted accounting principles (subject, in the case of the Unaudited Financial Statements, to the addition of notes and to normal year-end adjustments that individually and in the aggregate are not expected to be material) consistently applied throughout the periods involved. Other than as reflected in such Financial Statements and except for liabilities incurred in the ordinary course of business since the date thereof, the Borrower has no Indebtedness that is or would be material to the financial condition of the Borrower, nor any material unrealized or unanticipated losses from any commitments. Since the Balance Sheet Date there has been no material adverse change in the consolidated financial condition (as set forth in the Audited Financial Statements) or results of operations of the Borrower and its Subsidiaries taken as a whole.

5.6 Pending Litigation. Except as set forth in the Disclosure Schedule, there are no suits or proceedings pending or, to the knowledge of the Borrower, threatened before any court or arbitration tribunal or by or before any governmental or regulatory authority, commission, bureau or agency or public regulatory body against the Borrower that if adversely determined would have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole.

5.7 Certain Agreements; Material Contracts. The Borrower is not a party to any agreement or instrument or subject to any court order or governmental decree adversely affecting in any material respect the business, properties, assets or financial condition of the Borrower and its Subsidiaries taken as a whole.

5.8 Authorization, Etc. All authorizations, consents, approvals, accreditations, certifications and licenses required under the corporate charter or by-laws of the Borrower or under applicable law or regulation for the ownership or operation of the property owned or operated by the Borrower or the conduct of any business or activity conducted by the Borrower, including provision of services for which reimbursement is made by third party payors, other than authorizations, consents, approvals, accreditations, certifications or licenses the failure to obtain and/or maintain which would not have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole (collectively, "Licenses") have been duly issued and are in full force and effect. The Borrower has fulfilled and performed all of its material obligations with respect to such Licenses (to the extent now required to be fulfilled or performed) and no event has occurred that would allow, with or without the passage

of time or the giving of notice or both, revocation or termination thereof or would result in any other material impairment of the rights of the holder of any such License. All filings or registrations with any governmental or regulatory authority required for the conduct of the business or activity conducted by the Borrower have been made, other than any such filings or registrations as to which the failure to make same would not have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries, taken as a whole. Except as expressly contemplated hereby, no approval, consent or authorization of or filing or registration with any governmental commission, bureau or other regulatory authority or agency is required with respect to the execution, delivery or performance of any of the Loan Documents.

5.9 No Violation. The execution, delivery and performance by the Borrower of the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower. The Borrower is not in default, nor has any event occurred that with the passage of time or the giving of notice, or both, would constitute a default, in the performance, observance or fulfillment of any of the obligations, covenants or conditions contained in any agreement, instrument or other document to which the Borrower is a party, which default would have a material adverse effect on the consolidated assets, financial condition or results of operations of the Borrower and its Subsidiaries, taken as a whole. The Borrower is not in violation of any applicable federal, state or local law, rule or regulation or any writ, order or decree, which violation would have a material adverse effect on the consolidated assets, financial condition or results of operations of the Borrower and its Subsidiaries, taken as a whole. Except as otherwise set forth in the Disclosure Schedule under the caption "Litigation," the Borrower has not received notice of any violation of any federal, state or local environmental law, rule or regulation or assertion that the Borrower has any obligation to clean up or contribute to the cost of cleaning up any waste or pollutants.

5.10 Payment of Taxes. The Borrower and its Subsidiaries have properly prepared and filed or caused to be properly prepared and filed all federal tax returns and all material state and local tax returns that are required to be filed and have paid all taxes shown thereon to be due and all other taxes, assessments and governmental charges or levies imposed upon the Borrower and its Subsidiaries, their income or profits or any properties belonging to the Borrower. No extensions of any statute of limitations are in effect with respect to any tax liability of the Borrower or any Subsidiary of the Borrower. No deficiency assessment or proposed adjustment of the federal income taxes of the Borrower or any Subsidiary of the Borrower is pending and the Borrower has no knowledge of any proposed liability of a substantial nature for any tax to be imposed upon any of its properties or assets.

5.11 Transactions With Affiliates, Officers, Directors and 1% Shareholders. Except as set forth on the Disclosure Schedule, the Borrower has no Indebtedness to or material contractual arrangement or understanding with any Affiliate, officer or director of the Borrower, nor any shareholder holding of record at least 1% of the equity of the Borrower nor, to the best of the Borrower's knowledge (without independent inquiry), any of their respective relatives.

5.12 ERISA. The Borrower has never established or maintained any funded employee pension benefit plan as defined under Section 3(2)(A) of the Employee Retirement Income Security Act of 1974, as amended and in effect on the date hereof ("ERISA"), other than the plans described on the Disclosure Schedule. No employee benefit plan established or maintained, or to which contributions have been made, by the Borrower or any Subsidiary of the Borrower that is subject to Part 3 of Title I-B of ERISA, had an accumulated funding deficiency (as such term is defined in Section 302 of ERISA) as of the last day of the fiscal year of such plan ended most recently prior to the date hereof, or would have had an accumulated funding deficiency (as so defined) on such day if such year were the first year of the plan to which Part 3 of Title I-B of ERISA applied. No material liability to the Pension Benefit Guaranty Corporation has been incurred or is expected by the Borrower to be incurred by it or any Subsidiary of the Borrower with respect to any such plan or otherwise. The execution, delivery and performance of this Agreement and the other Loan Documents will not involve on the part of the Borrower any prohibited transaction within the meaning of ERISA or Section 4975 of the Internal Revenue Code. The Borrower has never maintained, contributed to or been obligated to contribute to any "multiemployer plan," as defined in Section 3(37) of ERISA. The Borrower has never incurred any "withdrawal liability" calculated under Section 4211 of ERISA, and there has been no event or circumstance that would cause it to incur any such liability.

5.13 Ownership of Properties; Liens. The Borrower has good and marketable title to all its material properties and assets, real and personal, that are now carried on its books, including, without limitation, those reflected in the Financial Statements (except those disposed of in the ordinary course since the date thereof), and has valid leasehold interests in its properties and assets, real and personal, which it purports to lease, subject in either case to no mortgage, security interest, pledge, lien, charge, encumbrance or title retention or other security agreement or arrangement of any nature whatsoever other than Permitted Liens and those specified in the Disclosure Schedule and other than those granted, or to be granted, to the Lender hereunder. All of the Borrower's material leasehold interests and material obligations with respect to real property are described on the Disclosure Schedule.

5.14 Employment Matters. Except as set forth on the Disclosure Schedule, there are no material grievances, disputes or controversies pending or, to the knowledge of the Borrower, threatened between the Borrower and its employees, nor

is any strike, work stoppage or slowdown pending or threatened against the Borrower.

5.15 Insurance. The Borrower maintains in force fire, casualty, comprehensive liability and other insurance covering its properties and business that is adequate and customary for the type and scope of its properties and business.

5.16 Indebtedness. Except as reflected in the Financial Statements or set forth in the Disclosure Schedule, and other than Indebtedness incurred in the ordinary course of business since the Balance Sheet Date, the Borrower has no outstanding Indebtedness.

5.17 Securities Law Compliance. The Borrower is not an "investment company" as defined in the Investment Company Act of 1940, as amended. All of the Borrower's outstanding stock was offered, issued and sold in compliance with all applicable state and federal securities laws.

5.18 Accuracy of Information. None of the information furnished to the Lender by or on behalf of the Borrower for purposes of this Agreement or any Loan Document or any transaction contemplated hereby or thereby contains, and none of such information hereinafter furnished will contain any material misstatement of fact, nor does or will any such information omit any material fact necessary to make such information not misleading at such time.

ARTICLE VI

CONDITIONS TO ADVANCES AND TERM LOAN

The Lender shall not be obligated to make any Advance or to fund the Term Loan unless the following conditions have been satisfied:

6.1 Each Advance and Funding of Term Loan. The obligations of the Lender to make each Advance and to fund the Term Loan are subject to the following conditions precedent, each of which shall have been met or performed on or before the Advance Date or the Closing Date, as the case may be:

(a) No Default. No Default or Event of Default shall have occurred and be continuing or will occur upon the making of the Advance or the Term Loan.

(b) Correctness of Representations. The representations and warranties made by the Borrower in this Agreement shall be true and correct with the same force and effect as though such representations and warranties had been made on and as of the Advance Date (i) except to the extent that the representations and warranties set forth in Article V of this Agreement are untrue as a result of

circumstances that have changed subsequent to the date hereof, which change has caused no non-compliance by the Borrower with the covenants, conditions and agreements in this Agreement and (ii) except that the references in Section 5.5 of this Agreement to the financial statements and the term "Balance Sheet Date" are deemed to refer to the most recent financial statements (inclusive of consolidated balance sheets and statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries) furnished to the Lender pursuant to Section 7.1(a) and (b) of this Agreement and the date of such financial statements, respectively.

(c) No Litigation; Certain Other Conditions. There shall be no suit or proceeding (other than suits or proceedings disclosed on the Disclosure Schedule on the date of this Agreement) pending or threatened before any court or arbitration tribunal or by or before any governmental or regulatory authority, commission, bureau or agency or public regulatory body that, if determined adversely to the Borrower or any Subsidiary of the Borrower, is reasonably likely to have a material adverse effect on the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole.

(d) No Material Adverse Change. There shall have been no material adverse change in the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole since the Balance Sheet Date.

(e) Loan Documents. All Loan Documents shall be in full force and effect.

6.2 First Advance and Funding of Term Loan. The obligations of the Lender to make the first Advance and to fund the Term Loan are subject to the following additional conditions precedent, each of which shall have been met or performed on or before the Closing Date:

(a) Opinion of Counsel. The Lender shall have received from independent counsel to the Borrower an opinion or opinions, in form and substance satisfactory to the Lender and its counsel.

(b) Certificates of Legal Existence and Authority to do Business. The Borrower shall have delivered to the Lender certificates as to its legal existence and good standing under the laws of The Commonwealth of Massachusetts, and the Borrower shall have delivered to the Lender certificates as to its authority to do business as a foreign corporation in the States of California, Colorado, Connecticut, Florida, Illinois, Maryland, Michigan, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Texas, Arizona, Minnesota and North Carolina, each dated as of a recent date.

(c) Clerk's Certificate. The Borrower shall have delivered to the Lender a certificate of its Clerk as to (i) its charter documents and by-laws, as amended, (ii) corporate votes authorizing the execution and delivery of the Loan Documents, and (iii) incumbency of the officers authorized to execute the Loan Documents on behalf of the Borrower.

(d) Notes. A Revolving Credit Note and a Term Note, each duly executed by the Borrower and otherwise completed, shall have been delivered to the Lender.

(e) Borrower's Certificates. The Borrower shall have furnished to the Lender a certificate duly executed by the Borrower's chief financial officer dated the Advance Date or Closing Date, as the case may be, to the effect that each of the conditions set forth in the foregoing Section 6.1 has been met as of such date.

(f) Mortgage. A mortgage (the "Mortgage") in the form attached hereto as Exhibit C with respect to the real property located in The Commonwealth of Massachusetts that is owned by the Borrower (the "Property"), duly executed by the Borrower and otherwise completed, shall have been delivered to the Lender and recorded. A title insurance policy in favor of the Lender issued by a title insurance company reasonably satisfactory to the Lender insuring title to the Property on terms and subject to conditions reasonably satisfactory to the Lender shall have been obtained.

(g) Insurance. The Borrower shall have furnished to the Lender copies of all its property insurance policies.

(h) All Proceedings Satisfactory. All corporate and other proceedings taken prior to or on the Closing Date in connection with the transactions contemplated by this Agreement, and all documents and exhibits related thereto, shall be reasonably satisfactory in form and substance to the Lender and its counsel.

(i) Additional Documents. The Borrower shall have delivered to the Lender all additional opinions, documents and certificates that the Lender or its counsel may reasonably require.

ARTICLE VII

AFFIRMATIVE COVENANTS OF THE BORROWER

The Borrower covenants and agrees that from the date of execution of this Agreement and until the payment in full of the principal of and interest upon the Notes and payment and performance of all other Obligations:

7.1 Reporting Requirements. The Borrower shall, unless the Lender shall otherwise consent in writing, furnish to the Lender:

(a) As soon as available and in any event within sixty days after the end of each of the first three quarters of each fiscal year of the Borrower and its Subsidiaries, (i) a consolidated and consolidating balance sheet of the Borrower and its Subsidiaries as of the end of such quarter and (ii) consolidated and consolidating statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for the period commencing at the end of the previous fiscal year and ending with the end of such quarter, all in reasonable detail and duly certified by the chief financial officer of the Borrower as having been prepared in accordance with generally accepted accounting principles consistently applied (subject to addition of notes and ordinary year-end audit adjustments), together with a certificate of the chief financial officer of the Borrower stating that no Default or Event of Default has occurred and is continuing or, if a Default or an Event of Default has occurred and is continuing, a statement as to the nature thereof and the action that the Borrower proposes to take with respect thereto;

(b) As soon as available and in any event within ninety days after the end of each fiscal year of the Borrower, the audited consolidated balance sheet of the Borrower and its Subsidiaries as of the end of such fiscal year and the audited consolidated statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for such fiscal year, in each case accompanied by the unqualified opinion with respect thereto of the Borrower's independent public accountants and a certification by such accountants stating that they have reviewed this Agreement and whether, in making their audit, they have become aware of any Default or Event of Default and if so, describing its nature, along with the related unaudited consolidating balance sheet of the Borrower and its Subsidiaries as of the end of such fiscal year and the unaudited consolidating statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for such fiscal year;

(c) Not later than sixty days following the end of each fiscal quarter a certificate signed by the chief financial officer of the Borrower substantially in the form of Exhibit 7.1(c) hereto (the "Compliance Certificate");

(d) Not later than thirty days after the end of each fiscal year of the Borrower, the Borrower's representative forecast for the next fiscal year on a consolidated basis, including, at a minimum, projected statements of profit and loss and projected cash flow, prepared in accordance with generally accepted accounting principles consistently applied;

(e) Promptly upon receipt thereof, one copy of each other report submitted to the Borrower or any Subsidiary by independent accountants in

connection with any annual, interim or special audit made by them of the books of the Borrower or any Subsidiary;

(f) Promptly after the commencement thereof, notice of all actions, suits and proceedings before any court, arbitration tribunal or governmental regulatory authority, commission, bureau, agency or public regulatory body that, if determined adversely to the Borrower or any Subsidiary of the Borrower, would be reasonably likely to have a material adverse effect on the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole;

(g) As soon as possible, and in any event within five days after the Borrower shall know of the occurrence of any Default or Event of Default, the written statement of the chief financial officer of the Borrower setting forth details of such Default or Event of Default and action that the Borrower proposes to take with respect thereto;

(h) As soon as possible, and in any event within five days after the occurrence thereof, written notice as to any other event of which the Borrower becomes aware that with the passage of time, the giving of notice or otherwise, is reasonably likely to result in a material adverse change in the consolidated financial condition or results of operations of the Borrower; and

(i) Such other information respecting the business or properties or the condition or operations, financial or otherwise, of the Borrower as the Lender may from time to time reasonably request.

7.2 Loan Proceeds. The Borrower shall use the proceeds of the Advances only for the purpose of general working capital, including, but not limited to, for the purpose of acquisitions for which the aggregate cost may not exceed \$2,500,000 per annum.

7.3 Maintenance of Business and Properties; Insurance.

(a) The Borrower will continue to engage in business of the same general nature as the business currently engaged in by the Borrower. The Borrower will at all times maintain, preserve and protect all material franchises and trade names and preserve all the Borrower's material tangible property used or useful in the conduct of its business and keep the same in good repair, working order and condition, ordinary wear and tear excepted, and from time to time make all needful and proper repairs, renewals, replacements, betterments, and improvements thereto so that the business carried on in connection therewith may be conducted properly and advantageously at all times.

(b) The Borrower will keep all of its insurable properties now or hereafter owned adequately insured at all times against loss or damage by fire or other casualty to the extent customary with respect to like properties of companies conducting similar businesses and to the extent available at commercially reasonable rates; and will maintain public liability and workmen's compensation insurance insuring the Borrower to the extent customary with respect to companies conducting similar businesses and to the extent available at commercially reasonable rates, all by financially sound and reputable insurers. All property insurance policies shall name the Lender as a loss payee and shall contain a provision requiring at least 15 days' written notice to the Lender prior to the cancellation or modification of each such policy. The Borrower shall furnish to the Lender from time to time at the Lender's request copies of all such insurance policies and certificates evidencing such insurance coverage. Notwithstanding the foregoing, the Borrower may self-insure workmen's compensation to the extent permitted by law and may also self-insure other risks to the extent reasonably deemed prudent by the Borrower.

7.4 Payment of Taxes. The Borrower shall pay and discharge, or cause to be paid and discharged, all material taxes, assessments, and governmental charges or levies imposed upon the Borrower and its Subsidiaries or their income or profits, or upon any other properties belonging to the Borrower prior to the date on which penalties attach thereto, and all lawful claims that, if unpaid, might become a lien or charge upon any material properties of the Borrower, except for such taxes, assessments, charges, levies or claims as are being contested by the Borrower in good faith by appropriate proceedings promptly initiated and diligently prosecuted, for which adequate book reserves have been established in accordance with generally accepted accounting principles, as to which no foreclosure, distraint, sale or other similar proceedings shall have been commenced, or, if commenced, have been effectively stayed.

7.5 Compliance with Laws, etc. The Borrower shall comply with the requirements of all applicable laws, rules, regulations and orders of any governmental authority, and obtain or maintain all Licenses required under applicable law or regulation for the operation of the Borrower's business, where noncompliance or failure to obtain or maintain would have a material adverse effect on the consolidated financial condition, assets, or results of operations of the Borrower and its Subsidiaries taken as a whole; provided, however, that such compliance or the obtaining of such Licenses may be delayed while the applicability or validity of any such law, rule, regulation or order or the necessity for obtaining any such License is being contested by the Borrower in good faith by appropriate proceedings promptly initiated and diligently prosecuted.

7.6 Books, Records and Accounts. The Borrower shall keep true and correct books, records and accounts, in which entries will be made in accordance with generally accepted accounting principles consistently applied, and that shall comply

with the requirements of the Foreign Corrupt Practices Act of 1977 to the extent applicable to the Borrower. The Lender or its representatives shall upon reasonable notice to the Borrower be afforded, during normal business hours, access to and the right to examine and copy any such books, records and accounts and the right to inspect the Borrower's premises and business operations. All financial and other information with respect to the Borrower and/or any of its Subsidiaries now or hereafter obtained by the Lender under this Agreement or otherwise in connection with any of the transactions contemplated hereunder shall be held in confidence and shall not be released or made available to any other Person, except (i) to governmental agencies (and examiners employed by same) having oversight over the affairs of the Lender, (ii) pursuant to subpoena or similar process issued by a court or governmental agency of competent jurisdiction, or (iii) as otherwise directed by order of any court or governmental agency of competent jurisdiction.

7.7 Further Assurances. The Borrower shall execute and deliver, at the Borrower's expense, all notices and other instruments and documents and take all actions, including, but not limited to, making all filings and recordings, that the Lender shall reasonably request in order to assure to the Lender all rights given to the Lender hereby or under any other Loan Document.

7.8 Bank Accounts. The Borrower shall maintain with the Lender a deposit account and, at the written request of the Lender, shall give the Lender written notice of any other accounts maintained by the Borrower, including the types of accounts and names and addresses of the institutions with which such accounts are maintained.

ARTICLE VIII

NEGATIVE COVENANTS OF THE BORROWER

The Borrower covenants and agrees that from the date of execution of this Agreement and until the payment in full of the principal of and interest upon the Notes and payment and performance of all other Obligations:

8.1 Sale of Assets; Mergers, Etc.

(a) Sale of Assets. The Borrower will not, except in the ordinary course of business, sell, transfer, or otherwise dispose of, to any Person any assets (including the securities of any Subsidiary).

(b) Mergers, Etc. Neither the Borrower nor any Subsidiary will consolidate with or merge into any other Person or permit any other Person to consolidate with or merge into it, or acquire all or substantially all of the assets of any Person, or sell, assign, lease or otherwise dispose of (whether in one transaction

or in a series of transactions) all or substantially all of its assets to any Person, except that

(1) a Subsidiary may consolidate with or merge into the Borrower or another Subsidiary; and

(2) the Borrower or any of its Subsidiaries may acquire all or substantially all of the assets of any Person provided the aggregate purchase price liability, including all contingent liabilities, when aggregated with all such acquisitions and any Investments permitted under Section 8.4(2) shall not exceed a total of \$5,000,000 in each calendar year during the term of this Agreement beginning with calendar year 1993.

8.2 Liens and Encumbrances.

(a) Neither the Borrower nor any Subsidiary will (a) cause or permit or (b) agree or consent to cause or permit in the future (upon the happening of a contingency or otherwise), any of its real or personal property, whether now owned or subsequently acquired, to be subject to any Lien other than Liens described below (which may herein be referred to as "Permitted Liens"):

(1) Liens securing the payment of taxes, assessments or governmental charges or levies or the demands of suppliers, mechanics, carriers, warehousemen, landlords and other like Persons, which payments are not yet due and payable or (as to taxes) may be paid without interest or penalty; provided, that, if such payments are due and payable, such Liens shall be permitted hereunder only to the extent that (A) all claims that the Liens secure are being actively contested in good faith and by appropriate proceedings, (B) adequate book reserves have been established with respect thereto to the extent required by generally accepted accounting principles, and (C) such Liens do not in the aggregate materially interfere with the owning company's use of property necessary or material to the conduct of the business of the Borrower and its Subsidiaries taken as a whole;

(2) Liens incurred or deposits made in the ordinary course of business (A) in connection with worker's compensation, unemployment insurance, social security and other like laws, or (B) to secure the performance of letters of credit, bids, tenders, sales contracts, leases, statutory obligations, surety, appeal and performance bonds and other similar obligations, in each case not incurred in connection with the borrowing of money, the obtaining of advances or the payment of the deferred purchase price of property;

(3) Liens not otherwise described in Section 8.2(a)(1) or (2) that are incurred in the ordinary course of business and are incidental to the conduct of its business or ownership of its property, were not incurred in connection with the borrowing of money, the obtaining of advances or the payment of the deferred purchase price of property and do not in the aggregate materially detract from the value of, or materially interfere with the owning company's use of, property necessary or material to the conduct of the business of the Borrower and its Subsidiaries taken as a whole;

(4) Liens in favor of the Lender or any of its affiliates;

(5) Judgment liens or attachments that shall not have been in existence for a period longer than 30 days after the creation thereof, or if a stay of execution shall have been obtained, for a period longer than 30 days after the expiration of such stay or if such an attachment is being actively contested in good faith and by appropriate proceedings, for a period longer than 30 days after the creation thereof;

(6) Liens existing as of the Closing Date and disclosed on the Disclosure Schedule hereto;

(7) Liens provided for in equipment or Financing Leases (including financing statements and undertakings to file financing statements) provided that they are limited to the equipment subject to such leases and the proceeds thereof;

(8) Leases, subleases, licenses and sublicenses granted to third parties not interfering in any material respect with the business of the Borrower or any Subsidiary of the Borrower;

(9) Any Lien on any asset of any corporation existing at the time such corporation is merged into or consolidated with the Borrower or a Subsidiary of the Borrower and not created in contemplation of such event;

(10) Any Lien existing on any asset prior to the acquisition thereof by the Borrower or any Subsidiary of the Borrower and not created in contemplation of such event;

(11) Liens in respect of any purchase money obligations for tangible property used in its business that at any time shall not exceed \$2,000,000, provided that any such encumbrances shall not extend to

property and assets of the Borrower or any Subsidiary not financed by such a purchase money obligation;

(12) Easements, rights of way, restrictions and other similar charges or Liens relating to real property and not interfering in a material way with the ordinary conduct of its business; and

(13) Liens on its property or assets created in connection with the refinancing of Indebtedness secured by Permitted Liens on such property, provided that the amount of Indebtedness secured by any such Lien shall not be increased as a result of such refinancing and no such Lien shall extend to property and assets of the Borrower or any Subsidiary not encumbered prior to any such refinancing.

(b) In case any property is subjected to a Lien in violation of Section 8.2(a), the Borrower will make or cause to be made provision whereby the Notes will be secured equally and ratably with all other obligations secured by such property, and in any case the Notes shall have the benefit, to the full extent that the holders may be entitled thereto under applicable law, of an equitable Lien equally and ratably securing the Notes. Such violation of Section 8.2(a) shall constitute an Event of Default hereunder, whether or not any such provision is made pursuant to this Section 8.2(b).

8.3 Sales and Leasebacks. The Borrower and its Subsidiaries will not sell or transfer any of their property and become, directly or indirectly, liable as the lessee under a lease of such property (other than such transactions between the Subsidiaries).

8.4 Investments. Neither the Borrower nor any Subsidiary will make or maintain any investments, made in cash or by delivery of property or assets, (a) in any Person, whether by acquisition of capital stock, Indebtedness, or other obligations or securities, or by loan or capital contribution, or otherwise, or (b) in any property, whether real or personal, (items (a) and (b) being herein called "Investments"), except the following:

(1) Investments in direct obligations of, or guaranteed by, the United States government, its agencies or any public instrumentality thereof and backed by the full faith and credit of the United States government with maturities not to exceed (or an unconditional right to compel purchase within) one year from the date of acquisition;

(2) Investments in or to any Subsidiary or other Person provided any such Investment when aggregated with all such other Investments permitted under this Section 8.4(2) and any acquisitions

permitted under Section 8.1(b) shall not exceed a total of \$5,000,000 in each calendar year during the term of this Agreement beginning with calendar year 1993;

(3) Investments and obligations issued by any state of the United States or any political subdivision of any such state or any public instrumentality thereof with maturities not to exceed (or an unconditional right to compel purchase within) 180 days of the date of acquisition that are rated in one of the top two rating classifications by at least one nationally recognized rating agency;

(4) Investments in demand and time deposits with, Eurodollar deposits with, certificates of deposit issued by, or obligations or securities fully backed by letters of credit issued by (x) any bank organized under the laws of the United States, any state thereof, the District of Columbia or Canada having combined capital and surplus aggregating at least \$100,000,000, or (y) any other bank organized under the laws of a state that is a member of the European Economic Community (or any political subdivision thereof), Japan, the Cayman Islands, or British West Indies having as of any date of determination combined capital and surplus of not less than \$500,000,000 or the equivalent thereof (determined in accordance with generally accepted accounting principles) ("Permitted Banks");

(5) Shares of money market mutual funds registered under the Investment Company Act of 1940, as amended;

(6) Foreign currency swaps and hedging arrangements entered into in the ordinary course of business to protect against currency losses, and interest rate swaps and caps entered into in the ordinary course of business to protect against interest rate exposure on Indebtedness bearing interest at a variable rate;

(7) Investments in publicly traded companies and mutual funds (other than money market mutual funds) that in the aggregate shall not exceed \$5,000,000; and

(8) Other Investments existing on the Closing Date and listed on the Disclosure Schedule.

8.5 Transactions with Affiliates. Neither the Borrower nor any Subsidiary will enter into any transaction (including the purchase, sale or exchange of property or the rendering of any service) with any Affiliate except upon fair and reasonable

terms that are at least as favorable to the Borrower or the Subsidiary as would be obtained in a comparable arm's-length transaction with a non-Affiliate.

8.6 ERISA Compliance. Neither the Borrower nor any of its Subsidiaries will at any time permit any employee pension benefit plan (as such term is defined in Section 3 of ERISA) maintained by the Borrower or any of its Subsidiaries or in which employees of the Borrower or any of its Subsidiaries is entitled to participate to:

(a) engage in any "prohibited transaction" as such term is defined in Section 4975 of the Internal Revenue Code of 1986, as amended, or described in Section 406 of ERISA;

(b) incur any "accumulated funding deficiency" as such term is defined in Section 302 of ERISA, whether or not waived; or

(c) terminate under circumstances that could result in the imposition of a Lien on the property of the Borrower or any Subsidiary of the Borrower pursuant to Section 4068 of ERISA.

8.7 Financial Covenants. The Borrower covenants and agrees that:

(a) Consolidated Tangible Net Worth. The Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower shall not be less than the sum of (i) \$26,000,000, and (ii) beginning with the year ending December 31, 1994, 50% of Consolidated Net Income (excluding losses) for each consecutive fiscal year of the Borrower beginning with the year ending December 31, 1994, on a cumulative basis.

(b) Consolidated Indebtedness. The ratio ("Debt-to-Net Worth Ratio") of the Consolidated Indebtedness (excluding all guaranties except guaranties with respect to borrowed money) as of the end of each fiscal quarter of the Borrower beginning with the fiscal quarter ending December 31, 1993 to its Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower beginning with the fiscal quarter ending December 31, 1993 shall not exceed 1.5 to 1.

(c) Consolidated Debt Service. The ratio (the "Cash Flow Ratio") as of the end of each fiscal quarter of the Borrower of (i) Consolidated Operating Cash Flow for the four consecutive fiscal quarters then ended to (ii) Consolidated Debt Service determined for the four consecutive fiscal quarters then ended shall not be less than 1.25 to 1.00.

8.8 Contracts Prohibiting Compliance with Agreement. The Borrower will not without the prior written consent of the Lender enter into any contract or other

agreement that would prohibit or in any way restrict the ability of the Borrower to comply with any provision of this Agreement.

ARTICLE IX

EVENTS OF DEFAULT

9.1 Default. If any one of the following events ("Events of Default") shall occur:

(a) Any representation or warranty made by the Borrower herein or in any other Loan Document, or in any certificate or report furnished by the Borrower hereunder or thereunder, shall prove to have been incorrect in any material respect when made;

(b) Payment of any principal or interest due under any Note shall not be made on or before the date due;

(c) A final judgment for in excess of \$2,000,000 shall be rendered against the Borrower or any of its Subsidiaries for the payment of money that, after deducting the amount of any insurance proceeds paid or payable to or on behalf of the Borrower or its Subsidiary in connection with such judgment, is in excess of \$2,000,000, and the same shall remain undischarged for a period of thirty (30) days, during which period execution shall not effectively be stayed. If a dispute exists with respect to the liability of any insurance underwriter under any insurance policy of the Borrower or its Subsidiary, no deduction under this subsection shall be made for the insurance proceeds that are the subject of such dispute;

(d) The Borrower or any Subsidiary shall (1) voluntarily terminate operations or apply for or consent to the appointment of, or the taking of possession by, a receiver, custodian, trustee or liquidator of such Person or of all or a substantial part of the assets of such Person, (2) admit in writing its inability, or be generally unable, to pay its debts as the debts become due, (3) make a general assignment for the benefit of its creditors, (4) commence a voluntary case under the Federal Bankruptcy Code (as now or hereafter in effect), (5) file a petition seeking to take advantage of any other law relating to bankruptcy, insolvency, reorganization, winding-up, or composition or adjustment of debts, (6) fail to controvert in a timely and appropriate manner, or acquiesce in writing to, any petition filed against it in an involuntary case under the Federal Bankruptcy Code or applicable state bankruptcy laws or (7) take any corporate action for the purpose of effecting any of the foregoing;

(e) Without its application, approval or consent, a proceeding shall be commenced, in any court of competent jurisdiction, seeking in respect of the

Borrower or any Subsidiary: the liquidation, reorganization, dissolution, winding-up, or composition or readjustment of debt, the appointment of a trustee, receiver, liquidator or the like of such Person or of all or any substantial part of the assets of such Person, or other like relief in respect of such Person under any law relating to bankruptcy, insolvency, reorganization, winding-up, or composition or adjustment of debts; and, if the proceeding is being contested in good faith by such Person, the same shall continue undismissed, or unstayed and in effect for any period of 45 consecutive days, or an order for relief against such Person shall be entered in any case under the Bankruptcy Code or applicable state bankruptcy laws;

(f) Any foreclosure or other proceedings shall be commenced to enforce, execute or realize upon any lien, encumbrance, attachment, trustee process, mortgage or security interest for payment of an amount in excess of \$250,000 against the Borrower or any Subsidiary;

(g) Default shall be made in the due observance or performance of any covenant or agreement under Article VIII;

(h) Default shall be made in the due observance or performance of any covenant or agreement contained herein (and not constituting an Event of Default under any other clause in this Article IX) or in any other Loan Document or in any other agreement between the Lender and the Borrower evidencing or securing borrowed monies and such default shall continue and shall not have been remedied within thirty days after the date on which such default occurred;

(i) The Borrower or any of its Subsidiaries shall fail to make any payment of principal or interest beyond the period of grace contained in any instrument or agreement evidencing any indebtedness (other than to the Lender) for money borrowed in excess of \$100,000 (unless such default is the result of a good faith dispute arising under such agreement or instrument and the other party or parties thereto have not accelerated the maturity of such indebtedness), or default shall be made by the Borrower or any of its Subsidiaries in the performance of any other covenant or agreement contained in any such agreement or instrument as a result of which the other party thereto proceeds to accelerate the maturity of the indebtedness of such Person under such agreement or instrument;

(j) There shall occur any material adverse change in the financial condition of the Borrower;

then, in the case of any such event, other than an event described in subsection (d) or (e) of this Section 9.1, the Lender may, at its option immediately declare any Obligations to it not otherwise due and payable at such time to be forthwith due and payable, whereupon the same shall become forthwith due and payable without further presentment, demand, protest, or other notice of any kind, all of which are

hereby expressly waived, anything contained herein or in the Notes to the contrary notwithstanding; and, in the case of any event described in subsection (d) or (e) of this Section 9.1, any Obligation not otherwise due and payable at such time shall become immediately due and payable without presentment, demand, protest, or other notice of any kind, all of which are hereby expressly waived, anything contained herein or in any Note to the contrary notwithstanding; and, further, in each and every such occurrence the Lender may proceed to protect and enforce its rights by suit in equity, action at law and/or other appropriate proceedings either for specific performance of any covenant or condition contained in this Agreement or in any instrument delivered to the Lender pursuant to this Agreement, or in aid of the exercise of any power granted in this Agreement or any such instrument.

9.2 Lender's Further Rights and Remedies. Upon the occurrence and during the unremedied continuation of an Event of Default, the Lender shall have the right to require the Borrower to provide the Lender with cash collateral or other collateral of a type and value satisfactory to the Lender in an amount equal to the Borrower's outstanding Obligations to the Lender. With respect to such collateral (the "Collateral"), the Lender shall have the rights and remedies of a secured party under the Uniform Commercial Code ("UCC") and the Borrower agrees to execute and deliver to the Lender such security agreements and financing statements under the UCC as the Lender may require, and to pay the cost of filing the same. Any deposits or other sums at any time credited by or due from the Lender to the Borrower shall at all times constitute Collateral for the Obligations. The Lender may apply the net proceeds of any disposition of Collateral or set-off to the Obligations in such order as the Lender may determine, whether or not due. With respect to Obligations not yet due, including contingent Obligations, the Lender may at its option hold Collateral (including any proceeds thereof) until all such Obligations have been paid in full.

ARTICLE X

MISCELLANEOUS

10.1 No Waiver, Remedies Cumulative. No failure on the part of the Lender to exercise and no delay in exercising any right hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right hereunder preclude any other or further exercise thereof or the exercise of any other right. The remedies herein provided are cumulative and are not exclusive of any remedies provided by law. Any condition or restriction imposed in this Agreement with respect to the Borrower may be waived, modified or suspended by the Lender but only on the Lender's prior action in writing and only as so expressed in such writing and not otherwise.

10.2 Survival of Representations, etc. All representations, warranties and covenants made herein or in any Loan Document shall survive the making of any Advance hereunder and the delivery of the Notes and the consummation of all other transactions contemplated hereby or thereby.

10.3 Right of Setoff. In addition to any rights now or hereafter granted under applicable law or otherwise and not by way of limitation of any such rights, upon the occurrence and during the unremedied continuation of an Event of Default, the Lender is hereby authorized at any time or from time to time, without presentment, demand, protest or other notice of any kind to the Borrower or to any other Person, any such notice being hereby expressly waived, to set off and to appropriate and apply any and all deposits (general or special) and any other indebtedness at any time held or owing by the Lender to or for the credit or the account of the Borrower against and on account of the Obligations and liabilities of the Borrower to the Lender under this Agreement or under any of the other Loan Documents, and all other claims of any nature or description arising out of or connected with this Agreement or any other Loan Document, irrespective of whether or not the Lender shall have made any demand hereunder and although said Obligations, liabilities or claims, or any of them, shall be contingent or unmatured.

10.4 Indemnity; Costs, Expenses and Taxes. The Borrower hereby agrees to indemnify the Lender and its legal representatives, successors, assigns and agents against, and agrees to protect, save and keep harmless each of them from and to pay upon demand, any and all liabilities, obligations, taxes (including any and all stamp and other taxes payable or determined to be payable in connection with the execution and delivery of any Loan Documents), liens, charges, losses, damages, penalties, claims, actions, suits, costs, indemnities, expenses and disbursements (including, without limitation, reasonable legal fees, costs and expenses, including without limitation reasonable costs of attending and preparing for depositions and other court proceedings), of whatsoever kind and nature, imposed upon, incurred by or asserted against such indemnified party in any way relating to or arising out of any of the transactions contemplated hereunder or in any of the Loan Documents, including but not limited to all costs of investigation, monitoring, legal representation, remedial response, removal, restoration, or permit acquisition that may now or in the future be undertaken, suffered, paid, awarded, assessed or otherwise incurred as a result of the presence of, release or threatened release of Hazardous Substances on, in, under or near the Property (all of the foregoing, collectively, "Costs") except to the extent arising by reason of the Lender's gross negligence, misconduct or breach hereof. Without limiting the foregoing, the Borrower agrees to pay on demand (a) all out-of-pocket costs and expenses of the Lender in connection with the preparation, execution and delivery of this Agreement and any other Loan Documents, including without limitation the reasonable fees and out-of-pocket expenses of Foley, Hoag & Elliot, special counsel for the Lender, with respect thereto, as well as (b) the reasonable fees and all out-of-pocket expenses of legal counsel, independent public

accountants and other outside experts retained by the Lender in connection with any request by the Borrower for consents, waivers or other action or forbearance by the Lender hereunder, for the modification or amendment hereof, or other like matters relating to the administration of this Agreement; and (c) all reasonable costs and expenses, if any, of the Lender incurred after the occurrence of any Event of Default hereunder in connection with the enforcement of any of the Loan Documents or the protection of any of the Lender's rights, thereunder, including, without limitation, any internal costs, including personnel costs of the Lender incurred in connection with such administration and enforcement or protection.

10.5 Notices.

(a) Unless telephonic notice is specifically permitted pursuant to the terms of this Agreement, any notice or other communication hereunder to any party hereto shall be by telegram, telecopier, telex, delivery in hand or by courier, or registered or certified mail (return receipt requested) and shall be deemed to have been given or made when telegraphed, telexed, telecopied (and confirmed received), delivered in hand or by courier, or three days after being deposited in the mails, postage prepaid, registered or certified, addressed to the party as follows (or at any other address that such party may hereafter specify to the other parties in writing):

(i) If to the Lender:

The First National Bank of Boston
100 Federal Street
Boston, Massachusetts 02110
Attn: Ms. Sharon A. Stone, Director
Telecopier No. (617) 434-4048

with a copy to:

Arlene L. Bender, Esq.
Foley, Hoag & Eliot
One Post Office Square
Boston, Massachusetts 02109
Telecopier No. (617) 482-7347

(ii) If to the Borrower:

Six Shattuck Road
Andover, Massachusetts 01810
Attn: Mr. Robert F. O'Brien, Treasurer
Telecopier No. (508) 975-3756

with a copy to:

Richard S. Chute, Esq.
Hill & Barlow
One International Place
Boston, Massachusetts 02110
Telecopier No. (617) 439-3580

10.6 MASSACHUSETTS LAW. THIS AGREEMENT AND EACH OF THE LOAN DOCUMENTS SHALL BE DEEMED A CONTRACT MADE UNDER THE LAW OF THE COMMONWEALTH OF MASSACHUSETTS AND SHALL BE GOVERNED BY, AND CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE INTERNAL LAWS OF SAID STATE (WITHOUT REGARD TO ITS PRINCIPLES OF CONFLICT OF LAWS).

10.7 Successors and Assigns. This Agreement shall be binding upon and shall inure to the benefit of the Borrower and the Lender, and their respective legal representatives, successors and assigns; provided that the Lender may assign its rights hereunder, but the Borrower may not assign any of its rights hereunder.

10.8 Counterparts. This Agreement may be executed in any number of counterparts and by different parties hereto in separate counterparts, each of which when so executed and delivered shall be deemed an original and all of which when taken together shall constitute one and the same instrument.

10.9 JURISDICTION, SERVICE OF PROCESS.

(a) ANY SUIT, ACTION OR PROCEEDING AGAINST THE BORROWER WITH RESPECT TO ANY OF THE LOAN DOCUMENTS OR ANY JUDGMENT ENTERED BY ANY COURT IN RESPECT OF ANY THEREOF SHALL BE BROUGHT IN THE COURTS OF THE COMMONWEALTH OF MASSACHUSETTS LOCATED IN SUFFOLK COUNTY OR IN THE UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF MASSACHUSETTS, AS THE LENDER (IN ITS SOLE DISCRETION) MAY ELECT, AND THE BORROWER HEREBY ACCEPTS THE EXCLUSIVE JURISDICTION OF SUCH COURTS FOR THE PURPOSE OF ANY SUIT, ACTION OR PROCEEDING AND AGREES NOT TO ASSERT ANY CLAIM THAT IT IS NOT PERSONALLY SUBJECT TO THE JURISDICTION OF SUCH COURTS.

(b) IN ADDITION, THE BORROWER HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY LAW, ANY OBJECTION IT MAY NOW OR HEREAFTER HAVE TO THE LAYING OF VENUE OF ANY SUIT, ACTION OR PROCEEDING ARISING OUT OF OR RELATING TO ANY

OF THE LOAN DOCUMENTS OR ANY JUDGMENT ENTERED BY ANY COURT IN RESPECT THEREOF BROUGHT IN SUFFOLK COUNTY IN THE COMMONWEALTH OF MASSACHUSETTS, AND HEREBY FURTHER IRREVOCABLY WAIVES ANY CLAIM THAT ANY SUIT, ACTION OR PROCEEDING BROUGHT IN SUFFOLK COUNTY IN THE COMMONWEALTH OF MASSACHUSETTS HAS BEEN BROUGHT IN AN INCONVENIENT FORUM.

10.10 Limit on Interest. It is the intention of the Lender and the Borrower to comply strictly with all applicable usury laws; and, accordingly, in no event and upon no contingency shall the Lender ever be entitled to receive, collect, or apply as interest under any Note any interest, fees, charges or other payments equivalent to interest, in excess of the maximum rate that the Lender may lawfully charge under applicable statutes and laws from time to time in effect; and, in the event that the Lender ever receives, collects or applies as interest on the Notes, any such excess, such amount that, but for this provision, would be excessive interest shall be applied to the reduction of the principal amount of the indebtedness evidenced by the Notes; and, if the principal amount of indebtedness evidenced by the Notes, and all lawful interest thereon, is paid in full, any remaining excess shall forthwith be paid to the Borrower, or other party lawfully entitled thereto. In determining whether or not the interest paid or payable, under any specific contingency exceeds the highest contract rate permitted by applicable law from time to time in effect, the Borrower and the Lender shall, to the maximum extent permitted under applicable law, characterize any non-principal payment as a reasonable loan charge, rather than as interest. Any provision of any Note, or of any other agreement between the Lender and the Borrower, that operates to bind, obligate, or compel the Borrower to pay interest in excess of such maximum lawful contract rate shall be construed to require the payment of the maximum rate only. The provisions of this Section 10.10 shall be given precedence over any other provisions contained in the Notes or in any other agreement between the Lender and the Borrower that is in conflict with the provisions of this Section 10.10.

10.11 Amendments, Modifications, Waivers. Any term of this Agreement or of the Notes may be amended and the observance of any term of this Agreement or of the Notes may be waived (either generally or in a particular instance and either retroactively or prospectively) only with the written consent of the Borrower and the Lender.

10.12 Headings. The headings of this Agreement are for convenience only and are not to affect the construction of or to be taken into account in interpreting the substance of this Agreement.

10.13 WAIVER OF NOTICE, ETC. THE BORROWER WAIVES DEMAND, NOTICE, PROTEST, NOTICE OF ACCEPTANCE OF THIS AGREEMENT, NOTICE OF LOANS MADE, CREDIT EXTENDED, COLLATERAL RECEIVED OR

DELIVERED OR OTHER ACTION TAKEN IN RELIANCE HEREON AND ALL OTHER DEMANDS AND NOTICE OF ANY DESCRIPTION, EXCEPT AS REQUIRED HEREBY. WITH RESPECT BOTH TO THE OBLIGATIONS AND COLLATERAL, THE BORROWER ASSENTS TO ANY EXTENSION OR POSTPONEMENT OF THE TIME OF PAYMENT OR ANY OTHER INDULGENCE, TO ANY SUBSTITUTION, EXCHANGE OR RELEASE OF COLLATERAL, TO THE ADDITION OR RELEASE OF ANY PARTY OR PERSONS PRIMARILY OR SECONDARILY LIABLE, TO THE ACCEPTANCE OF PRETRIAL PAYMENT THEREON AND THE SETTLEMENT, COMPROMISING OR ADJUSTING OF ANY THEREOF, ALL IN SUCH MANNER AND AT SUCH TIME OR TIMES AS THE LENDER MAY DEEM ADVISABLE. THE BORROWER AGREES THAT NO ACTIONS TAKEN BY ANY PERSON EXCEPT THE LENDER SHALL IMPAIR OR OTHERWISE AFFECT ITS OBLIGATIONS HEREUNDER UNTIL ALL OBLIGATIONS OF THE BORROWER HEREUNDER ARE SATISFIED IN FULL.

10.14 WAIVER OF TRIAL BY JURY. THE BORROWER WAIVES ANY AND ALL RIGHTS THAT IT MAY HAVE TO A TRIAL BY JURY ON ANY CLAIM OR ACTION, OF ANY NATURE WHATSOEVER, RELATING TO OR ARISING OUT OF THIS AGREEMENT OR ANY OF THE OTHER LOAN DOCUMENTS.

10.15 Severability. In the event that any one or more of the provisions contained in this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Agreement, but this Agreement shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

10.16 Entire Agreement. This Agreement and the other Loan Documents constitute the full and entire understanding and agreement between the parties with regard to the subject matter hereof and thereof and shall supersede all prior agreements and understandings, whether written or oral, between the parties with respect to the subject matter hereof and thereof.

10.17 Compliance with Covenants. All computations determining compliance with Sections 7 and 8 shall utilize accounting principles in conformity with those used in the preparation of the financial statements referred to in Section 5.5. If any subsequent financial reports of the Borrower shall be prepared in accordance with accounting principles different from those used in the preparation of the financial statements referred to in Section 5.5, the Borrower shall inform the Lender of the changes in accounting principles and shall provide to the Lender with such reports, such supplemental reconciling financial information as may be required to ascertain compliance by the Borrower with the covenants contained in this Agreement.

10.18 Termination. This Agreement may be terminated by the Borrower at any time upon written notice of such termination to the Lender; provided, however, that, unless and until all loans made by the Lender hereunder and all other Obligations hereunder of the Borrower to the Lender existing (whether or not due) as of the time of the receipt of such notice by the Lender shall have been paid in full, such termination shall in no way affect the rights and powers granted to the Lender in connection with this Agreement, and until such payment in full all rights and powers hereby granted to the Lender hereunder shall be and remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as an agreement under seal as of the date first above written.

Witness: MKS INSTRUMENTS, INC.

_____ By: _____
Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____
Title: _____

EXHIBIT A

DEMAND REVOLVING CREDIT NOTE

November 1, 1993

\$7,000,000

Boston, Massachusetts

FOR VALUE RECEIVED, MKS Instruments, Inc. (the "Company"), a Massachusetts corporation, hereby promises to pay to the order of The First National Bank of Boston, a national banking association (the "Payee"), at the offices of the Payee at 100 Federal Street, Boston, Massachusetts, or such other address as the Payee shall designate in a written notice to the Company, on demand, the sum of \$7,000,000 or such lesser sum as may from time to time be outstanding, together with interest (calculated on the basis of a 360 day year and the actual number of days elapsed in any period) at the annual rate determined as provided in the Loan Agreement between the Company and the Payee dated as of the date hereof (the "Loan Agreement").

Payments of interest shall be made monthly in arrears beginning December 1, 1993 and on the first Business Day of each month thereafter on the balance of the principal amount outstanding hereunder until this Note is paid in full. Funds paid hereunder shall be applied first to accrued and unpaid interest and then to the unpaid principal balance.

Overdue principal and interest shall bear interest at a rate of 3% per annum over the Base Rate, payable on demand.

This Note is issued by the Company pursuant to, and is governed by and subject to the terms and conditions of, the Loan Agreement. All capitalized terms used in this Note that are not defined herein, but that are defined in the Loan Agreement, shall have the meanings assigned to them therein.

Nothing contained in this Note, the Loan Agreement or the instruments securing this Note shall be deemed to establish or require the payment of a rate of interest in excess of the amount legally enforceable. In the event that the rate of interest so required to be paid exceeds the maximum rate legally enforceable, the rate of interest so required to be paid shall be automatically reduced to the maximum rate legally enforceable, and any excess paid over such maximum enforceable rate shall be automatically credited on account of the principal hereof without premium or penalty.

This Note may be prepaid in whole or in part only to the extent provided in the Loan Agreement.

Notices to the Company shall be by telegram, telecopy, telex, delivery in hand or by courier, or registered or certified mail (return receipt requested) and shall be deemed to have been given or made when telegraphed, telecopied (and confirmed received), telexed, delivered in hand or by courier, or three days after being deposited in the United States mails postage prepaid, registered or certified, return receipt requested, to the Company at Six Shattuck Road, Andover, Massachusetts 01810, marked "Attention: Robert F. O'Brien", Telecopier No. (508) 975-3756 or at such other address specified by the Company in accordance herewith to the holder.

No delay or omission on the part of the Payee in exercising any right hereunder shall operate as a waiver of such right or of any other right of the Payee, nor shall any delay, omission or waiver on any one occasion be deemed a bar to or waiver of the same or any other right on any future occasion. Every maker, endorser and guarantor of this Note or the obligations represented hereby waives presentment, demand, notice, protest and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Note, assents to any extension or postponement of the time of payment or any other indulgence, to any substitution, exchange or release of collateral and to the addition or release of any other party or person primarily or secondarily liable.

IN WITNESS WHEREOF, the undersigned has executed this Note as an instrument under seal, as of the date first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

EXHIBIT B

TERM NOTE

November 1, 1993

\$10,000,000

Boston, Massachusetts

FOR VALUE RECEIVED, MKS Instruments, Inc. (the "Company"), a Massachusetts corporation, hereby promises to pay to the order of The First National Bank of Boston, a national banking association (the "Payee"), at the offices of the Payee at 100 Federal Street, Boston, Massachusetts, or such other address as the Payee shall designate in a written notice to the Company, the principal amount of \$10,000,000 and to pay interest (calculated on the basis of a 360 day year and the actual number of days elapsed in any period) monthly in arrears beginning on December 1, 1993 and on the first Business Day of each month thereafter on the balance of such principal amount remaining unpaid from time to time from the date hereof until such principal amount shall have become due and payable, whether at maturity, by prepayment or otherwise, at the annual rate determined as provided in the Loan Agreement between the Company and the Payee dated as of the date hereof (the "Loan Agreement").

Payments of principal shall be made monthly in the aggregate fixed amount of \$55,555.56 beginning December 1, 1993 and on the first Business Day of each month thereafter until maturity. The entire unpaid principal balance and all accrued and unpaid interest hereunder shall be absolutely due and payable in full on November 1, 2000. Funds paid hereunder shall be applied first to accrued and unpaid interest and then to the unpaid principal balance.

Overdue principal and interest shall bear interest at a rate of 3% per annum over the Base Rate, payable on demand.

This Note is issued by the Company pursuant to, and is governed by and subject to the terms and conditions of, the Loan Agreement. This Note may become due and payable and matured upon the occurrence of an Event of Default. All capitalized terms used in this Note that are not defined herein, but that are defined in the Loan Agreement, shall have the meanings assigned to them therein.

Nothing contained in this Note, the Loan Agreement or the instruments securing this Note shall be deemed to establish or require the payment of a rate of interest in excess of the amount legally enforceable. In the event that the rate of interest so required to be paid exceeds the maximum rate legally enforceable, the rate of interest so required to be paid shall be automatically reduced to the maximum rate legally enforceable, and any excess paid over such maximum enforceable rate shall be automatically credited on account of the principal hereof without premium or penalty.

This Note may be prepaid in whole or in part only to the extent provided in the Loan Agreement.

This Note is secured by a Commercial Real Estate Mortgage dated the date hereof (the "Mortgage") from the maker hereof, as mortgagor, to the Payee hereof, as mortgagee. The Mortgage constitutes a lien on certain property, more particularly described therein, located in Andover and Lawrence, Massachusetts.

Notices to the Company shall be by telegram, telecopy, telex, delivery in hand or by courier, or registered or certified mail (return receipt requested) and shall be deemed to have been given or made when telegraphed, telecopied (and confirmed received), telexed, delivered in hand or by courier, or three days after being deposited in the United States mails postage prepaid, registered or certified, return receipt requested, to the Company at Six Shattuck Road, Andover, Massachusetts 01810, marked "Attention: Robert F. O'Brien", Telecopier No. (508) 975-3756 or at such other address specified by the Company in accordance herewith to the holder.

No delay or omission on the part of the Payee in exercising any right hereunder shall operate as a waiver of such right or of any other right of the Payee, nor shall any delay, omission or waiver on any one occasion be deemed a bar to or waiver of the same or any other right on any future occasion. Every maker, endorser and guarantor of this Note or the obligations represented hereby waives presentment, demand, notice, protest and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Note, assents to any extension or postponement of the time of payment or any other indulgence, to any substitution, exchange or release of collateral and to the addition or release of any other party or person primarily or secondarily liable.

IN WITNESS WHEREOF, the undersigned has executed this Note as an instrument under seal, as of the date first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

EXHIBIT C

AMENDED AND RESTATED
COMMERCIAL REAL ESTATE MORTGAGE

This AMENDED AND RESTATED COMMERCIAL REAL ESTATE MORTGAGE (as amended from time to time, this "Mortgage") is made this 1st day of November, 1993, by and from MKS Instruments, Inc., a Massachusetts corporation having its principal place of business at Six Shattuck Road, Andover, Massachusetts 01810 ("Mortgagor"), to THE FIRST NATIONAL BANK OF BOSTON, a national banking association having its principal office at 100 Federal Street, Boston, Massachusetts 02110 (the "Bank").

Whereas, the parties have entered into the following two mortgages: that certain Mortgage and Security Agreement dated January 6, 1988 recorded at Essex North Registry of Deeds at Book 2660, Page 050 and that certain Mortgage and Security Agreement dated May 20, 1987 recorded at said Deeds at Book 2500, Page 022 (collectively, the "Prior Mortgages");

Now, therefore, for valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree to amend and restate the Prior Mortgages in their entirety as follows:

1. Mortgage, Obligations and Future Advances.

1.1 Mortgage. For valuable consideration paid, the receipt and sufficiency of which are hereby acknowledged, Mortgagor hereby grants to the Bank, with MORTGAGE COVENANTS, the "Property" described in Section 1.4, below, to secure the prompt payment and performance of any and all obligations of Mortgagor (and if more than one Mortgagor of any of them) to the Bank, whether direct or indirect, absolute or contingent, primary or secondary, due or to become due, now existing or hereafter arising or acquired, pursuant to the following (the "Obligations"):

(a) all obligations under a certain Promissory Note of even date herewith from Mortgagor payable to the order of the Bank in the original principal amount of \$10,000,000 as the same may be further amended or extended (the "Note"); and

(b) all covenants and other obligations contained in this Mortgage or contemplated hereby, including without limitation Mortgagor's obligations under Section 7.1 hereof.

1.2 Security Interest in Property. As continuing security for the Obligations, Mortgagor hereby pledges, assigns and grants to the Bank a security interest in any of the Property (as defined in Section 1.4 below) constituting fixtures, (i.e., Building Service Equipment as defined in the Prior Mortgages). This Mortgage shall be

deemed to be a security agreement and financing statement pursuant to the terms of the Uniform Commercial Code of Massachusetts.

1.3 Collateral Assignment of Leases and Rents. Mortgagor hereby assigns to the Bank as collateral security for the Obligations all of Mortgagor's rights and benefits under any and all Leases (as defined in Section 1.4 below) and any and all rents and other amounts now or hereafter owing with respect to the Leases or the use or occupancy of the Property. This collateral assignment shall be absolute and effective immediately, but Mortgagor shall continue to collect rents owing under the Leases until an Event of Default (as defined in Section 6.1 below) occurs and the Bank exercises its rights and remedies to collect such rents as set forth in Section 6.2(c) hereof.

1.4 Property. The term "Property", as used in this Mortgage, shall mean those certain parcels of land and the structures and improvements now or hereafter thereon located at Six Shattuck Road, Andover, Massachusetts, and 17-23 Ballard Way, Lawrence, Massachusetts, as more particularly described in Exhibit A attached hereto, together with: (i) all rights now or hereafter existing, belonging or pertaining thereto; (ii) all fixtures, now owned or hereafter acquired, that are located on the Property; (iii) all of the rights and benefits of Mortgagor under any present or future leases and agreements relating to the Property, or the use or occupancy thereof together with any extensions and renewals thereof, specifically excluding all duties or obligations of Mortgagor of any kind arising thereunder (the "Leases"); and (iv) all contracts, permits and licenses respecting the use, operation or maintenance of the Property.

1.5 Cross-Collateral and Future Advances. It is the express intention of the Mortgagor that this Mortgage secure payment and performance of all of the Obligations, whether now existing or hereinafter incurred by reason of future advances by the Bank or otherwise. Notice of the continuing grant of this Mortgage shall not be required to be stated on the face of any document evidencing any of the Obligations, nor shall such documents be required to otherwise specify that they are secured hereby.

2. Representations, Warranties, Covenants.

2.1 Representations and Warranties. Mortgagor represents and warrants that:

(a) (i) Mortgagor is a corporation duly organized and validly existing under the laws of Massachusetts, (ii) Mortgagor has all requisite capacity to own the Property and conduct its business as now conducted and as presently contemplated, to execute and deliver this Mortgage and convey the Property as contemplated hereby and to grant the security interests and assignment of Leases contained herein,

(iii) the execution, delivery and performance of this Mortgage have been authorized by all necessary proceedings of the Mortgagor and do not contravene any provision of any law, rule or regulation applicable to Mortgagor or any agreement, instrument, order or undertaking binding on Mortgagor or by which the Property is bound or affected, (iv) this Mortgage has been duly executed and delivered by Mortgagor and is the legal, valid and binding obligation of Mortgagor enforceable in accordance with its terms except as limited by bankruptcy, insolvency, reorganization, moratorium and other laws affecting the enforcement of creditors' rights generally;

(b) Mortgagor is the sole legal and equitable owner of the Property, holding good and marketable fee simple title to the Property, subject to no liens, encumbrances, leases, security interests or rights of others except as set forth in the title insurance policy issued by Ticor Title Insurance Company of even date in favor of Mortgagee;

(c) Mortgagor is the sole legal and equitable owner of the entire lessor's interest in the Leases and Mortgagor has not executed any other assignment of the Leases or any of the rights or rents arising thereunder; and

(d) Each Obligation is a commercial obligation and does not represent a loan used for personal, family or household purposes and is not a consumer transaction, or to Mortgagor's knowledge otherwise subject to the provisions of M.G.L. Chapter 140D, the Federal Truth in Lending Act or Federal Reserve Board Regulation Z, or other consumer statutes or regulations and restrictions.

2.2 Recording: Further Assurances. Mortgagor covenants that it shall, at its sole cost and expense and upon the request of the Bank, cause this Mortgage, and each amendment, modification or supplement hereto, to be recorded and filed in such manner and in such places, and shall at all times comply with all such statutes and regulations, as may be required by law in order to establish, preserve and protect the interest of the Bank in the Property and the rights of the Bank under this Mortgage. Upon the written request of the Bank, and at the sole expense of Mortgagor, the Mortgagor will promptly execute and deliver such further instruments and documents and take such further actions as the Bank may deem desirable to obtain the full benefits of this Mortgage and of the rights and powers herein granted, including, without limitation, filing any financing statement under the Uniform Commercial Code, and obtaining any consents or estoppel certificates of lessees under the Leases that the Bank deems appropriate. Mortgagor authorizes the Bank to file any such financing statement without the signature of the Mortgagor to the extent permitted by applicable law, and to file a copy of this Agreement in lieu of a financing statement.

2.3 Restrictions on Mortgagor. Mortgagor covenants that it will not, directly or indirectly, without the prior written approval of the Bank in each instance:

(a) Sell, convey, assign, transfer, mortgage, pledge, hypothecate or dispose of all or any part of any legal or beneficial interest in the Property or any part thereof or permit any of the foregoing, except as expressly permitted by the terms of this Mortgage; or

(b) Permit to be created or suffer to exist any mortgage, lien, security interest, attachment, or other encumbrance or charge on the Property or any part thereof or interest therein, including, without limitation, (i) any lien arising under any federal, state or local statute, rule, regulation or law pertaining to the release or clean-up of Hazardous Substances and (ii) any mechanics' or materialmen's lien, except as permitted by the Loan Agreement of even date herewith between Mortgagor and Bank. Mortgagor further agrees to give the Bank prompt written notice of the imposition of any lien referred to in this Section 2.3(b) and to take any action necessary to secure the prompt discharge or release of the same. Mortgagor agrees to defend its title to the Property and the Bank's interest therein against the claims of all persons and, unless the Bank requests otherwise, to appear in and diligently contest, at Mortgagor's sole cost and expense, any action or proceeding which purports to affect Mortgagor's title to the Property or the priority or validity of this Mortgage or the Bank's interest hereunder.

2.4 Operation of Property. Mortgagor covenants and agrees as follows:

(a) Mortgagor will not permit the Property to be used for any unlawful or improper purpose, will at all times comply with all federal, state and local laws, ordinances and regulations, and will obtain and maintain all governmental or other approvals, relating to Mortgagor, the Property or the use thereof, including without limitation, any applicable zoning or building codes or regulations and any laws or regulations relating to the handling, storage, release or clean-up of Hazardous Substances, and will give prompt written notice to the Bank of (i) any violation of any such law, ordinance or regulation by Mortgagor or relating to the Property, (ii) receipt of notice from any federal, state or local authority alleging any such violation and (iii) the release on the Property of any Hazardous Substances. As used in this Mortgage, the term "Hazardous Substances" shall mean any oil or other material or substance constituting hazardous waste or hazardous materials or substances under any applicable federal or state law, regulation or rule;

(b) Mortgagor will at all times keep the Property insured for such losses or damage, for such periods and amounts, on such terms and by such companies as may be required by law or which the Bank may from time to time reasonably require. All policies regarding such insurance shall name the Bank as mortgagee, loss payee and additional insured, and provide that no cancellation or

material modification of such policies shall occur without fifteen days prior written notice to the Bank. Mortgagor will furnish to the Bank upon request such copies of original policies, certificates of insurance, or other evidence of the foregoing as is acceptable to the Bank;

(c) Mortgagor will not enter into or modify the Leases without the prior written consent of the Bank, such consent not to be unreasonably withheld or delayed. Mortgagor may consent to a sublease under or the assignment of any Lease upon written notice to the Bank, provided that Mortgagor does not release the lessee from liability. Mortgagor will not accept any rentals under any Lease for more than one month in advance, and will at all times perform and fulfill every term and condition of the Leases;

(d) Mortgagor will at all times (i) maintain accurate records and books regarding the Property in accordance with generally accepted accounting principles; (ii) permit the Bank and the Bank's agents, employees and representatives, at such reasonable times as the Bank may request, to enter and inspect the Property and such books and records; and (iii) promptly upon request provide to the Bank such financial statements and information regarding Mortgagor, the Property and the Leases as the Bank may request;

(e) Mortgagor will at all times keep the Property in good and first rate repair and condition (reasonable wear and tear excepted but damage from casualty not excepted) and will not commit or permit any strip, waste, impairment, deterioration or alteration of the Property or any part thereof; and

(f) Mortgagor shall comply with, and not modify the terms and conditions of, any prior mortgage affecting the Property or any note or other obligation secured thereby and shall not permit the holder of any such prior mortgage to advance any additional sums pursuant to such mortgage which would constitute a lien superior to the lien of this Mortgage except with the prior written consent of the Bank.

2.5 Payments. The Mortgagor covenants to pay when due:

(a) All federal, state or other taxes, betterment assessments and other governmental levies, water rates, sewer charges, insurance premiums, and other charges on the Property, this Mortgage or any Obligation secured hereby or that could, if unpaid, result in a lien on the Property or on any interest therein; and

(b) All amounts when due under the Note and each other instrument evidencing, securing or relating to any of the Obligations and under any agreement to which Mortgagor is a party or by which Mortgagor is bound, including without limitation, any mortgage encumbering the Property.

Mortgagor shall have the right to contest any notice, lien, encumbrance, claim, tax, charge, betterment assessment or premium filed or asserted against or relating to the Property; provided that it contests the same diligently and in good faith and by proper proceedings and, at the Bank's request, provides the Bank with adequate security, in the Bank's reasonable judgment, against the enforcement thereof. Mortgagor shall furnish to the Bank the receipted real estate tax bills or other evidence of payment of real estate taxes for the Property within ten (10) days prior to the date from which interest or penalty would accrue for nonpayment thereof as well as evidence of all other payments referred to above within fifteen (15) days after written request therefor by the Bank. If the Mortgagee fails to furnish such evidence of payment then the Bank may, at the Mortgagor's expense, apply for and obtain municipal lien certificates, and other evidence of real estate tax payments.

2.6 Notices: Notice of Default. Mortgagor will deliver to the Bank, promptly upon receipt of the same, copies of all notices or other documents it receives that materially affect the Property or its use or claim that the Mortgagor is in default in the performance or observance of any of the terms hereof or that the Mortgagor or any tenant is in default of any terms of the Leases. The Mortgagor further agrees to deliver to the Bank written notice promptly upon the occurrence of any Event of Default hereunder, or event which with the giving of notice or lapse of time or both would constitute an Event of Default.

3. Takings. In case of any condemnation for public use of, or any damage by reason of the action of any public or governmental entity or authority to, all or any part of the Property (a "Taking"), or the commencement of any proceedings or negotiations that might result in a Taking, Mortgagor shall promptly give written notice to the Bank, describing the nature and extent thereof. The Bank may, at its option, appear in any proceeding for a Taking or any negotiations relating to a Taking and Mortgagor shall promptly give to the Bank copies of all notices, pleadings, determinations and other papers relating thereto. The Mortgagor shall in good faith and with due diligence and by proper proceedings file and prosecute its claims for any award or payment on account of any Taking. The awards of damages on account of any Taking shall be paid to the Mortgagor. Such awards shall be applied to or toward the restoration (within a reasonable time) of that part of the Property that remains or towards the Obligations.

4. Insurance Proceeds. Mortgagor shall have the right to apply the proceeds of any insurance resulting from any loss with respect to the Property to repair (within a reasonable time) the damaged part of the Property. Any excess insurance proceeds shall be applied to the Obligations in such order as the Bank may determine.

5. Certain Rights of Bank.

5.1 Advances. If Mortgagor fails to pay or perform any of its obligations hereunder then, after 10 days notice (except in an emergency) to Mortgagor, the Bank may in its sole discretion do so. Such payments may include, but are not limited to, payments for taxes, assessments and other governmental levies, water rates, insurance premiums, maintenance, repairs or improvements constituting part of the Property. Notwithstanding the foregoing, the Bank shall not make any payment described in Section 2.5 so long as the Mortgagor is then in compliance with that Section and no Event of Default exists.

5.2 Legal Proceedings. The Bank shall have the right, but not the duty, to intervene or otherwise participate in any legal or equitable proceeding that, in the Bank's reasonable judgment, might affect the Property or any of the rights created or secured by this Mortgage. The Bank shall have such right whether or not there shall have occurred an Event of Default hereunder.

6. Defaults and Remedies.

6.1 Events of Default. Any Event of Default under and as defined in the Loan Agreement between the Bank and Mortgagor dated as of the date hereof shall constitute an "Event of Default" under this Mortgage.

6.2 Remedies. On the occurrence of any Event of Default the Bank may, at any time thereafter, at its option and, to the extent permitted by applicable law, without notice, exercise any or all of the following remedies:

(a) Declare the Obligations due and payable, and the Obligations shall thereupon become immediately due and payable, without presentment, protest, demand or notice of any kind, all of which are hereby expressly waived by Mortgagor;

(b) Take possession of the Property (including all records and documents pertaining thereto) and exclude Mortgagor therefrom, and operate the Property as a mortgagee in possession with all the powers as could be exercised by a receiver or as otherwise provided herein or by applicable law;

(c) Receive and collect all rents, income and profits from the Property, including as may arise under the Leases, and Mortgagor appoints the Bank as its true and lawful attorney with the power for the Bank in its own name and capacity to demand and collect such rents, income and profits and take any action that Mortgagor is authorized to take under the Leases. Lessees under the Leases are hereby authorized and directed, following notice from the Bank, to pay all amounts due Mortgagor under the Leases to the Bank, whereupon such lessees shall be

relieved of any and all duty and obligation to Mortgagor with respect to such payments so made;

(d) Sell the Property or any part thereof or interest therein pursuant to exercise of its STATUTORY POWER OF SALE or otherwise at public auction on terms and conditions as the Bank may determine or otherwise foreclose this Mortgage in any manner permitted by law, and upon such sale, Mortgagor shall execute and deliver such instruments as the Bank may request in order to convey and transfer all of Mortgagor's interest in the Property, and the same shall operate to divest all rights, title and interest of Mortgagor in and to the Property. In the event this Mortgage shall include more than one parcel of property or subdivision (each hereinafter called a "portion"), the Bank shall, in its sole and exclusive discretion, be empowered to foreclose upon any such portion without impairing its right to foreclose subsequently upon any other portion or the entirety of the Property from time to time thereafter;

(e) Cause one or more environmental assessments to be taken, arrange for the clean-up of any Hazardous Substances, or otherwise cure Mortgagor's failure to comply with any statute, regulation or ordinance relating to the presence or clean-up of Hazardous Substances; provided that the exercise of any of such remedies shall not be deemed to have relieved Mortgagor from any responsibility therefor or given the Bank "control" over the Property or cause the Bank to be considered to be a mortgagee in possession, "owner" or "operator" of the Property for purposes of any applicable law, rule or regulation pertaining to Hazardous Substances; and

(f) Take such other actions or proceedings as the Bank deems necessary or advisable to protect its interest in the Property and ensure payment and performance of the Obligations including, without limitation, appointment of a receiver (and Mortgagor hereby waives any right to object to such appointment) and exercise of any of the Bank's remedies provided in the Note or in any document evidencing, securing or relating to any of the Obligations or available to a secured party under the Uniform Commercial Code of Massachusetts or under other applicable law.

This Mortgage is upon the STATUTORY CONDITION, for any breach of which the Bank shall have the STATUTORY POWER OF SALE and any other remedies provided by applicable law including, without limitation, the right to pursue a judicial sale of the Property or any portion thereof by deed, assignment or otherwise. Mortgagor agrees and acknowledges that the acceptance by the Bank of any payments from Mortgagor after the occurrence of any Event of Default, the exercise by the Bank of any remedy set forth herein or the commencement of foreclosure proceedings against the Property shall not waive the Bank's right to foreclose or operate as a bar or estoppel to the exercise of any other rights or remedies of the Bank. Mortgagor agrees and acknowledges that the Bank, by making

payments or incurring costs described herein, shall be subrogated to any right of Mortgagor to seek reimbursement from any third parties including without limitation, any predecessor in interest to Mortgagor's title or other party who may be responsible under any law, regulation or ordinance relating to the presence or clean-up of Hazardous Substances.

6.3 Cumulative Rights and Remedies. All of the foregoing rights, remedies and options are cumulative and in addition to any rights the Bank might otherwise have, whether at law or by agreement and may be exercised separately or concurrently. Mortgagor further agrees that the Bank may exercise any or all of its rights or remedies set forth herein without having to pay Mortgagor any sums for use or occupancy of the Property.

6.4 Mortgagor's Waiver of Certain Rights. To the extent permitted by applicable law, Mortgagor hereby waives the benefit of all present and future laws (i) providing for any appraisal before sale of any portion of the Property or (ii) in any way extending the time for the enforcement of the collection of the Obligations or creating or extending a period of redemption from any sale made hereunder.

7. Miscellaneous.

7.1 Payments by the Bank. To the extent permitted by applicable law, Mortgagor shall pay to the Bank, on demand, all reasonable expenses, (including reasonable attorneys' fees and expenses and reasonable consulting, accounting, appraisal, brokerage and similar professional fees and charges) actually incurred by the Bank, in connection with the Bank's exercise, preservation or enforcement of any of its rights, remedies and options set forth in this Mortgage (including without limitation any amounts expended pursuant to Sections 5.1 and 6.2(e) hereof) and in connection with any litigation, proceeding or dispute whether arising hereunder or otherwise relating to the Obligations, together with interest thereon to the extent permitted by applicable law until paid in full by Mortgagor at a rate per annum equal to three percent (3 %) above the rate of interest per annum announced from time to time by The First National Bank of Boston at its head office as its Base Rate. Any amounts owed by Mortgagor hereunder shall be, until paid, part of the Obligations, and the Bank shall be entitled, to the extent permitted by law, to receive and retain such amounts in any action for a deficiency against or redemption by the Mortgagor, or any accounting for the proceeds of a foreclosure sale or of insurance proceeds. All references to "attorneys" in this Section 7 and elsewhere in this Mortgage shall include without limitation any attorney or law firm engaged by the Bank and the Bank's in-house counsel, and all references to "fees and expenses" in this Mortgage shall include without limitation any fees of such attorney or law firm and any allocated charges and allocation costs of the Bank's in-house counsel. The obligations of Mortgagor under this Section 7.1 shall survive any payment or satisfaction of any of the other Obligations.

7.2 No Waiver or Release. No failure of the Bank to exercise or delay by the Bank in exercising any right or remedy or option provided for herein or otherwise shall be deemed to be a waiver of that right, remedy or option or of any other right, remedy or option. No sale of all or any of the Property, no forbearance on the part of the Bank, no release or partial release of any of the Property, and no extension of the time for the payment of the whole or any part of any of the obligations or any other indulgence given by the Bank to the Mortgagor or any other person or entity, shall operate to release or in any manner affect the lien of this Mortgage or the original liability of the Mortgagor except to the extent specifically provided in any written instrument signed by the Bank accomplishing any of the foregoing. Notice of any such extensions or indulgences is waived by the Mortgagor. This Mortgage may not be waived, changed or discharged orally, but only by an agreement in writing signed by the Bank, and any oral waiver, change or discharge of any provision of this Mortgage shall be without authority and of no force and effect. A waiver on any one occasion shall be limited to its express terms and conditions and the circumstances giving rise to such waiver and shall not be construed to be a bar to or waiver of any right on any future occasion.

7.3 Notices. Any notice or other communication hereunder to any party hereto shall be by telegram, teletype, telex, delivery in hand or by courier, or registered or certified mail (return receipt requested) and shall be deemed to have been given or made when telegraphed, telexed, telecopied (and confirmed received), delivered in hand or by courier, or three days after being deposited in the mails, postage prepaid, registered or certified, addressed to each party as follows (or at any other address that such party may hereafter specify to the other parties in writing):

(a) If to the Bank:

The First National Bank of Boston
100 Federal Street
Boston, Massachusetts 02110
Attn: Ms. Sharon A. Stone, Director
Telecopier No. (617) 434-4048

with a copy to:

Arlene L. Bender, Esq.
Foley, Hoag & Eliot
One Post Office Square
Boston, Massachusetts 02109
Telecopier No. (617) 482-7347

(b) If to the Mortgagor:

Six Shattuck Road
Andover, Massachusetts 01810
Attn: Mr. Robert F. O'Brien, Treasurer
Telecopier No.

with a copy to:

Richard S. Chute, Esq.
Hill & Barlow
One International Place
Boston, Massachusetts 02110
Telecopier No. (617) 439-3580

7.4 Mortgagor's Waivers. Mortgagor waives presentment, demand, notice, protest, and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Mortgage (except for such demands and notices as are specifically required to be provided to Mortgagor under this Mortgage) and assents to any extension or postponement of the time of payment or performance or any other indulgence with respect to any of the Obligations, to any substitution, exchange or release of any collateral for any of the Obligations and/or to the addition or release of any other party or person primarily or secondarily liable hereunder or in connection with any of the Obligations.

7.5 Entire Agreement; Severability; Captions. The terms and conditions of this Mortgage constitute the entire agreement, and supersede all prior agreements and understandings, both written and oral, with respect to the subject matter hereof. The invalidity of any provisions of this Mortgage shall in no way affect the validity of any other provision hereof. The failure of the Bank to perfect its lien on or security interest in any of the Property shall not affect its rights in the remainder of the Property. Section and subsection captions are for convenience of reference only, are not a part of this Mortgage and shall not affect the interpretation hereof.

7.6 Successors. This Mortgage shall be binding upon each of the parties executing this Mortgage and their respective successors, administrators and assigns, and shall inure to the benefit of the parties hereto and the successors and assigns of the Bank. The term "Bank" shall include any subsequent holder of this Mortgage by assignment or otherwise.

7.7 Joint and Several Liability. If more than one party executes this Mortgage the term "Mortgagor" shall mean each and every one of them, and each of them shall be jointly and severally liable hereunder.

7.8 Governing Law Jurisdiction. This Mortgage shall take effect as a contract executed under seal and shall be interpreted in accordance with and governed by the laws of The Commonwealth of Massachusetts (other than its rules governing choice or conflicts of laws). Each party signing this Mortgage submits to personal jurisdiction in The Commonwealth of Massachusetts and waives any and all rights to object to such jurisdiction. Each such party agrees that service of process may be made and personal jurisdiction obtained by serving Mortgagor at any location provided in Section 7.3 hereof.

7.9 JURY WAIVER. THE BANK (BY ITS ACCEPTANCE OF THIS MORTGAGE) AND THE MORTGAGOR AGREE THAT NEITHER OF THEM, INCLUDING ANY ASSIGNEE OR SUCCESSOR SHALL SEEK A JURY TRIAL IN ANY LAWSUIT, PROCEEDING, COUNTERCLAIM, OR ANY OTHER LITIGATION PROCEDURE BASED UPON, OR ARISING OUT OF, THIS MORTGAGE, ANY RELATED INSTRUMENTS, ANY COLLATERAL OR THE DEALINGS OR THE RELATIONSHIP BETWEEN OR AMONG ANY OF THEM. NEITHER THE BANK NOR THE MORTGAGOR SHALL SEEK TO CONSOLIDATE ANY SUCH ACTION WITH ANY OTHER ACTION IN WHICH A JURY TRIAL CANNOT BE OR HAS NOT BEEN WAIVED. THE PROVISIONS OF THIS PARAGRAPH HAVE BEEN FULLY DISCUSSED BY THE BANK AND THE MORTGAGOR, AND THESE PROVISIONS SHALL BE SUBJECT TO NO EXCEPTIONS. NEITHER THE BANK NOR THE MORTGAGOR HAS AGREED WITH OR REPRESENTED TO THE OTHER THAT THE PROVISIONS OF THIS PARAGRAPH WILL NOT BE FULLY ENFORCED IN ALL INSTANCES.

EXECUTED under seal as of the date first above written.

MORTGAGOR:

MKS INSTRUMENTS, INC.

By: _____

Title: _____

Suffolk, ss.

November __, 1993

Then personally appeared the above named _____ of
MKS Instruments, Inc., and acknowledged that the foregoing is the free act and
deed of said corporation, before me,

Notary Public
Name:
My commission expires:

AGREEMENT REGARDING LOST PROMISSORY NOTES

In consideration of the execution and delivery to the First National Bank of Boston (the "Bank") by MKS Instruments, Inc. (the "Company") of replacement notes with respect to the Term Note dated November 1, 1993 in the principal amount of \$10,000,000 payable to the order of the Bank and the Demand Revolving Credit Note dated November 1, 1993 in the principal amount of \$7,000,000 payable to the order of the Bank (the "Original Notes"), the Bank and the Company hereby agree as follows:

1. The Bank has been unable to locate the Original Notes, which were delivered by the Company to the Bank on November 1, 1993. The Bank has made or caused to be made diligent efforts to find and recover the Original Notes, but has been unable to do so, and accordingly believes the Original Notes are lost or misplaced.

2. The Bank is, and has been, the rightful and unconditional owner of the Original Notes at all times since issuance of the Original Notes to it on November 1, 1993. The Original Notes have not been endorsed by the Bank for transfer or sold, assigned, pledged, hypothecated, transferred, or deposited under any agreement by the Bank, and no instrument or document authorizing such transfer, sale, assignment, pledge, hypothecation, or deposit of the Original Notes has been executed by or on behalf of the Bank.

3. The Bank agrees that if the Original Notes shall ever be found to be in the custody and control of the Bank or recovered by the Bank, the Bank will immediately and without consideration surrender the Original Notes to the Company or its successor for cancellation.

4. The Bank agrees to indemnify and hold harmless the Company and its successors and assigns (collectively, "Indemnitees") from and against any and all liability, obligation, loss, damage and expense (including reasonable attorneys' fees) arising from or on account of the sale, assignment, transfer, hypothecation, pledge or other disposition of the Original Notes, by operation of law or otherwise, by or for the Bank to any person other than the Company. The Company agrees (i) that it will give prompt notice to the Bank upon presentation to the Company of either Original Note or after receiving a claim in writing against it of any claim against it as to which recovery may be sought against the Bank under the foregoing indemnity and (ii) if such claim shall arise from the claim of a third party, that it will permit the Bank to assume the defense of any such claim or any litigation resulting from such claim. If the Bank assumes the defense of such claim or any litigation resulting therefrom, the obligations of the Bank hereunder as to such claim shall be to take all steps that the Bank in its sole discretion deems necessary in the defense, compromise or settlement of such claim or litigation and to pay or reimburse the Company for the amount of any settlement approved by the Bank or any judgment in connection with such claim or litigation and all costs and expenses of the Company associated therewith. The Company shall cooperate fully to make available to the Bank, at the

Bank's expense, all pertinent information and witnesses under its control. A final determination of any such action, suit, proceeding, claim, demand or assessment through legal proceedings shall be binding and conclusive upon the parties hereto as to the validity or invalidity, as the case may be, of such claim against the Bank.

5. The Bank agrees to keep this Agreement as an official record of the Bank and to maintain a copy of this Agreement in the loan file for the Company.

6. The Bank represents and warrants that this Agreement has been duly authorized by all necessary action on the part of the Bank.

IN WITNESS WHEREOF, the undersigned have executed this Agreement under seal as of the ___ day of March, 1994.

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

MKS INSTRUMENTS, INC.

By: _____

Title: _____

MKS INSTRUMENTS, INC.

FIRST AMENDMENT

TO LOAN AGREEMENT

This First Amendment (this "Amendment") dated as of June 30, 1994 amends the Loan Agreement dated as of November 1, 1993 (the "Loan Agreement"), between MKS INSTRUMENTS, INC. (the "Borrower") and THE FIRST NATIONAL BANK OF BOSTON (the "Bank"). Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower and the Bank have executed the Loan Agreement providing for a revolving credit facility for borrowings by the Borrower in amounts up to \$7,000,000; and

WHEREAS, the Borrower has requested, and the Bank has agreed, to extend the maturity of the credit facilities for an additional one-year period, on the terms and conditions set forth below;

NOW, THEREFORE, the Bank and the Borrower agree as follows:

Section 1. Amendment to the Loan Agreement. Section 1.1.46 of the Loan Agreement is hereby amended by deleting the date "June 30, 1994" appearing therein in the definition of "Revolver Termination Date" and substituting therefor the date "June 30, 1995".

Section 2. Representations and Warranties. The Borrower hereby represents and warrants as follows:

(a) The execution and delivery of this Amendment and the performance of this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of

the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 3. Conditions to Effectiveness. The effectiveness of this Amendment is conditioned on the following:

(a) the Borrower and the Bank shall each have executed and delivered a counterpart of this Amendment;

(b) the representations and warranties contained in Article V of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof; and

(c) no Default or Event of Default under the Loan Agreement shall have occurred and is continuing.

Section 4. Miscellaneous.

(a) On and after the date hereof, each reference in the Loan Agreement to "this Agreement" or words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of The Commonwealth of Massachusetts.

(d) This Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

IN WITNESS WHEREOF, the parties have caused this Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

MKS INSTRUMENTS, INC.

SECOND AMENDMENT

TO LOAN AGREEMENT

This Second Amendment (this "Amendment") dated as of October 27, 1994 amends the Loan Agreement dated as of November 1, 1993, as amended by the First Amendment dated as of June 30, 1994 (as so amended, the "Loan Agreement"), between MKS INSTRUMENTS, INC. (the "Borrower") and THE FIRST NATIONAL BANK OF BOSTON (the "Bank"). Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower and the Bank have executed the Loan Agreement providing for the Term Loan in the original principal amount of \$10,000,000; and

WHEREAS, the Borrower has requested, and the Bank has agreed, to amend the interest rate applicable to the Term Loan from time to time, and modify certain of the provisions with respect to the payment of interest thereon, on the terms and conditions set forth below;

NOW, THEREFORE, the Bank and the Borrower agree as follows:

Section 1. Amendments to the Agreement.

(a) Section 2.5 of the Loan Agreement is hereby amended by deleting the phrase "30, 60, 90, 120, 150 or 180 days" and substituting therefor the phrase "one, two, three, four, five or six months".

(b) Section 3.2 of the Loan Agreement whereby amended as follows:

(1) by deleting Section 3.2.1(i) and replacing it with the following:

"(i) During any period in which the Borrower maintains a Cash Flow Ratio in excess of 1.35 to 1 but less than 1.75 to 1 and a Debt-to-Net Worth Ratio in excess of 1.35 to 1:

- (a) the LIBOR Rate plus 1.75% or
- (b) the Long Term Funds Rate plus 1.75%."; and

(2) adding new a Section 3.2.1(iii) as follows:

"(iii) During any period in which the Borrower maintains a Cash Flow Ratio in excess of 1.75 to 1 and a Debt-to-Net Worth Ratio not in excess of 1.35 to 1:

- (a) the LIBOR Rate plus 1.40% or
- (b) the Long Term Funds Rate plus 1.40%."

(c) Section 3.2.4 of the Loan Agreement is hereby amended by deleting the phrase "30, 60, 90, 120, 150 or 180 days" and substituting therefor the phrase "one, two, three, four, five or six months".

Section 2. Representations and Warranties.

(a) The execution and delivery of this Amendment and the performance of this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 3. Conditions to Effectiveness. The effectiveness of this Amendment is conditioned on the following:

(a) the Borrower and the Bank shall each have executed and delivered a counterpart of this Amendment;

(b) the representations and warranties contained in Article V of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof; and

(c) no Default or Event of Default under the Loan Agreement shall have occurred and is continuing.

Section 4. Miscellaneous.

(a) On and after the date hereof; each reference in the Loan Agreement to "this Agreement" or words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof; and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of The Commonwealth of Massachusetts.

(d) This Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

IN WITNESS WHEREOF, the parties have caused this Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

MKS INSTRUMENTS, INC.

THIRD AMENDMENT

TO LOAN AGREEMENT

This Third Amendment (this "Amendment") dated as of June 30, 1995 amends the Loan Agreement dated as of November 1, 1993, as amended (the "Loan Agreement"), between MKS INSTRUMENTS, INC. (the "Borrower") and THE FIRST NATIONAL BANK OF BOSTON (the "Bank"). Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower and the Bank have executed the Loan Agreement providing for a revolving credit facility for borrowings by the Borrower in amounts up to \$7,000,000; and

WHEREAS, the Borrower has requested, and the Bank has agreed, to extend the maturity of the credit facilities for an additional ninety (90) day period, on the terms and conditions set forth below;

NOW, THEREFORE, the Bank and the Borrower agree as follows:

Section 1. Amendment to the Loan Agreement. Section 1.1.46 of the Loan Agreement is hereby amended by deleting the date "June 30, 1995 appearing therein in the definition of "Revolver Termination Date" and substituting therefore the date "September 30, 1995".

Section 2. Representations and Warranties. The Borrower hereby represents and warrants as follows:

(a) The execution and delivery of this Amendment and the performance of this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby

or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 3. Conditions to Effectiveness. The effectiveness of this Amendment is conditioned on the following:

(a) the Borrower and the Bank shall each have executed and delivered a counterpart of this Amendment;

(b) the representations and warranties contained in Article V of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof; and

(c) no Default or Event of Default under the Loan Agreement shall have occurred and is continuing.

Section 4. Miscellaneous.

(a) On and after the date hereto, each reference in the Loan Agreement to "this Agreement" or words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of The Commonwealth of Massachusetts.

(d) This Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

IN WITNESS WHEREOF, the parties have caused this Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

July 27, 1995

MKS Instruments, Inc.
Six Shattuck Road
Andover, MA 01810

Attention: Robert F. O'Brien, Treasurer

Ladies and Gentlemen:

WHEREAS, MKS Instruments, Inc. a Massachusetts corporation ("Borrower") and The First National Bank of Boston ("Lender") are parties to that certain Loan Agreement dated November 1, 1993, as amended (the "Loan Agreement"); and

WHEREAS, Borrower has signed a letter of intent dated May 17, 1995 (the "Letter of Intent") which sets forth Borrower's intention to acquire through merger UTI Instruments Company ("UTI"); and

WHEREAS, Borrower has requested a waiver of Section 8.1(b) of the Loan Agreement which restricts mergers to allow Borrower, or a wholly-owned subsidiary of Borrower, to merge with UTI pursuant to the terms of the Letter of Intent, and Lender has agreed to do so as set forth herein;

NOW, THEREFORE, the Bank hereby waives compliance with Section 8.1(b) of the Loan Agreement to permit the merger of Borrower, or a wholly-owned subsidiary of Borrower, with UTI pursuant to the terms of the Letter of Intent. This waiver is subject to Borrower, or a wholly-owned subsidiary of Borrower, completing the merger with UTI on or before September 30, 1995.

This waiver herein given shall not operate as a waiver of any other Default or Event of Default, if any, now existing or hereafter arising. Borrower represents that as of the date hereof all of the representations and warranties set forth in Article V of the Loan Agreement are true and correct.

In consideration of the foregoing, Borrower acknowledges that it has no claims, counterclaims, offsets, or defenses against Lender with respect to the Loan Agreement or otherwise.

IN WITNESS WHEREOF, Lender has caused this document to be executed as a document under seal by its duly authorized officer as of this 27th day of July, 1995.

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

ASSENTED TO:

MKS INSTRUMENTS

By: _____

Title: _____

Date: _____

September 25, 1995

MKS Instruments, Inc.
Six Shattuck Road
Andover, MA 01810

RE Loan Agreement dated November 1, 1993 by and between MKS
Investments, Inc. a Massachusetts corporation ("Borrower") and
The First National Bank of Boston ("Lender")

Attention: Robert F. O'Brien, Treasurer

Ladies and Gentlemen:

In a letter dated July 27, 1995 the Lender agreed, provided the merger was completed on or before September 30, 1995, to waive Section 8.1 (b) to allow the Borrower to merge with UTI Instruments Company.

The Borrower has requested that the Lender extend the time period for completion of the merger from September 30, 1995 to October 31, 1995 and the Lender hereby so agrees.

This waiver herein given shall not operate as a waiver of any other Default or Event of Default, if any, now existing or hereafter arising. The Borrower represents that as of the date hereof all of the representations and warranties set forth in Article V of the Loan Agreement are true and correct.

In consideration of the foregoing, Borrower acknowledges that it has no claims, counterclaims, offsets, or defenses against Lender with respect to the Loan Agreement or otherwise.

IN WITNESS WHEREOF, Lender has caused this document to be executed as a document under seal by its duly authorized officer as of this 25th day of September, 1995.

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

ASSENTED TO:

MKS INSTRUMENTS

By: _____

Title: _____

Date: _____

MKS INSTRUMENTS, INC.

FOURTH AMENDMENT

TO LOAN AGREEMENT

This Fourth Amendment (this "Amendment") dated as of September 30, 1995 amends the Loan Agreement dated as of November 1, 1993, as amended (the "Loan Agreement"), between MKS INSTRUMENTS, INC. (the "Borrower") and THE FIRST NATIONAL BANK OF BOSTON (the "Lender"). Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower and the Lender have executed the Loan Agreement providing for a revolving credit facility for borrowings by the Borrower in amounts up to \$7,000,000; and

WHEREAS, the Borrower has requested, and the Lender has agreed, to extend the maturity of the credit facilities on the terms and conditions set forth below;

NOW, THEREFORE, the Bank and the Borrower agree as follows:

Section 1. Amendment to the Loan Agreement.

(a) Section 1.1.46 of the Loan Agreement is hereby amended by deleting the date "September 30, 1995" appearing therein in the definition of "Revolver Termination Date" and substituting therefore the date "June 30, 1996".

(b) Section 1.1.34 of the Loan Agreement is hereby amended by adding "the Letter of Credit Agreements" after "the Notes,".

(c) Section 2.1 of the Loan Agreement is hereby amended by deleting the existing language and substituting the following:

2.1.1 Subject to the terms and conditions of this Agreement, the Lender hereby agrees to make Advances from time to time to the Borrower during the period from the date hereof to the Revolver Termination Date (or such earlier date on which the Lender shall have demanded payment of the Revolving Credit Note) in an aggregate outstanding amount not to exceed at any time \$7,000,000, less the face amount of outstanding Letters of Credit plus unpaid LC Draws (as defined in Section 2.1.2). The Lender shall have the absolute discretion to make such Advances as it deems appropriate and to demand repayment of Advances at any time. Each Advance shall, at the option of the Borrower, be a Base Rate Loan, a LIBOR Loan or a Money Market Rate Loan provided, however, that no LIBOR Loan or Money Market Rate Loan shall be made at any time in a principal amount of less than \$1,000,000.

2.1.2 Subject to the execution and delivery by the Borrower of a letter of credit application and agreement and related documents in form satisfactory to the Lender (each such "Letter of Credit Agreement"), and subject to the terms of this Agreement, the Lender agrees to issue for the account of the Borrower one or more standby letters of credit (the "Letters of Credit") from time to time, from and after the date hereof with expiration dates not later than the earlier of one year from the date of issuance or the Revolver Termination Date, provided the sum of the aggregate face amount of outstanding Letters of Credit plus unpaid LC Draws shall not exceed \$250,000 after giving effect to such issuance. The Lender shall have absolute discretion to issue such Letters of Credit. The Borrower shall pay to the Lender upon the issuance of each Letter of Credit, a Letter of Credit fee equal to 1.25% per annum of the face amount of such Letter of Credit (pro-rated for the number of days such Letter of Credit is outstanding). The Borrower shall also pay to the Lender, on demand from time to time, such fees and expenses as are customarily charged by the Bank in connection with the opening, amendment, negotiation and administration of each Letter of Credit. The Borrower shall pay the Lender for draws made on the Letters of Credit ("LC Draws") and other amounts relating to the Letters of Credit due from time to time in accordance with the Letter of Credit Agreements. If at any time the sum of the aggregate amount of Revolving Credit Loans plus the aggregate face amount of outstanding Letters of Credit and unpaid LC Draws shall exceed the Revolving Credit Loan, the Borrower shall immediately pay cash to the Lender in such amount as shall be necessary to eliminate such excess.

(d) Section 9.2 of the Loan Agreement is hereby amended by adding the following:

Upon the Revolver Termination Date, or the acceleration of the Revolving Credit Note, the Borrower hereby agrees to pay to the Lender an amount equal to the face amount of the then outstanding Letters of Credit, which amount shall be held by the Lender as cash collateral for all LC Draws. The Borrower hereby grants to the Bank a security interest in and pledge of such cash collateral to secure all such LC Draws and other Obligations relating to the Letters of Credit.

Section 2. Representations and Warranties. The Borrower hereby represents and warrants as follows:

(a) The execution and delivery of this Amendment and the performance of this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 3. Conditions to Effectiveness. The effectiveness of this Amendment is conditioned on the following:

(a) the Borrower and the Bank shall each have executed and delivered a counterpart of this Amendment;

(b) the representations and warranties contained in Article V of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof; and

(c) no Default or Event of Default under the Loan Agreement shall have occurred and is

Section 4. Miscellaneous.

(a) On and after the date hereof, each reference in the Loan Agreement to "this Agreement" or words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of The Commonwealth of Massachusetts.

(d) This Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

IN WITNESS WHEREOF, the parties have caused this Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

FIFTH AMENDMENT TO LOAN AGREEMENT

This Fifth Amendment to Loan Agreement is entered into as of the 31st day of October, 1995, by and between The First National Bank of Boston ("Lender") and MKS Instruments, Inc., a Massachusetts corporation ("Borrower").

WHEREAS, the Lender and the Borrower entered into a Loan Agreement as of November 1, 1993 and have subsequently amended such Loan Agreement (as amended, the "Loan Agreement");

WHEREAS, the Lender and the Borrower desire to amend the Loan Agreement;

NOW, THEREFORE, in consideration of the premises and for other good and valuable consideration, the adequacy and receipt of which are hereby acknowledged, the parties hereto hereby agree as follows:

1. The Loan Agreement is hereby amended by deleting Section 1.1.14. (the definition of Consolidated Operating Cash Flow) and replacing it with the following:

1.1.14. "Consolidated Operating Cash Flow" shall mean for any period, the net income (or loss) for such period (before extraordinary items and excluding the net income of any business entity that is not a Subsidiary has an ownership interest unless such net income shall have actually been received by such company in the form of cash distributions) of the Borrower and its Subsidiaries before deducting Interest Expense and taxes and after restoring thereto depreciation of real and personal property and leasehold improvements and amortization and after deducting cash taxes paid, Sub S distributions required to make shareholder tax payments, and capital expenditures incurred, provided that capital expenditures shall not include real estate purchases funded by debt.

2. The Loan Agreement is hereby amended by deleting Section 3.2.1. and replacing it with the following:

3.2.1. Borrower agrees to pay interest in respect of the unpaid principal amount of the Term Loan from the date of this Agreement until paid in full as follows. The Term Loan shall bear interest at the Base Rate unless Borrower desires to pay interest on all or a portion of the Term Loan at one of the following rates:

(i) During any period in which the Borrower maintains a Debt-to-Net Worth Ratio not in excess of 1.35 to 1:

(a) and a Cash Flow Ratio of from 1.35 to 1 to and including 1.75 to 1, the LIBOR Rate plus 1.60%;

(b) and a Cash Flow Ratio of from 1.76 to 1 to and including 2.0 to 1, the LIBOR Rate plus 1.30%

(c) and a Cash Flow Ratio of from 2.01 to 1 to and including 3.0 to 1, the LIBOR Rate plus 1.10%;

(d) and a Cash Flow Ratio in excess of 3.0 to 1, the LIBOR Rate plus .90%; or

(e) the Long Term Funds Rate plus 1.75%; or

(ii) During any period in which the Borrower maintains a Debt-to-Net Worth Ratio of 1.35 to 1 or more or a Cash Flow Ratio of less than 1.35 to 1:

(a) the LIBOR Rate plus 2.00%; or

(b) the Long Term Funds Rate plus 1.75%.

3. The Loan Agreement is hereby amended by adding the following clause (k) to Section 9.1 after clause (j) thereof;

(k) There shall occur any Event of Default under the Loan Agreement between the Borrower and the Lender dated as of October 31, 1995;

4. As hereby amended, the Loan Agreement is hereby ratified and confirmed.

IN WITNESS WHEREOF, the parties hereto have caused this Fifth Amendment to Loan Agreement to be executed as an agreement under seal as of the date first above written.

Witness: MKS INSTRUMENTS, INC.

_____ By: _____

Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

October 11, 1995

Robert F. O'Brien
Treasurer
MKS Instruments, Inc.
Six Shattuck Road
Andover, MA 01810

RE: Loan Agreement dated November 1, 1993, by and between MKS Instruments, Inc, a Massachusetts corporation ("Borrower") and The First National Bank of Boston ("Lender"), as amended.

Dear Bob:

The purpose of this letter is to confirm our discussion regarding MKS's potential acquisition of UTI Instruments Company, Inc ("UTI"). The Loan Agreement restricts the use of the proceeds of Advances to general working capital purposes, including acquisitions less than \$2,500,000 per annum. You have indicated that you plan to use the proceeds of Advances to temporarily fund the acquisition of UTI for an amount to exceed \$2,500,000. We hereby agree that the proceeds of Advances may temporarily fund the UTI acquisition with permanent funding to be in place on or before March 31, 1996. This agreement is subject to satisfactory review of the Merger Agreement between MKS Instruments, Inc. and UTI Instruments Company, Inc.

All other terms and conditions of the Loan Agreement shall remain in full force and effect, including, without limitation, the Lender's absolute discretion to make Advances and to demand repayment of Advances at any time.

Nothing contained in this letter shall operate as a waiver of any other Default or Event of Default, if any, now existing or hereafter arising. The Borrower represents that as of the date hereof all of the representations and warranties set forth in Article V of the Loan Agreement are true and correct.

In consideration of the foregoing, Borrower acknowledges that it has no claims, counterclaims, offsets, or defenses against Lender with respect to the Loan Agreement or otherwise.

If the foregoing correctly states our understanding, please sign the enclosed copy of this letter where indicated.

Very truly yours,

THE FIRST NATIONAL BANK OF
BOSTON

By: _____
Sharon A. Stone, Director

ASSENTED TO AND ACCEPTED this ____ day of October:

MKS INSTRUMENTS, INC.

By: _____

Title: _____

MKS INSTRUMENTS, INC.

SIXTH AMENDMENT

TO LOAN AGREEMENT

This Sixth Amendment (the "Amendment") dated as of February 23, 1996 amends the Loan Agreement dated as of November 1, 1993, as amended (the "Loan Agreement"), between MKS Instruments, Inc. (the "Borrower") and The First National Bank of Boston (the "Lender"). Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower, the Lender and Chemical Bank shall enter into a loan agreement (the "1996 Loan Agreement") on the date hereof; and

WHEREAS, the Lender and the Borrower agree that certain terms of the Loan Agreement should be made consistent with similar terms in the 1996 Loan Agreement;

NOW, THEREFORE, the Lender and the Borrower agree as follows:

Section 1. Amendment to the Loan Agreement.

(a) Section 4.2.2. of the Loan Agreement is hereby amended by deleting the existing language and substituting the following:

4.2.2. The Lender will notify the Borrower of any event occurring after the date of this Agreement that will entitle the Lender to any additional payment under this Section 4.2 as promptly as practicable. The Lender will furnish to the Borrower with such notice a certificate signed by an officer of the Lender certifying that the Lender is entitled to payment under this Section 4.2 and setting forth the basis (in reasonable detail) and the amount of each request by the Lender for any additional payment pursuant to this Section 4.2. Such certificate shall be conclusive in the absence of manifest error. The Borrower shall not be obligated to compensate the Lender pursuant to this Section for amounts accruing prior to the date that is 180 days before the Lender notifies the Borrower of its obligations to compensate the Lender for such amounts.

(b) Sections 7.1(a) and 7.1(c) of the Loan Agreement are hereby amended by replacing the word "sixty" in each with the word "forty-five".

(c) Section 8.1(b) of the Loan Agreement is hereby amended by deleting the existing language and substituting the following:

8.1(b) Mergers, Etc. Neither the Borrower nor any subsidiary will consolidate with or merge into any other Person or permit any other Person to consolidate with or merge into it, or acquire all or substantially all of the assets of any Person, or sell, assign, lease or otherwise dispose of (whether in one transaction or in a series of transactions) all or substantially all of its assets to any Person, except that

(1) a Subsidiary may consolidate with or merge into the Borrower or another Subsidiary; and

(2) the Borrower or any of its Subsidiaries may acquire all or substantially all of the assets of any Person provided (i) such Person is engaged in a line of business substantially similar to one or more of Borrower's existing lines of business, (ii) the aggregate purchase price liability incurred in any calendar year, including all contingent liabilities, when aggregated with all such acquisitions and any Investments permitted under Section 8.4(2) in any calendar year shall not exceed 25% of consolidated Tangible Net Worth as of the end of the most recent fiscal quarter or, if 80% or more of the purchase price is paid in capital stock of the Borrower, 40% of Consolidated Tangible Net Worth as of the end of the most recent fiscal quarter and (iii) based on a pro forma calculation of the ratios set forth in Section 8.7 as of the date such acquisition is closed, assuming consolidated of the acquired business with the Borrower for the four full fiscal quarters ended immediately preceding such closing and pro forma debt and debt service payments based on scheduled principal payments, including acquisition borrowings, if any, and pro forma interest on total debt at then prevailing borrowing rates, Borrower is in compliance with the financial covenants set forth in Section 8.7.

(d) Section 8.2 of the Loan Agreement is hereby amended by deleting the existing clause (11) and substituting the following:

(11) Liens in respect of any purchase money obligations for tangible property used in its business, which obligations shall not at any time exceed 5% of Consolidated Tangible Net Worth, provided that any such encumbrances shall not extend to property and assets of the Borrower or any subsidiary not financed by such a purchase money obligation;

(e) Section 8.3 of the Loan Agreement is hereby amended by adding the following words to the end thereof prior to the close parenthesis: "and transfers of capital equipment that will be leased pursuant to Financing Leases".

(f) Section 8.4 of the Loan Agreement is hereby amended by deleting the existing clause (2) and substituting the following:

(2) Investments in or to any Subsidiary or other Person, provided Borrower remains in compliance with Section 8.1(b);

and by deleting from clause (4) the word "\$100,000,000" and replacing it with the word "\$500,000,000".

(g) Section 8.7 of the Loan Agreement is hereby amended by deleting subsection (a) and replacing it with the following:

(a) Consolidated Tangible Net Worth. The Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower shall:

(A) prior to an IPO, not be less than the sum of (i) \$38,000,000, and (ii) 50% of Consolidated Net Income (excluding losses) for each consecutive fiscal quarter of the Borrower beginning with the quarter ending March 31, 1996, on a cumulative basis; and

(B) after an IPO, not be less than the sum of (i) the amount required by clause (A) above immediately prior to such IPO plus (ii) the net proceeds to the Borrower of the IPO less (iii) the Sub S Dividends.

For purposes of the foregoing, the following terms shall have the meanings indicated:

"IPO" shall mean the initial underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended, covering the offer and sale of the Borrower's Common Stock for the account of the Borrower.

"Sub S Dividends" shall mean one or more distributions by the Borrower to its shareholders who were shareholders prior to the IPO in an aggregate amount equal to the Borrower's "accumulated adjustments account", as defined in Section 1368(a)(1) if the Internal Revenue Code of 1986, as of the date of the IPO.

(h) Section 9.1 of the Loan Agreement is hereby amended by replacing existing clause (i) with the following:

(i) There shall occur any default under any instrument or agreement evidencing any indebtedness for money borrowed in excess of \$100,000 by the Borrower or any of its Subsidiaries;

and by adding the following clauses (l) and (m) after clause (k):

(l) There shall occur any Event of Default under any other loan or credit agreement to which the Borrower and the Lender are parties:

(m) The transfer by John R. Bertucci and/or his Affiliates of securities of the Borrower or the voting power related to such securities as a result of which the power to elect, appoint or cause the election or appointment of at least a majority of the members of the board of directors of the Borrower shall no longer be held by John R. Bertucci and/or his Affiliates;

Section 2. Representations and Warranties. The Borrower hereby represents and warrants as follows:

(a) The execution and delivery of this Amendment and the performance of this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 3. Conditions to Effectiveness. The effectiveness of this Amendment is conditioned on the following:

(a) The Borrower and the Lender shall each have executed and delivered a counterpart of this Amendment;

(b) The representations and warranties contained in Article V of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof; and

(c) No Default or Event of Default under the Loan Agreement shall have occurred and be continuing.

Section 4. Miscellaneous.

(a) On and after the date hereof, each reference in the Loan Agreement to "this Agreement" or words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of the Commonwealth of Massachusetts.

(d) This Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same document.

IN WITNESS WHEREOF, the parties have caused this Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

WAIVER

This Waiver (the "Waiver") dated as of October 18, 1996 concerns the Loan Agreement dated as of November 1, 1993, as amended (the "1993 Loan Agreement"), between MKS Instruments, Inc. (the "Borrower") and The First National Bank of Boston (the "Lender") and the Loan Agreement dated as of October 31, 1995, as amended (the "1995 Loan Agreement") between the Borrower and the Lender. Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the 1993 and 1995 Loan Agreements.

The Lender hereby waives the Events of Default under Section 9.1(g), (k) and (l) of the 1993 Loan Agreement and under Section 8.1 (g), (k), and (l) of the 1995 Loan Agreement resulting from (1) Borrower's failure to meet the financial covenants set forth in Section 8.7(b) and (c) of the 1993 Loan Agreement and Section 7.7 (b) and (c) of the 1995 Loan Agreement as of the end of the fiscal quarter ended June 30, 1996 and (2) the Event of Default that has occurred under Section 8.1(g), (k) and (l) of the Loan Agreement dated as of February 23, 1996 among the Borrower, the Lender and the Chase Manhattan Bank (f/k/a Chemical Bank) as a result of Borrower's failure to meet the financial covenants set forth in Section 7.7(b) and (c) of such Loan Agreement as of the end of the fiscal quarter ended June 30, 1996.

Except for the above waiver, the 1993 and 1995 Loan Agreements are in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

IN WITNESS WHEREOF, the Lender has caused this Waiver to be duly executed as of the date and the year first above written.

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

MKS INSTRUMENTS, INC.
WAIVER AND SEVENTH AMENDMENT
TO LOAN AGREEMENT

This Waiver and Seventh Amendment (the "Wavier and Amendment") dated as of February 4, 1997 concerns the Loan Agreement dated as of November 1, 1993 (the "Loan Agreement"), between MKS Instruments, Inc. (the "Borrower") and The First National Bank of Boston (the "Lender"). Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower has requested that the Lender waive certain Events of Default; and

WHEREAS, the Lender is willing, on the terms, subject to the conditions and to the extent set forth below, to grant such a wavier;

NOW, THEREFORE, the Lender and the Borrower agree as follows:

Section 1. Waiver. The Lender hereby waives the Events of Default under Section 9.1(g), (j), (k) and (l) of the Loan Agreement resulting from Borrower's failure to meet the financial covenant set forth in Section 8.7(c) of the Loan Agreement as of the end of the fiscal quarters ended September 30 and December 31, 1996.

Section 2. Amendment to the Loan Agreement.

(a) Section 3.2.1. of the Loan Agreement is hereby amended by adding the following at the end thereof:

Notwithstanding the preceding clauses (i) and (ii), from June 30, 1996 through June 30, 1997, the only alternative to the Base Rate shall be the LIBOR Rate plus 2.00%.

(b) Section 8.7(c) of the Loan Agreement is hereby amended by deleting the existing language and substituting the following:

(c) Cash Flow Ratio. The ratio ("Cash Flow Ratio") of Consolidated Operating Cash Flow to Consolidated Debt Service:

(1) for the Borrower's fiscal quarter ending March 31, 1997, shall not be less than 1.25 to 1.00;

(2) for the Borrower's two consecutive fiscal quarters ending June 30, 1997, shall not be less than 1.00 to 1.00;

(3) for the Borrower's three consecutive fiscal quarters ending September 30, 1997, shall not be less than 1.25 to 1.00; and

(4) for the Borrower's four consecutive fiscal quarters ending December 31, 1997 and for each series of four consecutive fiscal quarters of the Borrower ending after December 31, 1997, shall not be less than 1.25 to 1.00.

Section 3. Representations and Warranties. The Borrower hereby represents and warrants as follows:

(a) The execution and delivery of this Waiver and Amendment and the performance of this Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Waiver and Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Waiver and Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 4. Loan Documents. This Waiver and Amendment shall be a Loan Document for all purposes.

Section 5. Conditions to Effectiveness. The effectiveness of this Waiver and Amendment is conditioned on the following:

(a) The Borrower and the Lender shall each have executed and delivered a counterpart of this Waiver and Amendment;

(b) The representations and warranties contained in Article of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof;

(c) No Default or Event of Default under the Loan Agreement shall have occurred and be continuing other than the Events of Default described in Section 1 hereof; and

(d) The Borrower's audited consolidated financial statements for the year ended December 31, 1996 shall not differ in any materially adverse respect from the Borrower's unaudited consolidated financial statements for the year ended December 31, 1996, which the Borrower has provided to the Lender and upon which the Lender has relied in agreeing to this Waiver and Amendment.

Section 6. Miscellaneous.

(a) On and after the date hereof, each reference in the Loan Agreement to "this Agreement" or words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Waiver and Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of The Commonwealth of Massachusetts.

(d) This Waiver and Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same document.

IN WITNESS WHEREOF, the parties have caused this Waiver and Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

IN WITNESS WHEREOF, the parties have caused this Waiver and Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____

Title: _____

THE FIRST NATIONAL BANK OF
BOSTON

By: _____

Title: _____

STANDARD FORM OF INDUSTRIAL LEASE
(SEMI-GROSS)

TABLE OF CONTENTS

| | PAGE |
|---|------|
| ARTICLE I. DEFINITIONS..... | 1 |
| 1.1 Address of Landlord | 1 |
| 1.2 Address of Tenant | 1 |
| 1.3 Base Rent | 1 |
| 1.4 Base Year | 1 |
| 1.5 Building/s | 1 |
| 1.6 Center | 1 |
| 1.7 Common Area | 1 |
| 1.8 Lease Term | 1 |
| 1.9 Permitted Use of the Premises | 1 |
| 1.10 Premises | 1 |
| 1.11 Rent | 1 |
| 1.12 Additional Rent | 2 |
| 1.13 Security Deposit | 2 |
| 1.14 Tenant's Allocated Share | 2 |
| 1.15 Tenant's Proportionate Share..... | 2 |
| 1.16 Tenant's Prorata Share | 2 |
| ARTICLE II. THE DEMISED PREMISES | 2 |
| 2.1 Lease of the Premises | 2 |
| 2.2 Use of Common Area | 2 |
| 2.3 Quiet Enjoyment | 2 |
| 2.4 Reservations by Landlord | 2 |
| ARTICLE III. TERM OF THE LEASE | 3 |
| 3.1 Term | 3 |
| 3.2 Tender of Possession | 3 |
| 3.3 Holding Over | 3 |
| ARTICLE IV. RENT | 3 |
| 4.1 Base Rent | 3 |
| 4.2 Additional Rent | 4 |
| 4.2(a) Utilities and Services | 4 |
| 4.2(b) Insurance | 5 |
| 4.2(c) Real Estate Taxes | 5 |
| 4.2(d) HVAC Maintenance | 5 |
| 4.2(e) Common Area Expenses | 6 |
| 4.2(f) Rent on Sales Taxes | 6 |
| 4.3 Late Payment | 7 |

| | | |
|---------------|--|----|
| 4.4 | Security Deposit | 7 |
| ARTICLE V. | LANDLORD'S RIGHTS AND OBLIGATIONS | 7 |
| 5.1 | Maintenance by Landlord | 7 |
| 5.2 | Mortgage and Transfer: Estoppel Certificates | 7 |
| 5.3 | Landlord's Inability to Perform | 8 |
| 5.4 | Rights of Landlord | 8 |
| 5.4(a) | Name of Center | 9 |
| 5.4(b) | Redecorate | 9 |
| 5.4(c) | Re-Lease | 9 |
| 5.4(d) | Vehicles | 9 |
| 5.4(e) | Preservation of Center | 9 |
| ARTICLE VI. | TENANT'S RIGHTS AND OBLIGATIONS | 9 |
| 6.1 | Acceptance of Premises | 9 |
| 6.2 | Alterations and Additions | 9 |
| 6.3 | Assignment and Subletting | 10 |
| 6.4 | Locks | 10 |
| 6.5 | Maintenance by Tenant | 10 |
| 6.6 | Mechanic's Liens | 11 |
| 6.7 | Redelivery of Premises | 11 |
| 6.8 | Signs and Advertisements | 11 |
| 6.9 | Use of Common Areas | 11 |
| 6.10 | Use of Premises | 11 |
| 6.11 | Hazardous Substances | 11 |
| ARTICLE VII. | INSURANCE | 12 |
| 7.1 | Liability Insurance | 12 |
| 7.2 | Fire and Extended Coverage Insurance | 12 |
| 7.3 | Indemnification of Landlord | 12 |
| ARTICLE VIII. | EMINENT DOMAIN AND DAMAGE OR DESTRUCTION | 13 |
| 8.1 | Eminent Domain | 13 |
| 8.2 | Damage or Destruction | 13 |
| ARTICLE IX. | DEFAULT AND REMEDIES | 14 |
| 9.1 | Events of Default | 14 |
| 9.1(a) | Nonpayment | 14 |
| 9.1(b) | Noncompliance | 14 |
| 9.1(c) | Insolvency or Transfer | 15 |
| 9.1(d) | Bankruptcy | 15 |
| 9.1(e) | Receiver | 15 |
| 9.1(f) | Abandonment | 15 |
| 9.2 | Remedies | 15 |
| 9.2(a) | Repossession and Sale | 15 |
| 9.2(b) | Releasing | 15 |

9.2(c) Cancellation 15
9.2(d) Anticipatory Breach 16
9.2(e) Attorney's Fees 16
9.3 Remedies Cumulative 16
9.4 No Waiver 16

ARTICLE X. MISCELLANEOUS 16
10.1 Bankruptcy or Assignment to Trustee 16
10.2 Brokers 16
10.3 Captions 17
10.4 Certificates of Occupancy 17
10.5 Entire Agreement 17
10.6 Joint and Several Liability of Multiple Tenants 17
10.7 Notices 17
10.8 Partial Invalidity 17
10.9 Recording 17
10.10 Successors 17
10.11 Use of the Singular; Gender 18
10.12 Rider 18

- EXHIBIT A. RULES AND REGULATIONS
- EXHIBIT B . THE CENTER AND PREMISES
- EXHIBIT C. LANDLORD'S IMPROVEMENTS TO PREMIES (if any)

STANDARD FORM OF INDUSTRIAL LEASE
(SEMI-GROSS)

THIS LEASE, made this 21st day of September, 1995, by and between GENERAL AMERICAN LIFE INSURANCE COMPANY, a Missouri corporation (hereinafter "Landlord"), and MKS INSTRUMENTS, INC. (hereinafter "Tenant").

ARTICLE I. DEFINITIONS.

1.1 Address of Landlord: One Lincoln Centre, Suite 567, 5400 LBJ Freeway, Dallas, Texas 75240.

1.2 Address of Tenant: Six Shattuck Road, Andover, MA 01810.

1.3 Base Rent: See Paragraph No. 1 of Lease Rider Number One.

1.4 Base Year: *See Paragraph 2 of Lease Rider Number One.

1.5 Building/s: The Building/s in which the Premises is located. The specific Building in which the Premises is located contains 54,301 square feet. The total square footage of all the Buildings in the Center is 124,187 square feet.

1.6 Center: The land, improvements and appurtenances depicted on Exhibit B attached hereto and commonly referred to as: ARAPAHO GROVE BUSINESS PARK and located at 789 Grove Road, Suite 111, Richardson, Texas.

1.7 Common Area: The term "Common Area" means all the areas of the Center designed for the common use and benefit of the Landlord and all of the tenants, their employees, agents, customers and invitees. The Common Area includes, but not by way of limitation, parking lots, truck courts, landscaped and vacant areas, driveways, rail spurs, walks and curbs and facilities appurtenant to each as such areas may exist from time to time.

1.8 Lease Term: The lease term shall commence on September 1, 1995 and run for three (3) years, and 0 months, expiring on August 31, 1998.

1.9 Permitted Use of the Premises: light electronic assembly and associated activities.

1.10 Premises: 14,627 square feet of space in the Center located as outlined on Exhibit B attached hereto, and addressed as: 789 Grove Road, Suite 111, Richardson, Texas.

1.11 Rent: All sums, monies or payments required to be paid by Tenant to Landlord pursuant to this Lease, including Base Rent and Additional Rent.

1.12 Additional Rent: All sums, monies or payments required to be paid by Tenant to landlord pursuant to this Lease other than Base Rent.

1.13 Security Deposit: \$3,117.00

1.14 Tenant's Allocated Share: The percentage figure determined by dividing the number of square feet in the Premises by the number of square feet in the Building that is then leased to Tenant and to other tenants.

1.15 Tenant's Proportionate Share: The percentage figure determined by dividing the number of square feet in the Premises by the total number of square feet in all the buildings (this paragraph is applicable when the Center contains more than one Building), which percentage figure is: 11.78%.

1.16 Tenant's Prorata Share: The percentage figure determined by dividing the number of square feet in the Premises by the number of square feet in the specific Building in which the Premises is located, which percentage figure is: 26.94%.

ARTICLE II. THE DEMISED PREMISES.

2.1 Lease of the Premises. In consideration of the Rents, covenants, agreements and conditions hereinafter provided to be paid, kept, performed and observed, the Landlord leases to the Tenant and the Tenant hereby hires from the Landlord the Premises, upon all the terms and conditions set forth in this Lease.

2.2 Use of Common Area. Landlord grants the Tenant the nonexclusive revocable use of the Common Area by tenant, Tenant's employees, agents, customers and invitees, under all the terms and conditions hereof, which use shall be subject at all times to such reasonable, uniform and non-discriminatory rules and regulations as may from time to time be established.

2.3 Quiet Enjoyment. Landlord covenants that the Tenant, on paying the Rent herein provided and keeping, performing and observing the covenants, agreements and conditions herein required of the Tenant, shall peaceably and quietly hold and enjoy the Premises for the Lease Term, subject, however, to the terms and conditions of this Lease.

2.4 Reservations by Landlord. Landlord excepts and reserves from the Premises the roof and exterior walls of the Building/s, and further reserves the right to place, install, maintain, carry through, repair and replace such utility lines, air ducts, pipes, wires, appliances, tunneling and the like in, over, through and upon the Premises as may be reasonably necessary or advisable for the servicing of the Premises or any other

portions of the Center. Landlord further reserves the right, at any time, and from time to time to: (i) make alterations, changes and additions to the Building/s and other improvements in the Center; (ii) add additional areas to the Center and/or to exclude areas therefrom; (iii) construct additional buildings and other improvements in the Center; (iv) remove or relocate the whole or any part of any building or other improvement in the Center; and (v) relocate any other tenant in the Center. It is further understood that the existing layout of the buildings, walks, roadways, parking areas, entrances, exits, and other improvements shall not be deemed to be a warranty, representation or agreement on the part of the Landlord that the Center will remain exactly as presently built, it being understood and agreed that Landlord may change the number, dimensions and locations of the walks, buildings and parking spaces as Landlord shall deem proper.

ARTICLE III. TERM OF THE LEASE.

3.1 Term. Tenant shall have and hold the Premises for and during the Lease Term subject to the payment of the Rent and the full and timely performance by Tenant of all the covenants and conditions set forth in this Lease.

3.2 Tender of Possession. Landlord shall use its best efforts to tender possession of the Premises to Tenant at the commencement of the Lease Term. Landlord shall not be subject to any liability for any failure to tender possession of the Premises to Tenant, provided that such failure occurred as a consequence of any circumstance or cause beyond Landlord's reasonable control, including but not limited to any Act of God or the failure of a prior tenant to vacate all or any portion of the Premises.

3.3 Holding Over. In the event of a holding over by Tenant or any of its successors in interest after expiration or termination of this Lease without the consent in writing of the Landlord, Tenant shall be deemed a Tenant at sufferance and shall pay as liquidated damages, double Rent for the entire holdover period and all attorney's fees and expenses incurred by Landlord in enforcing its rights hereunder. Any holding over with the consent of Landlord shall constitute Tenant a month-to-month tenant upon and subject to all the terms, covenants and conditions of this Lease. *See paragraph 3 of Lease Rider Number One.

ARTICLE IV. RENT.

4.1 Base Rent. Tenant covenants to pay without notice, deduction, set-off or abatement to Landlord the Base Rent in lawful money of the United States in equal consecutive monthly installments in advance on the first day of each month during the Lease Term. Base Rent for any partial month shall be prorated on a per diem basis. Base Rent shall be payable to Landlord at Landlord's Address or such other place as Landlord may designate from time to time in writing. Tenant shall pay the first full month's Base Rent upon execution of this Lease.

4.2 Additional Rent. Tenant covenants to pay without notice, deduction, set-off or abatement to Landlord the Additional Rent in lawful money of the United States in equal consecutive monthly installments in advance on the first day of each month during the Lease Term. Additional Rent for any partial month shall be prorated on a per diem basis. Additional Rent shall be payable to Landlord at Landlord's Address or such other place as Landlord may designate in writing. In order to provide for current payments of Additional Rent, Tenant agrees to pay an amount of Additional Rent reasonably estimated by Landlord from time to time commencing on the first day of the month following the month in which Landlord notifies Tenant of the amount of such Additional Rent. If, as finally determined, the amount of Additional Rent owing by Tenant shall be greater than or less than the aggregate of all installments so paid to Landlord for each calendar year, the Tenant shall pay to Landlord the amount of such underpayment, or Landlord shall credit Tenant for the amount of such overpayment, as the case may be. It is the intention hereunder to estimate the amount of Additional Rent for each calendar year and then to adjust such estimate in the following year based on the actual amount of Additional Rent owing. The obligation of Tenant with respect to the payment of Additional Rent shall survive the termination of this Lease. Any payment, refund or credit made pursuant to this paragraph shall be made without prejudice to any right of Tenant to dispute the amount of Additional Rent owing, or the right of Landlord to correct any items as billed pursuant to the provisions hereof. Within 30 days of the date Landlord notifies Tenant of the amount of Additional Rent owing, Tenant or its authorized agent shall have the right to inspect the books of Landlord during the business hours of Landlord at such location that Landlord may specify, for the purpose of verifying such amount. Unless Tenant asserts specific errors within such 30 days, such notification by Landlord shall be deemed to be correct. No decrease in Additional Rent shall reduce Tenant's liability hereunder below the amount of Base Rent payable hereunder.

4.2(a) Utilities and Services. Landlord shall not be liable for any interruption or failure whatsoever in utility services. Tenant shall contract in its own name and pay for all charges for electricity, gas, fuel, telephone, and any other services or utilities used in, servicing or assessed against the Premises, unless otherwise herein expressly provided. Additionally, and if the Building is master metered for water, sewer and exterior lighting, Tenant agrees to pay to Landlord as Additional Rent Tenant's Prorata Share of the cost of such utilities for the Building. Additionally, and as containerized rubbish collection bins will be provided to the Building, Tenant agrees to pay to Landlord as Additional Rent, Tenant's Allocated Share of the service cost of such bins (unless Landlord, exercising reasonable discretion, should determine that Tenant's actual use thereof is greater than such Tenant's Allocated Share therefore, in which case an equitable adjustment shall be made). Landlord may, however, require Tenant to contract for his own rubbish collection, in the event Tenant's needs for such containers

constitute excessive demand on common containers. In such event, Tenant shall contract with the same provider as the Center's common bins.

4.2(b) Insurance. Tenant shall pay to Landlord as Additional Rent Tenant's Prorata Share (or, Tenant's Proportionate Share in the event there is more than one Building in the Center) of any increase in the cost of the premium for the fire and extended coverage insurance that Landlord maintains hereunder over the premium paid by Landlord for the Base Year. Tenant shall pay any increase in the cost of fire and extended coverage insurance caused by Tenant's use or activities on or about the Premises.

4.2(c) Real Estate Taxes. Tenant shall pay to Landlord as Additional Rent Tenant's Prorata Share (or, Tenant's Proportionate Share in the event there is more than one Building in the Center) of any increases in Landlord's Real Estate Taxes over Real Estate Taxes for the Base Year levied against the Center. "Real Estate Taxes" shall mean: (a) all ad valorem Real Estate Taxes on the Center (adjusted after protest or litigation, if any) for any part of the term of this Lease, exclusive of penalties; (b) any taxes which shall be levied in lieu of any such ad valorem Real Estate Taxes; (c) any special assessments for benefits on or to the Center paid in annual installments by Landlord; (d) occupational taxes or excise taxes levied on rentals derived from the operation of the property or the privilege of leasing property; (e) any private subdivision assessment made against the Center; and (f) the expense of protesting, negotiating or contesting the amount or validity of any such taxes, charges or assessments, such expense to be applicable to the period of the item contested, protested or negotiated.

If the Lease Term shall end during a tax year ("tax year" shall mean the annual period for which Real Estate Taxes are assessed and levied) of which only part is included in the Lease Term, the amount of such Additional Rent shall be prorated on a per diem basis and shall be paid on or before the last day of the Lease Term. If the Lease Term ends in any tax year before the amount to be payable by Tenant has been determined under the provisions of this Section, an amount payable for the portion of the Lease Term during the tax year shall be reasonably estimated by Landlord and the estimated amount shall be promptly paid by Tenant. As soon as the amount properly payable by Tenant for the partial period has finally been determined, the amount shall be adjusted between Landlord and Tenant. Tenant shall be liable for all taxes levied against personal property and trade fixtures placed by Tenant in the Premises.

4.2(d) HVAC Maintenance. Tenant shall pay to Landlord as Additional Rent Tenant's Allocated Share of Landlord's cost and expense of the maintenance service agreements to the heating, ventilating and air conditioning equipment and controls servicing the Premises. Tenant shall pay all expenses incurred to

repair the heating, ventilating and air conditioning equipment servicing the Premises. *See Paragraph 4 of Lease Rider Number One.

4.2(e) Common Area Expenses. Tenant will pay to Landlord as Additional Rent Tenant's Prorata Share (or, Tenant's Proportionate Share in the event there is more than one Building in the Center) of the Common Area Operating Cost. *See Paragraph 5 of Lease Rider Number One.

"Common Area Operating Cost" means the Landlord's total cost and expense incurred in owning, operating, maintaining and repairing the Common Area, including but without limitation by enumeration, costs for all electricity, gas, water, sewer or fuel used in connection with the operation, maintenance and repair of the Common Area; the amount paid for all electricity furnished to the Common Area to light the parking lots or for any other purpose; the amount paid for all labor and/or wages and other payments including costs to Landlord of workmen's compensation and disability insurance, payroll taxes, welfare and fringe benefits made to janitors, employees, contractors and subcontractors of the Landlord involved in the operation and maintenance of the Common Area; managerial, administrative and telephone expenses related to operation and maintenance of the Common Area; the total charges of any independent contractors employed in the care, operation, repair, maintenance, cleaning, snow removal, salting and landscaping of the Common Area; the amount paid for all supplies, tools, replacement parts of components, equipment and necessities which are occasioned by everyday wear and tear of the Common Area; the amount paid for premiums for all insurance required from time to time by Landlord or Landlord's mortgagees; the costs of machinery and equipment purchased or leased by Landlord to perform its Common Area maintenance obligations; and property management fees not to exceed five percent (5%) of the gross income of the Center. To the extent that Landlord elects to provide services which are not separately metered or directly billed to the tenant, such as water, sewer and trash hauling, the costs of such services shall be included in Common Area Operating Cost. Common Area Operating Cost shall not, however, include interest on debt, capital retirement of debt, depreciation, costs properly chargeable to the capital account, except for capital expenditures which reduce other operating expenses or such capital expenditures that are required by changes in any governmental law or regulation in which case such expenditures, plus interest on the unamortized principal investment at ten (10%) percent per annum, shall be amortized over the life of the improvements, and such costs shall be directly chargeable by the Landlord to Tenant in the Tenant's Prorata Share (or, Tenant's Proportionate Share in the event there is more than one Building in the Center).

4.2(f) Rent on Sales Taxes. Tenant shall pay to Landlord as Additional Rent any Sales or Rent Taxes, however named or designated, levied on any form of Rent or Additional Rent.

4.3 Late Payment. Tenant's failure to make any rental payment or other payment required of Tenant hereunder within three (3) days of the due date therefor shall automatically result in the imposition of a service charge for such late payment in the amount of ten (10%) percent of such payment, without notice. *See Paragraph 6 of Lease Rider Number One.

4.4 Security Deposit. Tenant herewith deposits with Landlord the Security Deposit as security for the performance by Tenant of every covenant and condition of this Lease. Said Security Deposit may be mingled with other funds of Landlord and shall bear no interest. If Tenant shall default with respect to any covenant or condition of this Lease, Landlord may apply the whole or any part of such Security Deposit to the payment of any sum in default, including Rent and Additional Rent, or any sum which Landlord may be required to spend by reason of Tenant's default. This includes, but is not limited to, applying the Security Deposit first to any restoration, relamping, repairs and/or cleanup costs necessary over and above normal wear and tear of the vacated space. Should Landlord so apply the Security Deposit or any portion thereof during the Lease Term, Tenant shall promptly reimburse Landlord for same. It is understood that the Security Deposit is not to be considered as the last month's rent. Should Tenant comply with all of the covenants and conditions of this Lease, the Security Deposit or any balance thereof shall be returned to Tenant within 30 days of the expiration of the Lease Term.

ARTICLE V. LANDLORD'S RIGHTS AND OBLIGATIONS.

5.1 Maintenance by Landlord. During the Lease Term, Landlord shall operate and maintain the Common Area and shall keep and maintain the roof, exterior walls (excluding doors, glass or plate glass), gutters and downspouts of the Building/s in good condition and repair. Landlord shall be under no obligation and shall not be liable for any failure to make repairs that are Landlord's responsibility herein until and unless Tenant notifies Landlord in writing of the necessity therefor, in which event Landlord shall have a reasonable time thereafter to make such repairs. Landlord reserves the right to the exclusive use of the roof and exterior walls of the Building/s which Landlord is so obligated to maintain and repair. Landlord shall enter into a service contract on the Building for the heating, ventilation and air conditioning equipment for periodic inspection and service of such equipment, and Tenant shall reimburse Landlord pursuant to the provisions hereof. If any portion of the Center which Landlord is obligated to maintain or repair is damaged by the negligence of Tenant, its agents, employees or invitees, then repairs necessitated by such damage shall be paid for by Tenant. *See Paragraph 7 of Lease Rider Number One.

5.2 Mortgage and Transfer: Estoppel Certificates. Landlord shall have the right to transfer, mortgage, pledge or otherwise encumber, assign and convey, in whole or in part, the Center, the Building/s, this Lease, and all or any part of the rights now or

thereafter existing therein and all Rents and amounts payable to Landlord under the provisions hereof. In the event of any such transfer or transfers, Landlord herein named (and in case of any subsequent transfer, the then transferor) shall be automatically freed and relieved from and after the date of such transfer of all personal liability as respects the performance of any covenants or agreements on the part of Landlord contained in this Lease thereafter to be performed. Nothing herein contained shall limit or restrict any such rights, and the rights of the Tenant under this Lease shall be subject and subordinate to all instruments executed and to be executed in connection with the exercise of any such rights, including, but not limited to, the lien of any mortgage, deed of trust, or security agreement now or hereafter placed upon Landlord's interest in the Premises. This paragraph shall be self-operative. However, Tenant covenants and agrees to execute and deliver upon demand such further instruments subordinating this Lease to the lien, of any such mortgage, deed of trust or security agreement as shall be requested by Landlord and/or mortgagee or proposed mortgagee or holder of any security agreement and hereby irrevocably appoints Landlord as its agent and attorney-in-fact to execute and deliver any such instrument for and in the name of Tenant. Tenant shall, within ten (10) days after written request of Landlord, execute, acknowledge, and deliver to Landlord or to Landlord's mortgagee, proposed mortgagee, Land Lessor or proposed purchaser of the Center or any part thereof, any estoppel certificates requested by Landlord from time to time, which estoppel certificates shall show whether the lease is in full force and effect and whether any changes may have been made to the original lease; whether the term of the lease has commenced and full rental is accruing; whether there are any defaults by Landlord and, if so, the nature of such defaults; whether possession has been assumed and all improvements to be provided by Landlord have been completed; and whether rent has been paid more than thirty (30) days in advance and that there are no liens, charges, or offsets against rental due or to become due and that the address shown on such estoppel is accurate.

5.3 Landlord's Inability to Perform. If, by reason of: inability to obtain and utilize labor, materials or supplies; circumstances directly or indirectly the results of a state of war or national or local emergency; any laws, rules, orders, regulations or requirements of any governmental authority now or hereafter in force; strikes or riots; accident in, damage to or the making of repairs, replacements, or improvements to, the Premises or any of the equipment thereof; or by reason of any other cause beyond the reasonable control of the Landlord including "Acts of God," Landlord shall be unable to perform or shall be delayed in the performance of any covenant to supply any service, such nonperformance or delay in performance shall not render Landlord liable in any respect for damages to either person or property, constitute a total or partial eviction, constructive or otherwise, work an abatement of rent or relieve Tenant from the fulfillment of any covenant or agreement contained in this Lease.

5.4 Rights of Landlord. Landlord may enter upon the Premises for the purpose of exercising any or all of the rights hereby reserved without being deemed guilty of an

eviction or disturbance of Tenant's use or possession and without being liable in any manner to Tenant. The reservation of these rights by Landlord shall not render Landlord liable for not performing any of the matters specified herein.

5.4(a) Name of Center. To change the name of the Building/s or the Center without notice or liability of the Landlord to Tenant;

5.4(b) Redecorate. During the last ninety (90) days of the Lease Term or any renewal or extension thereof, if during or prior to that time the Tenant has vacated the Premises, to decorate, remodel, repair, alter or otherwise prepare the Premises for reoccupancy; *See Paragraph 8 of Lease Rider Number One.

5.4(c) Re-Lease. To exhibit the Premises to others and to display "For Lease" signs on the Premises during the last one hundred eighty (180) days of the Lease Term or any renewal or extension thereof;

5.4(d) Vehicles. To remove abandoned or unlicensed vehicles and vehicles that are unreasonably interfering with the use of the parking lot by others, and to charge the responsible tenant for the expense of removing said vehicles;

5.4(e) Preservation of Center. To take any and all measures, including making inspection, repairs, alterations, additions and improvements to the Premises or to the Center as may be necessary or desirable for the safety, protection or preservation of the Premises or the Center or the Landlord's interests, or as may be necessary or desirable in the operation of the Premises or the Center.

ARTICLE VI. TENANT'S RIGHTS AND OBLIGATIONS.

6.1 Acceptance of Premises. Landlord will complete the Premises in accordance with Exhibit C, if attached hereto. Tenant acknowledges that it will examine the Premises before taking possession hereunder. Unless Tenant furnishes Landlord with a notice in writing specifying any defect in the construction or condition of the Premises within ten (10) days after taking possession, such taking of possession shall be conclusive evidence as against Tenant that at the time thereof the Premises were in good order and satisfactory condition.

6.2 Alterations and Additions. Tenant shall not make any alterations, improvements, or additions to the Premises without the prior written consent and approval of plans therefor by Landlord. Alterations, improvements or additions made by either of the parties upon the Premises, except moveable furniture and equipment placed in the Premises at the expense of Tenant, shall be the property of Landlord and shall remain upon and be surrendered with the Premises as a part thereof at the termination of this Lease, without disturbance, molestation, injury or damage unless Landlord elects to require Tenant to remove such alterations or improvements from the Premises at the

expiration of this Lease. In the event damage shall be caused by moving said furniture and equipment in or out of the Premises, said damage shall be repaired at the cost of Tenant. *See Paragraph 9 of Lease Rider Number One.

6.3 Assignment and Subletting. Tenant shall not assign or hypothecate this Lease or sublet all or any part of the Premises without the prior written consent of Landlord. If Tenant wishes to assign or sublet the Premises, it shall give notice in writing (by certified mail or by personal delivery) of such intention to Landlord and, thereupon, Landlord shall, within thirty (30) days of receipt of such notice, have the right to unilaterally terminate this Lease or to approve said subletting by written notice to Tenant. If no notice is given by Landlord, Landlord will be deemed to have elected to approve the assignment or subletting. If the assignment or subletting is approved and rents under the sublease are greater than the rents provided for herein, then Landlord shall have the further option either (a) to convert the sublease into a prime Lease and receive all of the rents, in which case Tenant will be relieved of further liability hereunder and under the proposed sublease, or (b) to require Tenant to remain liable under this Lease, in which event Tenant shall be entitled to retain such excess rents. If the assignment or subletting is approved and rents under the sublease are less than the rents provided for herein, Tenant shall remain liable under all the covenants and conditions of this Lease. Landlord may withhold its consent to any proposed assignee or subtenant which in Landlord's judgment (a) would conflict with the tenancy, use or business of any other tenant or the tenant mix of the Center, (b) has a net worth and/or credit history inferior to that of Tenant, or (c) is currently a tenant or negotiating for space in the Center.

6.4 Locks. No additional locks or similar devices shall be attached to any door or window without Landlord's prior written consent. No keys for any door other than those provided by the Landlord shall be made. If more than two keys for one lock are desired, the Landlord will provide the same upon payment by the Tenant. All keys must be returned to the Landlord at the expiration or termination of the lease. *See Paragraph 10 of Lease Rider Number One.

6.5 Maintenance by Tenant. Tenant shall be responsible for all maintenance and repair to the Premises of whatsoever kind or nature that is not herein set forth specifically as the obligation of Landlord. Tenant shall take good care of the Premises and fixtures, and keep them in good repair free from filth, overloading, danger of fire or any pest or nuisance, repair any damage or breakage done by Tenant or Tenant's agents, employees or invitees, including damage done to the Building/s by Tenant's equipment or installations. Tenant shall be responsible for the repair and replacement of all glass and plate glass on the Premises. In the event Tenant fails to maintain the Premises as provided for herein Landlord shall have the right, but not the obligation, to perform such maintenance as is required of Tenant in which event Tenant shall reimburse Landlord for its costs in providing such maintenance or repairs together with a ten (10%) percent charge for Landlord's overhead and Tenant shall promptly reimburse Landlord for the amount so billed to Tenant by Landlord.

6.6 Mechanic's Liens. Tenant will not permit any mechanic's liens, or other liens, to be placed upon the Premises, the Building/s or the Center during the Lease Term or any extension or renewal thereof, and in case of the filing of any such lien, Tenant will promptly pay same. Tenant agrees to pay all legal fees that might be incurred by Landlord because of any mechanic's liens being placed upon the Premises, as a result of Tenant's actions.

6.7 Redelivery of Premises. No later than the last day of the Lease Term, Tenant will remove all Tenant's personal property and repair all injury done by or in connection with installation or removal of such property and surrender the Premises broom clean (together with all keys to the Premises) in as good a condition as they were in at the beginning of the Lease Term, reasonable wear and tear excepted.

6.8 Signs and Advertisements. Tenant shall not put upon nor permit to be put upon any part of the Premises, the Building/s or the Center, any signs, billboards or advertisements whatever in any location or any form without the prior written consent of Landlord. A charge of \$50.00 per day per sign, billboard or advertisement will be assessed against Tenant if Tenant fails to obtain the written consent of Landlord prior to placing any such signs.

6.9 Use of Common Areas. Tenant shall not use any part of the Center exterior to the Premises for outside storage. No trash, crates, pallets, or refuse shall be permitted anywhere on the Center outside of the Building/s by Tenant except in enclosed metal containers to be located as directed by Landlord. Tenant shall not park any trucks or trailers, loaded or empty, except in front of the loading areas.

6.10 Use of Premises. The Premises hereby leased shall be used by the Tenant only for the Permitted Use of the Premises and for no other purposes. Tenant shall, at Tenant's expense, comply promptly with all applicable statutes, ordinances, rules, regulations, orders and requirements in effect during the term or any part of the term hereof regulating the use by Tenant of the Premises. Tenant shall not use or permit the use of the Premises in any manner that will tend to create waste or a nuisance, or will tend to unreasonably disturb such other tenants in the Center. Tenant, its employees and all persons visiting or doing business with the Tenant in the Premises shall be bound by and shall observe the Rules and Regulations attached to this Lease, as Exhibit A, and such further and other reasonable rules and regulations made hereafter by the Landlord relating to the Center or the Premises of which notice in writing shall be given to the Tenant and all such rules and regulations shall be deemed to be incorporated into and form a part of this Lease.

6.11 Hazardous Substances. Tenant shall not cause or permit to be released (whether by way of uncapping, pouring, spilling, spraying, spreading, attaching, or otherwise) into or onto the Premises, or the Building/s, or the Center, or the Common Areas (including

the ground and ground water thereunder and the sewer and drainage systems therein) any hazardous substances (as defined or established from time to time by applicable local, state or federal law). Tenant shall immediately notify Landlord if any such release occurs, and, as to any such release that has been caused or permitted by Tenant: (I) Tenant shall immediately and entirely remove such released hazardous substance, and in a manner fully in compliance with all laws pertaining to the removal and storage or deposit thereof; and (11) Tenant hereby agrees to hold Landlord harmless of and from any liability, public or private, resulting to Landlord as a result of such release. Further, Tenant shall, upon Landlord's demand and at Tenant's sole expense, demonstrate to Landlord (through such tests, professional inspections, sampling or otherwise as is, in Landlord's sole judgment, sufficient for the purpose) that Tenant has not caused or permitted any such release of hazardous substances.

ARTICLE VII. INSURANCE.

7.1 Liability Insurance. Tenant covenants and agrees to maintain on the Premises at all times during the Lease Term, or any extension or renewal thereof, a policy or policies of comprehensive public liability and property damage insurance with not less than \$1,000,000.00 combined single limit for both bodily injury and property damage.

7.2 Fire and Extended Coverage Insurance. Landlord shall, throughout the Lease Term, or any extension or renewal thereof, maintain fire and extended coverage (FEC) insurance on the property owned by Landlord located on the Center in such amounts and with such deductibles as Landlord shall determine. Landlord shall not in any way or manner insure any property of Tenant or any property that may be in the Premises not owned by Landlord. Tenant shall comply with all insurance regulations so that the lowest fire, lightning, explosion, extended coverage and liability insurance rates may be obtained; and nothing shall be done or kept in or on the Premises by Tenant which will cause an increase in the premium for any such insurance on the Premises or on any Building/s of which the Premises are a part or on any contents located therein, over the rate usually obtained for the proper use of the Premises permitted by this Lease or which will cause cancellation of any such insurance.

7.3 Indemnification of Landlord. Tenant shall indemnify Landlord and save Landlord harmless from and against any and all loss (including loss of rentals payable by Tenant or other tenants) and against all claims, actions, damages, liability and expenses in connection with loss of life, bodily and, personal injury or damage to property arising from any occurrence in, upon or at the Premises or any part thereof, or occasioned wholly or in part by any act or omission of Tenant, or by anyone permitted to be on the Premises by Tenant. Tenant assumes all risk of and Landlord shall not be liable for injury to person or damage to property resulting from the conditions of the Premises or from the bursting or leaking of any and all pipes, utility lines, connections, or air conditioning or heating equipment in, on or about the Premises, or from water, rain or snow which may leak into, issue or flow from any part of the Building/s. Tenant

agrees, at all times, to indemnify and hold Landlord harmless against all actions, claims, demands, costs, damages or expenses of any kind which may be brought or made against Landlord or which Landlord may pay or incur by reason of Tenant's occupancy of the Premises or its negligent performance of or failure to perform any of its obligations under this Lease. In case Landlord shall, without fault on its part, be made a party to any litigation commenced by or against Tenant, then Tenant shall protect and hold Landlord harmless and shall pay all costs, expenses and reasonable attorney's fees incurred or paid by Landlord in connection with such litigation. *See Paragraph 11 of Lease Rider Number One.

ARTICLE VIII. EMINENT DOMAIN AND DAMAGE OR DESTRUCTION.

8.1 Eminent Domain. In the event that title to the whole or a substantial part of the Premises shall be lawfully condemned or taken in any manner for any public or quasi-public use, this lease and the term and estate hereby granted shall forthwith cease and terminate as of the date of vesting of title and Landlord shall be entitled to receive the entire award, Tenant hereby assigning to Landlord the Tenant's interest therein, if any. However, nothing herein shall be deemed to give Landlord any interest in or to require Tenant to assign to Landlord any award made to Tenant for the taking of personal property or fixtures belonging to Tenant or for the interruption of or damage to Tenant's business or for Tenant's moving expenses. A sale to a public or quasi-public authority under threat of condemnation shall constitute a taking by eminent domain.

In the event that title to a part of the building/s other than the Premises shall be so condemned or taken, Landlord may terminate this lease and the term and estate hereby granted by notifying Tenant of such termination within sixty (60) days following the date of vesting of title, and this lease and the term and estate hereby granted shall expire on the date specified in the notice of termination, not less than sixty (60) days after the giving of such notice, as fully and completely as if such date were the date herein set for the expiration of the Lease Term, and the Rent hereunder shall be apportioned as of such date. In the event of any condemnation or taking of any portion of the parking area of the Center, which does not result in a reduction of the parking area by more than twenty percent (20%) the terms of this lease shall continue in full force and effect. If more than twenty percent (20%) of the parking area is taken, either party shall have the right to terminate this lease upon giving written notice to the other party within thirty (30) days of such taking.

8.2 Damage or Destruction. If the Premises, the Building/s or the Center or any part thereof is damaged by fire or other casualty, cause or condition whatsoever and Landlord shall determine not to restore said Premises, Building/s or Center, Landlord may, by written notice to Tenant given within sixty (60) days after such damage, terminate this Lease. Such termination shall become effective as of the date of the damage. If this Lease is not terminated as above provided and if the Premises are made partially or wholly untenable, Landlord, at its expense, shall restore the same with

reasonable promptness to the condition in which Landlord furnished the Premises to Tenant at the commencement of the Lease Term as to those items that were provided to the Premises at Landlord's expense without any reimbursement by Tenant. Landlord shall be under no obligation to restore any alteration, improvements or additions to the Premises made by Tenant or paid for by Tenant, including, but not limited to, any of the initial tenant finish done or paid for by Tenant or any subsequent changes, alterations or additions made by Tenant or reimbursed by Tenant. *See Paragraph 12 of Lease Rider Number One.

If, as a result of fire or other casualty, cause or condition whatsoever the Premises are made partially or wholly untenable and, if Landlord has not given the sixty (60) day notice above provided for and fails within one hundred twenty (120) days after such damage occurs to eliminate substantial interference with Tenant's use of said Premises or substantially to restore said Premises, Tenant may terminate this Lease after the end of said one hundred twenty (120) days, effective as of the date such damage occurs, by notice to Landlord given not later than ten (10) days after expiration of said one hundred twenty (120) day period. If the Premises are rendered totally untenable but this Lease is not terminated, all rent shall abate from the date of the fire or other relevant cause or condition until the Premises are ready for occupancy and reasonably accessible to Tenant. If a portion of the Premises is untenable, rent shall be prorated on a per diem basis and apportioned in accordance with the portion of the Premises which is usable by the Tenant until the damaged part is ready for the Tenant's occupancy. In all cases, due allowance shall be made for reasonable delay caused by adjustment of insurance loss, strikes, labor difficulties or any cause beyond Landlord's reasonable control. For the purposes of this Lease, said Premises shall be considered tenantable so long as and to the extent that the Premises are occupied. In any event, Tenant shall be responsible for the removal, or restoration, when applicable, of all its damaged property and debris from the Premises, upon request by Landlord or else Tenant must reimburse Landlord for the cost of removal.

ARTICLE IX. DEFAULT AND REMEDIES.

9.1 Events of Default. The occurrence of any one or more of the following events shall constitute a Default and a material breach of this Lease by Tenant:

9.1(a) Nonpayment. Failure of Tenant to pay any installment of Rent or other sum payable to Landlord hereunder on the date that same is due and such failure shall continue for a period of five (5) days; or *See Paragraph 13 of Lease Rider Number One.

9.1(b) Noncompliance. Failure of Tenant to comply with any term, condition or covenant of this Lease, other than the payment of Rent or other sum of money, and such failure shall not be cured within ten (10) days after written notice thereof has been delivered by Landlord to Tenant; or

9.1(c) Insolvency or Transfer. Insolvency, the making of a transfer in fraud of creditors or the making of an assignment for the benefit of creditors by Tenant or any guarantor of Tenant's obligation; or

9.1(d) Bankruptcy. The filing by or against Tenant or any guarantor of Tenant's obligations hereunder of a petition in bankruptcy or for liquidation, or adjudication as a bankrupt or insolvent in proceedings filed by or against Tenant or such guarantor; or

9.1(e) Receiver. Appointment of receiver or trustee for all or substantially all of the assets of Tenant or any guarantor of Tenant's obligations hereunder; or

9.1(f) Abandonment. Abandonment by Tenant of any substantial portion of the Premises or cessation of use of the Premises for the purpose leased. *See Paragraph 14 of Lease Rider Number One.

9.2 Remedies. In the event of the occurrence of any Default, Landlord shall have the right, without further notice to or demand upon Tenant and without being liable to Tenant for any damages or to any prosecution therefor, to do any and all of the following:

9.2(a) Repossession and Sale. Re-enter and take exclusive possession of the Premises with or without force or legal process, refuse to allow Tenant to enter the same or have possession thereof, change the locks on the doors to the Premises, take possession of any furniture or fixtures or other property in or upon the Premises (Tenant hereby waiving the benefit of all exemptions by law), sell the same at public or private sale without notice and apply the proceeds thereof to the costs of sale, payment of damages and payment of all sums owing under this Lease; and/or

9.2(b) Releasing. Relet the Premises as agent of Tenant for the balance of the term of this Lease or for a shorter or longer term and receive the rents therefor, applying them first to the payment of the expense of such reletting and, second, to the payment of damages suffered to the Premises, and third to all sums due and to become due under this Lease, Tenant remaining liable for and hereby agreeing to pay Landlord any deficiency; and/or

9.2(c) Cancellation. Cancel and terminate the remaining term of this Lease, and re-enter and take possession of the Premises free of this Lease. Thereafter this Lease shall be null and void and the Rent in such case shall be apportioned and paid on and up to the date of such entry. Thereafter both parties shall be released and relieved from and of any and all obligations thereafter to accrue hereunder.

Tenant shall be liable for all loss and damage resulting from such breach or default; and/or

9.2(d) Anticipatory Breach. Treat such default as an anticipatory breach of this Lease and, as liquidated damages for such default, be entitled to the difference, if any, between the sum which, at the time of such termination for anticipatory breach represents the then present worth (computed at ten percent (10%) per year) of the excess aggregate rents and additional rents payable hereunder that would have accrued over the balance of the Lease Term (including renewals) had such term not been prematurely terminated, over the aggregate market rental value of the Premises over the term (including renewals) that the Lease would have run had it not been prematurely terminated; and/or

9.2(e) Attorney's Fees. Recover from Tenant, Landlord's attorney's fees incurred in enforcing its rights hereunder.

9.3 Remedies Cumulative. All rights and remedies expressly provided in this Lease for Landlord's protection shall be cumulative as to each other and of any other rights and remedies provided hereunder or by law.

9.4 No Waiver. A waiver by Landlord of a breach or default by Tenant under the terms and conditions of this Lease shall not be construed to be a waiver of any subsequent breach or default or of any other or the same term or condition of this Lease, and the failure of Landlord to assert any breach or to declare a default by Tenant shall not be construed to constitute a waiver thereof so long as such breach or default continues unremedied.

ARTICLE X. MISCELLANEOUS.

10.1 Bankruptcy or Assignment to Trustee. Neither this Lease nor any interest therein nor any estate hereby created shall pass to any trustee or receiver in bankruptcy or to any other receiver or assignee for the benefit of creditors or otherwise by operation of law during the term of this Lease or any renewal thereof.

10.2 Brokers. Except as may be expressly set forth to the contrary in the Rider, each party represents to the other that no person, firm, corporation, or other entity is entitled to any brokerage commission or finder's fee on account of the execution, delivery, and consummation of this Lease. Tenant hereby agrees to indemnify Landlord and to hold Landlord free and harmless of and from any and all claims, losses, damages, costs and expenses of whatsoever nature, including attorneys' fees and costs of litigation arising from or relating to any brokerage commissions or finder's fees incurred by Tenant in connection with this Lease. *See Paragraph 15 of Lease Rider Number One.

10.3 Captions. The captions used throughout this Lease are for convenience and reference only and shall in no way be held to explain, modify, amplify, or aid in the interpretation, construction or meaning of any provisions in this Lease.

10.4 Certificates of Occupancy. Tenant may, prior to the commencement of the Lease Term, apply for a certificate of occupancy to be issued by the municipality in which the Premises are located, but this Lease shall not be contingent on issuance thereof.

10.5 Entire Agreement. This Lease including its Exhibits and Rider, if any, contains the entire agreement between the parties and no modification of this Lease shall be binding upon the parties unless evidenced by an agreement in writing signed by Landlord and Tenant after the date hereof.

10.6 Joint and Several Liability of Multiple Tenants. If there be more than one Tenant named herein, the provisions of this Lease shall be applicable to and binding upon such Tenants jointly and severally.

10.7 Notices. Except as otherwise herein provided, whenever by the terms of this Lease notice shall or may be given either to Landlord or, to Tenant, such notice shall be in writing and shall be deemed to have been properly delivered if sent by certified mail, return receipt requested, postage prepaid, to Landlord at Landlord's Address and to Tenant at the Premises, or to such other place as Landlord or Tenant may designate in writing. The date of mailing shall be deemed the date of delivery.

10.8 Partial Invalidity. If any term, covenant, condition or provision of this Lease or the application thereof to any person or circumstances shall, to any extent be invalid, unenforceable or violate a party's legal rights, then such term, covenant, condition or provision shall be deemed to be null and void and unenforceable. however, all other provisions of this Lease, or the application of such term or provision to persons or circumstances other than those which are held invalid, unenforceable or violative of legal rights, shall not be affected thereby. and each and every other term, condition, covenant and provision of this Lease shall be valid and be enforced to the fullest extent permitted by law.

10.9 Recording. This Lease shall not be recorded by either party without the written consent of the other.

10.10 Successors. The agreements' covenants and conditions of this Lease shall be binding upon and inure to the benefit of the heirs, legal representatives, successors and assigns of each of the parties hereto, except that no assignment, encumbrance or subletting by Tenant unless permitted by the provisions of this Lease, without the written consent of Landlord shall vest any right in the assignee, encumbrance or sublessee of Tenant.

10.11 Use of the Singular; Gender. The terms "Landlord" and "Tenant," and pronouns representing the same, wherever used herein shall include the plural as well as the singular, the feminine as well as the masculine.

10.12 Rider. A Rider consisting of 3 pages, with paragraphs numbered 1 through 20 consecutively, is attached hereto and made a part hereof.

IN WITNESS WHEREOF, the parties have executed this Lease as of the date hereinabove stated.

LANDLORD:

GENERAL AMERICAN LIFE INSURANCE
COMPANY, a Missouri Corporation

By: _____

TENANT:

MKS INSTRUMENTS, INC.

By: _____
Robert T. O'Brien, Treasurer

By: _____

By: _____

EXHIBIT A

RULES AND REGULATIONS

1. Signs. Tenant shall not inscribe any inscription or post, place, or in any manner display any sign, notice, picture, placard or advertising matter whatsoever anywhere in or about Premises at places visible (either directly or indirectly as an outline or shadow on a glass pane) from anywhere outside of the Premises or from public and common areas within Premises without first obtaining Landlord's written consent thereto and Landlord shall specify the color, size, style and material to be used. *See Paragraph 19 of Lease Rider Number One.
2. Showcases. No showcase shall be placed in front of or in the lobbies or corridors of the Premises and Landlord reserves the right to remove all showcases so placed and all signs other than those above provided for, without notice and at the expense of the tenant responsible. See Paragraph 19 of Lease Rider Number One.
3. Installation of Signs. All exterior and interior signs must be installed by Landlord or someone designated by Landlord and the actual cost thereof shall be paid by Tenant and all such signs are so placed at the risk of Tenant.
4. Telephone Connections. If Tenant desires telegraphic, cable television, or telephone connections, Landlord will direct electricians where the wires are to be introduced and without such direction no boring or cutting for wires shall be permitted.
5. Submission of Plans. Tenant shall submit to Landlord for Landlord's approval, a copy of its construction and equipment layout plan prior to commencement of construction. In the event that Tenant is unable to obtain Landlord's approval for said plans and layout, this Lease shall at Tenant's sole option be deemed null and void and any amounts paid by Tenant to Landlord pursuant to this lease shall be reimbursed to Tenant without offset. *See Paragraph 19 of Lease Rider Number One.
6. No Nuisances. Tenant shall not do or permit anything to be done in the Premises which will be dangerous to life, or limb, or which will tend to create a nuisance or injure the reputation of the Building/s. Tenant shall not use burning fluid, camphine, alcohol, kerosene, or anything else in order to light or heat the Premises except steam, gas or electricity. Tenant shall not bring into the Premises or keep therein any heating or lighting apparatus other than that provided by Landlord; or install any air conditioning or air cooling apparatus without the written consent of Landlord; or in any way injure, modify, or tamper with any of such apparatus in any manner or in any manner in violation of the regulations of the

Fire Department, or with any insurance policy upon said Buildings or any part thereof. Tenant shall not do or permit to be done in the Premises any activity in conflict with any of the laws, rules or regulations of any governmental agency or municipality having jurisdiction, or use the Premises for an illegal or immoral purpose. No beer, wine or intoxicating liquor shall be sold on or about the Premises without the written consent of Landlord in each instance.

7. Passageways. The sidewalk, passages, lobbies, corridors, elevators and stairways shall not be obstructed by Tenant; or used except for ingress and egress from and to the Premises. The doors, skylights, windows and transoms that reflect or admit light into passageways or into any place in said Buildings, shall not be covered or obstructed by Tenant.
8. Water Closets. The water closets and other apparatus shall not be used for any purpose other than those for which they were constructed, and no sweepings, rubbish, rags or other substances shall be thrown therein. Any damage resulting to them from misuse shall be borne by the tenant who shall cause it.
9. No Defacing or Offensive Business. Tenant and its employees and guests are not to injure or deface the Buildings nor the woodwork, nor the walls of the Premises, nor to carry on upon the premises any noisome, noxious, noisy or offensive business nor conduct an auction therein, nor interfere in any way with other tenants or those having business with them.
10. No Lodging. No room or rooms on or about the Premises shall be occupied or used as sleeping or lodging apartments.
11. Lock all Doors. Tenant shall, when leaving Premises at close of business, or unoccupied at any time, lock all doors and windows and for any default or carelessness in this respect shall make good all injury sustained by other tenants and by Landlord or by either of them, for damages resulting from such default or carelessness.
12. No Animals. No animal or bird shall be allowed in any part of the Premises or Buildings without the consent of Landlord.
13. No Accumulation of Rubbish. Tenant shall not accumulate or store on or about the Premises any waste paper, discarded records, paper files, sweepings, rags, rubbish or other combustible matter other than the normal accumulation needed to conduct the Permitted Use of the Premises. Nothing shall be thrown by Tenant, its employees or guests, out of the windows or doors or down the passages or skylights or over balcony rails of the Buildings or in the parking areas.

14. Exclusion of Peace Disturbers. Landlord reserves the right to exclude from the Premises or Buildings all drunken persons, idlers, diseased persons, peddlers, solicitors, persons of a general character or conduct so as to create a disturbance, and persons entering in crowds or in such unusual numbers as to cause inconvenience to tenants of the Buildings.
15. Changes to Rules. Landlord reserves the right to change these rules and to make such other and further reasonable rules and regulations either as it affects one or all tenants as in its judgment may from time to time be needed for the safety, care and cleanliness of the Center, for the preservation of good order therein or for any other cause. When such changes are made such modified or new rules shall be deemed a part hereof with the same effect as if written herein, when a copy shall have been delivered to Tenant or left with some person in charge of the Premises.
16. No Live Christmas Trees. No live or fresh cut Christmas Trees are permitted on or about the Premises.
17. No Picnics. No outside picnics or barbecue's are permitted without the prior written consent of Landlord.
18. No Outside Storage. No outside storage of any material is permitted.
19. Smoking Policy. Though Landlord encourages no smoking at the property within the leased premises, beginning July 1, 1995 forward, Tenant, Tenant's employees and agents's outdoor smoking shall be limited to behind the building in which Tenant occupies space. Tenant shall be responsible for maintaining the area and Landlord shall bill Tenant directly for any needed clean-up costs resulting from any smoking debris which litters the property. Violations of the smoking area rules will be handled by Landlord and/or the City of Richardson. *See Paragraph 19 of Lease Rider Number One.

Tenant, Tenant's employees and Tenant's customers shall not congregate in front of buildings except areas in front of Tenant's leased premises.

1. 1.3 Base Rent.
Years 1 - 3 \$5,485.13 per month
2. 1.4 Base Year. - Delete the sentence and replace with "The base year for this lease agreement is 1994".
3. 3.3 Holding Over. - On line 4 change "double Rent" to "monthly rent equivalent to one hundred twenty-five percent (125%) of the Base Rent".
4. 4.2(d) HVAC Maintenance. - Delete this paragraph and replace with the following: "Tenant shall be responsible for maintaining the heating/ventilation/air-conditioning systems throughout the term of the Lease. Upon termination of the Lease Agreement, Tenant shall deliver the equipment back to Landlord in the same condition as it was received, reasonable wear and tear accepted."
5. 4.2(e) Common Area Expenses. - At the end of the first paragraph add the following: "Additional rent due from this paragraph is estimated to be \$597.27 per month. Tenant shall deposit an additional \$597.27 per month during the term of the lease. At the end of each calendar year, if Tenant has deposited an excess amount, Landlord will credit any overage. If at the end of any calendar year Tenant has not deposited their pro rata portion in full, Tenant will be billed for any deficit."
6. 4.3 Late Payment. - On line 2 change "three (3)" to "ten (10)".
7. 5.1 Maintenance by Landlord. - On line one, top of page six, after the word "roof", insert "except as herein provided".

On line two, top of page six, after the word "repair.", delete the following: "Landlord shall enter into a service contract on the Building for the Heating, ventilation and air conditioning equipment for periodic inspection

and service of such equipment and Tenant shall reimburse Landlord pursuant to the provisions hereof."

8. 5.4(b) Redecorate. - Strike entire paragraph.
9. 6.2 Alterations and Additions. - On line 2 after "Premises" add "except as herein provided".
10. 6.4 Locks. - Strike entire paragraph.
11. 7.3 Indemnification of Landlord. - On line 2, after "loss", delete "(including loss of rentals payable by Tenant or other tenants)".
- On line 7, before "Premises" add "demised".
- On line 9, before "property" add "personal" and before "Premises" add "demised".
- On line 13, after "Building/s" add ", unless such damage or injury is a direct result of Landlord's gross negligence, willful act or failure to act".
- On line 16, delete "its" and replace with "Tenant's".
- At the end of the paragraph, add the following: "Notwithstanding anything contained in this Paragraph 7.3 to the contrary, Tenant shall not indemnify and hold Landlord harmless from any losses, claims, actions, damages, liabilities or expenses that are caused by or arise out of Landlord's gross negligence, willful acts or failure to act, or that is caused by conditions in the Demised Premises or the Building that has not been caused by Tenant and that Landlord has the obligation and duty to maintain, repair or replace."
12. 8.2 Damage or Destruction. - On line five of the first paragraph delete "sixty (60)" add "thirty (30)".
- Make the following changes in the second paragraph: On line 3, delete "sixty (60)" add "thirty (30)"; on line 4, delete "one hundred twenty (120)" add "ninety (90)"; on line 7, delete "one hundred twenty (120)" add "ninety (90)"; and on line 9, delete "one hundred twenty (120)" add "ninety (90)".
13. 9.1(a) Nonpayment. - On line 4, delete "five (5) days" add "ten (10) days after written notice from Landlord".
14. 9.1(f) Abandonment. - Delete this paragraph.

15. 10.2 Brokers. - Delete this paragraph and add "Each party represents that Firman Cook of Firman Cook, REALTORS(R) and Bill Bexley of Fults Companies/ONCOR International, are entitled to a brokerage commission on account of the execution, delivery and consummation of this Lease."
16. Tenant shall be responsible for causing the demised premises to at all times be in compliance with the terms of the Americans with Disabilities Act of 1990 (the "ADA"), including, without limitation of any improvements, additions or alterations to the demised premises. Furthermore, Tenant shall at all times operate the demised premises and its business thereon in a manner which causes the demised premises to comply with ADA. Landlord hereby reserves the right to hereafter modify, from time to time, policies, practices, rules and procedures applicable to the demised premises, to the extent necessary to comply with the ADA.
17. Waiver of Subrogation. - Each party hereto waives any and every claim which arises or may arise in its favor and against the other party hereto during the term of this Lease or any renewal or extension thereof for any and all loss of, or damage to, any of its property located within or upon, or constituting a part of, the Premises leased to Tenant hereunder, which loss or damage is covered by valid and collectible fire and extended coverage recoverable under said insurance policies. Such mutual waivers shall be in addition to, and not in limitation or derogation of, any other waiver or release contained in this Lease with respect to any loss of, or damage to, property of the parties hereto. Inasmuch as the above mutual waivers will preclude the assignment of any aforesaid claim by way of subrogation (or otherwise) to an insurance company (or to any other person), each party hereby agrees immediately to give to each insurance company which has issued to it policies of fire and extended coverage insurance, written notice of the terms of said mutual waivers, and to have said insurance policies properly endorsed, if necessary, to prevent the invalidation of said insurance coverages by reasons of said waivers.
18. Parking. - Parking for Tenant's customers, employees, and agents shall be limited to directly in front of the Premises. Overflow parking shall be limited to the open parking area between the 777 Grove Road and 783 Grove Road buildings and the north end of the 783 Grove Road building (See Exhibit "B"). Any violation of this parking limitation shall allow Landlord to have such vehicle towed with no recourse to Landlord.

EXHIBIT A:

19. 1. Signs. - On line 1 between "not" and "inscribe", insert "except as herein permitted".

2. Showcases. - On Line 1, delete "in front of or in the lobbies or corridors of the Premises" add "outside of the confines of the demised Premises".
5. Submission of Plans. - At the end of this paragraph add the following: "If the plans are not approved by Landlord within three (3) business days after submission by Tenant to Landlord, said plans shall automatically be deemed to be approved by Landlord."
19. Smoking Policy. - Outdoor smoking breaks shall be in accordance with Rules and Regulations Item No. 19.
20. Tenant's security deposit in the amount of \$3,117 for lease dated August 10, 1989 for 789 Grove Rd #111, Richardson, Texas shall be transferred to this new lease.

LOAN AGREEMENT

by and among

MKS INSTRUMENTS, INC.,
as Borrower,THE FIRST NATIONAL BANK OF BOSTON,
As Agent and as Lender,

and

CHEMICAL BANK,
as Lender,

February 23, 1996

TABLE OF CONTENTS

Page

ARTICLE I

DEFINITIONS

| | |
|--|---|
| 1.1. Definitions | 1 |
| 1.2. Accounting Terms | 8 |
| 1.3. Other Definitional Provisions | 8 |

ARTICLE II

REVOLVING CREDIT FACILITY

| | |
|---|----|
| 2.1. Revolving Credit | 8 |
| 2.2. Advances | 9 |
| 2.5. Interest Periods | 11 |
| 2.6. Unused Commitment Fee | 11 |
| 2.7. Deficiency Advances | 12 |
| 2.8. Termination of Existing Facilities | 12 |

ARTICLE III

ADDITIONAL TERMS

| | |
|---|----|
| 3.1. Payments | 13 |
| 3.2. Capital Adequacy | 14 |
| 3.3. Special Provisions Governing LIBOR Loans | 15 |
| 3.4. Taxes | 16 |

ARTICLE IV

REPRESENTATIONS AND WARRANTIES OF THE BORROWER

| | |
|--|----|
| 4.1. Organization, Existence and Power | 17 |
| 4.2. Authorization of Loan Documents; Binding Effect | 18 |
| 4.3. Authority | 18 |
| 4.4. Capital Structure | 18 |
| 4.5. Financial Condition | 18 |
| 4.6. Pending Litigation | 19 |
| 4.7. Certain Agreements; Material Contracts | 19 |

| | |
|--|----|
| 4.8. Authorization, Etc | 19 |
| 4.9. No Violation | 20 |
| 4.10. Payment of Taxes | 20 |
| 4.11. Transactions With Affiliates, Officers, Directors and 1% Shareholders | 20 |
| 4.12. ERISA | 21 |
| 4.13. Ownership of Properties; Liens | 21 |
| 4.14. Employment Matters | 21 |
| 4.15. Insurance | 21 |
| 4.16. Indebtedness | 22 |
| 4.17. Securities Law Compliance | 22 |
| 4.18. Accuracy of Information | 22 |

ARTICLE V

CONDITIONS TO ADVANCES

| | |
|--------------------------|----|
| 5.1. Each Advance | 22 |
| 5.2. First Advance | 23 |

ARTICLE VI

AFFIRMATIVE COVENANTS OF THE BORROWER

| | |
|--|----|
| 6.1. Reporting Requirements | 24 |
| 6.2. Loan Proceeds | 26 |
| 6.3. Maintenance of Business and Properties; Insurance | 26 |
| 6.4. Payment of Taxes | 26 |
| 6.5. Compliance with Laws, etc | 27 |
| 6.7. Further Assurances | 27 |
| 6.8. Bank Accounts | 27 |

ARTICLE VII

NEGATIVE COVENANTS OF THE BORROWER

| | |
|--|----|
| 7.1. Sale of Assets; Mergers, Etc | 28 |
| 7.2. Liens and Encumbrances | 29 |
| 7.3. Sales and Leasebacks | 31 |
| 7.4. Investments | 31 |
| 7.5. Transactions with Affiliates | 32 |
| 7.6. ERISA Compliance | 32 |
| 7.7. Financial Covenants | 33 |
| 7.8. Contracts Prohibiting Compliance with Agreement | 33 |

ARTICLE VIII
EVENTS OF DEFAULT

| | |
|-----------------------------------|----|
| 8.1. Default | 33 |
| 8.2. Agent to Act | 36 |
| 8.3. Cumulative Rights | 36 |
| 8.4. No Waiver | 36 |
| 8.5. Allocation of Proceeds | 36 |

ARTICLE IX
THE AGENT

| | |
|---|----|
| 9.1. Appointment | 37 |
| 9.2. Limitation on Liability | 37 |
| 9.3. Reliance | 38 |
| 9.4. Notice of Default | 38 |
| 9.5. No Representations | 38 |
| 9.6. Indemnification | 39 |
| 9.7. The Agent in its Individual Capacity | 39 |
| 9.8. Resignation | 40 |
| 9.9. Sharing of Payments, Etc | 40 |
| 9.10. Fees | 41 |

ARTICLE X

MISCELLANEOUS

| | |
|--|----|
| 10.1. Assignments and Participations | 41 |
| 10.2. Survival of Representations, Etc | 42 |
| 10.3. Right of Setoff | 43 |
| 10.4. Indemnity; Costs, Expenses and Taxes | 43 |
| 10.5. Notices | 44 |
| 10.6. MASSACHUSETTS LAW | 45 |
| 10.7. Counterparts | 45 |
| 10.8. JURISDICTION, SERVICE OF PROCESS | 45 |
| 10.9. Limit on Interest | 46 |
| 10.10. Amendments | 46 |
| 10.11. Headings | 47 |
| 10.12. WAIVER OF NOTICE, ETC | 47 |
| 10.13. Severability | 48 |
| 10.14. Entire Agreement | 48 |

| | | |
|--------|---------------------------------|----|
| 5 | | |
| 10.15. | Compliance with Covenants | 48 |
| 10.16. | Termination | 48 |
| 10.17. | WAIVER OF TRIAL BY JURY | 48 |

LOAN AGREEMENT

This Loan Agreement (the "Agreement") is entered into as of the 23rd day of February, 1996, by and among The First National Bank of Boston ("Bank of Boston"), Chemical Bank ("Chemical"; hereinafter Bank of Boston and Chemical may be referred to individually as a "Lender" or collectively as the "Lenders"), The First National Bank of Boston in its capacity as agent for the Lenders (in such capacity, together with any successor agent appointed in accordance with the terms of Section 9.8, the "Agent"), and MKS Instruments, Inc., a Massachusetts corporation ("Borrower").

PREMISES:

WHEREAS, the Borrower has requested that the Lenders make available to it a revolving credit facility of up to \$20,000,000; and

WHEREAS, the Lenders are willing to make such revolving credit facility available to the Borrower on the terms and conditions hereinafter set forth;

NOW, THEREFORE, in consideration of the premises and for other good and valuable consideration, the adequacy and receipt of which are hereby acknowledged, the parties hereto hereby agree as follows:

ARTICLE I

DEFINITIONS

1.1. Definitions. In addition to terms defined elsewhere in this Agreement, the following terms shall have the meanings indicated, which meanings shall be equally applicable to both the singular and plural forms of such terms:

2.4.1. "Adjusted LIBOR Rate" shall have the meaning set forth in Section

"Advance" shall mean the drawing down by the Borrower of a Base Rate Loan or a LIBOR Loan on any given Advance Date.

"Advance Date" shall mean the date as of which an Advance is consummated.

"Affiliate" of any Person shall mean any other Person which, directly or indirectly, controls, or is controlled by, or is under common control with, such Person. For purposes of this definition, "control" of any Person shall mean the power, directly or indirectly, either to (i) vote 10% or more of the securities having ordinary voting power for the election of directors of such Person or (ii) direct the management and policies of such Person, whether by contract or otherwise. As to

the Borrower, the term "Affiliate" shall include, without limitation, any partnership or joint venture of which the Borrower or any Affiliate of the Borrower is a general partner or is a limited partner with more than a ten percent (10%) interest, and any director or executive officer of the Borrower.

"Applicable Commitment Percentage" shall mean, with respect to each Lender at any time, a fraction, the numerator of which shall be such Lender's Revolving Credit Commitment and the denominator of which shall be the Total Revolving Credit Commitment, which Applicable Commitment Percentage for each Lender as of the Closing Date is as set forth in Exhibit A; provided, however, that the Applicable Commitment Percentage of each Lender shall be increased or decreased to reflect any assignments to or by such Lender effected in accordance with Section 10.1.

"Assignment and Acceptance" shall mean an Assignment and Acceptance in the form of Exhibit B (with blanks appropriately filled in) delivered to the Agent in connection with an assignment of a Lender's interest under this Agreement pursuant to Section 10.1.

"Base Rate" shall mean the higher of (a) the annual rate of interest announced from time to time by the Bank of Boston at the Bank of Boston's office at 100 Federal Street, Boston, Massachusetts, as its "base rate" or (b) one-half of one percent (1/2%) above the Federal Funds Effective Rate. For the purposes of this definition, "Federal Funds Effective Rate" shall mean, for any day, the rate per annum equal to the weighted average of the rates on overnight federal funds transactions with members of the Federal Reserve System arranged by federal funds brokers, as published for such day (or, if such day is not a Business Day, for the next preceding Business Day) by the Federal Reserve Bank of New York, or if such rate is not so published for any day that is a Business Day, the average of the quotations for such day on such transactions received by the Bank of Boston from three funds brokers of recognized standing selected by the Bank of Boston.

"Base Rate Loan" shall mean an Advance that is specified as such in the Notice of Borrowing with respect to such Advance and that bears interest at the Base Rate.

"Borrowing" shall mean the incurrence of one or more Advances on a given date.

"Business Day" shall mean a day on which commercial banks are required to be open for business in Boston, Massachusetts.

"Cash Flow Ratio" shall have the meaning set forth in Section 7.7(c).

"Closing Date" shall mean the date of this Agreement.

"Compliance Certificate" shall have the meaning set forth in Section 6.1(c).

"Consolidated Debt Service" shall mean for any period the sum (without duplication) of Interest Expense, the interest portion of Financing Lease Obligations and required principal payments on long-term debt of the Borrower and its Subsidiaries, determined on a consolidated basis.

"Consolidated Indebtedness" shall mean the Indebtedness of the Borrower and its Subsidiaries, determined on a consolidated basis.

"Consolidated Net Income" shall mean for any period the net income (or loss) for such period (before extraordinary items and excluding the net income of any business entity that is not a Subsidiary in which the Borrower or one of its Subsidiaries has an ownership interest unless such net income shall have actually been received by such company in the form of cash distributions) of the Borrower and its Subsidiaries after deducting all operating expenses, depreciation and amortization, Interest Expense, the interest portion of Financing Lease Obligations, all taxes in respect of income and profits paid or payable (including accrued Sub S distributions required to make shareholder tax payments) and all other proper deductions, all determined on a consolidated basis.

"Consolidated Operating Cash Flow" shall mean for any period, the net income (or loss) for such period (before extraordinary items and excluding the net income of any business entity that is not a Subsidiary in which the Borrower or one of its Subsidiaries has an ownership interest unless such net income shall have actually been received by the Borrower or Subsidiary, as the case may be, in the form of cash distributions) of the Borrower and its Subsidiaries before deducting Interest Expense and taxes and after restoring thereto depreciation of real and personal property and leasehold improvements and amortization and after deducting cash taxes paid, Sub S distributions required to make shareholder tax payments, and capital expenditures incurred, provided that capital expenditures shall not include real estate purchases funded by debt.

"Consolidated Tangible Net Worth" shall mean, at any time, the stockholders' equity of the Borrower and its Subsidiaries determined in accordance with generally accepted accounting principles including the book amount of all minority interests in MKS International, Inc. but excluding the book amount of all minority interests in other Affiliates and any foreign exchange translation adjustment, with no upward adjustments due to a reevaluation of assets (other than any such upward adjustment as may be required under generally accepted accounting principles in connection with the acquisition by the Borrower or any Subsidiary of another company or entity) minus the following items (without duplication of deductions) appearing on the balance sheet of the Borrower and its Subsidiaries:

(a) the book amount of all assets (including, without limitation, goodwill, patents, trademarks, copyrights, organizational expense and unamortized debt discount) that would be treated as intangibles under generally accepted accounting principles;

(b) treasury stock; and

(c) any write-up in the book amount of any asset or Investment subsequent to the Closing Date, resulting from a reevaluation or reappraisal thereof from the amount entered in accordance with generally accepted accounting principles by the Borrower or any Subsidiary on its books with respect to its acquisition of the asset or Investment.

"Costs" shall have the meaning set forth in Section 10.4.

"Debt-to-Net Worth Ratio" shall have the meaning set forth in Section 7.7(b).

"Default" shall mean any event that, with the lapse of time, the giving of notice, or both, would become an Event of Default hereunder.

"Event of Default" shall have the meaning set forth in Section 8.1 hereof.

"Existing Loan Agreements" shall mean the Loan Agreements between the Borrower and the Bank of Boston dated November 1, 1993 and October 31, 1995, respectively.

"Financing Lease" shall mean any lease of the Borrower or a Subsidiary, as lessee, that is shown or is required to be shown in accordance with generally accepted accounting principles as a liability on the balance sheet of the lessee thereunder.

"Financing Lease Obligation" shall mean for any period the monetary obligation of the lessee under a Financing Lease. The amount of a Financing Lease Obligation at any date is the amount at which the lessee's liability under the Financing Lease would be required to be shown on its balance sheet at such date.

"Hazardous Substances" shall mean any hazardous waste, as defined by 42 U.S.C. Section 6903(5), any hazardous substances, as defined by 42 U.S.C. Section 601(14), any pollutant or contaminant, as defined by 42 U.S.C. Section 9601(33), or any toxic substance, oil or hazardous materials or other chemicals or substances regulated by any laws or regulations relating to the discharge of air pollutants, water pollutants, or processed wastewater.

"Indebtedness" shall mean, for any Person, (a) all obligations of such Person that in accordance with generally accepted accounting principles would be reflected on the balance sheet of such Person as a liability, (b) all obligations of any other Person the payment or collection of which such Person has guaranteed (except by reason of endorsement for collection in the ordinary course of business) or in respect of which such Person is liable, contingently or otherwise, including, without limitation, liable by way of agreement to purchase, to provide funds for payment, to supply funds to or otherwise to invest in such other Person, or otherwise to assure a creditor against loss, (c) all obligations of any other Person for borrowed money or for the deferred purchase price of property or services secured by (or for which the holder of such indebtedness has an existing right, contingent or otherwise, to be secured by) any mortgage, or other encumbrance upon or in property (including, without limitation, accounts and contract rights) owned by such Person, whether or not such Person has assumed or become liable for the payment of such indebtedness or obligations, and (d) Financing Lease Obligations of such Person.

"Interest Expense" shall mean for any period the aggregate amount of interest recorded, in accordance with generally accepted accounting principles, on the financial statements for that period by the Borrower and its Subsidiaries in respect of Consolidated Indebtedness incurred for borrowed money.

"Interest Period" shall mean the period designated by the Borrower as such in the Notice of Borrowing with respect to any LIBOR Loan pursuant to and subject to the limitations set forth in Section 2.5.

"Interest Rate Determination Date" shall mean the third Business Day prior to the first day of the related Interest Period for a LIBOR Loan.

"Interim Maturity Date" shall mean the last day of any Interest Period.

"Investments" shall have the meaning set forth in Section 7.4.

"IPO" shall mean the initial underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended, covering the offer and sale of the Borrower's Common Stock for the account of the Borrower.

"LIBOR Loan" shall mean an Advance that is specified as such in the Notice of Borrowing with respect to such Advance and that bears interest at the adjusted LIBOR Rate.

"LIBOR Rate" shall mean for any Interest Rate Determination Date, the rate obtained by dividing (i) the quotation offered by the Agent in the interbank Eurodollar market for U.S. dollar deposits of amounts in immediately available funds

comparable to the principal amount of the LIBOR Loan for which the LIBOR Rate is being determined with a maturity comparable to the Interest Period for which such LIBOR Rate will apply as of approximately noon (Boston time) three Business Days prior to the commencement of such Interest Period by (ii) a percentage equal to 100% minus the stated maximum rate of all reserves required to be maintained against "Eurocurrency liabilities" as specified in Regulation D (or against any other category of liabilities that includes deposits by reference to which the interest rate on LIBOR Loans is determined) as applicable on such date to any member bank of the Federal Reserve System.

"Licenses" shall have the meaning set forth in Section 4.8.

"Lien" shall mean any interest in property securing an obligation owed to, or a claim by, a Person other than the owner of the property, whether the interest is based on common law, statute or contract (including the security interest lien arising from a mortgage, encumbrance, pledge, conditional sale or trust receipt or a lease, consignment or bailment for security purposes). For the purposes of this Agreement, the Borrower or a Subsidiary shall be deemed to be the owner of any property that it has acquired or holds subject to a Financing Lease or a conditional sale agreement or other arrangement pursuant to which title to the property has been retained by or vested in some other Person for security purposes, and such retention or vesting shall be deemed to be a Lien.

"Loan Documents" shall mean each of this Agreement, the Notes and any other document or instrument executed by the Borrower in favor of the Lenders in connection with the transactions contemplated hereby.

"Note" shall mean a Revolving Credit Note.

"Notice of Borrowing" shall have the meaning set forth in Section 2.2.1.

"Obligations" shall mean, without limitation, any and all liabilities, debts, and obligations of the Borrower to each of the Lenders, of each and every kind, nature and description, arising under this Agreement or any other Loan Document, whether now existing or hereafter incurred. "Obligations" also means, without limitation, any and all obligations of the Borrower to act or to refrain from acting in accordance with the terms, provisions and covenants of this Agreement or of any other Loan Document.

"Permitted Liens" shall have the meaning set forth in Section 7.2.

"Person" shall mean any natural person, corporation, unincorporated organization, trust, joint-stock company, joint venture, association, company, partnership or government, or any agency or political subdivision of any government.

"Required Lenders" shall mean, as of any date, Lenders on such date having Credit Exposures (as defined below) aggregating at least 66-2/3% of the aggregate Credit Exposures of all the Lenders on such date. For purposes of the preceding sentence, the "Credit Exposure" of each Lender shall mean the aggregate principal amount of the Advances owing to such Lender plus the aggregate unutilized amounts of such Lender's Revolving Credit Commitment.

"Revolver Termination Date" shall mean June 30, 1999 or any subsequent anniversary thereof if the Total Revolving Credit Commitment shall have been renewed by the Lenders.

"Revolving Credit Commitment" means, with respect to each Lender, the obligation of such Lender to make Advances to the Borrower up to an aggregate principal amount at any one time outstanding equal to such Lender's Applicable Commitment Percentage of the Total Revolving Credit Commitment.

"Revolving Credit Facility" shall mean the loan arrangement described in Article II of this Agreement, subject to all other applicable terms of this Agreement.

"Revolving Credit Note" shall have the meaning set forth in Section 2.3.

"Revolving Credit Outstandings" means, as of any date of determination, the aggregate principal amount of all Advances then outstanding and all interest accrued thereon.

"Revolving Loan Account" shall mean the account on the books of the Agent in the name of the Borrower in which the following shall be recorded: Advances made by the Lenders to and for the account of the Borrower pursuant to Section 2 of this Agreement; all other charges, expenses and other items properly chargeable to the Borrower with respect to such Advances; all Costs with respect to such Advances; all payments made by the Borrower on account of Indebtedness evidenced by the Revolving Credit Notes; and other appropriate debits and credits.

"Subsidiary" shall mean any Person of which the Borrower at the time owns, directly or indirectly, through another Subsidiary or otherwise, 50% or more of the equity interests.

"Sub S Dividends" shall mean one or more distributions by the Borrower to its shareholders who were shareholders prior to the IPO in an aggregate amount equal to the Borrower's "accumulated adjustments account," as defined in Section 1368(a)(1) of the Internal Revenue Code of 1986, as of the date of the IPO.

"Total Revolving Credit Commitment" shall mean a principal amount equal to \$20,000,000.

1.2. Accounting Terms. Accounting terms not specifically defined in this Agreement shall have the meanings given to them under generally accepted accounting principles.

1.3. Other Definitional Provisions. The words "hereof," "herein" and "hereunder," and words of similar import when used in this Agreement shall refer to this Agreement as a whole and not any particular provision of this Agreement. Any Article, Section, Exhibit or Schedule references are to this Agreement unless otherwise specified.

ARTICLE II

REVOLVING CREDIT FACILITY

2.1. Revolving Credit. Subject to the terms and conditions of this Agreement, each Lender severally agrees to make Advances from time to time to the Borrower during the period from the date hereof to the Revolver Termination Date on a pro rata basis as to the total Borrowing requested by the Borrower on any day determined by such Lender's Applicable Commitment Percentage up to but not exceeding the Revolving Credit Commitment of such Lender, provided, however, that the Lenders will not be required and shall have no obligation to make any such Advance (i) so long as a Default or an Event of Default has occurred and is continuing or (ii) if the Agent has accelerated the maturity of any of the Notes as a result of an Event of Default; provided further, however, that immediately after giving effect to each such Advance, the aggregate principal amount of Revolving Credit outstandings shall not exceed the Total Revolving Credit Commitment. Within such limits and subject to the terms and conditions hereof, the Borrower may borrow, repay and reborrow under the Revolving Credit Facility on any Business Day from the Closing Date until, but (as to borrowings and reborrowings) not including, the Revolver Termination Date. All Advances shall be due and payable no later than the Revolver Termination Date. Each Advance shall, at the option of the Borrower, be a Base Rate Loan or a LIBOR Loan provided, however, that no LIBOR Loan having an Interest Period of 2, 3 or 6 months shall be made at any time in a principal amount of less than \$1,250,000 and no LIBOR Loan having an Interest Period of 1 month shall be made at any time in a principal amount of less than \$1,000,000.

2.2. Advances.

2.2.1. Whenever the Borrower desires to obtain a LIBOR Loan hereunder, it may request that the Agent provide quotes as of any specified Interest Rate Determination Date as to the LIBOR Rate for any or all Interest Periods, and the Agent shall promptly provide such quotes. The Borrower shall give the Agent prior telecopied or telephone notice (given not later than 11:00 a.m. (Boston time)) on the day of any Borrowing with respect to a Base Rate Loan and at least three Business Days prior to the day of any Borrowing with respect to a LIBOR Loan. Each such notice (each a "Notice of Borrowing") shall specify the principal amount of each Advance to be made, the date of the Borrowing (which shall be a Business Day), whether each Advance being made is to be initially maintained as a Base Rate Loan or a LIBOR Loan and, in the case of a LIBOR Loan, the initial Interest Period applicable thereto. If such notice is given by telephone, it shall be immediately confirmed in writing. Notice of receipt of a Notice of Borrowing, together with the amount of each Lender's portion of an Advance requested thereunder, shall be provided by the Agent to each Lender by facsimile transmission with reasonable promptness on the day the Agent receives the Notice of Borrowing. No more than one Base Rate Loan shall be outstanding at any time, but the Borrower may increase the principal amount of any Base Rate Loan at any time by giving a Notice of Borrowing as set forth above.

2.2.2. No later than 3:00 p.m. on the Advance Date, each Lender shall, pursuant to the terms and subject to the conditions of this Agreement, make the amount of the Advance or Advances to be made by it on such day available by wire transfer to the Agent in the amount of its pro rata share, determined according to such Lender's Applicable Commitment Percentage of the Advance or Advances to be made on such day. Such wire transfer shall be directed to the Agent and shall be in the form of Dollars constituting immediately available funds. The amount so received by the Agent shall, subject to the terms and conditions of this Agreement, promptly be made available to the Borrower on the date so specified by delivery of the proceeds thereof to the Revolving Loan Account or otherwise as shall be directed in the applicable Notice of Borrowing and reasonably acceptable to the Agent.

2.2.3. Upon the Interim Maturity Date of any LIBOR Loan, unless the Borrower (i) shall have given the Agent a Notice of Borrowing in accordance with Section 2.2.1 requesting that a new LIBOR Loan be made on such Interim Maturity Date or (ii) shall have repaid such LIBOR Loan on such Interim Maturity Date, the Borrower shall be deemed to have requested that the Lenders make a Base Rate Loan to the Borrower on such Interim Maturity Date in an aggregate principal amount equal to the aggregate principal amount of the LIBOR Loan maturing on such Interim Maturity Date.

2.3. Revolving Loan Account. The Advances made by each Lender from time to time to the Borrower under this Agreement shall be evidenced by a Revolving Credit Note in the form of Exhibit C hereto (each, a "Revolving Credit Note") in the amount of such Lender's Revolving Credit Commitment. The Advances and the amounts of all payments on the Revolving Credit Notes shall be recorded by the Agent in the Revolving Loan Account of the Borrower. The debit balance of the Revolving Loan Account shall represent the amount of the Borrower's indebtedness to the Lenders from time to time by reason of Advances and other appropriate charges hereunder. All statements regarding the Revolving Loan Account shall be deemed to be accurate absent manifest error or unless objected to by the Borrower within 30 days after receipt. The Borrower agrees to review each such statement promptly after receipt and to bring any errors or discrepancies to the Agent's attention promptly.

2.4. Interest.

2.4.1. The Borrower agrees to pay interest in respect of the unpaid principal amount of each Advance from the date the proceeds thereof are made available to the Borrower until maturity (whether by acceleration, voluntary prepayment or otherwise) as follows. Each Advance shall bear interest at the Base Rate in effect from time to time unless the Borrower elects and qualifies to pay interest on such Advance at the following rate (the "Adjusted LIBOR Rate"):

(i) During any period in which the Borrower maintains a Debt-to-Net Worth Ratio of less than 1 to 1:

(a) and a Cash Flow Ratio of less than 1.75 to 1, the LIBOR Rate plus 1.125%;

(b) and a Cash Flow Ratio of 1.75 to 1 or greater up to and including 2.5 to 1, the LIBOR Rate plus .875%; or

(c) and a Cash Flow Ratio in excess of 2.5 to 1, the LIBOR Rate plus .625%;

(ii) During any period in which the Borrower maintains a Debt-to-Net Worth Ratio of 1 to 1 or more but less than or equal to 1.5 to 1:

(a) and a Cash Flow Ratio of less than 1.75 to 1, the LIBOR Rate plus 1.25%;

(b) and a Cash Flow Ratio of 1.75 to 1 or greater up to and including 2.5 to 1, the LIBOR Rate plus 1.00%; or

(c) and a Cash Flow Ratio in excess of 2.5 to 1, the LIBOR Rate plus .75%.

2.4.2. Overdue principal and (to the extent permitted by law) overdue interest in respect of each Base Rate Loan and each LIBOR Loan (to the extent not converted into a Base Rate Loan) shall bear interest, payable on demand, after as well as before judgment, at a rate per annum equal to the Base Rate in effect from time to time plus 3% per annum.

2.4.3. Interest shall accrue from and including the date of any Advance and shall be payable by the Borrower on each Advance in arrears on the last day of each of the Borrower's fiscal quarters, on any prepayment (on the amount prepaid), on any maturity date (whether by acceleration or otherwise), and after such maturity, on demand. Interest shall be calculated on the basis of actual days elapsed and a 360-day year.

2.5. Interest Periods. At the time it gives any Notice of Borrowing with respect to a LIBOR Loan, the Borrower shall elect the Interest Period applicable to the related Advance, which Interest Period shall, at the option of the Borrower, be a period of 1, 2, 3 or 6 months. Notwithstanding anything to the contrary contained herein:

(i) if any Interest Period begins on a day for which there is no numerically corresponding day in the calendar month at the end of such Interest Period, such Interest Period shall end on the last Business Day of such calendar month;

(ii) if any Interest Period would otherwise expire on a day that is not a Business Day, such Interest Period shall expire on the next succeeding Business Day; provided that if any Interest Period would otherwise expire on the day that is not a Business Day but is a day of the month after which no further Business Day occurs in such month, such Interest Period shall expire on the next preceding Business Day;

(iii) no Interest Period shall extend beyond the Revolver Termination Date.

2.6. Unused Commitment Fee. For the period beginning on the Closing Date and ending on the Revolver Termination Date, the Borrower agrees to pay to the Agent, for the pro rata benefit of the Lenders based on their Applicable Commitment Percentages, an unused commitment fee equal to 0.25% per annum multiplied by the average daily amount by which (a) the Total Revolving Credit Commitment exceeds (b) the Revolving Credit Outstandings less all accrued and unpaid interest. Such fees shall be due in arrears on the last Business Day of each March, June, September and December commencing March 29, 1996 to and on the Revolver Termination Date. Notwithstanding the foregoing, so long as any Lender fails to make available any portion of its Revolving Credit Commitment when

requested, such Lender shall not be entitled to receive payment of its pro rata share of such fee for so long as such Lender shall not have made available such portion. Such fee shall be calculated on the basis of a year of 360 days for the actual number of days elapsed.

2.7. Deficiency Advances. No Lender shall be responsible for any default of any other Lender in respect to such other Lender's obligation to make any Advance nor shall the Revolving Credit Commitment of any Lender hereunder be increased as a result of such default of any other Lender. Without limiting the generality of the foregoing, in the event any Lender shall fail to advance funds to the Borrower as herein provided, the Agent may in its discretion, but shall not be obligated to, advance under the Revolving Credit Note in its favor as a Lender all or any portion of such amount or amounts (each, a "deficiency advance") and shall thereafter be entitled to payments of principal of and interest on such deficiency advance in the same manner and at the same interest rate or rates to which such other Lender would have been entitled had it made such advance under its Revolving Credit Note; provided that, upon payment to the Agent from such other Lender of the entire outstanding amount of each such deficiency advance, together with accrued and unpaid interest thereon, from the most recent date or dates interest was paid to the Agent by the Borrower on each Advance comprising the deficiency advance at the rate of interest payable by the Borrower and payment by such other Lender to Agent of customary late fees, then such payment shall be credited against the applicable Revolving Credit Note of the Agent in full payment of such deficiency advance and the Borrower shall be deemed to have borrowed the amount of such deficiency advance from such other Lender as of the most recent date or dates, as the case may be, upon which any payments of interest were made by the Borrower thereon.

2.8. Termination of Existing Facilities. The outstanding Advances, if any, under the Loan Agreement between the Borrower and Bank of Boston dated November 1, 1993 (the "1993 Agreement") shall be replaced on the date hereof by one or more Advances under this Agreement and Borrower shall have no further right to obtain, and Lender shall have no obligation to make, Advances under the 1993 Agreement. The \$3,000,000 demand unsecured revolving credit facility made available to the Borrower by Chemical Bank as set forth in a letter agreement dated August 23, 1995 shall terminate on the date hereof.

ARTICLE III
ADDITIONAL TERMS

3.1. Payments.

3.1.1. The Borrower shall have the right to prepay the Notes, in whole at any time or in part from time to time, without premium or penalty, provided that, except as set forth in Section 3.3, no Advance, either in whole or in part, may be prepaid on the Advance Date of such Advance. The Borrower shall give notice (by telex or telecopier, or by telephone (confirmed in writing promptly thereafter)) to the Agent of each proposed prepayment hereunder prior to 11:00 a.m. (Boston time), (x) with respect to Base Rate Loans, upon the Business Day of the proposed prepayment and (y) with respect to LIBOR Loans, at least three Business Days prior to the Business Day of the proposed prepayment, which notice in each case shall specify the proposed prepayment date (which shall be a Business Day), the aggregate principal amount of the proposed prepayment and which Advances are to be prepaid. LIBOR Loans that are voluntarily prepaid before the last day of the applicable Interest Period shall be subject to the additional compensation requirements set forth in Section 3.3, and each prepayment of a LIBOR Loan shall be in an aggregate principal amount of not less than the total principal amount outstanding at such time under such LIBOR Loan. If at any time the outstanding principal amount of the Advances exceeds \$20,000,000, the Borrower will immediately prepay the Advances by the amount of such excess.

3.1.2. All payments of principal and interest due under the Notes (including Prepayments), and any other amounts owing to the Lenders under this Agreement shall be made by the Borrower not later than 2:30 p.m., Boston time, on the day due in lawful money of the United States of America to the Agent at its Boston, Massachusetts office in immediately available funds. The Borrower hereby authorizes the Agent to charge such payments as they become due, if not otherwise paid by the Borrower, to any account of the Borrower with the Agent as the Agent may elect.

3.1.3. Whenever any payment to be made hereunder or under any other Loan Document shall be stated to be due on a day that is not a Business Day, such payment may be made on the next succeeding Business Day, and such extension of time shall in such case be included in computing interest or other fees or charges provided for under this Agreement or any other Loan Document; provided, however, that with respect to LIBOR Loans, if the next succeeding Business Day falls in another calendar month, such payment shall be made on the next preceding Business Day.

3.1.4. All payments made by the Borrower on the Notes shall be applied by the Agent (a) first, to the payment of Costs with respect to the Notes, (b)

second, to the payment of accrued and unpaid interest on the Notes, until all such accrued interest has been paid, and (c) third, to the payment of the unpaid principal amount of the Notes. Except as otherwise provided herein, (a) each payment on account of the principal of and interest on the Notes and the fees described in Section 2.6 shall be made to the Agent for the account of the Lenders pro rata based on their Applicable Commitment Percentages, (b) all payments to be made by the Borrower for the account of each of the Lenders on account of principal, interest and fees, shall be made without diminution, setoff, recoupment or counterclaim, and (c) the Agent will promptly distribute to the Lenders in immediately available funds payments received in fully collected, immediately available funds from the Borrower.

3.2. Capital Adequacy.

3.2.1. If, after the date of this Agreement, a Lender shall have reasonably determined in good faith that the adoption or effectiveness after the date hereof of any applicable law, rule or regulation regarding capital adequacy, or any change therein, or any change in the interpretation or administration thereof by any governmental authority, central bank or comparable agency charged with the interpretation or administration thereof, or compliance by such Lender with any request or directive regarding capital adequacy (whether or not having the force of law) of any such authority, central bank or comparable agency, has or would have the effect of materially reducing the rate of return on such Lender's capital or assets as a consequence of its commitments or obligations hereunder to a level below that which such Lender could have achieved but for such adoption, effectiveness, change or compliance (taking into consideration such Lender's then current policies with respect to capital adequacy), then from time to time, subject to Section 3.2.2, within 15 days after demand, the Borrower shall pay to the Agent for the account of such Lender such additional amount or amounts as will compensate such Lender for such reduction (after such Lender shall have allocated the same fairly and equitably among all of its customers or any class generally affected thereby).

3.2.2. The Agent will notify the Borrower of any event occurring after the date of this Agreement that will entitle a Lender to any additional payment under this Section 3.2 as promptly as practicable. The Agent will furnish to the Borrower with such notice a certificate signed by an officer of the Lender requesting payment certifying that such Lender is entitled to payment under this Section 3.2 and setting forth the basis (in reasonable detail) and the amount of each request by such Lender for any additional payment pursuant to this Section 3.2. Such certificate shall be conclusive in the absence of manifest error. The Borrower shall not be obligated to compensate such Lender pursuant to this Section for amounts accruing prior to the date that is 180 days before such Agent notifies the Borrower of its obligations to compensate such Lender for such amounts.

3.3. Special Provisions Governing LIBOR Loans. Notwithstanding any other provisions of this Agreement, the following provisions shall govern with respect to LIBOR Loans as to the matters covered:

3.3.1. Increased Costs, Illegality, etc. (a) In the event that the Agent shall have determined (which determination shall, if made in good faith and absent manifest error, be final, conclusive and binding upon all parties):

(i) on any Interest Rate Determination Date, that by reason of any changes arising after the date of this Agreement affecting the interbank Eurodollar market, adequate and fair means do not exist for ascertaining the applicable interest rate on the basis provided for in the definition of LIBOR Rate; or

(ii) at any time during any Interest Period, that the Lenders shall incur increased costs (including taxes) or reductions in the amounts received or receivable hereunder with respect to a LIBOR Loan by reason of (x) any change since the Interest Rate Determination Date for the Interest Period in question in any applicable law or governmental rule, regulation, guideline or order (or any interpretation thereof and including the introduction of any new law or governmental rule, regulation, guideline or order) (such as, for example but not limited to, a change in official reserve requirements, but excluding reserve requirements that have been included in calculating the LIBOR Rate for such Interest Period) and/or (y) other circumstances affecting any Lender, the interbank Eurodollar market or the position of any Lender in the relevant market; or

(iii) at any time, that the making or continuance of any LIBOR Loan has become unlawful by compliance by the Lenders in good faith with any law, governmental rule, regulation, guideline or order, or has become impracticable as a result of a contingency occurring after the date of this Agreement;

then and in any such event, the Agent shall promptly after making such determination give notice (by telephone confirmed in writing) to the Borrower of such determination. Thereafter (x) in the case of clause (i) above, any Notice of Borrowing given by the Borrower with respect to a LIBOR Loan that has not yet been incurred shall be deemed rescinded by the Borrower and LIBOR Loans shall no longer be available until such time as the Agent notifies the Borrower that the circumstances giving rise to such notice no longer exist or that, notwithstanding such circumstances, LIBOR Loans will again be made available hereunder, (y) in the case of clause (ii), the Borrower shall pay to the Agent, upon written demand therefor (but only with respect to any LIBOR Loan made pursuant to a Notice of Borrowing issued

after the giving of the written notice that LIBOR Loans will again be made available hereunder referred to in clause (x) above), such additional amounts (in the form of an increased rate of, or a different method of calculating, interest or otherwise as the Agent in its sole discretion shall determine) as shall be required to compensate the Lenders for such increased cost or reduction in amount received (a written notice as to additional amounts owed the Lenders, showing the basis for such calculation thereof, shall be given to the Borrower by the Agent and shall, absent manifest error, be final, conclusive and binding upon the parties hereto), and (z) in the case of clause (iii), the Borrower shall take one of the actions specified in Section 3.3.1(b) as promptly as possible and, in any event, within the time period required by law.

(b) At any time that any LIBOR Loan is affected by the circumstances described in Section 3.3.1(a)(ii) or (iii), the Borrower may (and in the case of a LIBOR Loan affected pursuant to Section 3.3.1(a)(iii) shall) either (x) if the affected LIBOR Loan is then being made, withdraw the related Notice of Borrowing by giving the Agent telephonic (confirmed in writing) notice thereof on the same date that the Borrower was notified by the Agent pursuant to Section 3.3.1(a), or (y) if the affected LIBOR Loans are then outstanding, upon at least three Business Days' written notice to the Agent, require the Agent to convert each LIBOR Loan so affected into a Base Rate Loan.

3.3.2. Compensation. The Borrower shall compensate the Lenders, upon the Agent's written request (which request shall set forth the basis for requesting such amounts), for all reasonable losses, expenses and liabilities (including, without limitation, any interest paid by the Lender to lenders of funds borrowed by it to make or carry its LIBOR Loans to the extent not recovered by the Lenders in connection with the re-employment of such funds) and any loss sustained by any Lender in connection with the re-employment of the funds (including, without limitation, a return on such re-employment that would result in such Lender's receiving less than it would have received had such LIBOR Loan remained outstanding until the last day of the Interest Period applicable to such LIBOR Loan) that such Lender, may sustain: (i) if for any reason (other than a default by or negligence of any Lender) a LIBOR Loan is not advanced on a date specified therefor in a Notice of Borrowing (unless timely withdrawn pursuant to Section 3.3.1(b)(x) above), (ii) if any payment or prepayment of any LIBOR Loans occurs for any reason whatsoever (including, without limitation, by reason of Section 3.3.1(b)) on a date that is prior to the last day of an Interest Period applicable thereto, (iii) if any prepayment of any of its LIBOR Loans is not made on the date specified in a notice of payment given by the Borrower pursuant to Section 3.1 or (iv) as a consequence of an election made by the Borrower pursuant to Section 3.3.1(b) (y).

3.4. Taxes. All payments made by the Borrower under this Agreement and any Notes shall be made free and clear of, and without deduction or withholding for or on account of, any present or future income, stamp or other taxes, levies, imposts,

duties, charges, fees, deductions or withholdings, now or hereafter imposed, levied, collected, withheld or assessed by any governmental authority, excluding net income taxes and franchise taxes (imposed in lieu of net income taxes) imposed on any Lender as a result of a present or former connection between such Lender and the jurisdiction of the governmental authority imposing such tax or any political subdivision or taxing authority thereof or therein (other than any such connection arising solely from such Lender's having executed, delivered or performed its obligations or received a payment under, or enforced, this Agreement or any Note). If any such non-excluded taxes, levies, imposts, duties, charges, fees deductions or withholdings ("Non-Excluded Taxes") are required to be withheld from any amounts payable to the Lenders hereunder or under any Note, the amounts so payable to the Lenders shall be increased to the extent necessary to yield to the Lenders (after payment of all Non-Excluded Taxes) interest or any such other amounts payable hereunder at the rates or in the amounts specified in this Agreement. Whenever any Non-Excluded Taxes are payable by the Borrower, as promptly as possible thereafter the Borrower shall send to the Agent a certified copy of an original official receipt received by the Borrower showing payment thereof. If the Borrower fails to pay any Non-Excluded Taxes when due to the appropriate taxing authority or fails to remit to the Agent the required receipts or other required documentary evidence, the Borrower shall indemnify the Lenders for any incremental taxes, interest or penalties that may become payable to any Lenders as a result of any such failure. The agreements in this subsection shall survive the termination of this Agreement and the payment of the Advances and all other amounts payable hereunder.

ARTICLE IV

REPRESENTATIONS AND WARRANTIES OF THE BORROWER

In order to induce the Lenders to enter into this Agreement and to make the loans provided for herein, the Borrower makes the following representations and warranties to the Lenders, all of which shall survive the execution and delivery of this Agreement and the Notes.

4.1. Organization, Existence and Power. The Borrower is duly incorporated, validly existing and in good standing under the laws of the jurisdiction of its incorporation. The Borrower has the corporate power necessary to conduct the business in which it is engaged, to own the properties owned by it and to consummate the transactions contemplated by the Loan Documents. The Borrower is duly qualified or licensed to transact business in all places where the nature of the properties owned by it or the business conducted by it makes such qualification necessary and where the failure to be so qualified or licensed would have a material adverse effect upon the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole.

4.2. Authorization of Loan Documents; Binding Effect. The execution and delivery of this Agreement and the other Loan Documents and the performance of the transactions contemplated hereby and thereby have been duly authorized by all necessary corporate actions of the Borrower. Each of the Loan Documents constitutes the legal, valid and binding obligation of the Borrower, enforceable against the Borrower in accordance with its terms.

4.3. Authority. The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under the Loan Documents. Neither the authorization, execution, delivery, or performance by the Borrower of this Agreement or of any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

4.4. Capital Structure. The number of shares of stock of which the Borrower's authorized capital stock consists, the par value per share of such stock, the number of shares of such stock that have been issued and are outstanding and the number of shares that have been issued and are held by the Borrower as treasury shares are all disclosed on the Disclosure Schedule. Set forth in the Disclosure Schedule is a complete and accurate list of all Subsidiaries of the Borrower. The Disclosure Schedule indicates the jurisdiction of incorporation or organization of each of the Subsidiaries, the number of shares or units of each class of capital stock or other equity of the Subsidiaries authorized, and the number of such shares or units outstanding and the percentage of each class of such equity owned (directly or indirectly) by the Borrower. No shares of stock or units of equity interests of the Borrower or any of its Subsidiaries are covered by outstanding options, warrants, rights of conversion or purchase or similar rights granted or created by the Borrower except as set forth on the Disclosure Schedule. All the outstanding capital stock of the Borrower has been validly issued and is fully paid and nonassessable. All the stock or units of equity interests of the Borrower's Subsidiaries that are owned by the Borrower or any Subsidiary of the Borrower are owned free and clear of all mortgages, deeds of trust, pledges, liens, security interests and other charges or encumbrances.

4.5. Financial Condition. The audited consolidated balance sheet of the Borrower and its Subsidiaries dated as of December 31, 1995 (the "Balance Sheet Date") and the audited statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for and as of the end of the period ending on that date, including any related notes (the "Financial Statements"), all of which were

heretofore furnished to the Lenders, are true, correct and complete in all material respects and fairly present in all material respects the financial condition of the Borrower and its Subsidiaries as of the date of each such statement and have been prepared in accordance with generally accepted accounting principles consistently applied throughout the periods involved. Other than as reflected in such Financial Statements and except for liabilities incurred in the ordinary course of business since the date thereof, the Borrower has no Indebtedness that is or would be material to the financial condition of the Borrower, nor any material unrealized or unanticipated losses from any commitments. Since the Balance Sheet Date there has been no material adverse change in the consolidated financial condition (as set forth in the Financial Statements) or results of operations of the Borrower and its Subsidiaries taken as a whole.

4.6. Pending Litigation. Except as set forth in the Disclosure Schedule, there are no suits or proceedings pending or, to the knowledge of the Borrower, threatened before any court or arbitration tribunal or by or before any governmental or regulatory authority, commission, bureau or agency or public regulatory body against the Borrower that if adversely determined would have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole.

4.7. Certain Agreements; Material Contracts. The Borrower is not a party to any agreement or instrument or subject to any court order or governmental decree adversely affecting in any material respect the business, properties, assets or financial condition of the Borrower and its Subsidiaries taken as a whole.

4.8. Authorization, Etc. All authorizations, consents, approvals, accreditations, certifications and licenses required under the corporate charter or by-laws of the Borrower or under applicable law or regulation for the ownership or operation of the property owned or operated by the Borrower or the conduct of any business or activity conducted by the Borrower, including provision of services for which reimbursement is made by third party payors, other than authorizations, consents, approvals, accreditations, certifications or licenses the failure to obtain and/or maintain which would not have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole (collectively, "Licenses") have been duly issued and are in full force and effect. The Borrower has fulfilled and performed all of its material obligations with respect to such licenses (to the extent now required to be fulfilled or performed) and no event has occurred that would allow, with or without the passage of time or the giving of notice or both, revocation or termination thereof or would result in any other material impairment of the rights of the holder of any such License. All filings or registrations with any governmental or regulatory authority required for the conduct of the business or activity conducted by the Borrower have been made, other than any such filings or registrations as to which the failure to make same would not

have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries, taken as a whole. Except as expressly contemplated hereby, no approval, consent or authorization of or filing or registration with any governmental commission, bureau or other regulatory authority or agency is required with respect to the execution, delivery or performance of any of the Loan Documents.

4.9. No Violation. The execution, delivery and performance by the Borrower of the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower. The Borrower is not in default, nor has any event occurred that with the passage of time or the giving of notice, or both, would constitute a default, in the performance, observance or fulfillment of any of the obligations, covenants or conditions contained in any agreement, instrument or other document to which the Borrower is a party, which default would have a material adverse effect on the consolidated assets, financial condition or results of operations of the Borrower and its Subsidiaries, taken as a whole. The Borrower is not in violation of any applicable federal, state or local law, rule or regulation or any writ, order or decree, which violation would have a material adverse effect on the consolidated assets, financial condition or results of operations of the Borrower and its Subsidiaries, taken as a whole. Except as otherwise set forth in the Disclosure Schedule under the caption "Litigation," the Borrower has not received notice of any violation of any federal, state or local environmental law, rule or regulation or assertion that the Borrower has any obligation to clean up or contribute to the cost of cleaning up any waste or pollutants.

4.10. Payment of Taxes. The Borrower and its Subsidiaries have properly prepared and filed or caused to be properly prepared and filed all federal tax returns and all material state and local tax returns that are required to be filed and have paid all taxes shown thereon to be due and all other taxes, assessments and governmental charges or levies imposed upon the Borrower and its Subsidiaries, their income or profits or any properties belonging to the Borrower. No extensions of any statute of limitations are in effect with respect to any tax liability of the Borrower or any Subsidiary of the Borrower. No deficiency assessment or proposed adjustment of the federal income taxes of the Borrower or any Subsidiary of the Borrower is pending and the Borrower has no knowledge of any proposed liability of a substantial nature for any tax to be imposed upon any of its properties or assets.

4.11. Transactions With Affiliates, Officers, Directors and 1% Shareholders. Except as set forth on the Disclosure Schedule, the Borrower has no Indebtedness to or material contractual arrangement or understanding with any Affiliate, officer or director of the Borrower, nor any shareholder holding of record at least 1% of the equity of the Borrower nor, to the best of the Borrower's knowledge (without independent inquiry), any of their respective relatives.

4.12. ERISA. The Borrower has never established or maintained any funded employee pension benefit plan as defined under Section 3(2)(A) of the Employee Retirement Income Security Act of 1974, as amended and in effect on the date hereof ("ERISA"), other than the plans described on the Disclosure Schedule. No employee benefit plan established or maintained, or to which contributions have been made, by the Borrower or any Subsidiary of the Borrower that is subject to Part 3 of Title I-B of ERISA, had an accumulated funding deficiency (as such term is defined in Section 302 of ERISA) as of the last day of the fiscal year of such plan ended most recently prior to the date hereof, or would have had an accumulated funding deficiency (as so defined) on such day if such year were the first year of the plan to which Part 3 of Title I-B of ERISA applied. No material liability to the Pension Benefit Guaranty Corporation has been incurred or is expected by the Borrower to be incurred by it or any Subsidiary of the Borrower with respect to any such plan or otherwise. The execution, delivery and performance of this Agreement and the other Loan Documents will not involve on the part of the Borrower any prohibited transaction within the meaning of ERISA or Section 4975 of the Internal Revenue Code. The Borrower has never maintained, contributed to or been obligated to contribute to any "multiemployer plan," as defined in Section 3(37) of ERISA. The Borrower has never incurred any "withdrawal liability" calculated under Section 4211 of ERISA, and there has been no event or circumstance that would cause it to incur any such liability.

4.13. Ownership of Properties; Liens. The Borrower has good and marketable title to all its material properties and assets, real and personal, that are now carried on its books, including, without limitation, those reflected in the Financial Statements (except those disposed of in the ordinary course since the date thereof), and has valid leasehold interests in its properties and assets, real and personal, which it purports to lease, subject in either case to no mortgage, security interest, pledge, lien, charge, encumbrance or title retention or other security agreement or arrangement of any nature whatsoever other than Permitted Liens and those specified in the Disclosure Schedule. All of the Borrower's material leasehold interests and material obligations with respect to real property are described on the Disclosure Schedule.

4.14. Employment Matters. Except as set forth on the Disclosure Schedule, there are no material grievances, disputes or controversies pending or, to the knowledge of the Borrower, threatened between the Borrower and its employees, nor is any strike, work stoppage or slowdown pending or threatened against the Borrower.

4.15. Insurance. The Borrower maintains in force fire, casualty, comprehensive liability and other insurance covering its properties and business that is adequate and customary for the type and scope of its properties and business.

4.16. Indebtedness. Except as reflected in the Financial Statements or set forth in the Disclosure Schedule, and other than Indebtedness incurred in the

ordinary course of business since the Balance Sheet Date, the Borrower has no outstanding Indebtedness.

4.17. Securities Law Compliance. The Borrower is not an "investment company" as defined in the Investment Company Act of 1940, as amended. All of the Borrower's outstanding stock was offered, issued and sold in compliance with all applicable state and federal securities laws.

4.18. Accuracy of Information. None of the information furnished to the Lenders by or on behalf of the Borrower for purposes of this Agreement or any Loan Document or any transaction contemplated hereby or thereby contains, and none of such information hereinafter furnished will contain any material misstatement of fact, nor does or will any such information omit any material fact necessary to make such information not misleading at such time.

ARTICLE V

CONDITIONS TO ADVANCES

The Lenders shall not be obligated to make any Advances unless the following conditions have been satisfied:

5.1. Each Advance. The obligations of the Lenders to make each Advance are subject to the following conditions precedent, each of which shall have been met or performed on or before the Advance Date or the Closing Date, as the case may be:

(a) No Default. No Default or Event of Default shall have occurred and be continuing or will occur upon the making of the Advance.

(b) Correctness of Representations. The representations and warranties made by the Borrower in this Agreement shall be true and correct with the same force and effect as though such representations and warranties had been made on and as of the Advance Date (i) except to the extent that the representations and warranties set forth in Article IV of this Agreement are untrue as a result of circumstances that have changed subsequent to the date hereof, which change has caused no non-compliance by the Borrower with the covenants, conditions and agreements in this Agreement and (ii) except that the references in Section 4.5 of this Agreement to the financial statements and the term "Balance Sheet Date" are deemed to refer to the most recent financial statements (inclusive of consolidated balance sheets and statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries) furnished to the Lenders pursuant to Section 6.1(a) and (b) of this Agreement and the date of such financial statements, respectively.

(c) No Litigation; Certain Other Conditions. There shall be no suit or proceeding (other than suits or proceedings disclosed on the Disclosure Schedule on the date of this Agreement) pending or threatened before any court or arbitration tribunal or by or before any governmental or regulatory authority, commission, bureau or agency or public regulatory body that, if determined adversely to the Borrower or any Subsidiary of the Borrower, is reasonably likely to have a material adverse effect on the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole.

(d) No Material Adverse Change. There shall have been no material adverse change in the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole since the Balance Sheet Date.

(e) Loan Documents. All Loan Documents shall be in full force and effect.

5.2. First Advance. The obligations of the Lenders to make the first Advance are subject to the following additional conditions precedent, each of which shall have been met or performed on or before the Closing Date:

(a) Deliveries. The Agent shall have received, in form and substance satisfactory to the Agent and Lenders, the following:

(i) an opinion or opinions of independent counsel to the Borrower with respect to the Loan Documents and the transactions contemplated thereby;

(ii) certificates as to the Borrower's legal existence and good standing under the laws of The Commonwealth of Massachusetts, and certificates as to the Borrower's authority to do business as a foreign corporation in the States of Arizona, California, Colorado, Connecticut, Florida, Illinois, Maryland, Michigan, New Jersey, New Mexico, New York, Oregon, Pennsylvania and Texas, each dated as of a recent date;

(iii) a certificate of the Borrower's Clerk as to (i) its charter documents and by-laws, as amended, (ii) corporate votes authorizing the execution and delivery of the Loan Documents, and (iii) incumbency of the officers authorized to execute the Loan Documents on behalf of the Borrower;

(iv) a Revolving Credit Note to the order of each Lender, each duly executed by the Borrower and otherwise appropriately completed;

(v) a certificate duly executed by the Borrower's chief financial officer dated the Advance Date or Closing Date, as the case may be, to the

effect that each of the conditions set forth in the foregoing Section 5.1 has been met as of such date.

(b) All Proceedings Satisfactory. All corporate and other proceedings taken prior to or on the Closing Date in connection with the transactions contemplated by this Agreement, and all documents and exhibits related thereto, shall be reasonably satisfactory in form and substance to the Agent and the Lenders.

(c) Additional Documents. The Borrower shall have delivered to the Agent all additional opinions, documents and certificates that the Agent or any Lender may reasonably require.

ARTICLE VI

AFFIRMATIVE COVENANTS OF THE BORROWER

The Borrower covenants and agrees that from the date of execution of this Agreement and until the payment in full of the principal of and interest upon the Notes and payment and performance of all other Obligations, unless the Required Lenders shall otherwise consent in writing:

6.1. Reporting Requirements. The Borrower shall furnish to the Lenders:

(a) As soon as available and in any event within forty-five days after the end of each of the first three quarters of each fiscal year of the Borrower and its Subsidiaries, (i) a consolidated and consolidating balance sheet of the Borrower and its Subsidiaries as of the end of such quarter and (ii) consolidated and consolidating statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for the period commencing at the end of the previous fiscal year and ending with the end of such quarter, all in reasonable detail and duly certified by the chief financial officer of the Borrower as having been prepared in accordance with generally accepted accounting principles consistently applied (subject to addition of notes and ordinary year-end audit adjustments), together with a certificate of the chief financial officer of the Borrower stating that no Default or Event of Default has occurred and is continuing or, if a Default or an Event of Default has occurred and is continuing, a statement as to the nature thereof and the action that the Borrower proposes to take with respect thereto;

(b) As soon as available and in any event within ninety days after the end of each fiscal year of the Borrower, the audited consolidated balance sheet of the Borrower and its Subsidiaries as of the end of such fiscal year and the audited consolidated statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for such fiscal year, in each case accompanied by the

unqualified opinion with respect thereto of the Borrower's independent public accountants and a certification by such accountants stating that they have reviewed this Agreement and whether, in making their audit, they have become aware of any Default or Event of Default and if so, describing its nature, along with the related unaudited consolidating balance sheet of the Borrower and its Subsidiaries as of the end of such fiscal year and the unaudited consolidating statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for such fiscal year;

(c) Not later than forty-five days following the end of each fiscal quarter a certificate signed by the chief financial officer of the Borrower substantially in the form of Exhibit D hereto (the "Compliance Certificate");

(d) Not later than thirty days after the end of each fiscal year of the Borrower, the Borrower's representative forecast for the next fiscal year on a consolidated basis, including, at a minimum, projected statements of profit and loss and projected cash flow, prepared in accordance with generally accepted accounting principles consistently applied;

(e) Promptly upon receipt thereof, one copy of each other report submitted to the Borrower or any Subsidiary by independent accountants in connection with any annual, interim or special audit made by them of the books of the Borrower or any Subsidiary;

(f) Promptly after the commencement thereof, notice of all actions, suits and proceedings before any court, arbitration tribunal or governmental regulatory authority, commission, bureau, agency or public regulatory body that, if determined adversely to the Borrower or any Subsidiary of the Borrower, would be reasonably likely to have a material adverse effect on the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole;

(g) As soon as possible, and in any event within five days after the Borrower shall know of the occurrence of any Default or Event of Default, the written statement of the chief financial officer of the Borrower setting forth details of such Default or Event of Default and action that the Borrower proposes to take with respect thereto;

(h) As soon as possible, and in any event within five days after the occurrence thereof, written notice as to any other event of which the Borrower becomes aware that with the passage of time, the giving of notice or otherwise, is reasonably likely to result in a material adverse change in the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole; and

(i) Such other information respecting the business or properties or the condition or operations, financial or otherwise, of the Borrower as any Lender may from time to time reasonably request.

6.2. Loan Proceeds. The Borrower shall use the proceeds of the Advances only for the purpose of general working capital, acquisitions not prohibited hereby and capital expenditures.

6.3. Maintenance of Business and Properties; Insurance.

(a) The Borrower will continue to engage in business of the same general nature as the business currently engaged in by the Borrower. The Borrower will at all times maintain, preserve and protect all material franchises and trade names and preserve all the Borrower's material tangible property used or useful in the conduct of its business and keep the same in good repair, working order and condition, ordinary wear and tear excepted, and from time to time make all needful and proper repairs, renewals, replacements, betterments, and improvements thereto so that the business carried on in connection therewith may be conducted properly and advantageously at all times.

(b) The Borrower will keep all of its insurable properties now or hereafter owned adequately insured at all times against loss or damage by fire or other casualty to the extent customary with respect to like properties of companies conducting similar businesses and to the extent available at commercially reasonable rates; and will maintain public liability and workmen's compensation insurance insuring the Borrower to the extent customary with respect to companies conducting similar businesses and to the extent available at commercially reasonable rates, all by financially sound and reputable insurers. The Borrower shall furnish to the Agent from time to time at the Agent's request copies of all such insurance policies and certificates evidencing such insurance coverage. Notwithstanding the foregoing, the Borrower may self-insure workmen's compensation to the extent permitted by law and may also self-insure other risks to the extent reasonably deemed prudent by the Borrower.

6.4. Payment of Taxes. The Borrower shall pay and discharge, or cause to be paid and discharged, all material taxes, assessments, and governmental charges or levies imposed upon the Borrower and its Subsidiaries or their income or profits, or upon any other properties belonging to the Borrower prior to the date on which penalties attach thereto, and all lawful claims that, if unpaid, might become a lien or charge upon any material properties of the Borrower, except for such taxes, assessments, charges, levies or claims as are being contested by the Borrower in good faith by appropriate proceedings promptly initiated and diligently prosecuted, for which adequate book reserves have been established in accordance with generally accepted accounting principles, as to which no foreclosure, distraint, sale or other

similar proceedings shall have been commenced, or, if commenced, have been effectively stayed.

6.5. Compliance with Laws, etc. The Borrower shall comply with the requirements of all applicable laws, rules, regulations and orders of any governmental authority, and obtain or maintain all Licenses required under applicable law or regulation for the operation of the Borrower's business, where noncompliance or failure to obtain or maintain would have a material adverse effect on the consolidated financial condition, assets, or results of operations of the Borrower and its Subsidiaries taken as a whole; provided, however, that such compliance or the obtaining of such Licenses may be delayed while the applicability or validity of any such law, rule, regulation or order or the necessity for obtaining any such license is being contested by the Borrower in good faith by appropriate proceedings promptly initiated and diligently prosecuted.

6.6. Books, Records and Accounts. The Borrower shall keep true and correct books, records and accounts, in which entries will be made in accordance with generally accepted accounting principles consistently applied, and that shall comply with the requirements of the Foreign Corrupt Practices Act of 1977 to the extent applicable to the Borrower. Each Lender or its representatives shall upon reasonable notice to the Borrower be afforded, during normal business hours, access to and the right to examine and copy any such books, records and accounts and the right to inspect the Borrower's premises and business operations. All financial and other information with respect to the Borrower and/or any of its Subsidiaries now or hereafter obtained by any Lender under this Agreement or otherwise in connection with any of the transactions contemplated hereunder shall be held in confidence and shall not be released or made available to any other Person, except (i) to governmental agencies (and examiners employed by same) having oversight over the affairs of such Lender, (ii) pursuant to subpoena or similar process issued by a court or governmental agency of competent jurisdiction, or (iii) as otherwise directed by order of any court or governmental agency of competent jurisdiction.

6.7. Further Assurances. The Borrower shall execute and deliver, at the Borrower's expense, all notices and other instruments and documents and take all actions, including, but not limited to, making all filings and recordings, that any Lender shall reasonably request in order to assure to the Lenders all rights given to the Lenders hereby or under any other Loan Document.

6.8. Bank Accounts. The Borrower shall maintain its principal operating accounts with the Agent.

ARTICLE VII

NEGATIVE COVENANTS OF THE BORROWER

The Borrower covenants and agrees that from the date of execution of this Agreement and until the payment in full of the principal of and interest upon the Notes and payment and performance of all other Obligations, unless the Required Lenders shall otherwise consent in writing:

7.1. Sale of Assets; Mergers, Etc.

(a) Sale of Assets. The Borrower will not, except in the ordinary course of business, sell, transfer, or otherwise dispose of, to any Person any assets (including the securities of any Subsidiary).

(b) Mergers, Etc. Neither the Borrower nor any Subsidiary will consolidate with or merge into any other Person or permit any other Person to consolidate with or merge into it, or acquire all or substantially all of the assets of any Person, or sell, assign, lease or otherwise dispose of (whether in one transaction or in a series of transactions) all or substantially all of its assets to any Person, except that

(1) a Subsidiary may consolidate with or merge into the Borrower or another Subsidiary; and

(2) the Borrower or any of its Subsidiaries may acquire all or substantially all of the assets of any Person provided (i) such Person is engaged in a line of business substantially similar to one or more of Borrower's existing lines of business, (ii) the aggregate purchase price liability incurred in any calendar year, including all contingent liabilities, when aggregated with all such acquisitions and any Investments permitted under Section 7.4(2) in any calendar year shall not exceed 25% of Consolidated Tangible Net Worth as of the end of the most recent fiscal quarter or, if 80% or more of the purchase price is paid in capital stock of the Borrower, 40% of Consolidated Tangible Net Worth as of the end of the most recent fiscal quarter and (iii) based on a pro forma calculation of the ratios set forth in Section 7.7 as of the date such acquisition is closed, assuming consolidation of the acquired business with the Borrower for the four full fiscal quarters ended immediately preceding such closing and pro forma debt and debt service payments based on scheduled principal payments, including acquisition borrowings, if any, and pro forma interest on total debt at then prevailing borrowing rates, Borrower is in compliance with the financial covenants set forth in Section 7.7.

7.2. Liens and Encumbrances.

(a) Neither the Borrower nor any Subsidiary will (a) cause or permit or (b) agree or consent to cause or permit in the future (upon the happening of a contingency or otherwise), any of its real or personal property, whether now owned or subsequently acquired, to be subject to any Lien other than Liens described below (which may herein be referred to as "Permitted Liens"):

(1) Liens securing the payment of taxes, assessments or governmental charges or levies or the demands of suppliers, mechanics, carriers, warehousemen, landlords and other like Persons, which payments are not yet due and payable or (as to taxes) may be paid without interest or penalty; provided, that, if such payments are due and payable, such Liens shall be permitted hereunder only to the extent that (A) all claims that the Liens secure are being actively contested in good faith and by appropriate proceedings, (B) adequate book reserves have been established with respect thereto to the extent required by generally accepted accounting principles, and (C) such Liens do not in the aggregate materially interfere with the owning company's use of property necessary or material to the conduct of the business of the Borrower and its Subsidiaries taken as a whole;

(2) Liens incurred or deposits made in the ordinary course of business (A) in connection with worker's compensation, unemployment insurance, social security and other like laws, or (B) to secure the performance of letters of credit, bids, tenders, sales contracts, leases, statutory obligations, surety, appeal and performance bonds and other similar obligations, in each case not incurred in connection with the borrowing of money, the obtaining of advances or the payment of the deferred purchase price of property;

(3) Liens not otherwise described in Section 7.2(a)(1) or (2) that are incurred in the ordinary course of business and are incidental to the conduct of its business or ownership of its property, were not incurred in connection with the borrowing of money, the obtaining of advances or the payment of the deferred purchase price of property and do not in the aggregate materially detract from the value of, or materially interfere with the owning company's use of, property necessary or material to the conduct of the business of the Borrower and its Subsidiaries taken as a whole;

(4) Liens in favor of the Agent for the benefit of the Lenders;

(5) Liens permitted under Existing Loan Agreements;

(6) Judgment liens or attachments that shall not have been in existence for a period longer than 30 days after the creation thereof, or if a stay of execution shall have been obtained, for a period longer than 30 days after the expiration of such stay or if such an attachment is being actively contested in good faith and by appropriate proceedings, for a period longer than 30 days after the creation thereof;

(7) Liens existing as of the Closing Date and disclosed on the Disclosure Schedule hereto;

(8) Liens provided for in equipment or Financing Leases (including financing statements and undertakings to file financing statements) provided that they are limited to the equipment subject to such leases and the proceeds thereof;

(9) Leases or subleases with third parties or licenses and sublicenses granted to third parties not interfering in any material respect with the business of the Borrower or any Subsidiary of the Borrower;

(10) Any Lien on any asset of any corporation existing at the time such corporation is merged into or consolidated with the Borrower or a Subsidiary of the Borrower and not created in contemplation of such event;

(11) Any Lien existing on any asset prior to the acquisition thereof by the Borrower or any Subsidiary of the Borrower and not created in contemplation of such event;

(12) Liens in respect of any purchase money obligations for tangible property used in its business, which obligations shall not at any time exceed 5% of consolidated Tangible Net Worth, provided that any such encumbrances shall not extend to property and assets of the Borrower or any Subsidiary not financed by such a purchase money obligation;

(13) Easements, rights of way, restrictions and other similar charges or Liens relating to real property and not interfering in a material way with the ordinary conduct of its business; and

(14) Liens on its property or assets created in connection with the refinancing of Indebtedness secured by Permitted Liens on such property, provided that the amount of Indebtedness secured by any such Lien shall not be increased as a result of such refinancing and no

such Lien shall extend to property and assets of the Borrower or any Subsidiary not encumbered prior to any such refinancing.

(b) In case any property is subjected to a Lien in violation of Section 7.2(a), the Borrower will make or cause to be made provision whereby the Notes will be secured equally and ratably with all other obligations secured by such property, and in any case the Notes shall have the benefit, to the full extent that the holders may be entitled thereto under applicable law, of an equitable Lien equally and ratably securing the Notes. Such violation of Section 7.2(a) shall constitute an Event of Default hereunder, whether or not any such provision is made pursuant to this Section 7.2(b).

(c) Neither the Borrower nor any Subsidiary will agree with any third party not to cause or permit any of its real or personal property, whether now owned or subsequently acquired, to be subject to Liens (with or without exceptions).

7.3. Sales and Leasebacks. The Borrower and its Subsidiaries will not sell or transfer any of their property and become, directly or indirectly, liable as the lessee under a lease of such property (other than such transactions between the Subsidiaries and transfers of capital equipment that will be leased pursuant to Financing Leases).

7.4. Investments. Neither the Borrower nor any Subsidiary will make or maintain any investments, made in cash or by delivery of property or assets, (a) in any Person, whether by acquisition of capital stock, Indebtedness, or other obligations or securities, or by loan or capital contribution, or otherwise, or (b) in any property, whether real or personal, (items (a) and (b) being herein called "Investments"), except the following:

(1) Investments in direct obligations of, or guaranteed by, the United States government, its agencies or any public instrumentality thereof and backed by the full faith and credit of the United States government with maturities not to exceed (or an unconditional right to compel purchase within) one year from the date of acquisition;

(2) Investments in or to any Subsidiary or other Person, provided Borrower remains in compliance with Section 7.1(b);

(3) Investments and obligations issued by any state of the United States or any political subdivision of any such state or any public instrumentality thereof with maturities not to exceed (or an unconditional right to compel purchase within) 180 days of the date of acquisition that are rated in one of the top two rating classifications by at least one nationally recognized rating agency;

(4) Investments in demand and time deposits with, Eurodollar deposits with, certificates of deposit issued by, or obligations or securities fully backed by letters of credit issued by (x) any bank organized under the laws of the United States, any state thereof, the District of Columbia or Canada having combined capital and surplus aggregating at least \$500,000,000, or (y) any other bank organized under the laws of a state that is a member of the European Economic Community (or any political subdivision thereof), Japan, the Cayman Islands, or British West Indies having as of any date of determination combined capital and surplus of not less than \$500,000,000 or the equivalent thereof (determined in accordance with generally accepted accounting principles);

(5) Shares of money market mutual funds registered under the Investment Company Act of 1940, as amended;

(6) Foreign currency swaps and hedging arrangements entered into in the ordinary course of business to protect against currency losses, and interest rate swaps and caps entered into in the ordinary course of business to protect against interest rate exposure on Indebtedness bearing interest at a variable rate;

(7) Investments in publicly traded companies and mutual funds (other than money market mutual funds) that in the aggregate shall not exceed \$5,000,000; and

(8) Other Investments existing on the Closing Date and listed on the Disclosure Schedule.

7.5. Transactions with Affiliates. Neither the Borrower nor any Subsidiary will enter into any transaction (including the purchase, sale or exchange of property or the rendering of any service) with any Affiliate except upon fair and reasonable terms that are at least as favorable to the Borrower or the Subsidiary as would be obtained in a comparable arm's-length transaction with a non-Affiliate.

7.6. ERISA Compliance. Neither the Borrower nor any of its Subsidiaries will at any time permit any employee pension benefit plan (as such term is defined in Section 3 of ERISA) maintained by the Borrower or any of its Subsidiaries or in which employees of the Borrower or any of its Subsidiaries is entitled to participate to:

- (a) engage in any "prohibited transaction" as such term is defined in Section 4975 of the Internal Revenue Code of 1986, as amended, or described in Section 406 of ERISA;

- (b) incur any "accumulated funding deficiency" as such term is defined in Section 302 of ERISA, whether or not waived; or
- (c) terminate under circumstances that could result in the imposition of a Lien on the property of the Borrower or any Subsidiary of the Borrower pursuant to Section 4068 of ERISA.

7.7. Financial Covenants. The Borrower covenants and agrees that:

(a) Tangible Net Worth Test. The Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower shall:

(A) prior to an IPO, not be less than the sum of (i) \$38,000,000, and (ii) 50% of Consolidated Net Income (excluding losses) for each consecutive fiscal quarter of the Borrower beginning with the quarter ending March 31, 1996, on a cumulative basis; and

(B) after an IPO, not be less than the sum of (i) the amount required by clause (A) above immediately prior to such IPO plus (ii) the net proceeds to the Borrower of the IPO less (iii) the Sub S Dividends.

(b) Debt-to-Net Worth Ratio. The ratio ("Debt-to-Net Worth Ratio") of the Consolidated Indebtedness (excluding all guaranties except guaranties with respect to borrowed money) as of the end of each fiscal quarter of the Borrower beginning with the fiscal quarter ending December 31, 1995 to its Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower beginning with the fiscal quarter ending December 31, 1995 shall not exceed 1.5 to 1.

(c) Cash Flow Ratio. The ratio (the "Cash Flow Ratio") as of the end of each fiscal quarter of the Borrower of (i) Consolidated Operating Cash Flow for the four consecutive fiscal quarters then ended to (ii) Consolidated Debt Service for the four consecutive fiscal quarters then ended shall not be less than 1.25 to 1.00.

7.8. Contracts Prohibiting Compliance with Agreement. The Borrower will not enter into any contract or other agreement that would prohibit or in any way restrict the ability of the Borrower to comply with any provision of this Agreement.

ARTICLE VIII

EVENTS OF DEFAULT

8.1. Default. If any one of the following events ("Events of Default") shall occur:

(a) Any representation or warranty made by the Borrower herein or in any other Loan Document, or in any certificate or report furnished by the Borrower hereunder or thereunder, shall prove to have been incorrect in any material respect when made;

(b) Payment of any principal or interest due under any Note shall not be made on or before the date due;

(c) A final judgment or settlement for in excess of \$2,000,000 shall be rendered against or agreed to by the Borrower or any of its Subsidiaries for the payment of money that, after deducting the amount of any insurance proceeds paid or payable to or on behalf of the Borrower or its Subsidiary in connection with such judgment or settlement, as the case may be, is in excess of \$2,000,000, and such judgment shall remain undischarged for a period of thirty (30) days, during which period execution shall not effectively be stayed, or such settlement shall remain unpaid for a period of thirty days after the agreed payment date unless such delay has been agreed to by the other party. If a dispute exists with respect to the liability of any insurance underwriter under any insurance policy of the Borrower or its Subsidiary, no deduction under this subsection shall be made for the insurance proceeds that are the subject of such dispute;

(d) The Borrower or any Subsidiary shall (1) voluntarily terminate operations or apply for or consent to the appointment of, or the taking of possession by, a receiver, custodian, trustee or liquidator of such Person or of all or a substantial part of the assets of such Person, (2) admit in writing its inability, or be generally unable, to pay its debts as the debts become due, (3) make a general assignment for the benefit of its creditors, (4) commence a voluntary case under the Federal Bankruptcy Code (as now or hereafter in effect), (5) file a petition seeking to take advantage of any other law relating to bankruptcy, insolvency, reorganization, winding-up, or composition or adjustment of debts, (6) fail to controvert in a timely and appropriate manner, or acquiesce in writing to, any petition filed against it in an involuntary case under the Federal Bankruptcy Code or applicable state bankruptcy laws or (7) take any corporate action for the purpose of effecting any of the foregoing;

(e) Without its application, approval or consent, a proceeding shall be commenced, in any court of competent jurisdiction, seeking in respect of the Borrower or any Subsidiary: the liquidation, reorganization, dissolution, winding-up, or composition or readjustment of debt, the appointment of a trustee, receiver, liquidator or the like of such Person or of all or any substantial part of the assets of such Person, or other like relief in respect of such Person under any law relating to bankruptcy, insolvency, reorganization, winding-up, or composition or adjustment of debts; and, if the proceeding is being contested in good faith by such Person, the same shall continue undismitted, or unstayed and in effect for any period of 45

consecutive days, or an order for relief against such Person shall be entered in any case under the Bankruptcy Code or applicable state bankruptcy laws;

(f) Any foreclosure or other proceedings shall be commenced to enforce, execute or realize upon any lien, encumbrance, attachment, trustee process, mortgage or security interest for payment of an amount in excess of \$250,000 against the Borrower or any Subsidiary;

(g) Default shall be made in the due observance or performance of any covenant or agreement under Article VII;

(h) Default shall be made in the due observance or performance of any covenant or agreement contained herein (and not constituting an Event of Default under any other clause in this Article VIII) or in any other Loan Document or in any other agreement between any Lender and the Borrower evidencing or securing borrowed monies and such default shall continue and shall not have been remedied within thirty days after the date on which such default occurred;

(i) There shall occur any default under any instrument or agreement evidencing any indebtedness for money borrowed in excess of \$100,000 by the Borrower or any of its Subsidiaries;

(j) The transfer by John R. Bertucci and/or his Affiliates of securities of the Borrower or the voting power related to such securities as a result of which the power to elect, appoint or cause the election or appointment of at least a majority of the members of the board of directors of the Borrower shall no longer be held by John R. Bertucci and/or his Affiliates;

(k) There shall occur any material adverse change in the financial condition of the Borrower;

(l) There shall occur any Event of Default under either of the Existing Loan Agreements;

then, and in any such event and at any time thereafter, if such Event of Default or any other Event of Default shall have not been waived, any or all of the following actions may be taken: (i) the Agent (A) with the consent of the Required Lenders, may, and at the direction of the Required Lenders shall, declare any obligation of the Lenders to make further Advances terminated, whereupon the obligation of each Lender to make further Advances hereunder shall terminate immediately, and (B) the Agent shall at the direction of the Required Lenders, at their option, declare by notice to the Borrower any or all of the Obligations to be immediately due and payable, and the same, including all interest accrued thereon and all other obligations of the Borrower to the Agent and the Lenders, shall forthwith become immediately due and

payable without presentment, demand, protest, notice or other formality of any kind, all of which are hereby expressly waived, anything contained herein or in any instrument evidencing the Obligations to the contrary notwithstanding; provided, however, that notwithstanding the above, if there shall occur an Event of Default under clause (d) or (e) above, then the obligation of the Lenders to make Advances shall automatically terminate and any and all of the Obligations shall be immediately due and payable without the necessity of any action by the Agent or the Required Lenders or notice to the Agent or the Lenders; and (ii) the Agent and each of the Lenders shall have all of the rights and remedies available under each of the Loan Documents or under any applicable law.

8.2. Agent to Act. In case any one or more Events of Default shall occur and not have been waived, the Agent may, and at the direction of the Required Lenders shall, proceed to protect and enforce their rights or remedies either by suit in equity or by action at law, or both, whether for the specific performance of any covenant, agreement or other provision contained herein or in any other Loan Document, or to enforce the payment of the Obligations or any other legal or equitable right or remedy.

8.3. Cumulative Rights. No right or remedy herein conferred upon the Lenders or the Agent is intended to be exclusive of any other rights or remedies contained herein or in any other Loan Document, and every such right or remedy shall be cumulative and shall be in addition to every other such right or remedy contained herein and therein or now or hereafter existing at law or in equity or by statute, or otherwise.

8.4. No Waiver. No course of dealing between the Borrower and any Lender or the Agent or any failure or delay on the part of any Lender or the Agent in exercising any rights or remedies under any Loan Document or otherwise available to it shall operate as a waiver of any rights or remedies and no single or partial exercise of any rights or remedies shall operate as a waiver or preclude the exercise of any other rights or remedies hereunder or of the same right or remedy on a future occasion.

8.5. Allocation of Proceeds. If an Event of Default has occurred and not been waived, and the maturity of the Notes has been accelerated pursuant to this Article VIII, all payments received by the Agent hereunder, in respect of any principal of or interest on the Obligations or any other amounts payable by the Borrower hereunder, shall be applied by the Agent in the following order:

- (a) amounts due to the Lenders pursuant to Sections 2.6 and 10.4;
- (b) amounts due to the Agent pursuant to Section 9.10;

(c) payments of interest on Notes to be applied for the ratable benefit of the Lenders;

(d) payments of principal of Notes to be applied for the ratable benefit of the Lenders;

(e) payments of all other amounts due under any of the Loan Documents, if any, to be applied for the ratable benefit of the Lenders; and

(f) any surplus remaining after application as provided for herein, to the Borrower or otherwise as may be required by applicable law.

ARTICLE IX

THE AGENT

9.1. Appointment. Each Lender hereby irrevocably designates and appoints Bank of Boston as the Agent for the Lenders under this Agreement, and each of the Lenders hereby irrevocably authorizes Bank of Boston as the Agent for such Lender, to take such action on its behalf under the provisions of this Agreement and the other Loan Documents and to exercise such powers as are expressly delegated to the Agent by the terms of this Agreement and such other Loan Documents, together with such other powers as are reasonably incidental thereto. The Agent shall not have any duties or responsibilities, except those expressly set forth herein, or any fiduciary relationship with any of the Lenders, and no implied covenants, functions, responsibilities, duties, obligations or liabilities shall be read into this Agreement or any other Loan Document or otherwise exist against the Agent.

9.2. Limitation on Liability. Neither the Agent nor any of its officers, directors, employees, agents or attorneys-in-fact shall be liable to the Lenders for any action lawfully taken or omitted to be taken by it or them under or in connection with the Loan Documents except for its or their own gross negligence or willful misconduct. Neither the Agent nor any of its affiliates shall be responsible in any manner to any of the Lenders for any recitals, statements, representations or warranties made by the Borrower or any officer or representative thereof contained in any Loan Document, or in any certificate, report, statement or other document referred to or provided for in or received by the Agent under or in connection with any Loan Document, or for the value, validity, effectiveness, genuineness, enforceability or sufficiency of any Loan Document, or for any failure of the Borrower to perform its obligations under any Loan Document, or for any recitals, statements, representations or warranties made, or for the value, validity, effectiveness, genuineness, enforceability or sufficiency of any collateral. The Agent shall not be under any obligation to any of the Lenders to ascertain or to inquire as to the

observance or performance of any of the terms, covenants or conditions of any Loan Document on the part of the Borrower or to inspect the properties, books or records of the Borrower or its Subsidiaries.

9.3. Reliance. The Agent shall be entitled to rely, and shall be fully protected in relying, upon any Note, writing, resolution, notice, consent certificate, affidavit, letter, cablegram, telegram, telefacsimile or telex message, statement, order or other document or conversation reasonably believed by it to be genuine and correct and to have been signed, sent or made by the proper Person or Persons and upon advice and statements of legal counsel (including, without limitation, counsel to the Borrower), independent accountants and other experts selected by the Agent. The Agent may deem and treat the payee of any Note as the owner thereof for all purposes unless an Assignment and Acceptance shall have been filed with and accepted by the Agent. The Agent shall be fully justified in failing or refusing to take any action under this Agreement unless it shall first receive advice or concurrence of the Lenders or the Required Lenders as provided in this Agreement or it shall first be indemnified to its satisfaction by the Lenders against any and all liability and expense that may be incurred by it by reason of taking or continuing to take any such action. The Agent shall in all cases be fully protected in acting, or in refraining from acting, under the Loan Documents in accordance with a request of the Required Lenders, and such request and any action taken or failure to act pursuant thereto shall be binding upon all the Lenders and all present and future holders of the Notes.

9.4. Notice of Default. The Agent shall not be deemed to have knowledge or notice of the occurrence of any Default or Event of Default hereunder unless the Agent has received notice from a Lender or the Borrower referring to this Agreement, describing such Default or Event of Default and stating that such notice is a "notice of default." In the event that the Agent receives such a notice, the Agent shall promptly give notice thereof to the Lenders. The Agent shall take such action with respect to such Default or Event of Default as shall be reasonably directed by the Required Lenders; provided that, unless and until the Agent shall have received such directions, the Agent may (but shall not be obligated to) take such action, or refrain from taking such action, with respect to such Event of Default as it shall deem advisable in the best interests of the Lenders.

9.5. No Representations. Each Lender expressly acknowledges that neither the Agent nor any of its affiliates has made any representations or warranties to it and that no act by the Agent hereafter taken, including any review of the affairs of the Borrower or its Subsidiaries, shall be deemed to constitute any representation or warranty by the Agent to any Lender. Each Lender represents to the Agent that it has, independently and without reliance upon the Agent or any other Lender, and based on such documents and information as it has deemed appropriate, made its own appraisal of and investigation into the financial condition, creditworthiness, affairs, status and nature of the Borrower and made its own decision to enter into

this Agreement. Each Lender also represents that it will, independently and without reliance upon the Agent or any other Lender, and based on such documents and information as it shall deem appropriate at the time, continue to make its own credit analysis, appraisals and decisions in taking or not taking action under the Loan Documents and to make such investigation as it deems necessary to inform itself as to the status and affairs, financial or otherwise, of the Borrower or its Subsidiaries. Except for notices, reports and other documents expressly required to be furnished to the Lenders by the Agent hereunder, the Agent shall not have any duty or responsibility to provide any Lender with any credit or other information concerning the affairs, financial condition or business of the Borrower or its Subsidiaries which may come into the possession of the Agent or any of its Affiliates.

9.6. Indemnification. Each of the Lenders agrees to indemnify the Agent in its capacity as such (to the extent not reimbursed by the Borrower and without limiting any obligations of the Borrower to do so), ratably according to the respective principal amount of the Notes held by them (or, if no Notes are outstanding, ratably in accordance with their respective Applicable Commitment Percentages as then in effect) from and against any and all liabilities, obligations, losses (excluding any losses suffered by the Agent as a result of Borrower's failure to pay any fee owing to the Agent), damages, penalties, actions, judgments, suits, costs, expenses or disbursements of any kind or nature whatsoever that may at any time (including without limitation at any time following the payment of the Notes) be imposed on, incurred by or asserted against the Agent in any way relating to or arising out of any Loan Document or any other Document contemplated by or referred to therein or the transactions contemplated thereby or any action taken or omitted by the Agent under or in connection with any of the foregoing; provided that no Lender shall be liable for the payment of any portion of such liabilities, obligations, losses, damages, penalties, actions, judgments, suits, costs, expenses or disbursements resulting from the Agent's gross negligence or willful misconduct. The agreements in this subsection shall survive the payment of the Obligations and the termination of this Agreement.

9.7. The Agent in its Individual Capacity. With respect to its Advances made or renewed by it and any Note issued to it, the Agent shall have the same rights and powers under this Agreement as any Lender and may exercise the same as though it were not the Agent, and the terms "Lender" and "Lenders" shall, unless the context otherwise indicates, include the Agent in its individual capacity. The Agent and its Affiliates may make loans to, accept deposits from and generally engage in any kind of business with the Borrower as though the Agent were not the Agent hereunder. The Agent may apply any amount obtained by it through exercise of a right of banker's lien, set-off, counterclaim or otherwise to satisfaction of any obligations owed it by the Borrower whether under this Agreement or any Existing Loan Agreement and shall have the right to determine the order in which amounts are applied to such obligations.

9.8. Resignation. If the Agent shall resign as Agent under this Agreement, then the Required Lenders may appoint, with the consent, so long as there shall not have occurred and be continuing a Default or Event of Default, of the Borrower, which consent shall not be unreasonably withheld, a successor Agent for the Lenders, which successor Agent shall be a commercial bank organized under the laws of the United States or any state thereof, having a combined surplus and capital of not less than \$500,000,000, whereupon such successor Agent shall succeed to the rights, powers and duties of the former Agent and the obligations of the former Agent shall be terminated and canceled, without any other or further act or deed on the part of such former Agent or any of the parties to this Agreement; provided, however, that the former Agent's resignation shall not become effective until such successor Agent has been appointed and has succeeded of record to all right, title and interest in any collateral held by the Agent; provided, further, that if the Required Lenders and, if applicable, the Borrower cannot agree as to a successor Agent within ninety (90) days after such resignation, the Agent shall appoint a successor Agent that satisfies the criteria set forth above in this Section 9.8 for a successor Agent and the parties hereto agree to execute whatever documents are necessary to effect such action under this Agreement or any other Document executed pursuant to this Agreement; provided, however, that in such event all provisions of the Loan Documents shall remain in full force and effect. After any retiring Agent's resignation hereunder as Agent, the provisions of this Article IX shall inure to its benefit as to any actions taken or omitted to be taken by it while it was Agent under this Agreement.

9.9. Sharing of Payments, Etc. Each Lender agrees that if it shall, through the exercise of a right of banker's lien, set-off, counterclaim or otherwise, obtain payment with respect to its Obligations (other than pursuant to Article V) that results in its receiving more than its pro rata share of the aggregate payments with respect to all of the Obligations (other than any payment pursuant to Section 3.2 or 3.3), then (a) such Lender shall be deemed to have simultaneously purchased from the other Lenders a share in their Obligations so that the amount of the Obligations held by each of the Lenders shall be pro rata and (b) such other adjustments shall be made from time to time as shall be equitable to insure that the Lenders share such payments ratably; provided, however, that for purposes of this Section 9.9, the term "pro rata" shall be determined with respect to the Revolving Credit Commitment after subtraction of amounts, if any, by which any such Lender has not funded its share of the outstanding Advances and Obligations. If all or any portion of any such excess payment is thereafter recovered from the Lender that received the same, the purchase provided in this Section 9.9 shall be rescinded to the extent of such recovery, without interest. The Borrower expressly consents to the foregoing arrangements and agrees that each Lender so purchasing a portion of the other Lenders' Obligations may exercise all rights of payment (including, without limitation, all rights of set-off, banker's lien or counterclaim) with respect to such portion as fully as if such Lender were the direct holder of such portion.

9.10. Fees. The Borrower agrees to pay to the Agent, for its individual account, an annual Agent's fee as from time to time agreed to by the Borrower and Agent in writing.

ARTICLE X

MISCELLANEOUS

10.1. Assignments and Participations. (a) At any time after the Closing Date each Lender may, with the prior consent of the Borrower (so long as no Event of Default has occurred and is continuing) and the Agent, which consents shall not be unreasonably withheld, assign to one or more banks or financial institutions all or a portion of its rights and obligations under the Loan Documents (including, without limitation, all or a portion of any Note payable to its order); provided, that (i) each such assignment shall be of a constant and not a varying percentage of all of the assigning Lender's rights and obligations hereunder, (ii) for each assignment involving the issuance and transfer of a Note, the assigning Lender shall execute an Assignment and Acceptance and the Borrower hereby agrees to execute a replacement Note to give effect to the assignment, (iii) the minimum aggregate amount of a Revolving Credit Commitment that shall be assigned is \$5,000,000, (iv) such assignee shall have an office located in the United States, and (v) no consent of the Borrower or the Agent shall be required in connection with any assignment by a Lender to another Lender or to an Affiliate of any Lender. Upon such execution, delivery, approval and acceptance, from and after the effective date specified in each Assignment and Acceptance, (x) the assignee thereunder shall be a party hereto and, to the extent that rights and obligations hereunder or under any such Note have been assigned or negotiated to it pursuant to such Assignment and Acceptance, have the rights and obligations of a Lender hereunder and a holder of such Note and (y) the assignor thereunder shall, to the extent that rights and obligations hereunder or under such Note have been assigned or negotiated by it pursuant to such Assignment and Acceptance, relinquish its rights and be released from its obligations under this Agreement.

(b) By executing and delivering an Assignment and Acceptance, the Lender assignor thereunder and the assignee thereunder confirm to and agree with each other and the other parties hereto as follows: (i) the assignment made under such Assignment and Acceptance is made under such Assignment and Acceptance without recourse; (ii) such assigning Lender makes no representation or warranty and assumes no responsibility with respect to the financial condition of the Borrower or its Subsidiaries or the performance or observance by the Borrower of any of its obligations under any Loan Document or any other instrument or Document furnished pursuant hereto; (iii) such assignee confirms that it has received a copy of this Agreement, together with copies of the financial statements delivered pursuant to

Section 4.5 or Section 6.1, as the case may be, and such other Loan Documents and other documents and information as it has deemed appropriate to make its own credit analysis and decision to enter into such Assignment and Acceptance; (iv) such assignee will, independently and without reliance upon the Agent, such assigning Lender or any other Lender and based on such documents and information as it shall deem appropriate at the time, continue to make its own credit decisions in taking or not taking action under any Loan Document; (v) such assignee appoints and authorizes the Agent to take such action as agent on its behalf and to exercise such powers under the Loan Documents as are delegated to the Agent by the terms hereof and thereof, together with such powers as are reasonably incidental thereto; and (vi) such assignee agrees that it will perform in accordance with their terms all of the obligations that by the terms of the Loan Documents are required to be performed by it as a Lender and a holder of a Note.

(c) The Agent shall maintain at its address referred to herein a copy of each Assignment and Acceptance delivered to and accepted by it.

(d) Upon its receipt of an Assignment and Acceptance executed by an assigning Lender, the Agent shall give prompt notice thereof to Borrower.

(e) Nothing herein shall prohibit any Lender from pledging or assigning, without notice to or consent of the Borrower, any Note to any Federal Reserve Bank in accordance with applicable law.

(f) Each Lender may sell participations at its expense to one or more banks or other entities as to all or a portion of its rights and obligations under this Agreement; provided, that (i) such Lender's obligations under this Agreement shall remain unchanged, (ii) such Lender shall remain solely responsible to the other parties hereto for the performance of such obligations, (iii) such Lender shall remain the holder of any Note issued to it for the purpose of this Agreement, (iv) the Borrower, the Agent and the other Lenders shall continue to deal solely and directly with such Lender in connection with such Lender's rights and obligations under this Agreement and with regard to any and all payments to be made under this Agreement and (v) the sale of any such participations that require Borrower to file a registration statement with the Securities and Exchange Commission or under the securities regulations or laws of any state shall not be permitted.

(g) The Borrower may not assign any rights, powers, duties or obligations under this Agreement or the other Loan Documents without the prior written consent of all the Lenders.

10.2. Survival of Representations, Etc. All representations, warranties and covenants made herein or in any Loan Document shall survive the making of any

Advance hereunder and the delivery of the Notes and the consummation of all other transactions contemplated hereby or thereby.

10.3. Right of Setoff. In addition to any rights now or hereafter granted under applicable law or otherwise and not by way of limitation of any such rights, upon the occurrence and during the unremedied continuation of an Event of Default, the Agent and each Lender is hereby authorized at any time or from time to time, without presentment, demand, protest or other notice of any kind to the Borrower or to any other Person, any such notice being hereby expressly waived, to set off and to appropriate and apply any and all deposits (general or special) and any other indebtedness at any time held or owing by the Agent or any Lender to or for the credit or the account of the Borrower against and on account of the Obligations, and all other claims of any nature or description arising out of or connected with this Agreement or any other Loan Document, irrespective of whether or not such Agent or Lender shall have made any demand hereunder and although said Obligations, liabilities or claims, or any of them, shall be contingent or unmaturing.

10.4. Indemnity; Costs, Expenses and Taxes. The Borrower hereby agrees to indemnify the Lenders and their legal representatives, successors, assigns and agents against, and agrees to protect, save and keep harmless each of them from and to pay upon demand, any and all liabilities, obligations, taxes (including any and all stamp and other taxes payable or determined to be payable in connection with the execution and delivery of any Loan Documents), liens, charges, losses, damages, penalties, claims, actions, suits, costs, indemnities, expenses and disbursements (including, without limitation, reasonable legal fees, costs and expenses, including without limitation reasonable costs of attending and preparing for depositions and other court proceedings), of whatsoever kind and nature, imposed upon, incurred by or asserted against such indemnified party in any way relating to or arising out of the execution, delivery, enforcement, performance and administration of this Agreement or any other Loan Documents (all of the foregoing, collectively, "Costs") except to the extent arising by reason of any Lender's gross negligence, misconduct or breach hereof. Without limiting the foregoing, the Borrower agrees to pay on demand (a) all out-of-pocket costs and expenses of the Agent in connection with the preparation, execution and delivery of this Agreement and any other Loan Documents, including without limitation the reasonable fees and out-of-pocket expenses of Foley, Hoag & Eliot, special counsel for the Agent, with respect thereto, as well as (b) the reasonable fees and all out-of-pocket expenses of legal counsel, independent public accountants and other outside experts retained by the Lenders in connection with any request by the Borrower for consents, waivers or other action or forbearance by the Lenders hereunder, for the modification or amendment hereof, or other like matters relating to the administration of this Agreement; and (c) all reasonable costs and expenses, if any, of the Lenders incurred after the occurrence of any Event of Default hereunder in connection with the enforcement of any of the Loan Documents or the protection of any of the Lenders' rights thereunder, including, without limitation, any internal

costs, including personnel costs of the Lenders incurred in connection with such administration and enforcement or protection.

10.5. Notices.

(a) Unless telephonic notice is specifically permitted pursuant to the terms of this Agreement, any notice or other communication hereunder to any party hereto shall be by telegram, telecopier, telex, delivery in hand or by courier, or registered or certified mail (return receipt requested) and shall be deemed to have been given or made when telegraphed, telexed, telecopied (and confirmed received), delivered in hand or by courier, or three days after being deposited in the mails, postage prepaid, registered or certified, addressed to the party as follows (or at any other address that such party may hereafter specify to the other parties in writing):

(a) If to the Agent:

The First National Bank of Boston
100 Federal Street
Boston, Massachusetts 02110
Attn: Ms. Sharon A. Stone, Director
Telecopier No. (617) 434-4426

with a copy to:

Arlene L. Bender, Esq.
Foley, Hoag & Eliot
One Post Office Square
Boston, Massachusetts 02109
Telecopier No. (617) 832-7000

(b) If to the Borrower:

MKS Instruments, Inc.
Six Shattuck Road
Andover, Massachusetts 01810
Attn: Mr. Robert F. O'Brien, Treasurer
Telecopier No. (508) 975-3756

with a copy to:

Richard S. Chute, Esq.
Hill & Barlow
One International Place
Boston, Massachusetts 02110
Telecopier No. (617) 428-3500

(c) if to the Lenders:

At the addresses set forth on the signature pages hereof and on the signature page of each Assignment and Acceptance.

10.6. MASSACHUSETTS LAW. THIS AGREEMENT AND EACH OF THE LOAN DOCUMENTS SHALL BE DEEMED A CONTRACT MADE UNDER THE LAW OF THE COMMONWEALTH OF MASSACHUSETTS AND SHALL BE GOVERNED BY, AND CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE INTERNAL LAWS OF SAID STATE (WITHOUT REGARD TO ITS PRINCIPLES OF CONFLICT OF LAWS).

10.7. Counterparts. This Agreement may be executed in any number of counterparts and by different parties hereto in separate counterparts, each of which when so executed and delivered shall be deemed an original and all of which when taken together shall constitute one and the same instrument.

10.8 JURISDICTION, SERVICE OF PROCESS.

(a) ANY SUIT, ACTION OR PROCEEDING AGAINST THE BORROWER WITH RESPECT TO ANY OF THE LOAN DOCUMENTS OR ANY JUDGMENT ENTERED BY ANY COURT IN RESPECT OF ANY THEREOF SHALL BE BROUGHT IN THE COURTS OF THE COMMONWEALTH OF MASSACHUSETTS LOCATED IN SUFFOLK COUNTY OR IN THE UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF MASSACHUSETTS, AS THE LENDERS (IN THEIR SOLE DISCRETION) MAY ELECT, AND THE BORROWER HEREBY ACCEPTS THE EXCLUSIVE JURISDICTION OF SUCH COURTS FOR THE PURPOSE OF ANY SUIT, ACTION OR PROCEEDING AND AGREES NOT TO ASSERT ANY CLAIM THAT IT IS NOT PERSONALLY SUBJECT TO THE JURISDICTION OF SUCH COURTS.

(b) IN ADDITION, THE BORROWER HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY LAW, ANY OBJECTION

IT MAY NOW OR HEREAFTER HAVE TO THE LAYING OF VENUE OF ANY SUIT, ACTION OR PROCEEDING ARISING OUT OF OR RELATING TO ANY OF THE LOAN DOCUMENTS OR ANY JUDGMENT ENTERED BY ANY COURT IN RESPECT THEREOF BROUGHT IN SUFFOLK COUNTY IN THE COMMONWEALTH OF MASSACHUSETTS, AND HEREBY FURTHER IRREVOCABLY WAIVES ANY CLAIM THAT ANY SUIT, ACTION OR PROCEEDING BROUGHT IN SUFFOLK COUNTY IN THE COMMONWEALTH OF MASSACHUSETTS HAS BEEN BROUGHT IN AN INCONVENIENT FORUM.

10.9. Limit on Interest. It is the intention of the Lenders and the Borrower to comply strictly with all applicable usury laws; and, accordingly, in no event and upon no contingency shall the Lenders ever be entitled to receive, collect, or apply as interest under any Note any interest, fees, charges or other payments equivalent to interest, in excess of the maximum rate that the Lenders may lawfully charge under applicable statutes and laws from time to time in effect; and, in the event that the Lenders ever receive, collect or apply as interest on the Notes, any such excess, such amount that, but for this provision, would be excessive interest shall be applied to the reduction of the principal amount of the indebtedness evidenced by the Notes; and, if the principal amount of indebtedness evidenced by the Notes, and all lawful interest thereon, is paid in full, any remaining excess shall forthwith be paid to the Borrower, or other party lawfully entitled thereto. In determining whether or not the interest paid or payable, under any specific contingency exceeds the highest contract rate permitted by applicable law from time to time in effect, the Borrower and the Lenders shall, to the maximum extent permitted under applicable law, characterize any non-principal payment as a reasonable loan charge, rather than as interest. Any provision of any Note, or of any other agreement between the Lenders and the Borrower, that operates to bind, obligate, or compel the Borrower to pay interest in excess of such maximum lawful contract rate shall be construed to require the payment of the maximum rate only. The provisions of this Section 10.9 shall be given precedence over any other provisions contained in the Notes or in any other agreement between the Lenders and the Borrower that is in conflict with the provisions of this Section 10.9.

10.10. Amendments. No amendment, modification or waiver of any provision of any Loan Document and no consent by the Lenders to any departure therefrom by the Borrower shall be effective unless such amendment, modification or waiver shall be in writing and signed by the Agent, shall have been approved by the Required Lenders through their written consent, and the same shall then be effective only for the period and on the conditions and for the specific instances and purposes specified in such writing; provided, however, that, no such amendment, modification or waiver

(i) that changes, extends or waives any provision of Section 3.1.4, Section 9.9 or this Section 10.10, the amount of or the due date of any scheduled principal installment of or the rate of interest payable on or fees

payable with respect to any Obligation, that changes the definition of Required Lenders, that permits an assignment by the Borrower of its Obligations under any Loan Document, that reduces the required consent of the Lenders provided hereunder, that increases, decreases (other than pursuant to the express terms hereof) or extends (other than pursuant to the express terms hereof) the Revolving Credit Commitment of any Lender or the Total Revolving Credit Commitment or that waives any condition to the making of any Advance, shall be effective unless in writing and signed by each of the Lenders; or

(ii) that affects the rights, privileges, immunities or indemnities of the Agent shall be effective unless in writing and signed by the Agent.

Notwithstanding any provision of the other Loan Documents to the contrary, as between the Agent and the Lenders, execution by the Agent shall not be deemed conclusive evidence that the Agent has obtained the written consent of the Required Lenders. No notice to or demand on the Borrower in any case shall entitle the Borrower to any other or further notice or demand in similar or other circumstances, except as otherwise expressly provided herein. No delay or omission on any Lender's or the Agent's part in exercising any right, remedy or option shall operate as a waiver of such or any other right, remedy or option or of any Default or Event of Default.

10.11. Headings. The headings of this Agreement are for convenience only and are not to affect the construction of or to be taken into account in interpreting the substance of this Agreement.

10.12. WAIVER OF NOTICE, ETC. THE BORROWER WAIVES DEMAND, NOTICE, PROTEST, NOTICE OF ACCEPTANCE OF THIS AGREEMENT, NOTICE OF LOANS MADE, CREDIT EXTENDED, COLLATERAL RECEIVED OR DELIVERED OR OTHER ACTION TAKEN IN RELIANCE HEREON AND ALL OTHER DEMANDS AND NOTICE OF ANY DESCRIPTION, EXCEPT AS REQUIRED HEREBY. WITH RESPECT BOTH TO THE OBLIGATIONS AND COLLATERAL, THE BORROWER ASSENTS TO ANY EXTENSION OR POSTPONEMENT OF THE TIME OF PAYMENT OR ANY OTHER INDULGENCE, TO ANY SUBSTITUTION, EXCHANGE OR RELEASE OF COLLATERAL, TO THE ADDITION OR RELEASE OF ANY PARTY OR PERSONS PRIMARILY OR SECONDARILY LIABLE, TO THE ACCEPTANCE OF PRETRIAL PAYMENT THEREON AND THE SETTLEMENT, COMPROMISING OR ADJUSTING OF ANY THEREOF, ALL IN SUCH MANNER AND AT SUCH TIME OR TIMES AS THE LENDERS MAY DEEM ADVISABLE. THE BORROWER AGREES THAT NO ACTIONS TAKEN BY ANY PERSON EXCEPT THE LENDERS SHALL IMPAIR OR OTHERWISE AFFECT ITS OBLIGATIONS

HEREUNDER UNTIL ALL OBLIGATIONS OF THE BORROWER HEREUNDER ARE SATISFIED IN FULL.

10.13. Severability. In the event that any one or more of the provisions contained in this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Agreement, but this Agreement shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

10.14. Entire Agreement. This Agreement and the other Loan Documents constitute the full and entire understanding and agreement between the parties with regard to the subject matter hereof and thereof and shall supersede all prior agreements and understandings, whether written or oral, between the parties with respect to the subject matter hereof and thereof.

10.15. Compliance with Covenants. All computations determining compliance with Articles 6 and 7 shall utilize accounting principles in conformity with those used in the preparation of the financial statements referred to in Section 4.5. If any subsequent financial reports of the Borrower shall be prepared in accordance with accounting principles different from those used in the preparation of the financial statements referred to in Section 4.5, the Borrower shall inform the Agent of the changes in accounting principles and shall provide the Agent with such reports, such supplemental reconciling financial information as may be required to ascertain compliance by the Borrower with the covenants contained in this Agreement.

10.16. Termination. This Agreement may be terminated by the Borrower at any time upon written notice of such termination to the Agent; provided, however, that, unless and until all loans made by the Lenders hereunder and all other Obligations hereunder of the Borrower to any Lender existing (whether or not due) as of the time of the receipt of such notice by the Agent shall have been paid in full, such termination shall in no way affect the rights and powers granted to the Lenders in connection with this Agreement, and until such payment in full all rights and powers hereby granted to the Lenders hereunder shall be and remain in full force and effect.

10.17. WAIVER OF TRIAL BY JURY. THE BORROWER WAIVES ANY AND ALL RIGHTS THAT IT MAY HAVE TO A TRIAL BY JURY ON ANY CLAIM OR ACTION, OF ANY NATURE WHATSOEVER, RELATING TO OR ARISING OUT OF THIS AGREEMENT OR ANY OF THE OTHER LOAN DOCUMENTS.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as an agreement under seal as of the date first above written.

Witness: MKS INSTRUMENTS, INC.

By: _____
Title: _____

THE FIRST NATIONAL BANK OF BOSTON

By: _____
Title: _____
Address: 100 Federal Street
Boston, MA 02110

CHEMICAL BANK

By: _____
Title: _____
Address: c/o Chemical Connecticut
Corporation
3 Landmark Square, Suite 401
Stamford, CT 06901

EXHIBIT A

| Lender ----- | Revolving Credit Commitment ----- | Applicable Commitment Percentage ----- |
|--------------------------------------|--|---|
| The First National Bank of Boston | \$12,000,000 | 60% |
| Chemical Bank | \$ 8,000,000 | 40% |
| | ----- | ----- |
| | \$20,000,000 | 100% |

EXHIBIT B

FORM OF ASSIGNMENT AND ACCEPTANCE

DATED _____, _____

Reference is made to the Loan Agreement dated as of February __, 1996 (the "Agreement") among MKS Instruments, Inc., a Massachusetts corporation (the "Borrower"), the Lenders (as defined in the Agreement), and The First National Bank of Boston as Agent for the Lenders ("Agent"). Unless otherwise defined herein, terms defined in the Agreement are used herein with the same meanings.

_____ (the "Assignor") and _____ (the "Assignee") agree as follows:

1. The Assignor hereby sells and assigns to the Assignee, and the Assignee hereby purchases and assumes from the Assignor, WITHOUT RECOURSE, a _____%(1) interest in and to all of the Assignor's rights and obligations under the Agreement as of the Effective Date (as defined below), including, without limitation, such percentage interest in the Advances owing to the Assignor on the Effective Date and evidenced by the Revolving Credit Note held by the Assignor.

2. The Assignor (i) represents and warrants that, as of the date hereof, the aggregate principal amount of Advances owing to it (without giving effect to the assignments thereof which have not yet become effective) is \$ _____ under a Revolving Credit Note dated _____, 19__ in the principal amount of \$ _____; (ii) represents and warrants that it is the legal and beneficial owner of the interest being assigned by it hereunder and that such interest is free and clear of any adverse claim; (iii) makes no representation or warranty and assumes no responsibility with respect to any statements, warranties or representations made in or in connection with the Agreement or any of the Loan Documents or the execution, legality, validity, enforceability, genuineness, sufficiency or value of the Agreement or any of the Loan Documents or any other instrument or document furnished pursuant thereto; (iv) makes no representation or warranty and assumes no responsibility with respect to the financial condition of the Borrower or any Subsidiary or the performance or observance by the Borrower of any of its obligations under any of the Loan Documents or any other instrument or document furnished pursuant thereto and (v) attaches hereto the Revolving Credit Note referred to in Paragraph 1 above and requests that the Agent exchange such Note for replacement Notes as follows: a Revolving Credit Note dated _____, 19__ in the principal amount of \$ _____, payable to the order of the Assignor, and a Revolving Credit

(1) Specify percentage in no more than 4 decimal points. The minimum Revolving Credit Commitment that shall be assigned is \$5,000,000.

Note, dated _____ 19__, in the principal amount of \$ _____, payable to the order of the Assignee.

3. The Assignee (i) confirms that it has received a copy of the Agreement, together with copies of the financial statements referred to in Section 4.5 thereof and such other documents and information as it has deemed appropriate to make its own credit analysis and decision to enter into this Assignment and Acceptance; (ii) agrees that it will, independently and without reliance upon the Agent, the Assignor, or any other Lender and based on such documents and information as it shall deem appropriate at the time, continue to make its own credit decisions in taking or not taking action under the Agreement; (iii) appoints and authorizes the Agent to take such actions on its behalf and to exercise such powers under the Loan Documents as are delegated to the Agent by the terms thereof, together with such powers as are reasonably incidental thereto; (iv) will perform all of the obligations that by the terms of the Agreement are required to be performed by the Lender; and (v) specifies as its address for notices the office set forth beneath its name on the signature pages hereof.

4. The effective date for this Assignment and Acceptance shall be _____ (the "Effective Date"). Following the execution of this Assignment and Acceptance, it will be delivered to the Agent for approval and acceptance and recording by the Agent.

5. Upon such acceptance and recording, as of the Effective Date, (i) the Assignee shall be a party to the Agreement and, to the extent provided in this Assignment and Acceptance, have the rights and obligations of a Lender thereunder and under the Loan Documents and (ii) the Assignor shall, to the extent provided in this Assignment and Acceptance, relinquish its rights and be released from its obligations under the Agreement and the other Loan Documents.

6. Upon such acceptance and recording, from and after the Effective Date, the Agent shall make all payments under the Agreement and Note in respect of the interest assigned hereby (including, without limitation, all payments of principal, interest and fees with respect thereto) to the Assignee. The Assignor and Assignee shall make all appropriate adjustments in payments under the Agreement and the Note for periods prior to the Effective Date directly between themselves.

7. This Assignment and Acceptance shall be governed by and construed in accordance with, the laws of the State of _____.

[NAME OF ASSIGNOR]

By: _____
Name: _____
Title: _____

Notice Address: _____

After the Effective Date
Outstanding Advances: \$ _____

[NAME OF ASSIGNEE)

By: _____
Name: _____
Title: _____

Notice Address/Lending Office

Wire transfer Instructions:

After the Effective Date
Outstanding Advances: \$ _____

Accepted this ____ day of _____, 19__

THE FIRST NATIONAL BANK OF BOSTON,
as Agent

By: _____
Name: _____
Title: _____

Consented to:
MKS INSTRUMENTS, INC.

By: _____
Name: _____
Title: _____

EXHIBIT C

REVOLVING CREDIT NOTE

\$ _____

Boston, Massachusetts

February __, 1996

FOR VALUE RECEIVED, MKS INSTRUMENTS, INC., a Massachusetts corporation having its principal place of business located in Andover, Massachusetts (the "Borrower"), hereby promises to pay to the order of

_____ (the "Lender"), in its individual capacity, at the office of THE FIRST NATIONAL BANK OF BOSTON, as agent for the Lender (the "Agent"), located at 100 Federal Street, Boston, Massachusetts (or at such other place or places as the Agent may designate in writing) at the times set forth in the Loan Agreement dated as of February __, 1996 among the Borrower, the financial institutions party thereto (collectively, the "Lenders") and the Agent (the "Agreement" -- all capitalized terms not otherwise defined herein shall have the respective meanings set forth in the Agreement), in lawful money of the United States of America, in immediately available funds, the principal amount of _____ DOLLARS (\$_____) or, if less than such principal amount, the aggregate unpaid principal amount of all Advances made by the Lender to the Borrower pursuant to the Agreement, on the Revolver Termination Date or such earlier date as may be required pursuant to the terms of the Agreement, and to pay interest from the date hereof on the unpaid principal amount hereof, in like money, at said office, on the dates and at the rates provided in the Agreement. All or any portion of the principal amount of Advances may be prepaid as provided in the Agreement.

If payment of all sums due hereunder is accelerated under the terms of the Agreement or under the terms of the other Loan Documents executed in connection with the Agreement, the then remaining principal amount and accrued but unpaid interest shall bear interest, which shall be payable on demand, at the rate per annum set forth in Section 2.4.2 of the Agreement. Further, in the event of such acceleration, this Revolving Credit Note shall become immediately due and payable, without presentation, demand, protest or notice of any kind, all of which are hereby waived by the Borrower.

In the event this Revolving Credit Note is not paid when due at any stated or accelerated maturity, the Borrower agrees to pay, in addition to the principal and interest, all costs of collection, including reasonable attorneys' fees, and interest thereon at the rates set forth above.

Interest hereunder shall be computed as provided in the Agreement.

This Revolving Credit Note is one of the Revolving Credit Notes in the aggregate principal amount of \$20,000,000 referred to in the Agreement and is issued pursuant to and entitled to the benefits of the Agreement to which reference is hereby made for a more complete statement of the terms and conditions upon which the Advances evidenced hereby were or are made and are to be repaid. This Revolving Credit Note is subject to certain restrictions on transfer or assignment as provided in the Agreement.

No delay or omission on the part of the Lender in exercising any right hereunder shall operate as a waiver of such right or of any other right of the Lender, nor shall any delay, omission or waiver on any one occasion be deemed a bar to or waiver of the same or any other right on any future occasion. Every maker, endorser and guarantor of this Revolving Credit Note or the obligations represented hereby waives presentment, demand, notice, protest and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Revolving Credit Note, assents to any extension or postponement of the time of payment or any other indulgence, to any substitution, exchange or release of collateral and to the addition or release of any other party or person primarily or secondarily liable.

IN WITNESS WHEREOF, the Borrower has caused this Revolving Credit Note to be made, executed and delivered by its duly authorized representative under seal as of the date and year first above written.

MKS INSTRUMENTS, INC.

WITNESS:

By: _____
Name: _____
Title: _____

EXHIBIT D

FORM OF COMPLIANCE CERTIFICATE

The First National Bank of Boston, as Agent
100 Federal Street
Boston, Massachusetts 02110
Attn: Ms. Sharon A. Stone, Director

Ladies and Gentlemen:

Pursuant to the provisions of Section 6.1(c) of the Loan Agreement (the "Agreement") dated as of February __, 1996 by and between MKS Instruments, Inc. (the "Borrower"), the Lenders (as defined in the Agreement) and The First National Bank of Boston as Agent for the Lenders, the undersigned hereby certifies in the name and on behalf of the Borrower as follows:

- (A) (1) The Borrower has performed and maintained all of its obligations under the Agreement;
- (2) The undersigned has caused the provisions of the Agreement to be reviewed and there is no Default or Event of Default thereunder, other than as set forth on the Disclosure Schedule attached hereto;
- (3) No new action, suit or proceeding has been commenced, or threatened before any court, arbitration tribunal or governmental regulatory authority, commission, bureau, agency or public regulatory body that, if determined adversely to the Borrower or any Subsidiary of the Borrower, would be reasonably likely to have a material adverse effect on the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole, except as set forth on the Disclosure Schedule attached hereto;
- (4) All of the representations and warranties set forth in the Agreement other than Sections 4.5 and 4.6 are true and correct except as a result of the changes in circumstances set forth on the Disclosure Schedule attached hereto;
- (5) Since the end of the last fiscal year of the Borrower, there has been no material adverse change in the financial condition, business or results of operations of the Borrower and its Subsidiaries taken as a whole, except as set forth on the Disclosure Schedule attached hereto;

- (6) The financial statements submitted herewith are in compliance with the applicable provisions of Section 6.1 of the Agreement; and
- (7) Said financial statements have been prepared in accordance with generally accepted accounting principles consistent with those applied in the preparation of the most recent annual financial statements furnished to the Lenders pursuant to Section 6.1 of the Agreement, present fairly in all material respects the information contained therein and the financial condition of the Borrower, and are correct in all material respects, subject in the case of statements furnished under Section 6.1(a) to normal year-end adjustments and the absence of certain footnotes required under generally accepted accounting principles.

(B) The following calculations demonstrate that, based upon the financial statements of the Borrower submitted herewith, the Borrower is in compliance with all covenants set forth in Section 7.7 of the Agreement.

1. Section 7.7(a) -- Tangible Net Worth Test

- (a) Consolidated Tangible Net Worth = \$ _____
- (b) 50% of Consolidated Net Income (excluding losses) for each fiscal quarter beginning with the fiscal quarter ending March 31, 1996, up to and including the fiscal quarter last ended = \$ _____
- (c) prior to an IPO:
 (b) + \$38,000,000
 (which does not exceed Consolidated Tangible Net Worth) = \$ _____
- (d) after an IPO:
 (c) + the net proceeds of the IPO
 - the Sub S Dividend
 (which does not exceed Consolidated Tangible Net Worth) = \$ _____

2. Section 7.7(b) -- Debt-to-Net Worth Ratio

(a) Consolidated Indebtedness (excluding all guaranties except guaranties with respect to borrowed money) as of the end of the fiscal quarter last ended = \$ _____

(b) Consolidated Tangible Net Worth as of the end of the fiscal quarter last ended = \$ _____

(c) Ratio of (a) to (b) (which is not more than 1.5 to 1) = _____

3. Section 7.7(c) -- Cash Flow Ratio

(a) Consolidated Operating Cash Flow for the four consecutive fiscal quarters last ended = \$ _____

(b) Consolidated Debt Service for the four consecutive fiscal quarters last ended = \$ _____

(c) Ratio of (a) to (b) (which is not less than 1.25 to 1.0) = \$ _____

Terms defined in the Agreement and not otherwise expressly defined herein are used herein with the meanings set forth in the Agreement.

In witness whereof, the undersigned has executed this Certificate on this ____ day of _____, 19__.

MKS INSTRUMENTS, INC.

By: _____

Name: _____

Title: Chief Financial Officer

DISCLOSURE SCHEDULE

(1) 4.4 Capital Structure.

a. Capital Stock.

| Class | Authorized Capital Stock | Issued and Outstanding Capital Stock | Treasury Stock |
|-------------------|-----------------------------|--|-------------------|
| ----- | ----- | ----- | ----- |
| Class A common | 10,000, no par value | 2,454 | 0 |
| Class B common | 10,000, no par value | 3,250 | 0 |

b. Subsidiaries of Borrower.

- (i) MKS International, Inc.; Jurisdiction of Incorporation: Massachusetts; Authorized Capital Stock: 300,000, \$.01 par value; Issued and Outstanding Capital Stock: 19,013; Percentage of Equity Owned by Borrower: 70%
- (ii) MKS East, Inc.; Jurisdiction of Incorporation: Massachusetts; Authorized Capital Stock: 300,000, \$.01 par value; Issued and Outstanding Capital Stock: 1,000; Percentage of Equity Owned by Borrower: 77.5%
- (iii) MKS Japan, Inc.; Jurisdiction of Incorporation: Japan; Authorized Capital Stock: 2,000, Y50,000 par value; Issued and Outstanding Capital Stock: 707; Percentage of Equity Owned by Borrower: 77.5%
- (iv) MKS Instruments Canada Limited; Jurisdiction of Incorporation: Canada; Authorized Capital Stock: unlimited number; Issued and Outstanding Capital Stock: 1,100; Percentage of Equity Owned by Borrower: 77.5%
- (v) MKS Instruments Deutschland GmbH; Jurisdiction of Incorporation: Germany; Authorized Capital Stock: 1,200,000 DM; Issued and Outstanding Capital Stock: 1,200,000 DM; Percentage of Equity Owned by Borrower: 77.5%

- (vi) MKS Instruments France, S.A.; Jurisdiction of Incorporation: France; Authorized Capital Stock: 5,000; Issued and Outstanding Capital Stock: 5,000; Percentage of Equity Owned by Borrower: 77%
- (vii) MKS Korea Co., Ltd.; Jurisdiction of Incorporation: Republic of Korea; Authorized Capital Stock: 20,000; Issued and Outstanding Capital Stock: 5,000; Percentage of Equity Owned by Borrower: 77.5%
- (viii) MKS Instruments, UK Limited; Jurisdiction of Incorporation: United Kingdom; Authorized Capital Stock: 100; Issued and Outstanding Capital Stock: 100; Percentage of Equity Owned by Borrower: 75.0%
- (ix) MKS FSC, Inc.; Jurisdiction of Incorporation: Barbados; Authorized Capital Stock: 1,000; Issued and Outstanding Capital Stock: 1,000; Percentage of Equity Owned by Borrower: 77.5%

c. Outstanding Options, Etc.

On November 30, 1995, the Borrower adopted the MKS Instruments, Inc. 1995 Stock Incentive Plan (the "Plan") pursuant to which options to purchase 192,1863 shares of Class B Common Stock of the Borrower have been granted. The option grants will not be effective until the Plan is adopted by the stockholders of the Borrower which has not yet occurred. The MKS Instruments, Inc. Stock Appreciation Plan, as amended, was terminated in its entirety, effective September 30, 1995.

(2) 4.6 Pending Litigation.

None.

(3) 4.11 Transactions with Affiliates, Etc.

John R. Bertucci and Paul Utz, as lessors, lease on a month-to-month basis to the Borrower, as lessee, certain real estate in Santa Clara, California used by the Borrower as a sales and service facility. The current rent is approximately \$57,696 per year.

(3) 4.12 ERISA.

MKS Instruments, Inc. Profit-Sharing and Retirement Savings Plan

(4) 4.13 Ownership of Properties; Liens.

(a) Liens -- Borrower.

- (i) Mortgage liens and security interests granted to Bank of Boston on real property, fixtures, and certain other assets of the Borrower.
- (ii) Security interests granted to BancBoston Leasing, Inc. in equipment leased by the Borrower.
- (iii) Security interests granted to certain lessors of equipment to the Borrower, including Taylor of New England, Inc., Leasametric, Inc., Xerox Corporation, Pitney Bowes Credit Corporation, and IBM Credit Corporation.
- (iv) Liens granted to Leasing Associates, Inc. in certain automobiles leased by the Borrower.
- (v) Mortgage liens and security interests granted to Jefferson National Life Insurance Company in connection with land owned by Borrower in Boulder, Colorado.
- (vi) Liens granted by UTI Instruments Company in its copying machines and telephone system (UTI Instruments Company was merged with and into the Borrower on November 17, 1995)

(b) Liens -- Subsidiaries.

Liens granted by MKS Instruments France, S.A., MKS Investments Deutschland GmbH, and MKS Japan, Inc. on their respective land and buildings.

(c) Borrower's Material Leasehold Interests, Etc. See attachment.

(5) 4.14 Employment Matters.

None.

(6) 4.16 Indebtedness.

(a) Indebtedness under the Existing Loan Agreements

- (b) Loan Agreement with Chemical providing the Borrower with a revolving line of credit up to \$3,000,000
- (c) International Foreign Exchange Master Agreement dated as of June __, 1995 by and between the Borrower and Chemical
- (d) Guaranties as follows:
 - (i) Guaranty by the Borrower of Indebtedness of MKS Japan, Inc. to Fuji Bank and to Sanwa Bank.
 - (ii) Guaranty by the Borrower of Indebtedness of MKS Instruments Deutschland GmbH to Bank of Boston.
 - (iii) Guaranty by the Borrower of Indebtedness of MKS Korea Co., Ltd. to Bank of Boston.

(7) 7.4 Investments.

- (a) 45,000 shares of common stock of Sycon Instruments, Inc.
- (b) 6,000 shares of common stock of Vacuum Technology, Inc.
- (c) 5,512 shares of Fuji Bank
- (d) 35,000 shares of common stock of Applied Science and Technology, Inc.

MKS Instruments Inc.
Property Summary

| Location | Lease/Own | Size (sq. ft.) | Landlord | Lease Expires | Annual Rent |
|---|-----------|----------------|--|----------------|-------------|
| DOMESTIC LEASED | | | | | |
| 100 Washington Street North Haven, CT | Lease | 500 | Candid Associates | Month-to-Month | \$13,800 |
| 500 North Red Street St. 300 Tampa, FL | Lease | 250 | Centers of West Shore | Month-to-Month | \$6,678 |
| St. 409, 11350 McCormick Rd. Hunt Valley, MD | Lease | 845 | Hill Management | 7/31/97 | \$18,455 |
| St. 100C, 100 Roessler Road Pittsburgh, PA | Lease | 250 | Executive Secretarial Service Inc. | 9/30/98 | \$7,740 |
| St. 111, 113, 789 Grove St. Richardson, TX | Lease | 14,627 | General America Life Ins. Group | 8/31/98 | \$65,822 |
| St. 101, 6700 SW 105th Beaverton, OR | Lease | 415 | Go Co Realty | 1/12/96 | \$6,078 |
| 5601B Midway Park Place Albuquerque, NM | Lease | 3,400 | Singer Development Partnership | 5/31/96 | \$25,542 |
| St. 311, 6650 Highland Road Waterford, MI | Lease | 300 | Superior Contracting Corp. | Month-to-Month | \$7,200 |
| St. 215, 3019 Alvin Devane Blvd. Austin, TX | Lease | 4,144 | H.R.C. Joint Venture L.P. & Austin Bell Tower Investment Co. | 6/30/98 | \$35,814 |
| Bldg. 3, 3350 Scott Blvd. Santa Clara, CA | Lease | 4,000 | Utz/Bertucci | 4/30/98 | \$57,696 |
| 24 Walpole Park South Dr. Walpole, MA | Lease | 20,084 | Walpole Park South II Trust | 3/31/97 | \$100,420 |
| Unit A, 13341 Southwest Hwy. Orland Park, IL | Lease | 300 | Southwest Investment | 8/31/97 | \$6,420 |
| Mill Building 7,250 Canal St. Lawrence, MA | Lease | 4,000 | Andrea Management | 4/30/98 | \$8,000 |
| 5330 Sterling Drive Boulder, CO | Lease | 39,032 | Aspen Industrial Park Partnership | 10/31/98 | \$341,530 |
| 3844 E. University Drive Phoenix, AZ | Lease | 15,457 | The Hewson Company | 7/31/00 | \$115,000 |
| 119 Main Street Flemington, NJ | Lease | 272 | Large Sammell & Danziger | Month-to-Month | \$4,200 |
| 1815 W. First Ave. Suite 119 Mesa, AZ | Lease | 1,523 | Tri-City Commerce Center | 06/30/96 | \$7,070 |
| 550 N. Reo Street Tampa, FL | Lease | 300 | JFG Associates | Month-to-Month | \$6,678 |
| 7978 Victor-Pittsford Road Victor, NY | Lease | 300 | Eastview Office Park WBW Assoc. | 10/31/96 | \$6,000 |

| Location | Lease/Own | Size (sq. ft.) | Landlord | Lease Expires | Annual Rent |
|---|-----------|----------------|--|--------------------|---------------------------|
| 10220 SW Nimbus Portland, OR | Lease | 2,168 | Petula Assoc. Ltd. & Koll Portland Assoc. | 12/31/98 | \$26,928 |
| DOMESTIC LEASED | | | | | |
| 2030 Fortune Drive Suite C San Jose, CA | Lease | 35,873 | South Bay/Copley Assoc. III | 2/14/98 | \$277,656 |
| 3722 Lehigh Street Suite 410 Whitehall, PA | Lease | 1,055 | Jason C. and Marcus K. Danweber | 12/31/96 | \$8,440 |
| DOMESTIC OWED | | | | | |
| 3189 E. Airway Ave. Costa Mesa, CA | Own | 3,500 | | | |
| 3350 Scott Blvd. Bldg. 4 Santa Clara, CA | Own | 5,000 | | | |
| Six Shattuck Road Andover, MA | Own | 82,000 | | | |
| 651 Lowell Street Methuen, MA | Own | 85,000 | | | |
| 17 Ballard Way Lawrence, MA | Own | 40,000 | | | |
| FOREIGN LEASED | | | | | |
| 4c Jingnuin Bldg. Shanghai, China | LEASE | 156.9 SM | Silicon Int'l Ltd. | 04/10/96 | \$66,000 |
| 174 Cleopatra Drive Nepean, Ontario, Canada K2G5X2 | Lease | 100 | | Month-to- Month | C\$1,540 |
| 2nd flr. Zeus Bldg. 3-16 Yangjag Dong Seocho-Ku, Seoul Korea | Lease | 123.57 SM | | 10/31/96 | W7,200,000 |
| 988-1 Bangbac - Dong Seocho-Ku, Seoul Korea | Lease | 112 SM | | 12/11/96 | W1,608,000 |
| 2 St. Georges Ct. Altincham, Cheshire, England | Lease | 2191 | | | (pound sterling)17,500 |
| Rudower Chaussee 5 D-12484 Berlin, Germany | Lease | 43 SM | | 09/99 | DM8,000 |
| Kalfjeslaan 40 NL-2623 AJ Delft, Germany | Lease | 135 SM | | 12/97 | DM30,000 |
| 5-17-13 Narita-higeshi Suginami-ku, Tokyo, Japan | Lease | 10,481 | | | (Yen)50,160,480 |
| 4-1-45, Miyahara Yodogawa-ku, Osaka-shi, Osaka, Japan | Lease | 1,722 | | | (Yen)7,158,600 |
| 1-14-3 Hakataeki East, Hakata-ku Fukuoka-shi, Fukuoka, Japan | Lease | 1,250 | | | (Yen)5,136,000 |
| 1-34-6 Izumicyo, Izumi-ku Sendai-shi, Miyagi, Japan | Lease | 610 | | | (Yen)2,162,160 |
| 1-1-14 Fujishirodal Suita-shi, Osaka, Japan | Lease | 992 | | | (Yen)2,172,000 |

| Location | Lease/Own | Size (sq. ft.) | Landlord | Lease Expires | Annual Rent |
|---|-----------|----------------|----------|---------------|------------------------|
| 1-4-6 Honcho Aoba-ku Sendai-shi, Miyagi | Lease | 484 | | | (Yen)1,029,600 |
| FOREIGN OWNED | | | | | |
| 108-30 Concourse Gate Nepean, Ontario, Canada K2E7U7 | Own | 1,700 | | | C\$6,060 Condo fees |
| 43 Rue Du Cdt Rolland 93350 - Le Bourget | Own | 13,680 | | | |
| Schatzbogen 43 D-81829 Munchen, Germany | Own | 1,310 SM | | | |
| 1-20-32, Miyamae Suginami-ku, Tokyo | Own | 6,671 | | | |

MKS INSTRUMENTS, INC.
WAIVER AND FIRST AMENDMENT
TO LOAN AGREEMENT

This Waiver and First Amendment (the "Waiver and Amendment") dated as of October 18, 1996 concerns the Loan Agreement dated as of February 23, 1996 (the "Loan Agreement"), among MKS Instruments, Inc. (the "Borrower"), The First National Bank of Boston and The Chase Manhattan Bank (f/k/a Chemical Bank) (together, the "Lenders"). Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower has requested that the Lenders waive certain Events of Default; and

WHEREAS, the Lenders are willing, on the terms, subject to the conditions and to the extent set forth below, to grant such a waiver;

NOW, THEREFORE, the Lenders and the Borrower agree as follows:

Section 1. Waiver. The Lenders hereby waive the Events of Default under Section 8.1(g), (k) and (l) of the Loan Agreement resulting from Borrower's failure to meet the financial covenants set forth in Section 7.7(b) and (c) of the Loan Agreement as of the end of the fiscal quarter ended June 30, 1996.

Section 2. Amendment to the Loan Agreement.

(a) Section 2.4.1. of the Loan Agreement is hereby amended by deleting the existing language and substituting the following:

2.4.1. The Borrower agrees to pay interest in respect of the unpaid principal amount of each Advance from the date the proceeds thereof are made available to the Borrower until maturity (whether by acceleration, voluntary prepayment or otherwise) as follows. Each Advance shall bear interest at the Base Rate in effect from time to time unless the Borrower elects and qualifies to pay interest on such Advance at the following rate (the "Adjusted LIBOR Rate"):

(i) During any period in which the Borrower maintains a Debt-to-Net Worth Ratio of less than 1 to 1:

(a) and a Cash Flow Ratio of less than 1.40 to 1, the LIBOR Rate plus 1.65%;

(b) and a Cash Flow Ratio of 1.40 to 1 or greater but less than 1.75 to 1, the LIBOR Rate plus 1.125%;

(c) and a cash Flow Ratio of 1.75 to 1 or greater up to and including 2.5 to 1, the LIBOR Rate plus .875%; or

(d) and a Cash Flow Ratio in excess of 2.5 to 1, the LIBOR Rate plus .625%;

(ii) During any period in which the Borrower maintains a Debt-to-Net Worth Ratio of 1 to 1 or more but less than or equal to 1.5 to 1:

(a) and a Cash Flow Ratio of less than 1.40 to 1, the LIBOR Rate plus 1.65%;

(b) and a Cash Flow Ratio of 1.40 to 1 or greater but less than 1.75 to 1, the LIBOR Rate plus 1.25%;

(c) and a Cash Flow Ratio of 1.75 to 1 or greater up to and including 2.5 to 1, the LIBOR Rate plus 1.00%; or

(d) and a Cash Flow Ratio in excess of 2.5 to 1, the LIBOR Rate plus .75%.

Section 3. Representations and Warranties. The Borrower hereby represents and warrants as follows:

(a) The execution and delivery of this Waiver and Amendment and the performance of this Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Waiver and Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other

document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Waiver and Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 4. Loan Documents. This Waiver and Amendment shall be a Loan Document for all purposes.

Section 5. Conditions to Effectiveness. The effectiveness of this Waiver and Amendment is conditioned on the following:

(a) The Borrower and the Lenders shall each have executed and delivered a counterpart of this Waiver and Amendment;

(b) The representations and warranties contained in Article IV of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof; and

(c) No Default or Event of Default under the Loan Agreement shall have occurred and be continuing other than the Events of Default described in Section 1 hereof.

Section 6. Miscellaneous.

(a) On and after the date hereof, each reference in the Loan Agreement to "this Agreement" or words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Waiver and Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of The Commonwealth of Massachusetts.

(d) This Waiver and Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same document.

IN WITNESS WHEREOF, the parties have caused this Waiver and Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____
Title: _____

THE FIRST NATIONAL BANK OF BOSTON

By: _____
Title: _____

THE CHASE MANHATTAN BANK

By: _____
Title: _____

WAIVER

This Waiver (the "Waiver") dated as of October 18, 1996 concerns the Loan Agreement dated as of November 1, 1993, as amended (the "1993 Loan Agreement"), between MKS Instruments, Inc. (the "Borrower") and The First National Bank of Boston (the "Lender") and the Loan Agreement dated as of October 31, 1995, as amended (the "1995 Loan Agreement") between the Borrower and the Lender. Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the 1993 and 1995 Loan Agreements.

The Lender hereby waives the Events of Default under Section 9.1(g), (k) and (l) of the 1993 Loan Agreement and under Section 8.1(g), (k) and (l) of the 1995 Loan Agreement resulting from (1) Borrower's failure to meet the financial covenants set forth in Section 8.7(b) and (c) of the 1993 Loan Agreement and Section 7.7(b) and (c) of the 1995 Loan Agreement as of the end of the fiscal quarter ended June 30, 1996 and (2) the Event of Default that has occurred under Section 8.1(g), (k) and (l) of the Loan Agreement dated as of February 23, 1996 among the Borrower, the Lender and The Chase Manhattan Bank (f/k/a Chemical Bank) as a result of Borrower's failure to met the financial covenants set forth in Section 7.7(b) and (c) of such Loan Agreement as of the end of the fiscal quarter ended June 30, 1996.

Except for the above waiver, the 1993 and 1995 Loan Agreements are in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

IN WITNESS WHEREOF, the Lender has caused this Waiver to be duly executed as of the date and the year first above written.

THE FIRST NATIONAL BANK OF BOSTON

By: _____
Title: _____

MKS INSTRUMENTS, INC.
WAIVER AND SECOND AMENDMENT
TO LOAN AGREEMENT

This Waiver and Second Amendment (the "Waiver and Amendment") dated as of February 4, 1997 concerns the Loan Agreement dated as of February 23, 1996 (the "Loan Agreement"), among MKS Instruments, Inc. (the "Borrower"), The First National Bank of Boston and The Chase Manhattan Bank (f/k/a Chemical Bank) (together, the "Lenders"). Capitalized terms used herein but not otherwise defined shall have the meanings assigned to them in the Loan Agreement.

WHEREAS, the Borrower has requested that the Lenders waive certain Events of Default; and

WHEREAS, the Lenders are willing, on the terms, subject to the conditions and to the extent set forth below, to grant such a waiver;

NOW, THEREFORE, the Lenders and the Borrower agree as follows:

Section 1. Waiver. The Lenders hereby waive the Events of Default under Section 8.1(g), (k) and (l) of the Loan Agreement resulting from Borrower's failure to meet the financial covenant set forth in Section 7.7(c) of the Loan Agreement as of the end of the fiscal quarters ended September 30 and December 31, 1996.

Section 2. Amendment to the Loan Agreement.

(a) Section 2.4.1. of the Loan Agreement is hereby amended by adding the following at the end thereof:

Notwithstanding the preceding clauses (i) and (ii), from June 30, 1996 through June 30, 1997, the Adjusted LIBOR Rate shall be the LIBOR Rate plus 1.65%.

(b) Section 7.7(c) of the Loan Agreement is hereby amended by deleting the existing language and substituting the following:

(c) Cash Flow Ratio. The ratio ("Cash Flow Ratio") of Consolidated Operating Cash Flow to Consolidated Debt Service:

(1) for the Borrower's fiscal quarter ending March 31, 1997, shall not be less than 1.25 to 1.00;

(2) for the Borrower's two consecutive fiscal quarters ending June 30, 1997, shall not be less than 1.00 to 1.00;

(3) for the Borrower's three consecutive fiscal quarters ending September 30, 1997, shall not be less than 1.25 to 1.00; and

(4) for the Borrower's four consecutive fiscal quarters ending December 31, 1997 and for each series of four consecutive fiscal quarters of the Borrower ending after December 31, 1997, shall not be less than 1.25 to 1.00.

Section 3. Fees. The Borrower shall pay to the Agent, for the pro rata benefit of the Lenders based on their Applicable Commitment Percentages, a fee of \$25,000 on the date of this Waiver and Amendment. If the parties agree to another amendment of the Loan Agreement prior to the date 180 days after the date of this Waiver and Amendment, the Lenders agree to reduce by \$8,000 the fee that would otherwise be required to induce the Lenders to agree to such amendment.

Section 4. Representations and Warranties. The Borrower hereby represents and warrants as follows:

(a) The execution and delivery of this Waiver and Amendment and the performance of this Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents, and the transactions contemplated hereby and thereby, have been authorized by all necessary corporate actions of the Borrower. This Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents constitute the legal, valid and binding obligations of the Borrower, enforceable against the Borrower in accordance with their respective terms.

(b) The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under this Waiver and Amendment, the Loan Agreement as amended hereby and each of the other Loan Documents. Neither the authorization, execution, delivery or performance by the Borrower of this Waiver and Amendment nor the performance of the Loan Agreement as amended hereby or any other Loan Document nor the performance of the transactions contemplated hereby or thereby violates or will violate any provision of the corporate charter or by-laws of the Borrower, or does or will, with the passage of time or the giving of notice or both, result in a breach of or a default under, or require any consent under or result in the creation of any lien, charge or encumbrance upon any property or assets of the Borrower pursuant to, any material instrument, agreement or other document to which the Borrower is a party or by which the Borrower or any of its properties may be bound or affected.

(c) The execution and delivery by the Borrower of this Waiver and Amendment and the performance by the Borrower of the Loan Agreement as amended hereby and the Loan Documents do not and will not violate any provision of law or regulation applicable to the Borrower, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower.

Section 5. Loan Documents. This Waiver and Amendment shall be a Loan Document for all purposes.

Section 6. Conditions to Effectiveness. The effectiveness of this Waiver and Amendment is conditioned on the following:

(a) The Borrower and the Lenders shall each have executed and delivered a counterpart of this Waiver and Amendment;

(b) The representations and warranties contained in Article IV of the Loan Agreement shall be true and correct in all material respects as of the date hereof as though made on and as of the date hereof;

(c) No Default or Event of Default under the Loan Agreement shall have occurred and be continuing other than the Events of Default described in Section 1 hereof; and

(d) The Borrower's audited consolidated financial statements for the year ended December 31, 1996 shall not differ in any materially adverse respect from the Borrower's unaudited consolidated financial statements for the year ended December 31, 1996, which the Borrower has provided to the Lenders and upon which the Lenders have relied in agreeing to this Waiver and Amendment.

Section 7. Miscellaneous.

(a) On and after the date hereof, each reference in the Loan Agreement to "this Agreement" or words of like import shall mean and be deemed to be a reference to the Loan Agreement as amended hereby.

(b) Except as amended and modified hereby, the Loan Agreement is in all respects ratified and confirmed as of the date hereof, and the terms, covenants and agreements therein shall remain in full force and effect.

(c) This Waiver and Amendment and the modifications to the Loan Agreement set forth herein shall be deemed to be a document executed under seal and shall be governed by and construed in accordance with the laws of The Commonwealth of Massachusetts.

(d) This Waiver and Amendment may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same document.

IN WITNESS WHEREOF, the parties have caused this Waiver and Amendment to be duly executed as of the date and the year first above written.

MKS INSTRUMENTS, INC.

By: _____
Title: _____

THE FIRST NATIONAL BANK OF BOSTON

By: _____
Title: _____

THE CHASE MANHATTAN BANK

By: _____
Title: _____

REVOLVING CREDIT NOTE

\$8,000,000

Boston, Massachusetts

February 23, 1996

FOR VALUE RECEIVED, MKS INSTRUMENTS, INC., a Massachusetts corporation having its principal place of business located in Andover, Massachusetts (the "Borrower"), hereby promises to pay to the order of CHEMICAL BANK (the "Lender"), in its individual capacity, at the office of THE FIRST NATIONAL BANK OF BOSTON, as agent for the Lender (the "Agent"), located at 100 Federal Street, Boston, Massachusetts (or at such other place or places as the Agent may designate in writing) at the times set forth in the Loan Agreement dated as of February 23, 1996 among the Borrower, the financial institutions party thereto (collectively, the "Lenders") and the Agent (the "Agreement" -- all capitalized terms not otherwise defined herein shall have the respective meanings set forth in the Agreement), in lawful money of the United States of America, in immediately available funds, the principal amount of EIGHT MILLION DOLLARS (\$8,000,000) or, if less than such principal amount, the aggregate unpaid principal amount of all Advances made by the Lender to the Borrower pursuant to the Agreement, on the Revolver Termination Date or such earlier date as may be required pursuant to the terms of the Agreement, and to pay interest from the date hereof on the unpaid principal amount hereof, in like money, at said office, on the dates and at the rates provided in the Agreement. All or any portion of the principal amount of Advances may be prepaid as provided in the Agreement.

If payment of all sums due hereunder is accelerated under the terms of the Agreement or under the terms of the other Loan Documents executed in connection with the Agreement, the then remaining principal amount and accrued but unpaid interest shall bear interest, which shall be payable on demand, at the rate per annum set forth in Section 2.4.2 of the Agreement. Further, in the event of such acceleration, this Revolving Credit Note shall become immediately due and payable, without presentation, demand, protest or notice of any kind, all of which are hereby waived by the Borrower.

In the event this Revolving Credit Note is not paid when due at any stated or accelerated maturity, the Borrower agrees to pay, in addition to the principal and interest, all costs of collection, including reasonable attorneys' fees, and interest thereon at the rates set forth above.

Interest hereunder shall be computed as provided in the Agreement.

This Revolving Credit Note is one of the Revolving Credit Notes in the aggregate principal amount of \$20,000,000 referred to in the Agreement and is issued

pursuant to and entitled to the benefits of the Agreement to which reference is hereby made for a more complete statement of the terms and conditions upon which the Advances evidenced hereby were or are made and are to be repaid. This Revolving Credit Note is subject to certain restrictions on transfer or assignment as provided in the Agreement.

No delay or omission on the part of the Lender in exercising any right hereunder shall operate as a waiver of such right or of any other right of the Lender, nor shall any delay, omission or waiver on any one occasion be deemed a bar to or waiver of the same or any other right on any future occasion. Every maker, endorser and guarantor of this Revolving Credit Note or the obligations represented hereby waives presentment, demand, notice, protest and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Revolving Credit Note, assents to any extension or postponement of the time of payment or any other indulgence, to any substitution, exchange or release of collateral and to the addition or release of any other party or person primarily or secondarily liable.

IN WITNESS WHEREOF, the Borrower has caused this Revolving Credit Note to be made, executed and delivered by its duly authorized representative under seal as of the date and year first above written.

MKS INSTRUMENTS, INC.

WITNESS:

By: _____

Name: _____

Title: _____

REVOLVING CREDIT NOTE

\$12,000,000

Boston, Massachusetts

February 23, 1996

FOR VALUE RECEIVED, MKS INSTRUMENTS, INC., a Massachusetts corporation having its principal place of business located in Andover, Massachusetts (the "Borrower"), hereby promises to pay to the order of THE FIRST NATIONAL BANK OF BOSTON (the "Lender"), in its individual capacity, at the office of THE FIRST NATIONAL BANK OF BOSTON, as agent for the Lender (the "Agent"), located at 100 Federal Street, Boston, Massachusetts (or at such other place or places as the Agent may designate in writing) at the times set forth in the Loan Agreement dated as of February 23, 1996 among the Borrower, the financial institutions party thereto (collectively, the "Lenders") and the Agent (the "Agreement" -- all capitalized terms not otherwise defined herein shall have the respective meanings set forth in the Agreement), in lawful money of the United States of America, in immediately available funds, the principal amount of TWELVE MILLION DOLLARS (\$12,000,000) or, if less than such principal amount, the aggregate unpaid principal amount of all Advances made by the Lender to the Borrower pursuant to the Agreement, on the Revolver Termination Date or such earlier date as may be required pursuant to the terms of the Agreement, and to pay interest from the date hereof on the unpaid principal amount hereof, in like money, at said office, on the dates and at the rates provided in the Agreement. All or any portion of the principal amount of Advances may be prepaid as provided in the Agreement.

If payment of all sums due hereunder is accelerated under the terms of the Agreement or under the terms of the other Loan Documents executed in connection with the Agreement, the then remaining principal amount and accrued but unpaid interest shall bear interest, which shall be payable on demand, at the rate per annum set forth in Section 2.4.2 of the Agreement. Further, in the event of such acceleration, this Revolving Credit Note shall become immediately due and payable, without presentation, demand, protest or notice of any kind, all of which are hereby waived by the Borrower.

In the event this Revolving Credit Note is not paid when due at any stated or accelerated maturity, the Borrower agrees to pay, in addition to the principal and interest, all costs of collection, including reasonable attorneys' fees, and interest thereon at the rates set forth above.

Interest hereunder shall be computed as provided in the Agreement.

This Revolving Credit Note is one of the Revolving Credit Notes in the aggregate principal amount of \$20,000,000 referred to in the Agreement and is issued pursuant to and entitled to the benefits of the Agreement to which reference is

hereby made for a more complete statement of the terms and conditions upon which the Advances evidenced hereby were or are made and are to be repaid. This Revolving Credit Note is subject to certain restrictions on transfer or assignment as provided in the Agreement.

No delay or omission on the part of the Lender in exercising any right hereunder shall operate as a waiver of such right or of any other right of the Lender, nor shall any delay, omission or waiver on any one occasion be deemed a bar to or waiver of the same or any other right on any future occasion. Every maker, endorser and guarantor of this Revolving Credit Note or the obligations represented hereby waives presentment, demand, notice, protest and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Revolving Credit Note, assents to any extension or postponement of the time of payment or any other indulgence, to any substitution, exchange or release of collateral and to the addition or release of any other party or person primarily or secondarily liable.

IN WITNESS WHEREOF, the Borrower has caused this Revolving Credit Note to be made, executed and delivered by its duly authorized representative under seal as of the date and year first above written.

MKS INSTRUMENTS, INC.

WITNESS:

By: _____
Name: _____
Title: _____

PROMISSORY NOTE

\$475,000.00

August __, 1990
Denver, Colorado

FOR VALUE RECEIVED, the undersigned, M.K.S. Instruments, Inc., a Massachusetts Corporation, hereinafter collectively referred to as "Maker," whose address is 6 Shattuck Road, Andover, Massachusetts 01810, promises to pay to the order of Jefferson National Life Insurance Company, an Indiana corporation and/or Its Assigns (hereinafter referred to as "Holder," which term shall include any subsequent holder of this Note), at its office at One Virginia Ave., Indianapolis, Indiana 46204-3655 (or at such other place as Holder shall designate in writing) in lawful money of the United States of America, the principal sum of FOUR HUNDRED SEVENTY-FIVE THOUSAND AND NO/100 DOLLARS (\$475,000.00), with interest thereon from the date hereof as hereinafter set forth.

1. General Definitions. As used herein the following terms shall have the indicated meanings (definitions appear in alphabetical order and defined terms used within definitions are defined in the appropriate alphabetical place in this Paragraph 1):

(a) Deed Of Trust: The Deed of Trust dated of even date herewith, from M.K.S. Instruments Inc., a Massachusetts corporation, as Grantor, to the Public Trustee of the County of Boulder, Colorado, as Trustee, for the use and benefit of Holder, as Beneficiary, encumbering the Property and securing this Note.

(b) Default Rate: The interest rate equal to eighteen percent (18%) per annum.

(c) Maturity Date: September 1, 2000, unless such maturity date is sooner accelerated upon the occurrence of an event of default hereunder or under any of the other Loan Documents.

(d) Interest Rate: The interest rate shall be fixed at the rate of ten and three quarters percent (10.75%) per annum during the entire ten (10) year term of the loan.

(e) Loan Documents: Collectively, this Note, the Deed of Trust and all other documents and instruments executed by or on behalf of Maker, or either of them, evidencing, securing or relating to the loan evidenced by this Note, as the same may be amended from time to time.

(f) Loan Term: The period of time commencing on the date hereof and terminating on the Maturity Date.

(g) Outstanding Principal Balance: The principal amounts from time to time outstanding under this Note during the Loan Term.

(h) Property: The Real Estate together with all fixtures, equipment and machinery now or hereafter owned by Grantor and actually or constructively attached to the subject property, all present and future leases and rents in respect thereof, and as otherwise included in the definition of "Property" in the Deed of Trust, but not including any business assets of any tenant or of the Maker.

(i) Real Estate: The real property located in the County of Boulder, State of Colorado, encumbered by the Deed of Trust and more particularly described therein.

2. Terms of Loan.

(a) Interest Rate: Commencing on the date hereof and continuing until the Maturity Date, interest shall accrue on the Outstanding Principal Balance at a rate per annum equal to the Interest Rate.

(b) Installments of Principal and Interest: Commencing on October 1, 1990, and continuing thereafter on the first day of each calendar month thereafter through August 1, 2000, Maker shall make equal monthly installments of principal and interest (based on a 20 year amortization) on the amount of Four Thousand Eight Hundred Twenty-Three and no/100 dollars (\$4,823.00). On the Maturity Date of September 1, 2000, Maker shall pay Holder all remaining sums of principal and interest and other sums due under the Promissory Note and Deed of Trust. If not otherwise accelerated, the Note shall be due and payable in full on September 1, 2000.

(c) Payment -- Maturity: If not sooner paid in accordance with the terms of this Note, the entire Outstanding Principal Balance, plus any accrued but unpaid interest thereon and all the sums due hereunder, shall be due and payable, in full, on the Maturity Date.

(d) Prepayment: Upon thirty (30) days' notice, the loan may be prepaid in full during the first five (5) years of the loan term at a prepayment charge equalling ten and three-quarters percent (10.75%) of the principal balance. Commencing with the sixth (6th) year of the loan term, the entire loan can be prepaid at a charge of fifty percent (50%) of the then interest rate being charged on the Note. (For example, if the loan balance is \$400,000.00, and the Borrower wishes to prepay in full during the sixth year of the loan term, a prepayment of the \$400,000.00 would result in a prepayment penalty of 50% of 10.75% multiplied by \$400,000.00 or \$21,500.00). Thereafter, the prepayment penalty rate will be forty percent (40%) of the interest rate during the seventh (7th) year of the loan term; thirty percent (30%) of

the interest rate during the eighth (8th) year of the loan term; twenty percent (20%) of the interest rate during the ninth (9th) year of the loan term; and, ten percent (10%) of the interest rate during the tenth year of the loan term. Any prepayment penalty charge shall also apply if the Holder accelerates payment following a default or any involuntary prepayment with the exception of a full or partial condemnation.

(e) Application of Payments: All payments on this Note shall be made in immediately available funds received in Holder's office on the date due. During the Loan Term, all payments on this Note shall be applied first to the repayment of any sums advanced by Holder for the payment of taxes, assessments, insurance premiums, late charges or other charges against the Property (together with interest thereon from the date of advance until paid at the Default Rate), then to the payment of accrued and unpaid interest on the Outstanding Principal Balance and then to the reduction of the Outstanding Principal Balance.

3. Other Terms and Conditions.

(a) Default Rate: Upon the declaration of default by Holder and written notice to Make, then and in such event the entire Outstanding Principal Balance shall bear interest at the Default Rate from the date of default until the default is cured, or, if the default is not cured, then until the outstanding Principal Balance, accrued interest, attorney's fees and costs are paid in full. In the event of Maker's failure to pay the Outstanding Principal Balance, together with any accrued but unpaid interest thereon and all other sums due hereunder upon the maturity hereof (by acceleration or otherwise), same shall bear interest at the Default Rate from the date due until the default is cured and if the default is not cured, then until the outstanding Principal Balance, accrued interest, attorney's fees and costs are paid in full.

(b) Late Charge: In the event that Maker fails to pay any installment due hereunder or any portion thereof within ten (10) days after the due date thereof, Maker agrees to pay a late charge equal to five percent (5%) of the overdue amount. Maker acknowledges that it would be extremely difficult or impracticable to determine Holder's actual damages resulting from any late payment and this late charge is a reasonable estimate of those damages.

(c) Default: Time is of the essence hereof. Upon the occurrence of any of the following events of default, the payment of all principal, interest and any other sums due in accordance with the terms of this Note shall, at the option of Holder, be accelerated and such principal, interest and other sums shall be immediately due and payable upon demand of Holder by written notice to Maker, wherein Maker shall have a ten (10) day period from receipt of written notice of default to cure any monetary default, and Holder shall have the option to foreclose or to require foreclosure of any or all liens securing the payment hereof:

(1) Default in the payment within ten (10) days after receipt of written notice of default of any monthly installment due hereunder, or any part thereof, or failure to pay the entire Outstanding Principal Balance, together with any accrued but unpaid interest thereon and all other sums due hereunder upon the maturity hereof (whether by acceleration or otherwise);

(2) Breach or violation by Maker of any other agreement or covenant contained herein unless cured within twenty (20) days after receipt of written notice thereof from Holder to Maker;

(3) Default by Maker under the Deed of Trust or under any of the other Loan Documents (unless cured within any applicable grace period).

(d) Character of the Loan: Maker certifies that the loan evidenced by this Note is obtained for business or commercial purposes and that the proceeds thereof will not be used primarily for personal, family, household or agricultural purposes. It is expressly understood that this Note is non-revolving and, therefore, that the total disbursements made to or for the benefit of Maker in accordance with the provisions of this Note shall not, in the aggregate, exceed \$475,000.00.

(e) Security: The payment and performance of this Note is secured in part by the Deed of Trust.

(f) Corporate Liability: Holder shall have full recourse against Maker, and Maker shall be liable for payment of any and all sums evidenced hereby and/or secured by the Deed of Trust and/or the other Loan Documents, and for the performance of all of the covenants, duties and obligations arising under this Note, the Deed of Trust and the other Loan Documents.

(g) Governing Law: As an additional consideration for the extension of credit, each maker, endorser, cosigner and guarantor of this Note understands and agrees that the loan evidenced by this Note is made in the State of Colorado and the provisions hereof will be construed in accordance with the laws of the State of Colorado; and such parties further agree that in the event of default, this Note may be enforced in any court of competent jurisdiction in the State of Colorado, and they do hereby submit to the jurisdiction of such court regardless of their residence or where this Note or any endorsement hereof may be executed.

(h) Remedies Cumulative; Waiver: The remedies of Holder, as provided herein or in any of the other Loan Documents, shall be cumulative and concurrent, and may be pursued singularly, successively or together, at the sole discretion of Holder, and may be exercised as often as occasion therefor shall arise. No act of omission or commission of Holder, including specifically any failure to exercise any right, remedy or recourse shall be deemed to be a waiver or release of

the same; such waiver or release to be affected only through a written document executed by Holder and then only to the extent specifically recited therein. A waiver or release with reference to any one event shall not be construed as continuing, as a bar to, or as a waiver or release of, any subsequent right, remedy or recourse as to a subsequent event.

(i) Notice: Any notice, request, demand or other communication required or permitted hereunder or required by law shall be in writing and shall be effective upon delivery of the same in person to the intended addressee, or 1 day after deposit of the same with a responsible overnight courier service (such as Federal Express) for delivery to the intended addressee or 3 days after deposit of the same in the United States mail, postage prepaid, certified or registered mail, return receipt requested, sent to the intended addressee at the address shown on the first page of this Note, or to such different address as the intended addressee shall have designated by written notice sent in accordance herewith and actually received by the other party at least ten (10) days in advance of the date upon which such change of address shall be effective.

(j) Miscellaneous Provisions:

(1) Every maker, endorser, cosigner and guarantor of this Note expressly grants to Holder the right to release or to agree not to sue any other person, or to suspend the right to enforce this Note against such other person or to otherwise discharge such person; and each such maker, endorser, cosigner and guarantor agrees that the exercise of such rights by Holder will have no effect on the liability of any other person, primarily or secondarily liable hereunder. Each maker, endorser, cosigner and guarantor of this Note waives demand for payment, presentment for payment, protest, notice of protest, notice of dishonor, notice of nonpayment, notice of acceleration of maturity, diligence in taking any action to collect sums owing hereunder and all duty or obligation of Holder to effect, protect, perfect, retain or enforce any security for the payment of this Note or to proceed against any collateral before otherwise enforcing this Note.

(2) This Note and each payment of principal and interest hereunder shall be paid when due without deduction or setoff of any kind or nature or for any costs whatsoever.

(3) Maker agrees to reimburse Holder for all costs, including, without limitation, attorneys' fees, incurred to collect this Note if this Note is not paid when due. Maker agrees that Holder may from time to time extend the maturity of this Note or the time any payment is due under this Note and may accept further security or release security for the payment of this Note, without in any way affecting any obligations of Maker to Holder.

(4) Maker hereby expressly warrants and represents that there is not as of the date hereof any contract, agreement or understanding, written or oral, between Maker and any person or entity whatsoever which in any manner limits or affects the liability of Maker hereunder, nor shall Maker enter into any such contract, agreement or understanding prior to the payment in full of the principal indebtedness evidenced by this Note.

(5) If any provision hereof or of any of the other Loan Documents is, for any reason and to any extent, invalid or unenforceable, then neither the remainder of the document in which such provision is contained, nor the application of the provision to other persons, entities or circumstances, nor any other document referred to herein, shall be affected thereby, but instead shall be enforceable to the maximum extent permitted by law.

(6) This Note shall be a joint and several obligation of each Maker and of all endorsers, cosigners and guarantors hereof and shall be binding upon them and, subject to the restriction with respect to assumption of this Note referenced herein, their heirs, representatives, successors and assigns.

(7) All fees, charges or other sums paid by Maker to Holder, whether pursuant to the terms of this Note or otherwise, with respect to the loan evidenced by this Note or with respect to the Deed of Trust or any of the other Loan Documents which, under the laws of the State of Colorado, may be deemed to be in the nature of interest, shall, for the purpose of any law of the State of Colorado which may limit the maximum rate of interest to be charged with respect to the loan evidenced by this Note, be payable by Maker as and shall be deemed to be additional interest and, for such purposes only, the agreed upon and contracted rate of interest as calculated above shall be deemed to be increased to reflect the payment of such fees, charges and other sums as interest, which rate of interest Maker hereby agrees to pay.

(8) This Note may not be terminated or amended orally, but only by a termination or amendment in writing signed by Holder and Maker.

(9) When the context and construction so require, all words used in the singular herein shall be deemed to have been used in the plural and the masculine shall include the feminine and neuter and vice versa. The word "person" as used herein shall include any individual, company, firm, association, partnership, corporation, trust or other legal entity of any kind whatsoever.

(10) The headings of the paragraphs and sections of this Note are for convenience of reference only, are not to be considered a part hereof and shall not limit or otherwise affect any of the terms hereof.

IN WITNESS WHEREOF, Maker has executed this Promissory Note as of the day and year first above written.

MAKER: M.K.S. Instruments Inc.,
a Massachusetts Corp.

By: _____
Robert F. O'Brien, Treasurer

STATE OF)
) SS.
COUNTY OF)

The foregoing instrument was acknowledged before me, in the County of _____, State of _____, this _____ day of _____, 1990, by Robert F. O'Brien, Treasurer, of M.K.S. Instruments Inc., a Massachusetts Corp.

WITNESS my hand and official seal.

My commission expires:

Notary Public

Confidential Materials omitted and filed
separately with the Securities and Exchange Commission.
Asterisks denote omissions.

PURCHASE AGREEMENT

This Purchasing Agreement is made the 1st day of June, 1996 by and between Applied Materials, Inc., a Delaware corporation having its primary place of business in Santa Clara, CA (hereinafter called Purchaser) and MKS Instruments, Inc., having its primary place of business in Andover, MA (irhereinafter called Seller).

Whereas the parties wish to enter into a written agreement to establish terms, delivery periods, and pricing for the purchase and sale of certain products (identified in Attachment 1), and in consideration of the mutual promises set forth in this Agreement Purchaser and Seller agree as follows:

I. PURPOSE

To fully satisfy the ultimate customer by entering into a long-term, mutually beneficial business relationship for a competitive advantage through continuous improvement processes.

II. MUTUAL UNDERSTANDING

1. Build a creative relationship with teams to manage design, resource planning, and quality.
2. Manage the relationship, not transactions.
3. Commit totally to continuous Improvement.
4. Manage total cost for mutual profitability.
5. Recognize co-destiny in business decisions through a long-term, productivity-based agreement.
6. Share forecasts.
7. Reduce cycles through stocking programs and production control.

III. TERM OF THE AGREEMENT

The initial term of this Agreement is for six (6) years, effective June I, 1996, with an option to extend for twelve (12) months at the Purchaser's discretion.

IV. SCOPE

Seller will supply and Purchaser will purchase products, at all locations, in accordance with attached price list (Attachment 1). Products will be purchased

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

pursuant to this agreement via a Master Purchase Order Agreement (Attachment 7) and delivered in accordance with Purchaser's Terms and Conditions (Attachment 3) and all products will conform to applicable product specification. (Attachment 11, 12, 13), except for notations in Seller's response (Attachment 14). All parties agree to the terms and conditions on Attachment 3. If there is a conflict between the Terms and Conditions on Attachment 3 and this Agreement, the Terms and conditions of this Agreement shall prevail.

V. PRICING

1. All base prices and price reductions as listed in the Contract Parts Price List (Attachment 1) are firm through the first year of the agreement and are established as the "benchmark" for all future price adjustments. Pricing will be ***** and, ***** , will be adjusted to reflect the change ***** *****. A copy of the past ***** is attached as part of this contract (Attachment 2).

2. Seller agrees to supply Buyer written notice ***** on any Item being obsoleted or unavailable for purchase. Seller agrees to continue contract pricing the price at the time of notification, for *****.

VI. MOST FAVORED CUSTOMER

All of the prices, terms, warranties and benefits granted by Seller to Purchaser herein are the same or better than the equivalent terms being offered by Seller to any customer with like quality and quantity, but in no case will the prices quoted Purchaser for sale be unlawfully discriminatory under any federal, state or local laws.

VII. QUALITY/DELIVERY

Buyer agrees to furnish Seller with a monthly report showing Seller's quality and delivery performance as it applies to the performance of this Agreement.

A. Tracking

1. Commencing June 1, 1996, Seller will implement a continuous productivity program that will ultimately result in a ***** . The continuous improvement program goals are attached

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

(Attachment 8). The productivity projects are jointly agreed on by both parties and involve the following types of activities:

- i. manufacturing process improvements
- ii. the Seller's involvement in the design process to assure manufacturability and serviceability
- iii. target savings for the materials/design on new development projects
- iv. review of processes and equipment to ensure quality and cost
- v. drawing and configuration control provided by Seller provided on a need to know basis. The Buyer respects the Sellers proprietary documents and processes.

2. These performance measurements are expressed in the Supplier Performance detail Report, which is generated on a weekly basis by Purchaser. Purchaser agrees to forward the Supplier Performance Report to Seller on a timely basis and agrees to work with the Seller on the removal of any mutually agreed upon invalid Quality and Delivery statistics. Seller agrees to conform to the quality clauses as specified in Attachment 3, Article 10, and meet or exceed milestone goals as expressed in Article VII. Seller agrees to meet or exceed these Performance Standards for each of the Purchaser's product divisions. PPMs will be calculated based on Attachment 4.

B. Quality Clauses

1. Purchaser reserves the right to audit the manufacturing and/or quality process to assure policies and procedures are being followed, with 24 hours notice to the Seller.

2. After acceptance as a qualified source, ***** in ***** or design in the product being delivered to Purchaser and further agrees *****

*****.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

VIII. LEAD TIMES

Seller will provide a written plan to Purchaser outlining a measurable program to reach lead times at Identified in Attachment 9.

IX. AGREEMENT ADMINISTRATION

Purchaser and Seller will meet at least once per quarter to mutually evaluate the performance of each of the parties (Quarterly Business Reviews). Areas to be addressed will include, but no be limited to, the following:

At each review, the performance of each participant will be quantified where applicable. Goals to be achieved before the next review will be mutually established.

In addition to the above Quarterly Business Reviews, monthly quality and delivery meetings will be scheduled. These meetings will be at a location mutually agreed upon and set up to discuss current quality and delivery Issues. Purchaser will share PPM information with Seller and discuss progress towards attaining mutual goals. Minutes and action items will be the responsibility of the Purchaser and will be approved by the Seller and become part of the working file and part of the review process for contract renewals.

X. FORECASTING

1. Purchaser will provide Seller with a weekly ***** forecast. Each forecast shall be deemed proprietary for Seller's reference only. Production schedule information will be provided to Seller on a quarterly basis listing production objectives. Buyer agrees to target accuracy standards on a *****

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

***** provided to Seller.

XI. RESTOCKING FEES

Seller will accept up to ***** if not used and in original packaging for a *****. Buyer can return such unused product to Seller if is less than or equal to *****. Buyer will be responsible for the freight when returning unused product back to Seller. Specials and products unique (or unique in volume) to the Buyer will be negotiated on a situation basis, based on the ability to reuse and/or resell product.

XII. CANCELLATION FEES

All cancellation will be in writing (fax) or by electronic mail. The following cancellation fees will apply to "spot buy" purchases:

| | |
|-------|-------|
| ***** | ***** |
| ***** | ***** |
| ***** | ***** |
| ***** | ***** |

XIII. TERMS OF PAYMENT

Payment by Purchaser shall be net 30.

XIV. INVOICING

Bus Route Program: In accordance with Attachment 15.

Spot Buy Program: Seller shall submit an invoice reflecting Buyer pail number, Purchase Order number, quantity ordered, shipped and back ordered (if applicable), per product price and extended pricing.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

XV. DESIGN CHANGES

Seller agrees for the duration of the Agreement, *****

Buyer and Seller will mutually agree upon the time required to implement changes which Buyer desires in the design, applicable drawings or specifications for any product(s) covered by this Agreement, and upon the impact of such changes, if any, on the terms and conditions applicable to the new product(s). In the event Buyer's changes alter the pricing, delivery, lead time or other terms of this Agreement, and agreement upon altered terms cannot be reached, the subject product(s) may be removed from this Agreement without affecting the remaining products.

XVI. SHIPPING TERMS

Price basis and all shipments will be ***** Seller will use Buyers shipping account for best rates (*****).

XVII. BUS ROUTE

This Purchase Agreement authorizes Seller to create and maintain inventory, subject to this Agreement, for the Bus Route Program.

Releases against this Purchase Agreement shall be made as facsimile or EDI transmission. They shall specify ***** Buyer may release part number and quantities required on an as-needed basis. The transmission will contain ***** The first release of ***** The parts will be ***** The second release of ***** These parts will be picked up by Buyer ***** The transmission can be used ***** by the Seller.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

Buyer shall provide Seller with an anticipated ***** requirement on a weekly basis. The forecasts are not binding, do not represent firm orders, and are provided for reasonable planning purposes only.

Seller agrees to be able to meet a **** upward or downward variation quarterly in Buyer's forecasted demand for items produced in the United States. This quantity will be adjusted quarterly based on forecasted demand. Deliveries for demand for bus route items variations exceeding **** on a quarterly basis shall not be included in the calculation of late delivery PPM under this Agreement.

XVIII. PRICING AND STANDARDS OF PERFORMANCE

1. The Purchaser's commitment to purchase from Seller during the period of performance is contingent upon the ***** . Buyer retains the right ***** .

2. Seller agrees to maintain an inventory level of ***** of usage based on the monthly forecast quantity at Seller's facilities.

3. Seller will be notified when product is rejected by Purchaser for failure to conform to Purchaser's Quality Standards, and upon receipt of such notice Seller will promptly ***** . Rejected product and a Discrepant Material Report (Attachment 5) will be forwarded to the Seller. Charges for the item(s) are to be based upon Purchaser and Seller agreement over cause of defect.

XIX. LIMITS OF LIABILITY

Purchaser's maximum liability in the event of termination is limited to ***** for parts modified to Purchaser's specifications based on the rolling forecast provided by Purchaser. Items which are ***** , will be Identified by the Seller and, if long lead time components are identified, liability in excess of ***** , the Buyer and Seller will negate the liability.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

XX. WARRANTY

Seller warrants that all Items delivered will be merchantable, will be free of defects in materials, workmanship and title, and will conform to all applicable specifications, drawings and descriptions set forth herein or furnished by Purchaser for a period determined on Attachment 16 (Product Model Pricing).

Seller shall hold Purchaser harmless from any claim that any item supplied by Seller infringes any patent, copyright or other intellectual property right of any third party, except to the extent that such item was manufactured in compliance with Buyer's detail design for specific structure.

XXI. PRODUCT DEVELOPMENT

In the event Seller and Purchaser jointly develop new products, any arrangement may be covered under separate agreements apart from this Master Agreement, and shall have no effect on this Agreement

XXII. GLOBAL PRICING

Seller agrees to extend the pricing negotiated in this contract, Attachments 1 and 2, multiplied by ***** to all of Applied Material's international divisions and subsidiaries. ***** at time of purchase.

XXIII. TESTING

Bi-annually Seller will provide Buyer with testing data and results of ***** tested under current Sematech standards. This data will be submitted during the quarterly business reviews of the testing, preferably six months from the effective date of the contract and, again, six months later.

Seller will conduct testing ***** valves in accordance with Attachment 17 and provide Buyer with complete testing data bi-annually.

Confidential Materials omitted and filed
separately with the Securities and Exchange Commission.
Asterisks denote omissions.

XXIV. SAFETY

Seller agrees to protect its own and its subcontractor's work and be responsible under all circumstances for their condition and to protect Purchaser's facility, property, employees and the public from damage or injury. Seller agrees to abide by and observe all standards of the Occupational Safety & Health Administration which are applicable to the work being performed at Applied Material facilities as well as all miss and regulations that may be issued by Purchaser from time to time.

XXV. PUBLICITY

No release shall be made to the news media or to the general public relating to the Agreement without the prior written approval of both parties. All parties recognize that news releases made by either party shall recognize the participation and contributions of the other party.

XXVI. CONFIDENTIALITY AGREEMENT

The technical data and information which has been or may be furnished to Seller by Purchaser in connection with Seller's supply of products, or purchasing services is the property of Purchaser and has been furnished solely to enable Seller to render service to Purchaser in accordance with the Non-disclosure Agreement (Attachment 6).

XXVII. FORCE MAJEURE

Neither party shall be liable for failure to perform any of its obligations under this agreement during any period in which such party cannot perform due to fire, flood, or any other natural disaster, war, embargo, riot, or the intervention of any government authority, provided that the party so delay immediately notified the other party of such delay. If Seller's performance is delayed for these reasons **** *****. Purchaser may terminate this agreement and/or Purchaser Orders thereunder by giving Seller written notice, which termination shall be effective upon receipt of such notice. If Purchaser terminates, its sole liability under this agreement or any other Purchase Orders issued thereunder will be to pay any balance due for conforming product (1) delivered by Seller before receipt of Purchaser's termination notice; and (2) ordered by Purchaser for delivery and actually delivered within fifteen (15) days after receipt of Purchaser's termination notice.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

XXVII. NOTICES

Notices, reports, and other communications made with respect to this agreement will be given in writing, addressed to the parties at the following addresses or such other addresses as may be designated in writing by either party to the other. All notices required to be given will be effective when delivered by hand or when deposited in the United States Mail, fax or EDI or carrier service.

Purchaser: Contract Specialist - CMM&E/Austin (Carol Lauer)
Supplier Engineer - CMM&E/Austin (Hamp Levi)

Seller: Applied Materials Account Manager - Bill McPheeters

XXIX. AMENDMENTS AND WAIVERS

No terms or provisions of this agreement may be changed, waived, discharged, or terminated orally but only by an instrument in writing signed by the party against whom the enforcement of such change, waiver, discharge, or termination is sought.

XXX. GOVERNING LAW

This Agreement shall be interpreted in accordance with and governed by the laws of the *****, except as to its principles of conflicts of law. The parties hereto irrevocably submit to the jurisdiction of the ***** in any action brought by the parties hereto concerning this Agreement.

XXXI. UNIFORM COMMERCIAL CODE

Except to the extent that the provisions of this Agreement are clearly inconsistent therewith, this Agreement shall be governed by the applicable provisions of the Uniform Commercial Code of the ***** . To the extent that this Agreement entails delivery or performance of services, such services shall be deemed "goods" within the meaning of the Uniform Commercial Code, except when to so deem such services as "goods" would result in an absurdity.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

XXXII. DOCUMENTS INCORPORATED BY REFERENCE The following documents are hereby incorporated by reference:

- Attachment 1 List of Parts covered under contract/prices

- Attachment 2 *****
- Attachment 3 Terms and Conditions
- Attachment 4 PPM Calculations
- Attachment 5 Discrepant Material Report
- Attachment 6 Non-Disclosure Agreement
- Attachment 7 Master Purchase Order
- Attachment 8 Continuous Program Goals
- Attachment 9 Product Model Pricing/Lead Times
- Attachment 10 Quarterly Business Reviews
- Attachment 11 *****
- Attachment 12 *****
- Attachment 13 *****
- Attachment 14 MKS Response to Purchasing Specs
- Attachment 15 *****

XXXIII. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement and supersedes all prior written or oral and all contemporaneous oral agreement, understandings, negotiations between Purchaser and Seller with respect to the subject matter hereof.

FOR APPLIED MATERIALS:

/s/Carol Lauer

Contract Specialist
June 1, 1996

/s/Hamp Levi

Hamp Levi,
Supplier Quality Engineer
June 1, 1996

FOR MKS INSTRUMENTS:

/s/Leo Berlinghieri

Leo Berlinghieri,
Director Customer Support

/s/Bill McPheeters

Bill McPheeters,
Account Representative

Confidential Materials omitted and filed separately
with the Securities and Exchange Commission. Asterisks denote omissions.

Attachment 1

MKS INSTRUMENTS, INC.

Contract Parts

| Amat P/N | Mks P/N | Austin B/R | Scla B/R | Spot Buy | Current Pricing | 1996 Pricing | EST. ANNUAL Change Usage | 1996 Ext. Cost | 1996 Ext. Cost | |
|----------|---------|---------------|-------------|-------------|--------------------|-----------------|-----------------------------|-------------------|-------------------|----------------|
| ----- | | | | | | | | | | |
| TOTALS | | | | | | | | ** | ***** | ***** ***** |

5/3/96
Prepared by C. Lauer

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

ATTACHMENT 2

MKS Purchasing Agreement
PO 517005

***** History

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

ATTACHMENT 3

- 1. ACCEPTANCE - This agreement, together with the terms and conditions, constitute the final, complete, exclusive and entire agreement between Seller and Buyer with respect to the subject matter hereof. Any term or condition in any order, confirmation or other document furnished by Buyer which is in any way inconsistent with or in addition to this agreement and the terms and conditions is hereby expressly rejected, and Seller's acceptance of any offer or order of buyer is expressly made in reliance on Buyer's assent to all terms and conditions hereof. Seller's failure to object to any term or condition in any oral or written communication from the Buyer, whether delivered before or after the date hereof, shall not constitute an acceptance thereof or a waiver of any term or condition hereof.

 *****.
- 2. INVOICES - Invoices shall contain the following information: purchase order number, item number, description of goods, sizes, quantities, unit prices, and extended totals in addition to any other information specified elsewhere herein. Payment of invoices shall not constitute acceptance of goods or services and shall be subject to adjustment for errors, shortages, defects in the goods, or other failure of Seller to meet the requirements of the Purchase Order. If any product is deemed defective by Buyer, Buyer shall return such defective product to Seller within ***** against the original P.O. number in accordance with Seller's instructions, freight prepaid, with a description of such defect. All *****
 ***** Partial shipments must be invoiced separately.
- 3. CASH DISCOUNTS - Time in connection with any discount offered will be calculated from *****
 ***** For the purpose of earning the discount, payment is deemed to be made on the date of *****.
- 4. TAXES - Unless otherwise specified, the agreed prices include all applicable federal, state, and local taxes. All such taxes shall be stated separately on Seller's invoice.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

5. PRICES - Seller hereby agrees and represents that prices charged for goods and services provided hereunder *****

6. ODC ELIMINATION - (a) In the event Seller's goods are manufactured with or contain Class I ODCs as defined under Section 602 of the Federal Clean Air Act (42 USC Section 7671a(a)) and implementing regulations, or if Seller suspects that such a condition exists, Seller shall notify Buyer prior to performing and work against this order. Buyer reserves the right to terminate all orders for such goods without penalties. (b) Buyer reserves the right to return any and all goods delivered which are found to contain or have been manufactured with Class A ODCs. Buyer reserves the right to terminate any outstanding orders for such goods without penalties. Seller shall reimburse Buyer all monies paid to Seller and all additional costs incurred by Buyer in purchasing and returning such goods.

7. DELIVERY -

- (a) Time is of the Essence. Failure to deliver to a mutually acceptable delivery schedule shall constitute default.
(b) Buyer will pay only for maximum quantities ordered. Overshipments will be held at Seller's risk and expense for a reasonable time awaiting shipping instructions. Return shipping charges for excess quantities will be at Seller's expense.
(c) No partial delivery shall be made unless Buyer has given prior consent.
(d) *****

8. PACKING AND SHIPMENT - Unless otherwise specified, when the price of this order is based on the weight of the ordered goods, such price is to cover net weight of goods ordered only, and no charges will be allowed for boxing, crating, handling damage, carting, drayage, storage, or other packing requirements. Unless otherwise specified, all goods shall be packed, packaged, marked, and otherwise prepared for shipment in a manner which is (i) in accordance with good commercial practice, (ii) acceptable to common carriers for shipment at the lowest rate for the particular goods and in accordance with I.C.C. regulations and (iii) adequate to insure safe arrival of the goods at the named destination.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

Seller shall mark all containers with necessary lifting, handling, and shipping information and also purchase order numbers, date of shipment, and the names of the consignee and consignor. An itemized packaging sheet must accompany each shipment.

9. RESPONSIBILITY FOR GOODS - Seller shall *****
*****. All shipment will be delivered by Seller. Freight collect, or if prepaid, such freight will be billed to the Buyer and Buyer will reimburse Seller for such freight. Unless otherwise specified by Buyer, transportation will be by the most cost effective method of transportation in keeping with any particular delivery date.

10. QUALITY ASSURANCE - (a) All goods purchased hereunder shall be subject to inspection and test by Buyer to the extent practicable at all times and places, including the period of manufacture and in any event, prior to final acceptance. If inspection or test is made by Buyer on Seller's premises, Seller, without additional charge, shall provide all reasonable facilities and assistance for the safety and convenience of Buyer's inspectors. No preliminary inspection or test shall constitute acceptance. Records of all inspection work shall be kept complete and available to Buyer during the performance of this order and for such further period as the Buyer may determine.

(b) In case any goods are defective in material or workmanship, or otherwise not in conformity with the requirements of this order, Buyer shall have the right either to reject, require correction, or accept such goods with a mutually acceptable adjustment in price. Any goods which have been rejected or required to be corrected shall be replaced or corrected by and at the expense of the Seller promptly after notice. If, after being requested by Buyer, the Seller fails to promptly replace or correct any defective goods within the delivery schedule, Buyer may

(c) The Seller shall provide and maintain a quality assurance program which is acceptable to Buyer.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

11. WARRANTY - (a) Seller warrants that all goods and services delivered hereunder shall be free from defects in workmanship, material, and manufacture; shall comply with the requirements of this contract, including any drawings or specifications incorporated herein or samples furnished by Seller, and, where design is Seller's responsibility, shall be free from defects in design. Seller further warrants all goods purchased hereunder shall be of merchantable quality and shall be fit and suitable for the purpose intended by Buyer. The foregoing warrants shall constitute conditions and are in addition to all other warranties, whether expressed or implied, and shall survive any delivery, inspection, acceptance, or payment by Buyer.

(b) If any goods or services delivered hereunder do not meet the warranties specified herein or otherwise acceptable, Buyer may

(c) Buyer's approval of Seller's material or design shall not relieve Seller of the warranties set forth in this clause, nor shall waiver by Buyer or any drawing or specification requirement for one or more of the goods constitute a waiver of such requirements for the remaining goods to be delivered hereunder unless so stated by Buyer in writing. The provisions of this clause shall not limit or affect the rights of Buyer under the clause entitled "QUALITY ASSURANCE".

12. CHANGES - Buyer may at anytime, by a written order and without notice to sureties or assignees, suspend performance hereunder, increase or decrease the order quantities, or make changes within the general scope of this order in any one or more of the following:

- (a) method of shipment or packing, and/or
- (b) place and date of delivery

Confidential Materials omitted and filed separately
with the Securities and Exchange Commission. Asterisks denote omissions.

(c) any requested changes in design or product specification will be promptly considered by Seller and accommodation to such requests will be at Seller discretion. If any such change causes an increase or decrease in the cost of or time required for performance of the Purchase Order, an equitable adjustment shall be made in the Purchase Order price or delivery schedule, or both, and the order shall be modified in writing accordingly. No claim by Seller for adjustment hereunder shall be valid unless asserted within ***** from the date of receipt by Seller of the notification of change, provided however, that such period may be extended upon written approval of Buyer. However, nothing in this clause shall excuse Seller from proceeding with the order as changed or amended.

13. TERMINATION FOR DEFAULT - (a) Buyer may, by notice, terminate this Purchase Order in whole or in part (i) if Seller fails to deliver goods or services on agreed delivery schedules; (ii) if Seller fails to replace or correct defective goods or services; (iii) if Seller materially fails to perform any other obligations or; (iv) if Seller becomes insolvent.

(b) In the event of termination pursuant to this Section:

(i) Seller shall continue to supply any portion of this Purchase Order not terminated.

(ii) At Buyer's request Seller will transfer title and deliver to Buyer:

(1) any completed goods, (2) any partially completed goods, and (3) all unique materials. Prices for partially completed goods and unique materials so accepted shall be negotiated. However, such prices shall not exceed the Agreement price per item.

(c) Buyer's rights and remedies herein are in addition to any other rights and remedies provided by law or in equity.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

- 17. INSURANCE - Seller shall maintain (1) comprehensive general liability insurance covering bodily injury, property contractual liability, products liability and completed operations, (2) Worker's Compensation and employer's liability insurance, and (3) auto insurance, in such amounts as are necessary to insure against the risks of Seller's operations. Upon request, Seller shall furnish to Buyer certificates evidencing such coverage. Seller shall notify Buyer at least thirty (30) days prior to the cancellation or change of any of the foregoing policies.
- 18. TOOLS AND DOCUMENTS - Unless otherwise agreed in writing, special dies, tools, patterns and drawings used in the manufacture of goods herein ordered shall be furnished by and at the expense of the Seller.
- 19. *****a

*****.
- 20. ASSIGNMENTS - No right or obligation under this order shall be assigned by Seller without the prior written consent of Buyer, and any purported assignment without such consent shall be void. Buyer may assign this order at any time if such assignment is considered necessary by Buyer in connection with a sale of Buyer's assets or a transfer of its obligation.
- 21. GRATUITIES - Seller warrants that it has not offered or given and will not offer or give to any employee, agent, or representative of Buyer any gratuity. Any breach of this warranty shall be material breach of each and every contract between Buyer and Seller.
- 22. NOTICE OF LABOR DISPUTES - Whenever an actual or potential labor dispute is delaying or threatens to delay the timely performance of this Purchase Order, Seller will immediately notify Buyer of such dispute and furnish all relevant details.
- 23. INSOLVENCY - The insolvency or adjudication of bankruptcy, the filing of a voluntary petition, or the making of an assignment for the benefit of creditors, by either party, shall be a material breach hereof.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

- 24. COMPLIANCE WITH LAWS - Seller warrants that no law, rule, or ordinance of the United States, a state, or any other government agency has been violated in supplying the goods or services ordered herein.
- 25. WAIVER - In the event Buyer fails to insist on performance of any of the terms and conditions, or fails to exercise any of its rights or privileges hereunder, such failure shall not constitute a waiver of such terms, conditions, rights, or privileges.
- 26. EQUAL EMPLOYMENT OPPORTUNITY - Seller represents and agrees that it is in compliance with Executive Order 11246 and implementing regulations unless exempted.
- 27. GOVERNMENT CONTRACTS - If this Purchase Order is issued in connection with direct performance of a Government prime contract or subcontract, then the flowdown Federal Acquisition Regulations clauses (and any applicable agency supplements thereto) in effect on the date of this Purchase Order are incorporated herein by reference. The contract number of the prime contract or subcontract is listed on the fact of this Purchase Order.
- 28. LIMITATION OF LIABILITY - SELLER SHALL NOT BE LIABLE TO BUYER HEREUNDER FOR CONSEQUENTIAL, INCIDENTAL OR INDIRECT DAMAGES INCLUDING BUT NOT LIMITED TO LOSS OF ANTICIPATED PROFITS, LOSS OF USE OF THE EQUIPMENT OR ANY ASSOCIATED EQUIPMENT OR LOSS OF PRODUCT FROM BUYER'S OR OWNER'S PLANT ARISING OUT OF CONTRACT, WARRANTY, NEGLIGENCE, INDEMNITY OR STRICT LIABILITY. AS USED HEREIN, INCIDENTAL OR INDIRECT DAMAGES SHALL NOT MEAN INJURY TO PERSONS OR DAMAGE TO TANGIBLE PROPERTY, EXCEPT FOR PATENT AND WARRANTY OBLIGATIONS, INJURY TO PERSONS, OR DAMAGE TO THIRD PARTIES (AS USED HEREIN, BUYER SHALL NOT BE CONSIDERED A THIRD PARTY), THE TOTAL LIABILITY OF THE SELLER TO BUYER HEREUNDER SHALL NOT EXCEED *****

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

- 29. MUTUAL INDEMNITY - Each Party shall defend, indemnify and hold harmless the other from and against any and all claims, suits, losses, and liabilities and the associated costs and expenses (including attorney's fees), caused in whole or in part by the others breach of any term or provision of this agreement, or any negligent, grossly negligent or intentional acts, errors or omissions by such party, its employees, officers, agents or representatives in the performance of this Agreement.
- 30. APPLICABLE LAW - This Purchase Order shall be governed by, subject to, and constructed in accordance with the laws of the ***** excluding conflict of law rules.
- 31. FORCE MAJEURE - Neither party shall be liable for failure to perform any of its obligations under this agreement during any period in which such party cannot perform due to fire, flood, or any other natural disaster, war, embargo, riot, or the intervention of any government authority, provided that the party so delayed immediately notifies the other party of such delay. If Seller's performance is delayed for these reasons **** ***** uyer may terminate this agreement and/or any Purchase Orders hereunder by giving Seller written notice, which termination shall be effective upon receipt of such notice. If Buyer terminates, its sole liability under this agreement or any other Purchase Orders issued hereunder will be to pay any balance due for conforming Product (1) delivered by Seller before receipt of Buyer's termination notice; and (2) ordered by Buyer for delivery and actually delivered within fifteen (15) days after receipt of Buyer's termination notice.

Confidential Materials omitted and filed separately with
the Securities and Exchange Commission. Asterisks denote omissions.

SUPPLIER RATING SYSTEM
PPM CALCULATIONS

WHAT THE HECK IS PPM?

The number of parts rejected or delinquent out of every million parts produced.

QUALITY

| | | |
|---|-----|-------------------------------------|
| No. of parts rejected (incoming & floor) | 15 | |
| Divided by | | |
| No. of parts received | 147 | |
| | --- | |
| x 1,000,000 | | 0.1020408 x 1,000,000 = 102,041 PPM |

DELIVERY

| | | |
|--|-----|-------------------------------------|
| No. of parts rec. late (1 or more days) | 44 | |
| Divided by | | |
| No. of parts received | 147 | |
| | --- | |
| x 1,000,000 | | 0.2993197 x 1,000,000 = 299,320 PPM |

SUPPLIER RATING INDEX (SRI)

```

*****
*****

*****
*****

*****
*****

*****
*****
*****
*****
*****
*****

```

SUPPLIER QUALITY INDEX (SQI)

Supplier Quality Performance

SUPPLIER DELIVERY INDEX (SDI)

Supplier Delivery Performance

C. Lauer
5/5/96

APPLIED MATERIALS, INC. ("Applied"), having its principal offices in Santa Clara, CA and MKS Instruments, Inc. ("Participant") having its principal offices in Andover, Massachusetts, wish to exchange certain proprietary information, the party disclosing such information being referred to herein as "Discloser" and the party receiving information being referred to as "Recipient." The parties agree as follows:

I. IDENTIFICATION OF PROPRIETARY INFORMATION

A. Applied may disclose the following types of information: all drawings, specifications, and other information relating to all parts under Master PO 517005/A/S

B. Participant may disclose the following types of information:

C. The information described in A. and B. above shall be deemed "Proprietary Information" if:

(1) in the case of a written disclosure, Discloser affixes to the document an appropriate legend, such as "Proprietary" or "Confidential", and

(2) in the case of an oral or visual disclosure, Discloser makes a contemporaneous oral statement and delivers to Recipient a written statement within thirty (3) days to the effect that such disclosure is proprietary, confidential or the like.

D. "Proprietary Information" shall not include information which: (1) becomes a matter of public knowledge through no fault of Recipient, (2) is rightfully received by Recipient from a third party without restriction on disclosure, (3) is independently developed by Recipient without the use of Discloser's Proprietary Information, (4) is in the possession of Recipient prior to its disclosure by Discloser, or (5) is disclosed pursuant to a valid order of a court or authorized government agency provided that Recipient has given Discloser an opportunity to defend, limit or protect such disclosure.

II. RESPONSIBILITIES OF RECIPIENT

A. Recipient agrees (1) not to disclose Proprietary Information to any third party and (2) to protect the Proprietary Information with at least the degree of care with which it protects its own proprietary information, but in no case with less than a reasonable degree of care.

B. Within thirty (30) days of a written request by Discloser, Recipient shall (1) destroy or return to Discloser all documents received from Discloser which contain Proprietary Information, all documents it may have created which reveal any Proprietary Information, and all copies of the foregoing (except for one copy which may be kept by the legal department for archival purposes only), and (2) deliver to Discloser a certificate stating that Recipient has complied with such requests.

C. The Nondisclosure Agreement ("NDA") Coordinator for Applied shall be Carol Lauer.

D. The NDA Coordinator for Participant shall be Leo Berlinghieri.

III. DISCLOSURE PERIOD AND CONFIDENTIALITY PERIOD

A. The period during which Discloser may disclose Proprietary Information under this Agreement shall begin on the date of the first disclosure of Proprietary Information (which may be prior to the date of this Agreement) and shall end on 5/31/02 (if no date is specified, the period shall end three (3) years from the date this Agreement was signed). Either party may terminate the Agreement by giving the other party ten (10) days written notice.

B. The obligations set forth in Article II shall (1) termination five (5) years from the initial date of disclosure of the particular item of Proprietary Information and (2) survive the termination or expiration of this Agreement.

IV. MISCELLANEOUS

A. Recipient shall not acquire intellectual property rights from Discloser other than by a separate written agreement. The disclosure of Proprietary Information by Discloser does not constitute a warranty that such information does not infringe the rights of any third party.

B. This Agreement does not create any partnership, joint venture or agency between the parties. This Agreement shall not prevent a party from entering into a relationship with a third party, provided the first party does not violate the terms of this Agreement.

C. Before exporting or reexporting any Proprietary Information, a party must comply with all applicable regulations of the U.S. Department of Commerce Office of Export Administration and/or other applicable agencies.

D. This Agreement is the complete and exclusive statement of the understanding between the parties regarding the subject matter hereof and supersedes all prior or contemporaneous communications. It may be amended only by a writing signed by both parties.

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

E. This Agreement shall be interpreted and enforced according to the laws of the ***** (exclusive conflict of law rules).

APPLIED MATERIALS, INC.

MKS Instruments, Inc.
(Name of Participant Company)

| | | | |
|---|---------------------|--------------------------|--|
| By: /s/ C. Lauer | 5/3/96 | By: /s/ Leo Berlinghieri | 6/12/96 |
| ----- (Signature) | ----- (Date) | ----- (Signature) | ----- (Date) |
| Carol Lauer | Contract Specialist | Leo Berlinghieri | Vice President, Customer Support |
| ----- (Printed Name) | ----- (Title) | ----- (Printed Name) | ----- (Title) |
| Applied Division or Product Group: GMME | ----- | Please circle one: | Customer Supplier Consultant |

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

APPLIED MATERIALS BILL TO: ACCOUNTS PAYABLE MAILSTOP NO. 3200 PURCHASE ORDER
9700 U.S. HIGHWAY 290 EAST
AUSTIN, TX 78724-1102
PHONE (512) 272-1000 FAX (512) 272-3000 NO. 517005

TO: MKS INSTRUMENTS, INC. SHIP TO: METRIC 5 BLDG. 5-B, 9715 BURNET RD., AUSTIN, TX 78758 Amendment:
6 Shattuck Road SHIP TO ABOVE ADDRESS UNLESS OTHERWISE NOTED BELOW Date: 6/1/96
Andover, MA 01810

CONFIRMING: L. Berlinghleri By PL TERMS INSP. CODE RESALE NO. 3-00103-8201-5 SHIP VIA: FOB
CL Net 30 TAXABLE [] RESALE [] [] PPD [] COL [] Per Contract Terms Sellers Dock

ITEM QUANTITY UNIT AMI PART NO. RE DESCRIPTION DELIVERY ACCT. NO. UNIT PRICE EXTENDED
NO. V. SCHEDULE PRICE PRICE

Enter Document Text Here: This Master Purchase Order, No. 517005 (Fixed Price Spot Buys(, 517005A (Austin Bus Route), 517005S (Santa Clara Bus Route) is issued to MKS Instruments, Inc. for the purchase of products described in the attached Purchase Agreement per the Terms & Conditions attached.

Ship To: Applied Materials
9715 Burnet Road
Metric 5
Austin, Texas 78758
or
Applied Materials, Bldg. 17, 2821 Scott Blvd., Santa Clara, CA 95060

Estimated Contract Value... *****

NOTE: APPLIED MATERIALS WILL NOT BE LIABLE FOR GOODS, SERVICES, COSTS OR EXPENSES WHICH HAVE NOT BEEN AUTHORIZED BY APPLIED MATERIALS PURCHASING PERSONNEL.

APPLIED MATERIALS

THIS ORDER CAN BE ACCEPTED ONLY UPON THE TERMS AND CONDITIONS SPECIFIED ON THE FACE AND REVERSE SIDE HEREOF, INCLUDING SUCH SPECIFICATIONS, DRAWINGS OR OTHER DOCUMENTS AS ARE INCORPORATED HEREIN BY REFERENCE OR ATTACHED HERETO. READ THEM!

By: _____
BUYER

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omission.

Attachment 8
MKS Improvement Plan
Delivery & Quality PPM Levels

Delivery Performance

- 1. MKS will track it's own on-time delivery performance and compare to the Applied Materials performance reports. All late deliveries will be ***** will be performed on this data and any trends identified will be followed by a corrective action.
- 2. *****
- 3. Although MKS has produced under ***** we periodically have ***** . Currently MKS is ***** . This directly supports our delivery and quality improvement effort.
- 4. ***** will continue to be done on a regular basis to ensure MKS adjusts required capacity to meet current and projected loads.

Quality Performance

- 1. MKS will continue to ***** . Additional emphasis will be placed on ***** related to Applied Materials demand.
- 2. MKS will continue to ***** on these processing procedures. These procedures will be included in our ***** .
- 3. MKS will review the returns from Applied Materials ***** . Any trends identified will be followed ***** .

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

4. The MKS

will conduct a
***** input
from the *****with a goal of quality
improvement.

5. MKS will incorporate its

*****.

6. MKS ***** will meet with Applied Materials
***** to review
*****.

The above information and action will be summarized and shown at the quarterly meeting between Applied Materials and MKS Instruments. Other improvement techniques will be explored and utilized relative to the performance data and failure analysis.

Confidential Materials omitted and filed separately
with the Securities and Exchange Commission.

QUARTERLY BUSINESS REVIEWS

July 30, 1996

Quality PPM
Delivery PPM

Notes:

October 18, 1996

Quality PPM
Delivery PPM

Notes:

January, 1997

Quality PPM
Delivery PPM

Notes:

| | | |
|-------------------|-----------------------------|---|
| APPLIED MATERIALS | SPECIFICATION, COMMODITY | No. 0250-09509 Date: 9/19/1994 Rev: PI Page 1 of 9 |
|-------------------|-----------------------------|---|

APPROVALS:

CMMR Engr. Test Engr Mgr. Test Engr. M.E. Mgr. W.C. Mgr.

Pages 1 through 9 contain
Confidential Materials which have been omitted
and filed separately with the Securities and Exchange Commission.

| | | | | |
|------|-----|--------|------|------|
| | REV | CHANGE | DFTG | APVD |
| DATE | | | | |

Information contained in this document if considered by Applied
Materials to be confidential and is not to be used in any manner
without the consent of Applied Materials

Used on Assembly

APPLIED MATERIALS
3050 Bowers Ave., Santa Clara, CA 95054

| | | |
|-------------------|-----------------------------|---|
| APPLIED MATERIALS | SPECIFICATION, COMMODITY | No. 0250-10023 Date: 6/17/94 Rev: E1 ADG Page 1 of 5 |
|-------------------|-----------------------------|---|

APPROVALS:

CMMR Engr. Test Engr Mgr. Test Engr. M.E. Mgr. W.C. Mgr.

Pages 1 through 5 contain
Confidential Materials which have been omitted
and filed separately with the Securities and Exchange Commission.

| | | | | |
|------|-----|--------|------|------|
| DATE | REV | CHANGE | DFTG | APVD |
|------|-----|--------|------|------|

Information contained in this document if considered by Applied
Materials to be confidential and is not to be used in any manner
without the consent of Applied Materials

Used on Assembly

APPLIED MATERIALS
3050 Bowers Ave., Santa Clara, CA 95054

1

To be provided

1

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

Delivery Mechanics

TYPE 5 - Just-In-Time Bus Route Mechanics

A. This Agreement authorizes Seller to create and maintain inventory subject to the terms of this Agreement, for the Bus Route Program in accordance to and subject to Article 5 of the Master Purchase Order and Sales Agreement. Items to be included in the Bus Route Program are found in Attachment 1 of the Master Purchase Order and Sales Agreement.

B. Buyer will notify Seller of requirements *****.

C. Seller will *****.

D. Seller shall have all items *****.

E. If the *****.

F. For back ordered items, Seller will *****.

G. Seller will be paid *****.

For *****

Confidential Materials omitted and filed separately with the Securities and Exchange Commission. Asterisks denote omissions.

For *****

H. Seller will maintain *****
*****.

I. Buyer will *****

*****.

1. If discrepancies in pricing or quality are found,
*****.
2. If no discrepancies are found,

*****.

J. Buyer shall make payment to Seller in accordance with the terms established in this agreement.

PERSONAL & CONFIDENTIAL
MEMORANDUM

TO:
FROM: George Manning
DATE:
SUBJECT: 1997 Management Incentive Program

The amount of bonus you may be eligible to earn as part of the 1997 Management Incentive Program will be dependent on the percentage of consolidated net profits achieved by the Corporation as a percentage of consolidated net sales for calendar year 1997. Consolidated net profits means the consolidated net profits of the Corporation and its subsidiaries before payment by the Corporation of bonuses to all employees of the Corporation, contributions by the Corporation to the Retirement Plan on behalf of all employees of the Corporation, in the United States who are eligible to participate in the Retirement Plan, and payment by the Corporation of all income taxes.

Your target bonus under this Management Incentive Program is 15% of your 1997 base compensation. If in calendar year 1997 the Corporation achieves the same consolidated net profits level it achieved in 1995, you would earn 15% of your base compensation for 1997 (your target bonus). If the consolidated net profits are 8% or less of consolidated net sales, you will earn no bonus. If consolidated net profits are in excess of 8% of net sales, you will earn a percent of your target bonus as shown on the attached table. Your bonus will be calculated as 1.25% of your target bonus for every 1/10% (.001) the consolidated net profits exceeds 8% of net sales. However, in no event can your bonus exceed 30% of your base compensation for 1997.

In order to participate in this Management Incentive Program, you must be actively employed by MKS Instruments, Inc. as of December 31, 1997.

THIS INFORMATION IS EXTREMELY CONFIDENTIAL AND SHOULD BE TREATED AS SUCH. YOU SHOULD NOT DIVULGE THIS INFORMATION INSIDE OR OUTSIDE OF MKS INSTRUMENTS, INC.

Attachment

PERSONAL & CONFIDENTIAL

1997 MANAGEMENT INCENTIVE PROGRAM
 CALENDAR YEAR 1997 CONSOLIDATED NET PROFIT TABLE
 (JANUARY 1 - DECEMBER 31, 1997)

Your target bonus is 15% of your 1997 base compensation. You will achieve 100% of your target bonus if consolidated net profits reach 16%. Your maximum incentive is capped at 30% of your 1997 base compensation.

| CONSOLIDATED NET PROFIT %* | % OF TARGET BONUS EARNED |
|--------------------------------|-----------------------------|
| (less than or equal to) 8.0% | 0% |
| 8.1% - 8.9% | 1.25 - 11.25% |
| 9% - 9.9% | 12.5 - 23.75% |
| 10% - 10.9% | 25 - 36.25% |
| 11% - 11.9% | 37.5 - 48.75% |
| 12% - 12.9% | 50 - 61.25% |
| 13% - 13.9% | 62.5 - 73.75% |
| 14% - 14.9% | 75 - 86.25% |
| 15% - 15.9% | 87.5 - 98.75% |
| 16% - 16.9% | 100 - 111.25% |
| 17% - 17.9% | 112.5 - 123.75% |
| 18% - 18.9% | 125 - 136.25% |
| 19% - 19.9% | 137.5 - 148.75% |
| 20% - 20.9% | 150 - 161.25% |
| 21% - 21.9% | 162.5 - 173.75% |
| 22% - 22.9% | 175 - 186.25% |
| 23% - 23.9% | 187.5 - 198.75% |
| (greater than or equal to) 24% | 200% - maximum |

* Consolidated net profit before bonus, profit sharing, and taxes

THIS INDENTURE OF LEASE, made and entered into this 21st day of December, 1989 by and between DONNELL W. MURPHY as he is Trustee of WALPOLE PARK SOUTH (II) Trust under a Declaration of Trust dated August 10, 1988 filed with the Norfolk Registry District of the Land Court as Document No. 554329 (hereinafter referred to as "LESSOR"); and, NGS ASSOCIATES, INC., a Massachusetts corporation having its principal office in Canton, Massachusetts, (hereinafter referred to as "LESSEE").

WITNESSETH

That LESSOR, for and in consideration of the rent and all other charges and payments hereinafter reserved and payable by LESSEE, and in consideration of the covenants, agreements, terms provisions and conditions to be kept and performed hereunder by LESSEE, does hereby demise and lease to LESSEE, and LESSEE does hereby hire and take from LESSOR the premises hereinafter mentioned and described, subject to the covenants, agreements, terms, provisions and conditions of this Lease for the term hereinafter stated:

1. DESCRIPTION OF DEMISED PREMISES

The space, consisting of 5,021 square feet, substantially as outlined in yellow on the plan annexed hereto as Exhibit 1 (hereinafter "PREMISES"), located in the building known in the numbering as 24 WALPOLE PARK SOUTH, Walpole, Massachusetts (hereinafter "BUILDING"). The Lease includes the LESSEE'S right to use, the parking facilities of the Building for the parking of automobiles of employees, customers, invitees, or licensees of LESSEE in common with other tenants in the Building.

2. TERM OF LEASE

2.1 DEFINITIONS: As used in this Lease, the words "TERM COMMENCEMENT DATE" is the date on which the Premises are ready for

LESSEE'S occupancy (as defined in Section 3.2 hereof) and as set forth in Exhibit 2 hereof.

2.2 HABENDUM: TO HAVE AND TO HOLD the Premises for a term of years commencing on Term Commencement Date and ending on the Termination Date as stated in Exhibit 2 or on such earlier date upon which said term may expire or be terminated pursuant to any of the conditions or other provisions of this Lease, or pursuant to law (which date for the termination of the term hereof is hereinafter referred to as TERMINATION DATE"), or any later date to which the term of this Lease may become extended pursuant to the provisions of Section 28 of the Addenda hereto annexed (if the term of this Lease becomes extended, the expression "term" as used in this Lease shall be deemed to include such extended term).

2.3 DECLARATION FIXING TERM COMMENCEMENT DATE: As expeditiously as possible after the Term Commencement Date, the LESSEE agrees upon request of the LESSOR, to join in the execution, in recordable form, of a written declaration in which shall be stated such Term Commencement Date and (if need be) the Termination Date. If this Lease is terminated before the term expires, then upon LESSOR'S request the parties shall execute, acknowledge, and deliver an instrument acknowledging such fact and the date of termination of this Lease.

3. CONSTRUCTION - READINESS FOR OCCUPANCY

3.1 COMPLETION DATE: Subject to delays due to causes beyond the reasonable control of the LESSOR, or by action or inaction of LESSEE, LESSOR shall use reasonable speed and diligence in the construction of the Premises and shall use his best efforts to have the Premises ready for LESSEE'S occupancy on or before the Term Commencement Date, but nothing herein contained shall be construed to create any liability on the part of the LESSOR for his failure, due to any cause whatsoever, to have the Premises ready for occupancy on said date. If the Term Commencement Date shall not have occurred on or before March 1, 1990, for any reason, except failure on the part of the LESSEE to perform any of its obligations hereunder, LESSEE may give LESSOR a thirty (30) day written notice of termination (sent by registered or certified mail, return receipt requested), and unless the Term Commencement Date shall have occurred within thirty (30) days from the date of receipt of such notice, the obligations to the parties hereto shall cease and terminate as of the thirtieth (30th) day next following receipt of such notice.

3.2 WHEN PREMISES DEEMED READY: The Premises shall be conclusively deemed ready for LESSEE'S occupancy as soon as the initial installations to be done by LESSOR referred to in Exhibit 3 ("Building Standard Work") annexed hereto and made a part hereof (hereinafter referred to as "BUILDING STANDARD WORK") in the Premises have been substantially completed by LESSOR insofar as is practicable in view of delays or defaults, if any, of LESSOR or his contractors, and the

facilities specified in Exhibit 3 are substantially available to LESSEE, in accordance with the obligations assumed by LESSOR hereunder. The Premises shall be not deemed to be unready for LESSEE'S occupancy or incomplete if only minor insubstantial details of construction or mechanical adjustments remain to be done in the Premises, or any part thereof (provided that LESSOR shall diligently continue to complete all work required of him hereunder), or if the delay in the availability of the Premises for occupancy is (i) due to special work, changes, alterations, or additions required or made by LESSEE in the layout or finish of the Premises or any part thereof other than as specified under Building Standard Work (provided that LESSOR shall diligently continue to complete all work required of him hereunder); or, (ii) caused in whole or in part by delay and/or default on the part of LESSEE or its contractors.

3.3 PREPARATION OF PREMISES: Except as is otherwise herein provided or as may be otherwise approved by the LESSOR, all work necessary to prepare the Premises for LESSEE'S occupancy, including work to be performed at LESSEE'S expense, shall be performed by contractors employed by LESSOR and all materials and workmanship shall be in accordance with Building Standard Work. The term "preparation of the Premises for LESSEE'S occupancy" shall include not only work done within the Premises, but also related work out-side the Premises such as, but not limited to, the installation of additional air conditioning equipment and facilities to serve the Premises and additional risers, feeders, and wiring or other electrical equipment to serve the Premises. If any work, including, but not by way of limitation, installation of built-in equipment by the manufacturer or distributor thereof, shall be performed by contractors not employed by LESSOR, LESSEE shall take all reasonable measures to the end that such contractors shall cooperate in all ways with LESSOR'S contractors and shall not conflict in any other way with the performance of such work.

3.4 CONCLUSIVENESS OF LESSOR'S PERFORMANCE: LESSEE shall be conclusively deemed to have agreed that LESSOR has performed all of his obligations hereunder, unless not later than the end of the second calendar month next beginning after the Term Commencement Date, LESSEE shall give LESSOR written notice specifying the respects in which LESSOR has not performed any such obligation. There shall be excluded from the scope of this section those omissions or defects which could not reasonably have become apparent to LESSEE within the time specified and those will be deemed to have been corrected unless LESSEE shall have notified LESSOR thereof not later than the end of the sixth calendar month next beginning after the Term Commencement Date.

4. USE OF PREMISES

4.1 IN GENERAL: LESSEE shall use and occupy the Premises only for the purpose of conducting the use set forth in Exhibit 2 hereof and for no other purpose.

LESSEE shall not use, or suffer or permit the use of, or suffer or permit anything to be done in or anything to be brought into or kept in the Premises or any part thereof (i) which would violate any of the covenants, agreements, terms, provisions, and conditions of this Lease; (ii) for any unlawful purpose or in any unlawful manner; or, impair or interfere with or tend to impair or interfere with any of the Building services or the proper and economic heating, air conditioning, or other servicing of the Building or Premises, or with the use of any of the other areas of the Building by, or occasion discomfort, inconvenience, or annoyance to, any of the other tenants or occupants of the Building. LESSEE shall not install any electrical or other equipment of any kind which, in the reasonable judgement of LESSOR, might cause any such impairment, interference, discomfort, inconvenience, or annoyance. The installation and/or use of business office machines normally incident to the type and size of LESSEE'S business operations in the Premises shall not be deemed forbidden by this Article 4.

4.2 SPECIFIC RESTRICTIONS:

(a) No part of the Premises shall be used for any of the following purposes:-

- (1) As a facility for the use, generation, treatment, storage or disposal of hazardous materials, (as any one or more of such terms are defined by General Laws, Chapter 21C; General Laws Chapter 21E; Comprehensive Environmental Response Act; Compensation and Recovery Act, 42 USC section 9601 et seq; the Resource Conservation and Recovery Act of 1976, 42 USC section 6901, et seq; or, any of the rules and regulations promulgated under the aforesaid), except for the use, generation, treatment, or storage of those hazardous materials as to which LESSOR has given his prior approval, and then only to the extent that such materials are licensed and approved in accordance with all applicable laws and regulations of all governmental authorities having jurisdiction thereof.
- (2) Any industrial use which discharges processed waste water on site.
- (3) Subsurface disposal of liquid or likable waste.
- (4) Storage of petroleum or other refined petroleum products except within those portions of the premises which will be heated, or in vaulted tanks equipped with monitoring systems.

- (5) Manufacture and/or the tanning of leather, but this prohibition shall not exclude the manufacture of products made from leather.
- (6) Dry cleaning establishment.
- (7) Manufacture or processing of paper from pulp.
- (8) Manufacture of plastic from raw materials, but this prohibition shall not exclude the manufacture of any type of product made from plastic material.
- (9) Steel mill or foundry.
- (10) Manufacture of abrasives.
- (11) Dyeing of textiles.

(b) No part of the Premises shall involve as a principal use any of the following:-

- (1) Processing, manufacture, or storage of chemicals.
- (2) Printing of textiles.
- (3) A laboratory which tests or analyzes biological or chemical materials which are provided by others.
- (4) Electroplating of products.
- (5) Use of any volatile organic compound in any industry devoted to the manufacture of electronic components unless the following conditions are observed:
 - (i) In order to minimize spillage or leakage during the process of loading or unloading, all loading/unloading areas of any building in which the same shall be used, shall be roofed, and the ground area immediately below the same pitched to and provided with an in-ground holding tank, constructed of material sufficient to contain any spill or leak of any volatile organic compound.
 - (ii) No volatile organic compound shall be stored in any room or area of any building where any sink or open drain is located.

4.3 SEWER USE DISCHARGE PERMIT: LESSEE understands that sanitary sewerage from the Building will discharge into the Town of Walpole, MA sewer system which is a tributary to that owned and/or controlled by the Massachusetts Water Resources Authority ("MWRA"). The LESSEE further understands that discharge of such sewerage is generally regulated under 360 CMR 10.000 and that the LESSEE may be considered to be "user" thereunder. If, because of the LESSEE'S use of the premises, it discharges or will discharge "industrial wastes" (as defined in 360 CMR 10.004) into the said sewer system, the LESSEE shall make prompt application to the MWRA for a Sewer Use Discharge Permit so as to permit such discharge and agrees to hold and save the LESSOR harmless and indemnified for any claim, demand, or penalty asserted by the MWRA or others with respect to such sewer discharge.

5. RENT

The LESSEE shall pay to the LESSOR, during the term of this Lease, the yearly rent as stated in Exhibit 2 (hereinafter referred to as "YEARLY RENT"), payable in equal monthly installments, as stated in said Exhibit 2, in advance, on the first day of each month for and in respect of such month and at such rate for such further time as LESSEE shall hold the Premises or any part thereof. The rent reserved and covenanted to be paid under this Lease shall commence on the Term Commencement Date. If, by reason of any provisions of this Lease, the rent reserved hereunder shall commence on any day other than the first day of a calendar month, the rent for such calendar month shall be prorated. The rent shall be payable at the office of LESSOR or such place as LESSOR may designate, without any setoff or deduction whatsoever.

6. UTILITIES

6.1 FACILITIES: LESSOR will supply or cause to be supplied to the Premises, at no cost to LESSEE, at or prior to the Term Commencement Date, all facilities for water (hot and cold); heating, ventilation, and air conditioning; sprinkler; electricity; and sewer services required for LESSEE'S intended use of the Premises (all as set forth and described in Building Standard Work annexed hereto as Exhibit 3), and where feasible such utilities and services shall be separately metered.

6.2 ADDITIONS TO ELECTRICAL SYSTEM: If LESSEE shall require electric current or facilities for use in the premises in excess of what is provided in Exhibit 3 hereof, LESSOR, upon written request and at the sole cost and expense of LESSEE, will furnish and install such additional wire, conduits, feeders, switchboards, and appurtenances as reasonably may be required to supply such additional requirements of LESSEE if current therefore be available to LESSOR, provided that the same shall be permitted by applicable laws and insurance regulations, and shall not cause permanent damage or injury to the Building or the Premises, or cause or create a dangerous or hazardous condition, or entail excessive or unreasonable

alterations or repairs, or interfere with or disturb other tenants or occupants of the Building. LESSEE agrees that it will not make any material alteration or material addition to the electrical equipment and/or appliances in the Premises without the prior written consent of LESSOR in each instance first obtained.

6.3 PAYMENT OF CHARGES: LESSEE shall pay when due all charges for water, gas, sewer, electricity, heating fuels, power, and any other services supplied to it at the Premises directly to the utility company, supplier, or provider providing the same.

7. COMMON AREAS

7.1 RIGHT TO USE: LESSOR grants to LESSEE in common with other tenants within the Building, and their agents, employees, licensees, customers, and persons doing work for or business with them, the right to use the common areas (hereinafter referred to as "COMMON AREAS") consisting of the parking areas, roadways, pathways, sidewalks, entrances, and exits designated by LESSOR for common use of the Building, subject to the terms and conditions of this Lease.

7.2 MAINTENANCE OF COMMON AREAS: The LESSOR or his managing agent shall maintain the Common Areas and, in connection therewith, shall have the right to incur, in his sole discretion, such reasonable expenses as may be required (i) to maintain and keep in good repair (including the making of any necessary replacements) all portions of the Common Areas; (ii) to keep the Common Areas reasonably free from accumulated snow, ice, and refuse, and open for use and fully lighted during all business hours.

7.3 CONTROL OF COMMON AREAS: The Common Areas shall be subject to the exclusive control and management of LESSOR and LESSOR shall have the right to establish, modify, change, and enforce reasonable rules and regulations with respect to the Common Areas and LESSEE agrees to abide by and conform with such rules and regulations. LESSEE agrees that it and its employees will park their trucks, delivery vehicles and automobiles only in such of the parking areas as LESSOR may from time to time designate for that purpose. LESSOR shall have the right to close any part of the Common Areas for such time as may be necessary to clean and repair the same, and to close any part of the parking area for such time as LESSOR deems necessary in order to discourage noncustomer parking and to do other things in the parking areas as LESSOR in her discretion deems reasonable and necessary for the benefit of the Building.

8. ADDITIONAL RENT

8.1 DEFINITIONS: As used in this Article 8, the words and terms which follow mean and include the following:

(a) "LESSEE'S PROPORTIONATE SHARE" shall mean a fraction having as numerator the Rentable Area and having as denominator the Building Rentable Area as stated in Exhibit 2.

(b) "TAXES" shall mean the real estate taxes and assessments imposed upon the Building and any and all other taxes, levies, betterments, assessments, and charges arising from the ownership and/or the operation of said Building which are or shall be imposed by national, state, municipal or other authorities, and which are or may become a lien upon the Building. If, due to a future change in the method of taxation, any franchise, income, or profit tax shall be levied against LESSOR in substitution for or in lieu of any tax which would otherwise constitute a real estate tax, such franchise, income, or profit tax shall be deemed to constitute "taxes" for the purpose hereof. The word "Taxes" shall exclude any special assessments which are imposed for benefits rendered to the Building such as a sidewalk assessment, regardless of how labeled or identified.

(c) "TAX YEAR" shall mean the twelve (12) month period commencing on July 1 immediately preceding the Term Commencement Date, and each twelve (12) month period commencing on an anniversary of said date during the term of this Lease.

(d) "OPERATING COSTS" shall mean all reasonable costs incurred and expenditures of whatever nature made by the LESSOR in the operation and management, repair, and maintenance of the Building; related equipment, facilities, and appurtenances; as well as maintenance of all exterior portions of the Building, and including, not limited to, the following:

Taxes:

Federal Social Security, Unemployment and Old Age Taxes and contributions, and Massachusetts Unemployment taxes and contributions accruing to and paid by the LESSOR on account of all employees of the LESSOR who are employed in, about, or on account of the Building, except that taxes levied upon the net income of the LESSOR, and taxes withheld from employees, and Taxes shall not be included herein.

Water:

All charges and rates connected with water supplied to the Building and related sewer use charges, to the extent such charges and rates are paid for by LESSOR.

Supplies and Materials:

All supplies and materials used in the operation and maintenance of the Building, Common Areas, and surrounding areaways.

Wages:

Wage and cost of all employee benefits of all employees of the LESSOR who are employed in, about or on account of the Building.

Maintenance:

The cost of all outside contractors and all, maintenance and service agreements with respect to the Building, Common Areas, and surrounding areaways; maintenance, repairs, and replacement of equipment used for servicing.

Electricity:

The cost of all electric current for the operation of any machine, appliance, or device used in connection with the operation of the Building, including the cost of electric current for exterior public lights.

Insurance, etc.:

Fire and extended coverage, casualty, liability, and such other insurance as may be required by any lending institution in connection with the Building and the Common Areas, and all other expenses customarily incurred in connection with the operation and maintenance of first-class buildings in the Metropolitan Boston area.

Management:

All fees and costs incurred in respect of the management of the Building.

"Operating Costs" shall include only reasonable and bona fide expenses actually incurred by LESSOR and shall not include any of the following: executive salaries; charges, which under this Lease, would be chargeable to a specific tenant of the Building; leasing commissions; interest; depreciation; or other expenses relating to ownership as distinguished from the operation and/or management of the Building.

(e) "COMPUTATION YEAR" shall mean the twelve (12) month period beginning on the date of January 1 immediately prior to the Term Commencement Date and each twelve (12) month period commencing on an anniversary of said date during the term of this Lease. If the Term Commencement

Date or the Termination Date occurs during a Computation Year, the LESSEE shall be liable for only a portion of the Operating Costs in respect to such Computation Year, represented by a fraction, the numerator of which shall be the number of days of the herein term which falls within the Computation Year, and the denominator of which shall be three hundred and sixty-five (365).

(f) "TAX STATEMENT" and "OPERATING COST STATEMENT" shall mean a statement in writing signed by LESSOR, setting forth the amounts payable by LESSEE for a specified Tax or Computation Year, respectively, pursuant to this Section 8.

8.2 PAYMENT OF TAXES BY LESSEE:

(a) In each Tax Year, the LESSEE shall pay to LESSOR, LESSEE'S Proportional Share of Taxes in the manner as hereinafter set forth.

(b) Estimated payments on account of LESSEE'S Proportionate Share of Taxes, (as reasonably estimated by the LESSOR) shall be made monthly by the LESSEE and at the time and in the fashion provided in this Lease for the payment of Yearly Rent. Such monthly payment shall be sufficient to provide LESSOR by the end of each Tax Year with a sum equal to LESSEE'S Proportionate Share of Taxes for such Tax Year. Promptly after the receipt of the Tax bill, LESSOR shall provide LESSEE with a Tax Statement. If the total of the estimated payments theretofore made by LESSEE for the Tax Year exceed the required payments on account thereof for such year, LESSOR shall credit the amount of overpayment against subsequent obligations of LESSEE on account of Taxes (or refund such overpayment if the Term of this Lease has ended and LESSEE has no further obligations to LESSOR); but, if the aggregate of the monthly payments made by the LESSEE for such Tax Year are less than the LESSEE'S Proportionate Share of Taxes, LESSEE shall pay the balance of said amount to LESSOR within thirty (30) days after being so advised by LESSOR. LESSOR shall have the same rights and remedies for non-payment by LESSEE of any payments due on account of such Taxes as LESSOR has under this Lease for failure of LESSEE to pay Rent.

(c) If the Term Commencement Date or the Termination Date occurs during a Tax Year, the LESSEE shall be liable for only that portion of Taxes in respect of such Tax Year represented by a fraction, the numerator of which shall be the number of days of the herein term which falls within the Tax Year, and the denominator of which shall be three hundred sixty-five (365). In the event the first day of the Tax Year should be changed after the Term Commencement Date to a day other than July 1 so as to change the twelve (12) month period comprising the Tax year, in determining Taxes due from the LESSEE hereunder with respect to Taxes payable for the period between July 1 and such changed first day of the Tax Year, such amount of Taxes shall be multiplied by a fraction, the numerator of which shall

be the number of days elapsing during such period, and the denominator of which shall be three hundred sixty-five (365).

8.3 PAYMENT OF OPERATING COSTS BY LESSEE:

(a) In each Computation Year, the LESSEE shall pay to LESSOR, LESSEE'S Proportionate Share of Operating Costs in the manner as hereinafter set forth.

(b) Estimated payments by LESSEE on account of LESSEE'S Proportionate Share of Operating Costs shall be made monthly by the LESSEE and at the time and in the fashion provided in this Lease for the payment of Yearly Rent. Such monthly payment (to be reasonably estimated by the LESSOR) shall be sufficient to provide LESSOR by the end of each Computation Year with a sum equal to LESSEE'S Proportionate Share of Operating Costs pursuant to subparagraph (a) hereof for such Computation Year. Promptly after the end of each Computation Year, LESSOR shall submit to LESSEE a reasonably detailed Operating Cost Statement for such year. If the estimated payments theretofore made for such Computation Year by LESSEE exceed LESSEE'S required payment on account thereof for such year, according to such statement, LESSOR shall credit the amount of overpayment against subsequent obligations of LESSEE with respect to Operating Costs (or refund such overpayment if the Term of this Lease has ended and LESSEE has no further obligation to LESSOR); but, if the aggregate of the monthly payments made for such Computation Year are less than the LESSEE'S Proportionate Share of Operating Costs, LESSEE shall pay the balance of said amount to LESSOR within thirty (30) days after being so advised by LESSOR. LESSOR shall have the same rights and remedies for the nonpayment by LESSEE of any payments due on account of Operating Costs as LESSOR has hereunder for the failure of LESSEE to pay Rent.

9. CHANGES OR ALTERATIONS BY LESSOR

LESSOR reserves the right at any time and from time to time, without the same constituting an actual or constructive eviction, and without incurring any liability to LESSEE therefor, or otherwise affecting LESSEE'S obligations under this Lease, to make such changes, alterations, additions, improvements, repairs, or replacements in or to the Building (including the Premises) and the fixtures and equipment thereof, as well as in or to the outside areas, and entrances, thereof, as he may deem necessary or desirable, provided, however, that there be no unreasonable obstruction of the right of, access to, or unreasonable interference with, the use and enjoyment of the Premises by LESSEE. Nothing contained in this Section 9 shall be deemed to relieve LESSEE of any duty, obligation, or liability of LESSEE with respect to making any repair, replacement, or improvement, or complying with any law, order, or requirement of any government or other authority.

10. FIXTURES, EQUIPMENT, AND IMPROVEMENTS -- REMOVAL BY LESSEE

All fixtures, equipment, improvements, and appurtenances attached to or built into the Premises prior to or during the term, whether by LESSOR at his expense or at the expense of LESSEE (either or both), or by LESSEE, shall be and remain part of the premises and shall not be removed by LESSEE at the end of the term unless otherwise expressly provided in this Lease. Where not built into the Premises, and if furnished and installed by and at the sole expense of LESSEE, all removable electric fixtures, carpets, drinking or tap water facilities, furniture, or trade fixtures, or business equipment shall not be deemed to be included if such fixtures, equipment, improvements, and appurtenances, and may be, and upon the request of LESSOR will be, removed by LESSEE upon the condition that such removal shall not materially damage the premises or the Building, and that the cost of repairing any damage to the premises or the Building arising from such removal shall be paid by LESSEE; provided however, that any such items as toward which LESSOR shall have granted any allowance or credit to LESSEE shall be deemed not to have been furnished and installed in the Premises by or at the sole expense of LESSEE.

11. ALTERATIONS AND IMPROVEMENTS BY LESSEE AFTER TERM COMMENCEMENT DATE

LESSEE shall make no structural alterations, decorations, installations, removals, additions, or improvements in or to the Premises after the Term Commencement Date without LESSOR'S prior written consent and then only by contractors or mechanics engaged on LESSEE'S behalf, by LESSOR. No such installations or work shall be undertaken or begun by LESSEE until LESSOR has approved written plans and specifications therefor, and no amendments or additions to such plans and specifications shall be made without the prior written consent of LESSOR. Any such work, alterations, decorations, installations, removals, additions, and improvements shall be done at LESSEE'S sole expense and at such times and in such manner as LESSOR may from time to time designate. If LESSEE shall make any alterations, decorations, installations, removals, additions, or improvements, then LESSOR may require the LESSEE at the expiration of this Lease to restore the Premises to substantially the same condition as existed on the Term Commencement Date. LESSOR'S consents and approvals called for in this Section 11 shall in no instance be unreasonably withheld or delayed.

12. REPAIRS TO PREMISES

12.1 REPAIRS BY LESSEE: LESSEE shall keep all and singular the Premises in such repair, order, and condition as the same are in on the Term Commencement Date or may be put in during the term hereof, reasonable use and wearing thereof and damage by fire or by casualty insured against only excepted. LESSEE shall make, as and when needed as a result of misuse by, or neglect or improper conduct

of, LESSEE or LESSEE'S servants, employees, agents, or licensees, or otherwise, all repairs in and about the Premises necessary to preserve them in such repair, order, and condition, which repairs shall be in quality and class equal to the original work. LESSOR may elect, at the expense of LESSEE, to make any such repairs or repair any damage or injury to the Building or the Premises caused by moving property of LESSEE in and out of the Building, or by installation or removal of furniture or other property, or by misuse by, or neglect, or improper conduct of LESSEE or LESSEE'S servants, employees, agents, or licensees outside the Premises but affecting LESSEE'S use and enjoyment of the Premises, excluding any repairs required to be made in or damage in the Premises by the LESSOR, as set forth in section 12.2 hereof.

12.2 REPAIRS BY LESSOR: All repairs required in the Premises occasioned by action of the elements or by matters ordinarily covered by LESSOR'S fire and extended coverage insurance, but excluding repairs becoming necessary as the result of misuse or negligence on the part of LESSEE or LESSEE'S employees, agents, or licensees, shall be made by and at the expense of LESSOR. LESSOR agrees to keep in good order, condition, and repair, including replacements thereof as and when necessary (i) the structural elements of the Premises which includes all footings, foundations, floor slabs, columns, girders, mullions, loadbearing exterior walls; and, (ii) the roofing system of the Premises which includes support members, membrane assembly, flashings, roof insulation assembly, hatches, sleeves, vents, and brackets.

13. INSURANCE, INDEMNIFICATION, EXONERATION AND EXCULPATION

13.1 PUBLIC LIABILITY INSURANCE: LESSEE shall procure, keep in force, and pay for comprehensive public liability insurance (hereinafter referred to as "LIABILITY INSURANCE") indemnifying LESSOR and LESSEE against all claims and demands for injury to or death of persons or damage to property which may be claimed to have occurred upon the Premises, or in or about the common areas of the Building which arise out of the LESSEE'S use and occupancy of the Premises, in amounts which shall be in a combined single limit for bodily injury or death and for property damage ("Broad Form" endorsement, so-called), in a sum of not less than ONE MILLION DOLLARS (\$1,000,000) DOLLARS.

13.2 HAZARD INSURANCE: During the term of this lease, LESSOR shall keep the Building including any improvements which may be made by LESSOR in the Premises including, but not limited to, painting, light fixtures, floor covering, and partitions, if installed by LESSOR, to the extent that the same are customarily insurable as part of the realty and may be covered by LESSOR'S insurance, insured against loss or damage by fire and any of the casualties included in the broadest standard form obtainable of extended coverage or supplementary contract endorsements.

13.3 CERTIFICATE OF INSURANCE: All such insurance shall be effected with insurers authorized to do business in Massachusetts under valid and enforceable policies. The Liability Insurance shall name LESSOR and LESSEE as the insureds, as their respective interests appear, and shall provide that it shall not be cancelled without at least thirty (30) days prior written notice to each insured named therein. Not less than fifteen (15) days prior to the expiration date of each expiring policy of Liability Insurance, original copies of such policies issued by the respective insurers, or certificates of such policies setting forth in full the provisions thereof and issued by such insurers, together with evidence satisfactory to LESSOR of payment of all premiums for such policies, shall be delivered by LESSEE to LESSOR and certificates as aforesaid of such policies shall upon request of LESSOR be delivered by LESSEE to the holder of any mortgage affecting the Building. LESSEE may provide Liability Insurance as an endorsement to any of its blanket policies.

13.4 GENERAL: LESSEE will save LESSOR harmless, and will exonerate and indemnify LESSOR from and against any and all claims, liabilities, or penalties asserted by or on behalf of any person, firm, corporation, or public authority;

(a) On account of, or based upon any injury to person, or loss of or damage to property, sustained or occurring on the Premises on account of, or based upon, the act, omission, fault, negligence, or misconduct of the LESSEE, its employees, agents, and invitees.

(b) On account of, or based upon any injury to person, or loss of or damage to property, sustained or occurring elsewhere (other than on the Premises), in or about the Building, and, in particular and without limiting the generality of the foregoing, in or about the Common Areas, surrounding areaways, roof, or other appurtenances and facilities used in connection with the Building or Premises, arising out of the use or occupancy of the Premises by the LESSEE or by any person claiming by, through, or under LESSEE, on account of or based upon the act, omission, fault, negligence, or misconduct of all such persons other than LESSOR and those for whose conduct the LESSOR is legally responsible.

(c) On account of or based upon (including monies due on account of) any work or thing whatsoever done by the LESSEE, its employees, agents, and invitees (other than by LESSOR or his contractors, or agents or employees of either) on the Premises during the term of this Lease and during the period of time, if any, prior to the Term Commencement Date that LESSEE may have been given access to and used the Premises; and, in respect to any of the matters set forth in subsections (a) and (b) hereof, from and against all cost expenses (including reasonable attorney's fees) and liabilities incurred in or in connection with any such claim, or any action, or proceeding brought thereon; and in case any action or proceeding by brought against LESSOR by reason of such claim, LESSEE, upon notice from LESSOR shall, at LESSEE'S expense, resist or defend such action or proceeding and employ such

counsel therefore reasonably satisfactory to LESSOR, it. being agreed that such counsel as may act for insurance underwriters of LESSEE engaged in such defense, shall be deemed satisfactory. Nothing in this Lease shall be construed to require LESSEE to indemnify LESSOR against the consequences of any act, omission, fault, negligence, or misconduct of LESSOR or those for whose conduct LESSOR is legally responsible, and the LESSOR shall indemnify the LESSEE for or in respect of such conduct.

13.5 PROPERTY OF LESSEE: In addition to and not in limitation of the foregoing, LESSEE covenants and agrees that all merchandise, furniture, fixtures, and property of every kind, nature, and description which may be in or upon the Premises or Building, or on the Common Areas, surrounding areaways, or approaches adjacent thereto, during the term hereof, shall be at the sole risk and hazard of LESSEE, and that if the whole or any part thereof shall be damaged, destroyed, stolen, or removed due to any cause or reason whatsoever, no part of said damage or loss shall be charged to or borne by LESSOR.

13.6 BURSTING OF PIPES, ETC.: LESSOR shall not be liable for any injury or damage to persons or property resulting from fire, explosion, falling plaster, steam, gas, electricity, electrical disturbance, water, rain, or snow leaks from any part of the Premises or the Building or from the pipes, appliances, or plumbing works or from the roof, street, or sub-surface, or from any other place by dampness or by any other cause of whatever nature; nor shall LESSOR or his agents be liable for any such damage caused by other tenants or persons in the Building or caused by operations in construction of any private, public, or quasi-public work; nor shall LESSOR be liable for any latent defect in the Premises or in the Building.

13.7 REPAIRS AND ALTERATIONS: There shall be no allowance to LESSEE for diminution of rental value of the Premises and no liability on the part of LESSOR by reason of inconvenience, annoyance, or injury to LESSEE arising from any repairs, alterations, additions, replacements, or improvements made by LESSOR, LESSEE, or others in any portion of the Building or Premises, or in or to the fixtures, appurtenances, or equipment thereof, or for failure of LESSOR or others to make any repairs, alterations, additions, or improvements in or to any portion of the Building or to the Premises, or in or to the fixtures, appurtenances, or equipment thereof.

14. ASSIGNMENT AND SUBLETTING

14.1 PROHIBITION: LESSEE covenants and agrees that neither this Lease nor the term and estate hereby granted, nor any interest herein or therein, will be assigned, mortgaged, pledged, encumbered, or otherwise transferred (including without limitation, transfers by operation of law) and that neither the Premises nor any part thereof will be encumbered in any manner by reason of any act or omission on the part of LESSEE, or used or occupied or permitted to be used or occupied by

anyone other than LESSEE, or be sublet (which term without limitation, shall include granting of concessions, licenses, and the like) in whole or in part, without, in each instance, having first received the express written consent of LESSOR which shall not be unreasonably withheld or delayed, except that no such consent shall be required for an assignment or sublease to LESSEE'S affiliates. It shall be a condition of the validity of any assignment (whether the LESSOR'S written consent is required or not, as aforesaid) that the assignee agrees directly with LESSOR, by written instrument in form satisfactory to LESSOR, to be bound by all the obligations of LESSEE hereunder including, without limitation, the covenant against further assignment and subletting. No assignment or subletting shall relieve LESSEE from its obligations hereunder and LESSEE shall remain fully and primarily liable therefor.

14.2 NO WAIVER: If this Lease be assigned, or if the Premises or any part thereof be sublet or occupied by anyone other than LESSEE, LESSOR may, at any time and from time to time, collect rent and other charges from the assignee, subtenant, or occupant, and apply the net amount collected to the rent and other charges herein reserved, but no such assignment, subletting, occupancy, or collection shall be deemed a waiver of this covenant, or the acceptance of the assignee, subtenant, or occupant as a tenant or the release of LESSEE from the further performance by LESSEE of its obligations hereunder. The consent by LESSOR to an assignment or subletting shall in no way be construed to relieve LESSEE or any successor from obtaining the express consent in writing of LESSOR to any further assignment of this Lease or subletting of all or a portion of the Premises.

15. MISCELLANEOUS COVENANTS

LESSEE covenants and agrees as follows:

15.1 ACCESS TO PREMISES: LESSEE shall (i) permit LESSOR to erect, use, and maintain pipes, ducts, and conduits in and through the Premises, provided the same do not materially reduce the floor area or materially or adversely affect the LESSEE'S use of the same; (ii) permit the LESSOR, any mortgagee of the Building and its representatives, and any authorized representative of the Walpole Board of Health to have free and unrestricted access to and to enter upon the Premises at all reasonable hours for the purpose of inspection, or for making repairs, replacements, or improvements in or to the Building, or the equipment thereof (including without limitation, sanitary, electrical, or other systems), or to determine compliance with all laws, orders, and requirements of governmental or other authority, or exercising any right reserved to LESSOR under this Lease (including the right during the progress of any such repairs, replacements, or improvements, or while performing work and furnishing materials in connection with compliance with any such laws, orders, or requirements, to take upon or through or to keep and store within the Premises all necessary materials, tools, and equipment); and, (iii) permit LESSOR, at reasonable times, to show the Premises during ordinary business hours to any mortgagee,

prospective lessee, prospective purchaser, prospective mortgagee, or prospective assignee of any mortgage of the Building, and during the period of twelve (12) months next preceding the Termination Date to any person contemplating the leasing of the Premises or any part thereof. If LESSEE shall not be personally present to open and permit entry into the Premises at any time when for any reason an entry therein shall be necessary or permissible, LESSOR or LESSOR'S agents may, in an emergency situation, enter the same by a master key, or may forcibly enter the same, without rendering LESSOR or such agents liable therefor (if during such entry LESSOR or LESSOR'S agents shall accord reasonable care to LESSEE'S property), and without in any manner affecting the obligations and covenants of this Lease. The rights provided for in subsections (i), (ii) and (iii) hereof shall be exercised upon reasonable notice (telephonic or otherwise) if the same is practicable, and with minimum practicable interference with the conduct of the LESSEE'S business in the Premises.

15.2 ACCIDENTS TO SANITARY AND OTHER SYSTEMS: LESSEE shall give to LESSOR prompt notice of any fire or accident occurring in the Premises, and of any damage to, or defective condition in, any part of the Premises' sanitary, electrical, heating, or other systems located in or passing through the Premises, but if the damage or defective condition was caused by LESSEE or by the employees, licensees, or invitees of LESSEE, the cost to remedy the same shall be paid by LESSEE. LESSEE shall not be entitled to claim any eviction from the Premises or any damages arising from any such damage or defect unless the same shall have been occasioned by the negligence of LESSOR, his agents, servants, or employees, and in case of a claim of eviction, unless such damage or defective condition shall have rendered the Premises untenable and the Premises shall not have been made tenantable by LESSOR within a commercially reasonable period of time.

15.3 SIGNS: No signs may be installed on or in any window of the Premises by LESSEE. No other signs shall be permitted in or about the Premises or Building without the written approval of the LESSOR which approval shall not be unreasonably withheld or delayed. Said exterior sign shall in all events conform to the requirements of Exhibit 4 hereof.

15.4 INFLAMMABLE - ODORS: LESSEE shall not bring or permit to be brought or kept in or on the Premises or elsewhere in the Building, any flammable, combustible, or explosive fluids, material, chemical substances, or cause or permit and odors of cooking or other processes, or any unusual or other objectionable odors to emanate from or permeate the Premises.

15.5 REQUIREMENTS OF LAW - FINES AND PENALTIES: LESSEE at its sole expense shall comply with all laws, rules, orders and regulations of federal, state, county, and municipal authorities and with any direction of any public officer or officers, pursuant to law, which shall impose any duty upon LESSOR or LESSEE

arising out of LESSEE'S use or occupancy of the Premises. LESSEE shall reimburse and compensate LESSOR for all expenditures made by, or damages or fines sustained or incurred by LESSOR, due to nonperformance or noncompliance with, or breach or failure to observe any term, covenant, or condition of this Lease upon LESSEE'S part to be kept, observed, performed, or complied with.

15.6 LESSEE'S ACTS - EFFECT ON INSURANCE: LESSEE shall not do or permit to be done any act or thing upon the Premises nor elsewhere in the Building which will invalidate or be in conflict with any insurance policies covering the Building and the fixtures and property therein; and shall not do, or permit to be done, any act or thing upon the Premises or Building which shall or might subject LESSOR to any liability or responsibility for injury to any person or persons or to property by reason of any business or operation being carried on upon said Premises, or for any other reason. LESSEE at its own expense shall comply with all rules, orders, regulations, or requirements of the Board of Fire Underwriters, or any other similar body having jurisdiction, and shall not (i) do, or permit anything to be done, in or upon the Premises, or bring or keep anything therein, except as now or hereafter permitted by the Fire Department, Board of Fire Underwriters, any fire insurance rating organization, or other authority having jurisdiction, and then only in such quantity and manner of storage as will not increase the rate for any insurance applicable to the Building; or, (ii) use the Premises in a manner which shall increase such insurance rates on the Building or on property located therein, over that applicable at the commencement of this Lease. If by reason of failure of LESSEE to comply with the provisions hereof, the insurance rate applicable to any policy of insurance shall at any time thereafter be higher than it otherwise would be, then LESSEE shall reimburse LESSOR for that part of any insurance premiums thereafter paid by LESSOR, which shall have been charged because of such failure by LESSEE.

Under Sections 15.5 and 15.6 hereof, there shall be no duty on LESSEE to make any structural change or to make any other change in the Premises unless required because of the manner in which LESSEE shall be using the Premises.

16. DAMAGE BY FIRE OR OTHER CASUALTY

If the Premises or any part thereof shall be damaged by fire or other casualty, LESSOR shall proceed with reasonable diligence, and at the expense of LESSOR (but only to the extent of insurance proceeds made available to LESSOR by any mortgagee of the Building), to repair or cause to be repaired such damage; provided, however, in respect of such alterations, decorations, additions, and improvements originally made or installed by LESSEE at LESSEE'S expense as shall have been damaged by such fire or other casualty, and which (in the judgment of LESSOR) can more effectively be repaired as an integral part of the repair work in the Premises, that the repairs to such LESSEE'S alterations, decorations, additions, and improvements shall be performed by LESSOR but at LESSEE'S expense. All repairs to and replacements

of property which LESSEE is entitled to remove as in Article 10 provided, shall be made by at the expense of LESSEE. If the Premises or any part thereof shall have been rendered unfit for use and occupation hereunder by reason of such damage, the Yearly Rent or a just and proportionate part thereof according to the nature and extent to which the Premises shall have been so rendered unfit, shall be suspended or abated from the date of the occurrence of such casualty until the Premises (except as to the property which is to be repaired by or at the expense of LESSEE) shall have been restored as nearly as practicably may be to the condition in which they were immediately prior to such fire or other casualty; provided, however, that if LESSOR or any mortgagee of the Building shall be unable to collect the insurance proceeds (including any rent insurance proceeds) applicable to such damage because of some action or inaction on the part of LESSEE, or the employees, licensees, or invitees of LESSEE, the cost of repairing such damage shall be paid by LESSEE and there shall be no abatement of rent. LESSOR shall not be liable for delays in the making of any such repairs which are due to government regulations, casualties, strikes, unavailability of labor and materials, and other causes beyond the reasonable control of LESSOR, nor shall LESSOR be liable for any inconvenience or annoyance to LESSEE or injury to the business of LESSEE resulting from delays in repairing such damage. If (i) the Premises are so damaged by such fire or other casualty at any time during the last twelve (12) months of the term hereof that the cost to repair such damage (as reasonably estimated by the LESSOR) is likely to exceed one-third of the total Yearly Rent for the period from the estimated date of restoration until the Termination Date; or (ii) the Building (whether or not including any portion of the Premises) is so damaged by such fire or other casualty that substantial alteration or reconstruction of the Building shall in LESSORS judgement be required, then and in either of such events, this Lease and the term hereof may be terminated at the election of LESSOR by a notice in writing of his election so to terminate which shall be given by LESSOR to LESSEE within sixty (60) days following such fire or other casualty, the effective termination date of which shall be not less than thirty (30) days after the date on which such termination notice is received by LESSEE. If the Premises are damaged by fire or other casualty, and are not substantially restored to its original condition within a period of sixty (60) days therefrom, the LESSEE may, by notice in writing to LESSOR cancel and terminate this Lease on account thereof. In the event of any such termination, this Lease and the term hereof shall expire as of such effective termination date as though that were the Termination Date as stated in Exhibit 2, and the Yearly Rent shall be apportioned as of such date; and, if the Premises or any part thereof shall have been rendered unfit for use and occupation by reason of such damage, the Yearly Rent for the period from the date of occurrence of such fire or other casualty to the effective termination date, or a just and proportionate part thereof, according to the nature and extent to which the Premises shall have been so rendered unfit, shall be abated. Any abatement of rent pursuant to this section, whether total or partial, shall extend to all rent items called for by this Lease whether "yearly" or otherwise.

17. WAIVER OF SUBROGATION RIGHTS

The LESSOR discharges and releases the LESSEE, his agents or employees, to the extent of the LESSOR'S insurance coverage, for and on account of any and all claims and liabilities arising out of any loss or damage during the term hereof, or any extension thereof, to any property of the LESSOR caused by fire and such risks as are customarily comprehended by the term "extended coverage" in endorsements to fire insurance policies; and (ii) such other risks as are covered by insurance which the LESSOR may desire to procure.

The LESSEE discharges and releases the LESSOR, his agents or employees, to the extent of LESSEE'S insurance coverage for and on account of any and all claims and liabilities arising out of any loss or damage during the term hereof, or any extension hereof, to any property of the LESSEE caused by (i) fire and such risks as are comprehended by the term "extended coverage" in endorsements to fire insurance policies; and (ii) such other risks as are covered by insurance which the LESSEE may desire to procure.

In consideration of the foregoing, each of the parties hereto agrees with the other party (i) that such insurance as may be in effect during the term of this Lease, or any extensions thereof, shall include a clause or endorsement which provides in substance that the insurance company waives any right or subrogation which it might otherwise have against the LESSOR or the LESSEE, as the case may be; and, (ii) upon demand of the other party for any extra premium costs, if any, incurred in obtaining such clause or endorsement.

Upon demand in writing made by either party hereto, the other party agrees to furnish to it a statement of the amount and type of such insurance coverage and the names of the insurance companies and to request its insurance companies to give notice to such other party of any cancellation or discontinuance of any part of such coverage.

18. CONDEMNATION -- EMINENT DOMAIN

In the event that the Premises or any part thereof, or the whole or any part of the Building (including within such term the Common Areas thereof shall be taken or appropriated by eminent domain or shall be condemned for any public or quasi-public use, or (by virtue of any such taking, appropriation, or condemnation) shall suffer any damage (direct, indirect, or consequential) for which LESSOR or LESSEE shall be entitled to compensation, then (and in any such event) this Lease and the term hereof may be terminated at the election of LESSOR or LESSEE by a notice in writing of his or its election so to terminate which shall be given to the other party within sixty (60) days following the date on which LESSOR shall have received notice of such taking, appropriation, or condemnation.

Upon the giving of any such notice of termination (either by LESSOR or LESSEE) this Lease and the term hereof shall terminate on or retroactively as of the date on which LESSEE shall be required to vacate any part of the Premises, or shall be deprived of a substantial part of the means of access thereto; provided, however, that LESSOR may in LESSOR'S notice elect to terminate this Lease and the term hereof retroactively as of the date on which such taking, appropriation, or condemnation became legally effective. In the event of any such termination, this Lease and the term hereof shall expire as of such effective termination date and the Yearly Rent shall be apportioned as of such date: If neither party (having the right so to do) elects to so terminate, LESSOR will, with reasonable diligence and at LESSOR'S expense, restore the remainder of the Premises, or the remainder of the means of access thereto, as nearly as practicably may be to the same condition as obtained prior to such taking, appropriation, or condemnation, in which event (i) the Rentable Area and Yearly Rent, according to the nature and extent of the taking, appropriation, or condemnation, and the resulting permanent injury to the Premises, or the means of access thereto, shall be permanently abated; and, (ii) a just proportion of the remainder of the Yearly Rent, according to the nature and extent of the taking, appropriation, or condemnation and the resultant injury sustained by the Premises or the means of access thereto, shall be abated until what remains of the Premises or the means of access thereto, shall have been restored as full as may be for permanent use and occupation by LESSEE hereunder. There is expressly reserved to LESSOR all rights to compensation and damages created, accrued, or accruing by reason of any such taking, appropriation or condemnation, in implementation and confirmation of which LESSEE does hereby acknowledge that LESSOR shall be entitled to receive all such compensation and damages, grants to LESSOR all and whatever rights (if any) LESSEE may have to such compensation and damages, and agrees to execute and deliver all and whatever further instruments of assignment as LESSOR may from time to time request.

If part of the Building but not any part of the Premises, or if any part of the Common Areas of the Building shall be taken or appropriated by eminent domain or condemned for any public or quasi-public use, LESSOR'S right to terminate this Lease pursuant to this Section may be exercised only if LESSOR shall reasonably determine that the continued operation of the Building or what may remain thereof would not be economically feasible.

Upon the giving of any notice of termination under this Section 18, whether by LESSOR or LESSEE, the term of this Lease shall end upon LESSEE'S vacating the Premises pursuant to the notice, unless the term be sooner ended as a matter of law as a consequence of the taking, appropriation, or condemnation.

19. LESSEE'S DEFAULT

19.1 EVENTS OF DEFAULT: If at any time subsequent to the date of this Lease any one or more of the following events (hereinafter referred to as a "DEFAULT OF LESSEE") shall occur:

(a) LESSEE shall fail to pay the rent or other charges hereunder when due, and such failure shall continue for a period of seven (7) days after receipt of notice from LESSOR (receipt shall be presumed within a three day period after the same is posted in the U.S. Mail postage prepaid); provided however, that if such failure shall occur more than once during each Computation Year, no written notice from the LESSOR shall be required, and the LESSEE shall be in default hereunder, if its failure shall continue for a period of seven (7) days after the payment of rent or other charges hereunder shall become due.

(b) LESSEE shall neglect or fail to perform or observe any other covenant herein contained on LESSEE'S part to be performed or observed, and LESSEE shall fail to remedy the same within thirty (30) days after written notice from LESSOR, specifying such neglect or failure, or if such failure is of such a nature that LESSEE cannot reasonably remedy the same within such thirty (30) day period, LESSEE shall fail to promptly commence to remedy the same and shall prosecute such remedy to completion with due diligence and continuity; or,

(c) LESSEE'S leasehold in the Premises shall be taken on execution or by other process of law directed against LESSEE; or,

(d) LESSEE shall make an assignment for the benefit of creditors; or shall file a voluntary petition in bankruptcy; or shall be adjudicated bankrupt or insolvent; or shall file any petition or answer seeking any reorganization, arrangement, composition, readjustment, liquidation, dissolution, or similar relief for itself under any present or future Federal, State, or other statute, law, or regulation for the relief of debtors; or shall seek or consent to, or acquiesce in, the appointment of any trustee, receiver, or liquidator of LESSEE or of all or any substantial part of its properties; or shall admit in writing its inability to pay its debts generally as they become due; or,

(e) A petition shall be filed against LESSEE in bankruptcy or under any other law seeking any reorganization, arrangement, composition, readjustment, liquidation, dissolution, or similar relief under any present or future Federal, State or other statute, law or regulation and shall remain undismissed or unstayed for an aggregate period of sixty (60) days (whether or not consecutive); or, if any debtor in possession (whether or not LESSEE), trustee, receiver, or liquidator of LESSEE of all or any substantial part of its properties shall be appointed without the consent of acquiescence of LESSOR and such appointment shall remain unvacated or unstayed

for an aggregate period of sixty (60) days (whether or not consecutive), then in any such case (i) if such Default of LESSEE shall occur prior to the Term Commencement Date, this Lease shall ipso facto, and without further act on the part of LESSOR, terminate; and, (ii) if such Default of LESSEE shall occur after the Term Commencement Date, LESSOR may terminate this lease by notice to LESSEE specifying a date not less than ten (10) days after the giving of such notice, on which this Lease shall terminate and this Lease shall come to an end on the date specified therein as fully and completely as if such date were the date herein originally fixed for the expiration of the term of this Lease (LESSEE hereby waiving any rights of redemption under present or future laws), and LESSEE will then quit and surrender the Premises to LESSOR, but LESSEE shall remain liable as hereinafter provided.

19.2 RE-ENTRY BY LESSOR: If this Lease shall have been terminated as provided in this Section, or if any execution shall be issued against LESSEE or any of LESSEE'S property whereupon the Premises shall be taken or occupied by someone other than LESSEE, then LESSOR may, without notice, re-enter the Premises, either by force, summary proceedings, ejectment, or otherwise, and remove and disposes LESSEE and all other persons and any and all property from the same as if this Lease had not been made.

19.3 DAMAGES DUE: In case of any such termination, the rent reserved hereunder shall thereupon become due and be paid up to the time of such termination together with any expenses LESSOR may incur for attorney's fees, brokerage commissions, or expenses with respect to putting the Premises in good order and for preparing the same for reletting. In addition, if such termination occurs during the initial term of this Lease, there shall become due from the LESSEE to the LESSOR an amount which shall be equal to the unamortized portion of the total cost to the LESSOR of furnishing and providing the Building Standard Work in and to the Premises, measured from the date of such termination to the date originally fixed in this Lease as the Termination Date, as if such cost was fully amortized over the initial term of this Lease.

19.4 LIQUIDATED DAMAGES: In case of any such termination, LESSEE shall also pay LESSOR as liquidated damages for the failure of LESSEE to observe and perform the covenants herein contained to be performed by LESSEE, any deficiency between the rent reserved hereunder and/or covenanted to be paid and the net amount, if any, of the damages collected under Section 19.3 and the rents collected on account of the lease or leases of the Premises for each month of the period which would otherwise have constituted the balance of the term of this Lease. In computing such liquidated damages there shall be added to such deficiency such expenses as LESSOR may incur in connection with reletting such as legal expenses, brokerage, advertising, and for keeping the Premises in good order and for preparing the same for reletting. Any such liquidated damages shall be paid in monthly installments by LESSEE on the first day of each month, and any suit brought to

collect the amount of the deficiency for any month shall not prejudice in any way the rights of LESSOR to collect the deficiency for any subsequent month by similar proceedings. In no event shall LESSEE be entitled to receive the excess, if any, of such net rents collected over the sums payable by any LESSEE of the Premises to LESSOR hereunder. LESSOR, upon termination or at any time hereafter, shall have the right, in lieu of collecting liquidated damages in installments as above provided, to recover from LESSEE liquidated damages payable on demand equal to the excess of the rent which would have been payable from the date of such demand to the end of the period which would otherwise have constituted the balance of the term of this Lease, over the then fair market rental value of the Premises for the same period. For this purpose, in computing the amount of rent, the amounts to be included for Operating Costs and other amounts required by this Lease to be paid by LESSEE shall be deemed, for each month, to be equal to the amount of the item for the twelve (12) months preceeding the date of demand.

19.5 LESSOR'S RIGHTS: In case of any default by LESSEE, reentry, expiration, or dispossession by summary proceedings, or otherwise, LESSOR may (i) re-let the Premises or any part or parts thereof, either in the name of LESSOR or otherwise, for a term or terms which may at LESSOR'S option be equal to or less than or exceed the period which would otherwise have constituted the balance of the term of this Lease and may grant concessions or free rent to the extent that LESSOR in his discretion deems advisable and necessary to re-let the same; and, (ii) may make such reasonable alterations, repairs, and decorations in the Premises as LESSOR in his sole judgement considers advisable and necessary for the purpose of reletting the Premises, and the making of such alterations, repairs, and decorations shall not operate or be construed to release LESSEE from liability hereunder as aforesaid. LESSOR shall in no event be liable in any way whatsoever for failure to re-let the Premises, or, in the event that the Premises are re-let, for failure to collect the rent under such reletting. LESSEE hereby expressly waives any and all rights of redemption granted by or under any present or future laws in the event of LESSEE being evicted or dispossessed, or in the event of LESSOR obtaining possession of the Premises, by reason of the violation of the LESSEE of any of the covenants and conditions of this Lease.

19.6 REMEDIES NON-EXCLUSIVE: The specified remedies to which LESSOR may resort hereunder are not intended to be exclusive of any remedies or means of redress to which LESSOR may at any time be lawfully entitled and LESSOR may invoke any remedy (including the remedy of specific performance) allowed at law or in equity as if specific remedies were not herein provided for.

20. LESSOR'S DEFAULT

LESSOR shall in no event be in default in the performance of any of LESSOR'S obligations hereunder unless and until LESSOR shall have failed to perform such

obligations within thirty (30) days, or such additional time as is reasonably required to correct any such default, after written notice by LESSEE to LESSOR specifying wherein LESSOR has failed to perform any such obligation.

21. ENTIRE AGREEMENT; WAIVER; SURRENDER

21.1 ENTIRE AGREEMENT: This Lease, the Exhibits hereto annexed, and the Addenda hereto annexed (if any) are made a part hereof, and contain the entire and only agreement between the parties and any and all statements and representations, written and oral, including previous correspondence and agreements between the parties hereto, are merged herein. LESSEE acknowledges that all representations and statements upon which it relied in executing this Lease are contained herein, and that the LESSEE in no way relied upon any other statements or representations, written or oral. Any executory agreement hereafter made shall be ineffective to change, modify, discharge, or effect an abandonment of this Lease in whole or in part unless such executory agreement is in writing and signed by the party against whom the enforcement of the change, modification, discharge, or abandonment is sought.

21.2 WAIVER BY LESSOR: The failure of LESSOR to seek redress for violation, or insist upon the strict performance of any covenant or condition of this Lease, or any of the rules and regulations promulgated by the LESSOR shall not prevent a subsequent act, which would have originally constituted a violation, from having all the force and effect of an original violation. The receipt by LESSOR of rent with knowledge of the breach of any covenant of this Lease shall not be deemed a waiver of such breach. The failure of LESSOR to enforce any of his rules and regulations against LESSEE and/or any other tenant in the Building shall not be deemed a waiver of any such rules and regulations. No provisions of this Lease shall be deemed to have been waived by LESSOR unless such waiver be in writing signed by LESSOR. No payment by LESSEE or receipt by LESSOR of a lesser amount than the monthly rent herein stipulated shall be deemed to be other than on account of the stipulated rent, nor shall any endorsement or statement on any check or any letter accompanying any check or payment as rent be deemed an accord and satisfaction, and LESSOR may accept such check or payment without prejudice to LESSOR'S right to recover the balance of such rent or pursue any other remedy in this provided.

21.3 SURRENDER: No act or thing done by LESSOR during the term hereby demised shall be deemed an acceptance of a surrender of the Premises, and no agreement to accept such surrender shall be valid, unless in writing signed by the LESSOR. No employee or agent of LESSOR shall have any power to accept the keys to the Premises prior to the termination of this Lease.

22. INABILITY TO PERFORM

Except as provided in Sections 3.1 and 3.2 hereof, this Lease and the obligations of LESSEE to pay rent hereunder and perform all of the other covenants, agreements, terms, provisions, and conditions hereunder on the part of LESSEE to be performed, shall in no way be affected, impaired, or excused because LESSOR is unable to fulfill any of his obligations under this Lease; or is unable to supply or is delayed in supplying any service expressly or impliedly to be supplied; or is unable to make, or is delayed in making, any repairs, replacements, additions, alterations, improvements, or decorations; or is unable to supply or is delayed in supplying any equipment or fixtures if LESSOR is prevented or is delayed from so doing by reason of strikes or labor troubles, or any other similar or dissimilar cause whatsoever beyond LESSOR'S reasonable control, including but not limited to governmental preemption in connection with a national emergency; or by reason by any rule, order, or regulation of governmental agency; or by reason of the conditions of supply and demand which have been or are affected by war, hostilities, or other similar or dissimilar emergency. In each such instance of inability of LESSOR to perform, LESSOR shall exercise reasonable diligence to eliminate the cause of such inability to perform.

23. BILLS AND NOTICES

Any notice, consent, request, bill, demand, or statement hereunder by either party to the other party shall be in writing and shall be deemed to have been duly given when either delivered personally or mailed addressed to LESSOR at his address as set forth in Exhibit 2 hereof and to LESSEE at the Premises, or if any address for notices shall have been duly changed as hereinafter provided, to the party at such changed address. Either party may at any time change the address for such notices, consents, request, bills, demands, or statements by delivering or mailing, as aforesaid, to the party entitled thereto, a notice stating the change and setting forth the changed address.

24. PARTIES BOUND - SEISEN OF TITLE

The covenants, agreements, terms, provisions, and conditions of this Lease shall bind and benefit the successors and assigns of the parties hereto with the same effect as if mentioned in each instance where a party hereto is named or referred to, except that no violation of the provisions of Article 14 hereof shall operate to vest any rights in any successor or assignee of LESSEE, and that the provisions of this Article 24 shall not be construed as modifying Article 19 hereof. The words "LESSOR" and "LESSEE" as used herein shall be construed in each and every covenant and clause in this Lease, unless repugnant to the context thereof, to refer to the person or persons first named above and their respective representatives, successors, and assigns, and those claiming by, through, or under any of them.

If in connection with or as a consequence of the sale, transfer, or other disposition of the Building, LESSOR ceases to be the owner of the reversionary interest in the same, LESSOR shall be entirely freed and relieved from the performance and observance thereafter of all covenants and obligations hereunder on the part of LESSOR to be performed and observed, it being understood and agreed in such event (and it shall be deemed and construed as a covenant running with the land) that the person succeeding to LESSOR'S ownership of said reversionary interest shall thereupon and thereafter assume, perform, and observe, any and all such covenants and obligations of LESSOR.

25. SUBORDINATION AND LESSEE'S ESTOPPEL CERTIFICATE

25.1 SUBORDINATION OF LEASE: LESSEE agrees that, at the election of the LESSOR, this Lease shall be subject and subordinate to the lien of any one or more mortgages which may be now or hereafter be placed on, encumber, or affect the Building and to all renewals, modifications, consolidations, and replacements thereof. When requested to do so by LESSOR, LESSEE agrees to execute, acknowledge, and deliver to the LESSOR an instrument (hereinafter referred to as "SUBORDINATION AGREEMENT") in form and substance reasonably satisfactory to the LESSOR, and in proper form for recording, wherein LESSEE agrees to and does subordinate this Lease to the lien of any one or more mortgages above mentioned, and to all renewals, modifications, consolidations, replacements, and extensions of the same, and to attorn to and recognized such mortgage(s) thereunder, and to any person claiming by, through, or under such mortgage(s).

25.2 LESSEE'S ESTOPPEL CERTIFICATE: LESSEE shall at any time, and from time to time, on not less than seven (7) days' prior written notice from LESSOR, execute, acknowledge, and deliver to LESSOR a statement in writing addressed to LESSOR (or to any mortgagee or prospective mortgagee of the Building) certifying that this Lease is unmodified and is in full force and effect, or if there have been modifications, the dates that this Lease is in full force and effect as modified, setting forth the modifications; stating the dates to which the rent and other charges under this Lease have been paid; and, whether or not to the best of its knowledge, there exists any default in the performance of any covenant, agreement, term, provision, or condition of this Lease, and if so, specifying each such default of which it has knowledge. It is intended that any such statement delivered pursuant hereto may be relied on by LESSOR and by any such mortgagee or prospective mortgagee affecting the Building.

25.3 NEGLIGENCE OR FAILURE OF LESSEE: In the event that LESSEE shall neglect or shall refuse to comply with its obligations as set forth in Sections 25.1 and 25.2, or shall neglect or refuse to execute a Subordination Agreement and/or Estoppel Certificate within a ten (10) day period after LESSOR's written request therefor, LESSEE hereby irrevocably appoints LESSOR as its attorney-in-fact with full power

and authority to execute and deliver such instrument or instruments or and in the name of LESSEE, or LESSOR may treat such neglect or failure on the part of the LESSEE as Default of LESSEE within the meaning of Section 19.1 of this Lease.

26. QUIET ENJOYMENT

LESSEE, subject to the terms and provisions of this Lease, on payment of the rent and other charges and upon observing, keeping, and performing all of the other terms and provisions of this Lease on LESSEE'S part to be observed, kept, and performed, shall lawfully, peaceably, and quietly have, hold, and occupy and enjoy the Premises during the term hereof, without hindrance or ejection by any persons lawfully claiming under LESSOR to have title to the Premises superior to LESSEE. The foregoing covenant of quiet enjoyment is in lieu of any other covenant, express or implied.

27. MISCELLANEOUS

27.1 SEPARABILITY: If any provision of this Lease or portion of such provision or the application thereof to any person or circumstance is for any reason held invalid or unenforceable, the remainder of the Lease (or the remainder of such provision) and the application thereof to other persons or circumstances shall not be affected thereby.

27.2 CAPTIONS AND VARIATIONS IN PRONOUNS: The captions in each article, section, and subsection in this Lease are inserted only as a matter of convenience and for reference, and in no way define, limit, or describe, the scope of this Lease or the intent of any provision thereof. All pronouns and any variation thereof shall be deemed to refer to the masculine, feminine, neuter, singular or plural, as the identity of the party or parties, or their representatives, heirs, successors and assigns, may require.

27.3 INCORPORATION OF EXHIBITS AND ADDENDA: Exhibits 1, 2, 3, and 4 and the Addenda hereto annexed (if any) and initialled by the parties hereto are expressly made a part of this Lease.

27.4 GOVERNING LAW: This Lease is made pursuant to, and shall be governed by and construed in accordance with, the laws of the Commonwealth of Massachusetts.

27.5 NONRECOURSE: Neither the trustee of the LESSOR Trust nor any of the beneficiaries thereof, or their respective heirs, successors, or assigns shall be personally liable for the performance or observance of any covenant or condition herein contained, or for the payment of any claim or judgement under this Lease, and no recourse shall be had against any such person for such performance, observance,

or payment. LESSEE agrees to look solely to the equity of the LESSOR in the Building for the satisfaction of any LESSEE'S claims under this Lease.

IN WITNESS WHEREOF, the parties hereto have executed this Indenture of Lease in duplicate original as a sealed instrument on the day and year first above set forth.

ATTEST

LESSOR:
WALPOLE PARK SOUTH (II) TRUST
By:

Witness

DONNELL W. MURPHY
Trustee as aforesaid

LESSEE:
NGS ASSOCIATES, INC.
By:

Secretary

Its
Hereunto Duly Authorized

EXHIBIT 1
PLAN OF PREMISES

EXHIBIT 2
REFERENCE DATA

DATE OF EXECUTION OF LEASE: December 21, 1989

LESSEE NGS ASSOCIATES, INC.

ARTICLE 1

PREMISES: Tenant space 2B in the Premises numbered as 24 Walpole Park South, Walpole, MA, substantially as shown upon plan hereto annexed as Exhibit 1.

ARTICLE 2

(a) TERM COMMENCEMENT DATE: March 1, 1990

(b) TERMINATION DATE: February 28, 1995

ARTICLE 4

USE OF PREMISES: For warehousing and sale of LESSEE'S products, and any other lawful use, and offices incidental thereto. No retail sales shall be permitted to be conducted from the Premises.

ARTICLE 5

RENT: Rent shall be paid at the times and in the amounts as set forth in Schedule A to this Exhibit 2. As set forth in Exhibit 2, payment of rent shall commence on the first day of the fourth month next following the Term Commencement Date. Notwithstanding the foregoing, the LESSEE shall, as of the Term Commencement Date, be liable for its periodic payment of LESSEE'S Proportionate Share of Taxes and LESSEE'S Proportionate Share of Operating Costs, as provided in this Lease.

ARTICLE 7

PARKING SPACES ALLOCATED TO LESSEE: Nine (9) Spaces

ARTICLE 8

(a) RENTABLE AREA: 5,021 (+)/(-) square feet

(b) BUILDING RENTABLE AREA: 95,567 (+)/(-) square feet

(c) LESSEE'S PROPORTIONATE SHARE: 5.3%

ARTICLE 23

ADDRESSES OF PARTIES:

to LESSOR:

Walpole Park South (II) Trust
147 Morgan Drive
Norwood, MA 02062

to LESSEE (prior to occupancy of Premises)

110 Shawmut Road
Canton, MA 02021

(after occupancy of Premises)

24 Walpole Park South
Walpole, MA 02081

EXHIBIT 2
SCHEDULE A

RENT SCHEDULE

| | DUE DATE | RENTABLE SF | RENTAL RATE | PAYMENT |
|-------------------|----------|-------------|-------------|---------|
| March | 1, 1990 | 5,021 sf | \$ /sf | \$ |
| April | 1, 1990 | 5,021 sf | \$ /sf | \$ |
| May | 1, 1990 | 5,021 sf | \$ /sf | \$ |
| June | 1, 1990 | 5,021 sf | \$6.50/sf | \$2,720 |
| July | 1, 1990 | 5,021 sf | \$6.50/sf | \$2,720 |
| August | 1, 1990 | 5,021 sf | \$6.50/sf | \$2,720 |
| September | 1, 1990 | 5,021 sf | \$6.50/sf | \$2,720 |
| October | 1, 1990 | 5,021 sf | \$6.50/sf | \$2,720 |
| November | 1, 1990 | 5,021 sf | \$6.50/sf | \$2,720 |
| December | 1, 1990 | 5,021 sf | \$6.50/sf | \$2,720 |
| January | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| February | 1, 1991 | 5,021 | \$6.50/sf | \$2,720 |
| Effective Rent Yr | 1 | | \$4.88/sf | \$2,720 |
| March | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| April | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| May | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| June | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| July | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| August | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| September | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| October | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| November | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| December | 1, 1991 | 5,021 sf | \$6.50/sf | \$2,720 |
| January | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| February | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| Effective Rent Yr | 2 | | \$6.50/sf | \$2,720 |

| | DUE DATE | RENTABLE SF | RENTAL RATE | PAYMENT |
|-------------------|----------|-------------|-------------|---------|
| March | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| April | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| May | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| June | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| July | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| August | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| September | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| October | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| November | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| December | 1, 1992 | 5,021 sf | \$6.50/sf | \$2,720 |
| January | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| February | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| Effective Rent Yr | 3 | | \$6.50/sf | \$2,720 |
| March | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| April | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| May | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| June | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| July | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| August | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| September | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| October | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| November | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| December | 1, 1993 | 5,021 sf | \$6.50/sf | \$2,720 |
| January | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| February | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| Effective Rent Yr | 4 | | \$6.50/sf | \$2,720 |
| March | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| April | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| May | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |

| | DUE DATE | RENTABLE SF | RENTAL RATE | PAYMENT |
|-------------------|-----------------|-------------|-------------|---------|
| June | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| July | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| August | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| September | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| October | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| November | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| December | 1, 1994 | 5,021 sf | \$6.50/sf | \$2,720 |
| January | 1, 1995 | 5,021 sf | \$6.50/sf | \$2,720 |
| February | 1, 1995 | 5,021 sf | \$6.50/sf | \$2,720 |
| Effective Rent Yr | 5 | | \$6.50/sf | \$2,720 |
| EFFECTIVE RENT: | 5.00 YEAR LEASE | | \$6.18/sf | \$2,584 |

A)

EXHIBIT 3

BUILDING STANDARD WORK

- NOTES
1. This "Scope of Work" is intended to outline the improvements to accommodate the Lessee's tenancy within the "Tenant Space".
 2. Unless otherwise noted the following items are not included:
 - A) The floor, walls, superstructure, roof and mechanical systems do not include any provisions for Lessee's machinery, equipment or the installation of same.
 - B) Security, Public Address, or Telephone Systems.
 - C) Computer Power or Data Wiring.
 3. Note the attached "Schedule (A)" for "Lessee's Quantities" included within the "Scope of Work".
 4. The Lessor or his nominee agree to perform the items noted within the "Scope of Work" substantially in accordance with the following information and for the "Rent" noted in Section (I).

| | | | |
|--------|-----------|-------------------|--|
| HEIGHT | | Overall: 21' - 4" | Maximum: top of concrete floor to top of Steel. |
| | Office | Clear: 9' - 0" | Minimum: top of concrete floor to underside of Acoustical Ceiling. |
| | Warehouse | Clear: 18' - 0" | Minimum: top of concrete floor to underside of Steel |

| | | | |
|--------------|--------|---|--|
| TENANT SPACE | Office | Office Toilet Office Toilet Lunch Private Offices Conference Room Lab Reception | (Mens Office Toilet) (Womens Office Toilet) |
| | | The balance of the area is open office | |

Warehouse The balance of the area is open warehouse.

Standard Tenant Improvements

| | | | | |
|------------------|----------------|--------|---|----------|
| CONCRETE etc. | | 111. | 4" non structural concrete floor on grade. | |
| | | 111.a. | 3000 psi concrete. | |
| | | 111.b. | 6"x6"/#10/#10 welded wire mesh reinforcing. | |
| | | 111.c | Control joints designed to reduce cracking. | |
| | Rear Entrance | 120. | Precast concrete stairs and rail. | |
| GLASS etc. | Front Entrance | 306. | Exterior front windows, door and sidelight. | |
| METAL STUD WALLS | Office | 355.a. | Face Wall (Interior) One layer of 1/2" gypsum board applied to the inside face of the front exterior wall, taped and sanded to the ceiling plus 6". | |
| | Warehouse | 355.b. | Face Wall (Interior) One layer of 1/2" gypsum board applied to the inside face of the front exterior wall, taped and sanded to the underside of steel. | |
| | Office | 360.a. | Demising (Office/Warehouse) (Wall | (Rated) |
| | Warehouse | 360.b. | Demising (Tenant) (Wall Framing 16" o.c., sound dampening insulation, two layers per face of 5/8" firecode gypsum board, taped and sanded to the underside of the metal deck. | (Rated) |
| | Office | 364.a. | Standard (Bathrooms)(Non Rated) Wall Framing 16" o.c. to the underside of the metal deck or barjoint, one layer per face of 1/2" gypsum board, taped and sanded to the underside of the ceiling plus 6". | |

| | | | |
|--------------------------|------------------|--------|---|
| DOORS and FRAMES etc. | Rear Entrance | 373.a. | Metal Door (Non Rated) |
| | | | Pressed metal frame, hollow metal door, 1 1/2 pair of butts, lock set, closer, threshold and weather-stripping. |
| | | 373.c | Metal Door (Rated) |
| | | | Pressed metal frame, hollow metal door, 1 1/2 pair of butts, lock set, and closer. |
| | | 373.e. | Hardboard Door (Rated) |
| | | | Pressed metal frame, hardboard door, 1 1/2 pair of butts, pass set, & bumper. |
| FINISHES | Office | 401. | Ceiling: White painted aluminum grid, 2' x 4' acoustical tiles. |
| | | 404. | Doors: Painted. |
| | Office Toilet | 406. | Floors: Vinyl Composite Tile. |
| | Kitchen & Lab | | |
| | Office | 408. | Floors: Carpet () Glued directly to the floor. () Allow \$12.00 per s.y. installed with tax for selection made from options provided by Lessor. |
| | Warehouse | 409. | Floors: Concrete Sealer. |
| | Office | 410. | Walls: Two coats of flat latex wall paint. |
| | Office | 413. | Base: 4" vinyl cove base. |
| | Toilets | 415. | Toilet paper holder, paper towel & soap dispensers, and mirrors. |
| | Office Toilet | 416. | Vanity cabinets and counters. |
| | Office | 418. | Louvre drapes for each exterior window. |
| PLUMBING | Office Toilet | 500.a. | Men: Water closet, vanity sink & faucet. |
| | Office Toilet | 500.b. | Women: Water closet, vanity sink & faucet. |
| ELECTRIC | | 552. | Service: 200 amp 120/208 volt panel board, located at column line C, with circuit breakers and electric meter. |

| | | | |
|---------------------|-----------|--------|---|
| | Office | 557.a. | Lights: Lighting level of 75 fc using 2 x 4, 4 tube recessed fluorescent fixture. |
| | Warehouse | 557.c. | Lights: Lighting level of 35 fc using 8', 2 tube strip fluorescent fixture. |
| | | 557.g. | Lights: Emergency lights and battery pack. |
| | | 557.h. | Lights: Exit signs. |
| | Office | 559.a. | Switches: Single pole wall switch & plate. Direct from panel board. |
| | Warehouse | | Direct from panel board. |
| | Office | 559.d. | Outlets: 110 volt duplex wall outlet. |
| | | 560.a. | Fire alarm horns and lights. |
| | | 560.b. | Fire alarm pull stations. |
| FIRE SPRINKLER | | 600.a. | Group 2 standard hazard calculated wet system having one head per 120 s.f. of floor area. |
| | Office | 603. | Drops with Heads |
| | Warehouse | 604. | Heads |
| HEATING and COOLING | Office | 650.a. | Heating and Cooling System 1. Gas heat and electric cooled roof top unit. 2. One thermostat per roof top unit. 3. Air distributed via a ducted system from the roof top unit and returned via the ceiling space plenum. 4. The system will maintain a: Heating temperature of 68 degrees when the outside temperature is 0 degrees. Cooling temperature is 90 degrees or a 15 degree differential between the inside & outside temperature. |
| | Warehouse | 650.b. | Heating System 1. Gas fired suspended unit heaters. 2. One thermostat per each heater 3. Air distributed directly from unit heaters. 4. The system will maintain a: Heating temperature of 55 degrees when the outside temperature is 0 degrees. |
| MISCELLANEOUS | | 702.a. | Overhead door, 8' - 0" X 8' - 0". |
| | | 702.b. | Dock seal and rubber dock bumpers. |
| GENERAL CONDITIONS | | 1158. | Exterior sign with Lessee's name installed over the front and rear entrances. |

1428. Architectural service; one design & revision.

=====
 Non Standard Tenant Improvements
 =====

| | | | |
|---------------|-----------|--------|---|
| ROOF | | 250.a. | Cut & patch for roof top units |
| GLASS & GLAZ | Reception | 300. | Slider with louver drapes. |
| PLUMBING | Kitchen | 500. | Kitchen sink, faucer and disposal. |
| | | 500. | Water connected for coffee maker. |
| ELECTRIC | | 555. | Power wire roof top unit. |
| MISCELLANEOUS | | 700. | Labor & material for adds to "Scope of Work". |
| | | 711. | Kitchen cabinets and counters. |
| ENCLOSURES | | | Title Page |
| | | | Section (I) Summation |
| | | | Section (II) Scope of Work |
| | | | Schedule (A) Lessee's Quantities |
| | | | Schedule (B) Rent Schedule |
| | | | Key Plan Of Premises |
| | | | Lessee's Floor Plan |

PROPOSAL TO LEASE
SCOPE OF WORK
SCHEDULE (A) PAGE (1)

LESSEE
QUANTITY

| | | | |
|--|--------------------------|---|--|
| Walpole Park South II Trust N.G.S. Associates, Inc. Tenant Space Number: WPS2-2B Proposal Number: WPS2-03NGSASS.(2) Tenant Number: WPS2-(N/A) November 21, 1989 | STANDARD IMPROVEMENTS | OFFICE: Rentable Area ----- WAREHOUSE: Rentable Area ----- TOTAL: Rentable Area | 2,500 sf 50% 2,521 sf 50% 5,021 sf |
|--|--------------------------|---|--|

| | | | | | |
|--------|--------------------|-------------------|-----------------------|----------------------------|-----------------------|
| 111 | CONCRETE etc | Floors | On Grade | | 5,021 sf |
| 120 a) | | Stairs | Pre Case Stair & Rail | Rear Entrance | 1 ea |
| 306 | GLASS etc | Door & Windows | | Front Entrance | 1 ea |
| 355 a) | METAL STUD WALLS | Face Wall | Interior | | 40 lf |
| 355 b) | | Face Wall | Interior | | 0 lf |
| 360 a) | | Demising Wall | Office/Ware | Rated | 40 lf |
| 360 b) | | Demising Wall | Tenant | Rated | 250 lf |
| 364 a) | | Standard Wall | | Non Rated | 192 lf |
| 373 a) | DOORS & FRAMES etc | Metal Door | | Non Rated | Rear Entrance 1 ea |
| 373 c) | | Metal Door | | Rated | Interior 1 ea |
| 373 e) | | Hardboard Door | | Non Rated | Interior 8 ea |
| 401 | FINISHES | Ceilings | Acoustical 2 x 6 Tile | | 2,500 sf |
| 404 | | Doors | Paint | | 10 ea |
| 406 | | Floor | Vinyl Composite Tile | | 1,160 sf |
| 408 | | Floor | Carpet | | 164 sy |
| 410 | | Walls | Paint | Office Walls | 6,159 sf |
| 413 | | Base | Vinyl Cove | Office Walls | 628 lf |
| 515 | | Accessories | | | 2 ea |
| 416 | | Vanities | Lavanette | | 2 ea |
| 418 | | Windows | Louvre Drapes | | 3 ea |
| 500 | PLUMBING | Toilet Rooms | Plumbing Fixtures | | 4 ea |
| 552 | ELECTRIC | Service & Meters | | | 1 ea |
| 557 a) | | Light Fixtures | 2' x 4' Recessed | | 35 ea |
| 557 b) | | Light Fixtures | 8' Strips | | 6 ea |
| 557 c) | | Light Fixtures | Emergency | Lights | 3 ea |
| 557 d) | | Light Fixtures | | Battery Packs | 1 ea |
| 557 e) | | Light Fixtures | Exit Signs | | 3 ea |
| 559 a) | | Switches | Single Pole | Wall Mounted Switch | 16 ea |
| 559 b) | | Outlets | 110 Volt | Wall Mounted Duplex Outlet | 38 ea |
| 560 a) | | Fire Alarm | Horn & Lights | | 1 ea |
| 560 b) | | Fire Alarm | Full Stations | | 2 ea |
| 603 | FIRE SPRINKLER | Drops With Heads | Dropped Ceiling Area | | 25 ea |
| 604 | | Heads | Exposed Ceiling Area | | 38 ea |
| 650 a) | HEATING & COOLING | Heating & Cooling | Roof Top Units | | 2,500 sf |
| 650 b) | | Heating | Unit Heaters | | 4,521 sf |
| 702 | MISCELLANEOUS | Overhead Doors | Seals | Rubber Bumpers | 1 ea |
| 1158 | GENERAL CONDITIONS | Signs | Tenant Neat | Exterior | Front & Rear 1 pr |
| 250 | ROOF | Cut & Patch | Roof Top Units | | 1 ea |

| | | | | |
|--------|-----------------|------------------|------------------------------------|----------|
| 300 | GLASS & GLAZING | Reception | Slider W/ Louver Blinds | 12 sf |
| 500 a) | PLUMBING | Kitchen | Kitchen Sink, Disposal & Faucet | 1 ea |
| 500 b) | | Kitchen | Water Connection for Coffee Maker | 1 ea |
| 555 | ELECTRIC | Power Wire | Roof Top Unit | 1 ea |
| 700 a) | MISCELLANEOUS | Labor & Material | For Additional Tenant Improvements | 5,021 sf |
| 711 | | Kitchen | Cabinets & Counters | 6 lf |

EXHIBIT 4

SIGN SPECIFICATIONS

This sign specification is written to create and maintain standards of uniformity for all businesses in Walpole Park South (II). Tenants must conform with these specifications, and any variations must be approved of by the Landlord.

- A. BUILDING SIGNS - One (1) non-illuminated 4'0" X 5'0" will be allowed for each tenant for identification purposes. The sign shall be manufactured with a 1 1/2" X 2 1/2" extruded aluminum retainer forming frame around changeable .063 aluminum face. Face and frame will be rust to match trim on building. All lettering must be Rockwell Bold. The sign shall be mounted and centered over entrance door.

One (1) non-illuminated 1' 6" X 4' 0" will be allowed for tenant identification above the loading dock doors in the rear of the Building. The sign will be manufactured of 0.40 aluminum with a 1" aluminum tube frame. Face will be rust background with white copy. All lettering must be Rockwell Bold.

- B. WINDOW SIGNS - Nothing is to appear in/or on the windows without the LESSOR's approval before installation.

OTHER SIGNS - No other signs, temporary or permanent, are allowed without written approval of the LESSOR.

28. LESSEE'S OPTION TO EXTEND LEASE TERM

28.1 OPTION GRANTED: At the expiration of the initial term of this Lease, and if this Lease shall then be in full force and effect, and the LESSEE shall have fully performed or observed all of the terms, covenants, and conditions on its part to be performed or observed hereunder, the LESSEE shall have the option to extend the term of the Lease, upon the same terms, covenants and conditions, (except for rent as hereinbelow referred to as "EXTENDED TERM"). The option herein granted shall be exercised by the LESSEE by giving written notice to the LESSOR, not less than three (3) months and no more than six (6) months prior to the expiration of the initial Lease Term.

28.2 RENT DURING EXTENDED TERM: The Yearly Rent payable by the LESSEE during the Extended Term shall be the greater of the following: (1) the rate per annum payable at the end of the initial Lease term; or, (2) a sum equal to what would be considered as the fair market rental for the Premises, based upon the use of the same as first class office and warehouse space located in the rental community between Route 1 and Route 128 as of the date of commencement of the Extended Term, under similar terms and conditions as contained in this Lease, but requiring no investment by LESSOR for improvements, renovations, repairs, etc. (hereinafter referred to as "MARKET RENT"). If the parties cannot agree as to the Market Rent, the Market Rent shall be determined by two (2) appraisers who are members of the American Institute of Real Estate Appraisers to be appointed and paid for by each of the parties. If such appraisers cannot agree on the Market Rent, they shall together promptly select a third appraiser who shall also be a member of the American Institute of Real Estate Appraisers and whose fee shall be shared by each of the parties hereto. A written determination as to the Market Rent signed by any two (2) of the appraisers so chosen shall be final and binding on the parties hereto. The Yearly Rent payable by the LESSEE during the Extended Term shall be paid in addition thereto, the LESSEE shall pay all other charges, such as, but not limited to, Taxes and Operating Costs as set forth in this Lease.

EXHIBIT 2
REFERENCE DATA

DATE OF EXECUTION OF LEASE: December 21, 1989

DATE OF EXECUTION OF THIS FIRST AMENDMENT: March , 1994

LESSEE: NGS DIVISION/MKS INSTRUMENTS, INC.,

ARTICLE 1 DESCRIPTION OF DEMISED PREMISES

- (a) Initial Premises: 5,021+ square feet of space ("INITIAL SPACE") consisting of 2,500+/- of office space and 2,521+/- of warehouse space located in the building numbered 24 Walpole Park South, Walpole, Massachusetts, as shown on the space plan hereto annexed as Exhibit 1, outlined in yellow, and being identified thereon as "Initial Space A".
- (b) Additional Space: "B" Commencing on May 1, 1992 the LESSEE shall take and lease from the LESSOR an additional 5,021+/- square feet of space ("ADDITIONAL SPACE") consisting of 500+/- square feet of office space and 4,521+/- of warehouse space located contiguous to the Initial Space, as shown on the space plan hereto annexed as Exhibit 1, outlined in yellow, and being identified thereon as "Additional Space B".
- (b) Additional Space: "C" Commencing on March 1, 1994 the LESSEE shall take and lease from the LESSOR an additional 10,042+/- square feet of space ("ADDITIONAL SPACE") consisting of 1,250+/- square feet of office space and 8,792+/- of warehouse space located contiguous to the Initial Space, as shown on the space plan hereto annexed as Exhibit 1, outlined in yellow, and being identified thereon as "Additional Space C".

ARTICLE 2

- 2.1 TERM COMMENCEMENT DATE: as to the Initial Space "A"
March 1, 1990
- TERM COMMENCEMENT DATE: as to the Additional Space "B"
May 1, 1992
- TERM COMMENCEMENT DATE: as to the Additional Space "C"
March 1, 1994

2.2 TERMINATION DATE: March 31, 1997

to the same Exhibit 3A as annexed hereto, such Exhibit 3A being applicable to the Additional Space (as defined in said Exhibit 2).

Except as above provided, The Lease shall be otherwise deemed to be unamended and unmodified.

IN WITNESS WHEREOF, the parties have hereto executed this FIRST AMENDED in duplicate original as a sealed instrument on this ____ day of March 1994.

LESSOR:

WITNESS

DONNELL W. MURPHY
Trustee as aforesaid

ATTEST:

LESSEE:
NGS DIVISION/MKS INSTRUMENTS, INC.
BY:

SECRETARY/CLERK

ITS
hereunto duly authorized

DATE: 03/15/94 TENANT : NGS DIVISION/MKS INSTRUMENTS, INC.

RENT PAYMENT SCHEDULE

| DUE DATE | RENTABLE SQ. FT. | | | RENTABLE SQ. FT. | RENTAL RATE | | | RENTAL PAYMENT |
|-------------------|------------------|---------|---------|------------------|-------------|---------|---------|----------------|
| | Space A | Space B | Space C | | Space A | Space B | Space C | |
| January 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| February 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| March 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| April 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| May 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| June 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| July 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| August 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| September 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| October 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| November 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| December 1, 1994 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| CALENDAR YEAR 1 | | | | | | | | |
| January 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| February 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| March 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| April 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| May 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| June 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| July 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| August 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| September 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| October 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| November 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| December 1, 1995 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| CALENDAR YEAR 2 | | | | | | | | |
| January 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 8.00 | \$ 8.00 | \$ 8.00 | \$ 8,368.33 |
| February 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 8.00 | \$ 8.00 | \$ 8.00 | \$ 8,368.33 |
| March 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 8.00 | \$ 8.00 | \$ 8.00 | \$ 8,368.33 |

RENT PAYMENT SCHEDULE

| DUE DATE | RENTABLE SQ. FT. | | | RENTABLE SQ. FT. | RENTAL RATE | | | RENTAL PAYMENT |
|-------------------|------------------|---------|---------|------------------|-------------|---------|---------|----------------|
| | Space A | Space B | Space C | | Space A | Space B | Space C | |
| April 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| May 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| June 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| July 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| August 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| September 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| October 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| November 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| December 1, 1996 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 5.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |

CALENDAR YEAR 3

| | | | | | | | | |
|-------------------|-------|-------|--------|--------|---------|---------|---------|-------------|
| January 1, 1997 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 8.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| February 1, 1997 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 8.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| March 1, 1997 | 5,021 | 5,021 | 10,042 | 20,084 | \$ 8.00 | \$ 5.00 | \$ 5.00 | \$ 8,368.33 |
| April 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| May 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| June 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| July 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| August 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| September 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| October 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| November 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |
| December 1, 1997 | 0 | 0 | 0 | 0 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 |

CALENDAR YEAR 4

FIRST AMENDMENT

This is the FIRST AMENDMENT made to a certain Indenture of Lease ("THE LEASE") made by and between Donnell W. Murphy, Trustee of Walpole Park South (II) Trust ("LESSOR"), as landlord; and NGS Division/MKS Instruments, Inc., a Massachusetts corporation ("THE LESSEE"), as tenant dated December 21, 1989. The Lease concerns certain premises leased by the LESSEE from the LESSOR at 24 Walpole Park South Drive, Walpole, MA.

In consideration hereof, the LESSOR and the LESSEE do hereby modify The Lease as follows:

29. EXHIBIT 1 ("Plan of Premises") as annexed to The Lease is stricken and there is substituted in place thereof Exhibit 1 as annexed hereto.
30. EXHIBIT 2 ("Reference Data") as annexed to The Lease is stricken and there is substituted in place thereof Exhibit 2 as annexed hereto.
31. EXHIBIT 3 ("Building Standard Work") as annexed to The Lease is amended by identifying the same as being applicable to the Initial Space (as defined in Exhibit 2 hereto annexed); and further by adding to the same Exhibit 3A as annexed hereto, such Exhibit 3A being applicable to the Additional Space (as defined in said Exhibit 2).

Except as above provided, The Lease shall be otherwise deemed to be unamended and unmodified.

IN WITNESS WHEREOF, the parties have hereto executed this FIRST AMENDMENT in duplicate original as a sealed instrument on this 19th day of November, 1993.

LESSOR:

WITNESS

DONNELL W. MURPHY
Trustee as aforesaid

ATTEST:

LESSEE:
NGS DIVISION/MKS INSTRUMENTS, INC.
BY:

WITNESS

Its
hereunto duly authorized

DATE: 10/15/93 TENANT : NGS DIVISION/MKS INSTRUMENTS, INC.

| DUE DATE | RENTABLE SQ. FT. | | | RENT PAYMENT | SCHEDULE RENTAL RATE | | | RENTAL PAYMENT |
|-------------------|------------------|----------|-----------|------------------|----------------------|---------|---------|----------------|
| | Space A | Space B | Space C | RENTABLE SQ. FT. | Space A | Space B | Space C | |
| January 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| February 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| March 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| April 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| May 1 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| June 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| July 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| August 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| September 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| October 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| November 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| December 1, 1993 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ----- | | | | | | | | |
| CALENDAR YEAR 1 | | | | | | | | |
| January 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| February 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| March 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| April 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| May 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| June 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| July 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| August 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| September 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| October 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| November 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| December 1, 1994 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| ----- | | | | | | | | |
| CALENDAR YEAR 2 | | | | | | | | |
| January 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |
| February 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 6.50 | 5.58 | 5.00 | 9,238.64 |

| DUE DATE | RENTABLE SQ. FT. | | | RENT PAYMENT SQ. FT. | SCHEDULE RENTAL RATE | | | RENTAL PAY- MENT |
|-------------------|---------------------|----------|-----------|-------------------------|----------------------------|---------|---------|------------------------|
| | Space A | Space B | Space C | | Space A | Space B | Space C | |
| March 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 5.00 | 0.00 |
| April 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| May 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| June 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| July 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| August 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| September 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| October 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| November 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| December 1, 1995 | 5,021.00 | 5,021.00 | 10,042.00 | 20,084.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CALENDAR YEAR 3 | | | | | | | | |

EXHIBIT 2

REFERENCE DATA

DATE OF EXECUTION OF LEASE: December 21, 1989

DATE OF EXECUTION OF THIS FIRST AMENDMENT: October , 1993

LESSEE: NGS DIVISION/MKS INSTRUMENTS, INC.,

ARTICLE 1 DESCRIPTION OF DEMISED PREMISES

- (a) Initial Premises: 5,021 (+/-) square feet of space ("INITIAL SPACE") consisting of 2,500 (+/-) of office space and 2,521 (+/-) of warehouse space located in the building numbered 24 Walpole Park South, Walpole, Massachusetts, as shown on the space plan hereto annexed as Exhibit 1, outlined in yellow, and being identified thereon as "Initial Space A".
- (b) Additional Space: "B" Commencing on May 1, 1992 the LESSEE shall take and lease from the LESSOR an additional 5,021 (+/-) square feet of space ("ADDITIONAL SPACE") consisting of 500 (+/-) square feet of office space and 4,521 (+/-) of warehouse space located contiguous to the Initial Space, as shown on the space plan hereto annexed as Exhibit 1, outlined in yellow, and being identified thereon as "Additional Space B".
- (b) Additional Space: "C" Commencing on March 1, 1994 the LESSEE shall take and lease from the LESSOR an additional 10,042 (+/-) square feet of space ("ADDITIONAL SPACE") consisting of 1,250 (+/-) square feet of office space and 8,792 (+/-) of warehouse space located contiguous to the Initial Space, as shown on the space plan hereto annexed as Exhibit 1, outlined in yellow, and being identified thereon as "Additional Space C".

ARTICLE 2

- 2.1 TERM COMMENCEMENT DATE: as to the Initial Space "A" March 1, 1990

TERM COMMENCEMENT DATE: as to the Additional Space "B" May 1, 1992

TERM COMMENCEMENT DATE: as to the Additional Space "C" March 1, 1994
- 2.2 TERMINATION DATE: February 28, 1995

ARTICLE 4

USE OF PREMISES: For office and warehousing space of LESSEE'S products, and any other lawful use. No retail sales shall be permitted to be conducted from the premises.

ARTICLE 5 - RENT

Rent for the Initial Space and the Additional Space shall be paid to LESSOR in accordance with the attached Exhibit 2A-Schedule B

ARTICLE 7 - PARKING SPACES ALLOCATED TO LESSEE:

Twenty Six (30) spaces

ARTICLE 8.1(a) - RENTABLE AREA

| | |
|-----------------------|----------------------|
| INITIAL SPACE: "A" | 5,021 + square feet |
| | - |
| ADDITIONAL SPACE: "B" | 5,021 + square feet |
| | - |
| ADDITIONAL SPACE: "C" | 10,042 + square feet |
| | ----- |
| TOTAL | 20,084 + square feet |
| | - |

BUILDING RENTABLE AREA: 95,567+ square feet

LESSEE'S PROPORTIONATE SHARE:

| | |
|---------------------------------------|--------|
| For Initial Space | 5.25% |
| For Initial Space & Additional Spaces | 21.00% |

ARTICLE 23 - ADDRESSES OF PARTIES:

LESSOR: P.O. Box 123
7 West Street
Walpole, Massachusetts 02081

LESSEE: 25 Walpole Park South
Walpole, Massachusetts 02081

EXHIBIT 3A

BUILDING STANDARD WORK
APPLICABLE TO ADDITIONAL SPACE

The interior development to the Additional Space shall be substantially in accordance with the plan/sketch hereto annexed which indicates an approximate 12%/88% office-warehouse use.

SECTION (II) SCOPE OF WORK

- NOTES
1. This "Scope of Work" is intended to outline the improvements to accommodate the Lessee's tenancy within the "Tenant Space".
 2. Unless otherwise noted the following items are not included:
 - A) The floor, walls, superstructure, roof and mechanical systems do not include any provisions for Lessee's machinery, equipment or the installation of same.
 - B) Security, Public Address, or Telephone Systems.
 - C) Computer Power or Data Wiring.
 3. Note the attached "Schedule (A)" for "Lessee's Quantities" included within the "Scope of Work".
 4. The Lessor or his nominee agree to perform the items noted within the "Scope of Work" substantially in accordance with the following information and for the "Rent" noted in Section (I).

| | | |
|-----------|----------|--|
| HEIGHT | Overall: | 21' - 4" Maximum: top of concrete floor to top of Steel. |
| Office | Clear: | 9' - 0" Minimum: top of concrete floor to underside of Acoustical Ceiling. |
| Warehouse | Clear: | 18' - 0" Minimum: top of concrete floor to underside of Steel. |

TENANT SPACE Office 1- 10x10 Private Office

 * 7 WEST STREET * WALPOLE, MA * 02081 * (508) 668-1200 * FAX (508) 668-1201 *

- 1- 12x13 Private Office
- 1- 10x12 Kitchen Area
- 1- Mens Rooms
- 1- Ladies Room

Warehouse The balance of the area is open warehouse.

Standard Tenant Improvements

- | | | |
|------------------|----------------|---|
| CONCRETE etc. | 111. | 4" non structural concrete floor on grade. |
| | 111.a | 3000 psi concrete. |
| | 111.b | 6"x6"/#10/#10 welded wire mesh reinforcing. |
| | 111.c | Control joints designed to reduce cracking. |
| Rear Entrance | 120. | Precast concrete stairs and rail. |
| | | |
| GLASS etc. | Front Entrance | 306. Exterior front windows, door and sidelight. |
| | | |
| METAL STUD WALLS | Office | 355.a. Face Wall (Interior) One layer of 1/2" gypsum board applied to the inside face of the front exterior wall, taped and sanded to the ceiling plus 6". |
| | Warehouse | 355.b Face Wall (Interior) One layer of 1/2" gypsum board applied to the inside face of the front exterior wall, taped and sanded to the underside of steel. |
| | Warehouse | 360.a Demising Wall (Ware) (Rated) |

 * 7 WEST STREET * WALPOLE, MA * 02081 * (508) 668-1200 * FAX (508) 668-1201 *

| | | | |
|-----------|---------------|--------|---|
| | Warehouse | 360.b. | Demising Wall (Tenant) (Rated) Framing 16" o.c., sound dampening insulation, two layers per face of 5/8" firecode gypsum board, taped and sanded to the underside of the metal deck. |
| | Office | 364.a. | Standard Wall (Bathrooms) (Non Rated) Framing 16" o.c. to the underside of the metal deck or barjoint, one layer per face of 1/2" gypsum board, taped and sanded to the underside of the ceiling plus 6". |
| DOORS and | Rear Entrance | 373.a. | Metal Door (Non Rated) Pressed metal frame, hollow metal door, 1 1/2 pair of butts, lock set, closer, threshold and weather- stripping. |
| | | 373.c | Metal Door (Rated) Pressed metal frame, hollow metal door, 1 1/2 pair of butts, lock set, and closer. |
| | | 373.e. | Hardboard Door (Rated) Pressed metal frame, hardboard door, 1 1/2 pair of butts, pass set, & bumper. |
| FINISHES | Office | 401. | Ceiling: White painted aluminum grid, 2' x 4' acoustical tiles. |
| | | 404. | Doors: Painted. |
| | Toilets | 406. | Floors: Vinyl Composite Tile. |
| | Office | 408. | Floors: Carpet () Glued directly to the floor. |

() Allow \$11.50 per
s.y. installed with
tax for selection
made from options
provided by
Lessor.

| | | | |
|-----------|------|--|-------------------------------------|
| Warehouse | 409. | Floors: | Concrete Sealer. |
| | 410. | Walls: | Two coats of flat latex wall paint. |
| Toilets | 413. | Base: | 4" vinyl cove base. |
| | 415. | Toilet paper holder, paper towel & soap dispensers, and mirrors. | |
| Toilets | 416. | Vanity cabinets and counters. | |
| Office | 418. | Louvre drapes for each exterior window. | |

| | | | | |
|----------|---------------|--------|--------|--|
| PLUMBING | Office Toilet | 500.a. | Men: | Water closet, vanity sink & faucet. |
| | Office Toilet | 500.b. | Women: | Water closet (1), vanity sink (1) & faucet (1), with floor drain and hose bib. |

| | | | | |
|----------|-----------|--------|----------|---|
| ELECTRIC | | 552. | Service: | 125 amp 120/208 volt panel board, located at column line C, with circuit breakers and electric meter. |
| | Office | 557.a. | Lights: | Lighting level of 75 fc using 2 x 4, 4 tube recessed fluorescent fixture. |
| | Warehouse | 557.c. | Lights: | Lighting level of 35 fc using 8', 2 tube strip fluorescent fixture. |
| | | 557.g. | Lights: | Emergency lights and battery pack. |

| | | | | |
|--|---------------------|--------|------------|---|
| | Office | 557.h. | Lights: | Exit signs. |
| | | 559.a. | Switches: | Single pole wall switch & plate. Direct from panel board. |
| | Warehouse Office | 559.d. | Outlets: | 110 volt duplex wall outlet. |
| | | 560.a. | Fire alarm | horns and lights. |
| | | 560.b. | Fire alarm | pull stations. |
| | | 560.c. | Fire alarm | smoke detectors. |

FIRE
SPRINKLER

| | | | |
|--|-----------|--------|---|
| | | 600.a. | Group 2 standard hazard calculated wet system having one head per 120 s.f. of floor area. |
| | Office | 603. | Drops with Heads |
| | Warehouse | 604. | Heads |

HEATING and

| | | | |
|--|--------|--------|---|
| | Office | 650.a. | Heating and Cooling System |
| | | 1. | Gas heat and electric cooled roof top unit. |
| | | 2. | One thermostat per roof top unit. |
| | | 3. | Air distributed via a ducted system from the roof top unit and returned via the ceiling space plenum. |
| | | 4. | The system will maintain a: Heating temperature of 68 degrees when the outside temperature is 0 degrees. Cooling temperature of 75 degrees when the outside temperature is 90 degrees or a 15 degree differential between the inside & outside temperature. |

| | | | |
|--|-----------|--------|---|
| | Warehouse | 650.b. | Heating System |
| | | | 1. Gas fired suspended unit heaters. |
| | | | 2. One thermostat per each heater |
| | | | 3. Air distributed directly from unit heaters. |
| | | | 4. The system will maintain a: Heating temperature of 55 degrees when the outside temperature is 0 degrees. |

| | | | |
|---------------|-----------|--------|---|
| MISCELLANEOUS | Warehouse | 702.a. | 2- Overhead door, 8' - 0" X 8' - 0". |
| | Warehouse | 702.b. | 2- Dock seal and rubber dock bumpers. |

| | | | |
|-----------------------|--|-------|---|
| GENERAL CONDITIONS | | 1158. | Exterior sign with Lessee's name installed over the front and rear entrances. |
| | | 1428. | Architectural service; one design & revision. |

Non Standard Tenant Improvements

| | | | |
|-----------|--|------|--|
| SPRINKLER | | 600. | Relocate existing office area heads, back to exposed ceiling area. |
|-----------|--|------|--|

| | | | |
|---------------|--|------|--|
| MISCELLANEOUS | | 700. | Labor & material for adds to "Scope of Work" |
|---------------|--|------|--|

ENCLOSERS

Title Page
Section (I) Summation
Section (II) Scope of Work
Key Plan of Premises
Lessee's Floor Plan

SECOND AMENDMENT

This is the SECOND AMENDMENT made to a certain Indenture of Lease ("THE LEASE") made by and between Donnell W. Murphy, Trustee of Walpole Park South (II) Trust ("LESSOR"), as landlord; and NGS Division/MKS Instruments, Inc. a Massachusetts corporation ("THE LESSEE"), as tenant dated December 21, 1989. The Lease concerns certain premises leased by the LESSEE from the LESSOR at 24 Walpole Park South Drive, Walpole, MA 02081.

In consideration hereof, the LESSOR and the LESSEE do hereby modify The Lease as follows:

1. EXHIBIT 2 ("Reference Data") Article 2.2 as annexed to The Lease, the data shall be stricken and is substituted in place thereof the following Date: March 31, 1998.

2. EXHIBIT 2A ("Rental Payment Schedule") as annexed to The Lease is stricken and there is substituted in place thereof Exhibit 2A as annexed hereto. Except as above provided, The Lease shall be otherwise deemed to be unamended and unmodified.

IN WITNESS WHEREOF, the parties have hereto executed this SECOND AMENDMENT in duplicate original as a sealed instrument on this day of December 1996.

LESSOR

WITNESS

DONNELL W. MURPHY
Trustee as aforesaid

ATTEST:

LESSEE:
NGS DIVISION/MKS INSTRUMENTS, INC.
BY:

WITNESS

Its Treasurer
hereunto duly authorized

7) TENANT will have NINE (9) PARKING SPACES located on site.

Accepted by the LESSOR:

WALPOLE PARK SOUTH II TRUST

DONNELL MURPHY

(Signature)

PROPERTY MANAGER/TRUSTEE

April 2, 1992

Accepted by the TENANT:

NGS DIVISION/MKS
INSTRUMENTS INC.

(Name)

(Signature)

(Title)

April 2, 1992

PROPOSAL TO LEASE
SCHEDULE (A) PAGE (2)

NON
STANDARD
IMPROVEMENTS

Proposal Number: WPS2-03NGSASS. (6)
Tenant Number: WPS2 (N/A)

Lessee Lessor
Quantity Allows

Adjust- FNC to
ment Lessee

| | | | | | | | |
|--|------------------|---------------------------|---------------|----------|-----------|----------|----------|
| 250 a) ROOF | Cut & Patch | RTU | Lab | 1 ea | (None) ea | 1 ea | 1,122 |
| 250 b) | Cut & Patch | RTU Gas & Elec P. Pocket | Lab | 2 ea | (None) ea | 2 ea | |
| 250 c) | Cut & Patch | Unit Heater | Ware | 1 ea | (None) ea | 1 ea | |
| 250 d) | Cut & Patch | Unit Heater Exist Pent | Lab | 1 ea | (None) ea | 1 ea | |
| 500 a) PLUMBING | Unit Heater | Relocate | Ware | 1 ls | (None) ls | 1 ls | 2,531 |
| 500 b) | Unit Heater | Gas Piping | Ware | 35 lf | (None) lf | 35 lf | |
| 500 c) | Roof Top Unit | Gas Piping | Lab | 35 lf | (None) lf | 35 lf | |
| 500 d) | Water Heater | Relocate | Offices | 1 ls | (None) ls | 1 ls | |
| 555 a) ELECTRIC | Power Wire | Roof Top Unit | Lab | 1 ea | (None) ea | 1 ea | 2,404 |
| 555 b) | Power Wire | Unit Heater | Ware | 1 ea | (None) ea | 1 ea | |
| 555 c) | Power Wire | Water Heater | Office | 1 ea | (None) ea | 1 ea | |
| 555 d) | Re-Work/Relocate | Existing Etc. | Offs/Lab/Ware | 1 ls | (None) ls | 1 ls | |
| 555 e) | Misc. | | Offs/Lab/Ware | 1 ls | (None) ls | 1 ls | |
| 559 | Outlets | 20 And, 2/Circuit | Lab | 20 ea | (None) ea | 20 ea | |
| 700 MISCELLANEOUS | Demolition | Existing Office/Ware Wall | Offices/Ware | 42 lf | (None) lf | 42 lf | 966 |
| 1100 GENERAL CONDITIONS | Labor & Material | Tenant Improvements | | 5,021 sf | (None) sf | 5,021 sf | 2,768 |
| 1100 | Labor & Material | | | 5,021 sf | (None) sf | 5,021 sf | |
| 1150 | Building Permit | | | 1 ls | (None) sf | 1 ls | |
| 1155 | Dumpster | | | 1 ea | (None) ea | 1 ea | |
| | Cleaning | Construction & Finel | | 5,021 sf | (None) sf | 5,021 sf | |
| TOTAL COST OF CONSTRUCTION (DUE UPON COMPLETION) | | | | | | \$61,602 | \$61,602 |

[1]
Lease Agreement
MKS Japan Co., Ltd.

Harmonize Building
Fifth Floor

MIFUJI

[2]
Lease Agreement (Offices in Building)
Lessor: Mifuji Kanzai K.K.
Lessee: MKS Japan Co., Inc.

The aforementioned Lessor and Lessee conclude this lease agreement according to the terms and conditions set forth below.

Paragraph 1 (Leased Property)
Lessor leases to Lessee, and Lessee leases from Lessor the property indicated below.

Address of Property: 5-17-13, Narita-higashi, Suginami-ku, Tokyo
Structure and Scale the Building: Steel-framed reinforced concrete structure with roof, with one underground floor and eight above ground floors.

Name: Harmonize Building

Leased area:

Fifth floor: 324.5 square meters (98.3 tsubo)

Paragraph 2 (Purpose of Use)

Lessee shall use the leased property as an office, and shall not use it for any other purpose.

Paragraph 3 (Term of Lease)

The term of the lease is established as set forth below.

A two (2) year period from January 1, 1996 to December 31, 1997 shall be established as the term of the lease.

However, if within at least 6 months but no more than 1 year from the date the term of the lease expires, either party indicates to the other party in writing a desire to renew the lease, this lease can be renewed upon the mutual consent of both parties. At the time of the renewal, Lessee shall pay Lessor one month's rent as a renewal fee.

Paragraph 4 (Rent)

1. Total Monthly Rent: 4,729,997 yen (including 5% consumption tax of 225,237 yen)

(1) Rent:

Fifth floor: 1,336,490 yen (including 5% consumption tax of 38,930 yen)

(2) Fee for Shared Services

Fifth floor: 324,000 yen (including 5% consumer tax of 23,380 yen)

Second floor: 531,877 yen (including 5% consumer tax of 9,440 yen)

[3]

2. By the end of every month Lessee shall pay the following month's rent by transferring funds to a bank account designated by Lessor, and Lessee shall be responsible for paying the fees for transferring funds.

3. If the term of the lease ends before the end of a month or if the rent is increased or decreased for any other reason, the rent shall be calculated on a per diem basis based on the number of days in that month.

Paragraph 5 (Adjustments to Rent)

The rent in this contract shall be reviewed every two (2) years from the commencement of the lease, and adjustments thereto carried out upon the mutual consent of both parties.

However, if as a result of changes in prices, increases in taxes or other public charges, or changes in other economic conditions, etc., the rent has become unreasonable, Lessor can adjust the rent even before the term of the lease has expired upon the consent of Lessee.

Paragraph 6 (Security Deposit)

1. As security to ensure that Lessee fulfills its obligations as set forth in the terms of this contract, Lessee shall provide 9,830,000 yen, an amount equivalent to ten (10) months rent, to Lessor at the time this contract is signed.

2. When Lessee has failed to pay the rent on time, has caused damages or has failed to fulfill any other of its obligations as set forth in the terms of this contract, upon notification thereof, Lessor is entitled to appropriate all or some of the deposit to pay for such.

3. Lessee shall not be entitled to claim that the possession of the security deposit as established in this contract offsets any monetary obligation Lessee is responsible for paying to Lessor.

4. In the case of Paragraph 6, Section 2 above, within a week after receiving the notification of appropriation, Lessee must supply the amount necessary to restore the security deposit to the amount prior to the appropriation.

5. Lessee shall not transfer claim to the security deposit to a third party, nor offer such for use as collateral.

Paragraph 7 (Return of the Security Deposit)

When the contract has terminated due to the expiration of the term thereof, Lessor shall return the deposit to Lessee within one month after Lessor has confirmed that Lessee has returned the leased property to its original condition, has completely vacated the premises, and has completed dismantling and removal operations.

Paragraph 8 (Termination of Lease Before Expiration)

If this contract is terminated before it expires due to circumstances of Lessee, or if it is terminated for reasons that are the fault of Lessee, an amount equivalent to 10% of the total in Paragraph 6, Section 1 above shall be paid as compensation.

Paragraph 9 (Category of Project)

None

Paragraph 10 (Responsibility for Expenses)

Lessee shall be responsible for expenses produced as a result of the daily work carried out within the area contracted for use by Lessee, such as the fees for use of utilities such as electricity, water, gas.

[4]

Paragraph 11 (Late Payment Penalty)

When Lessee is late in paying obligations set forth in this contract, upon notification thereof by Lessor, Lessee shall pay a late payment penalty based on a per annum rate of 14.6%.

Paragraph 12 (Matters to be Reported)

When matters pertaining to any of the following occurs, Lessee must promptly submit a written report of the gist thereof to Lessor.

1. When there has been a significant change with regard to the representative of the company or any other item pertaining to the commercial registration of the company.
2. When a merger, etc., has occurred.
3. When there has been a change in the type of business.

Paragraph 13 (Items Requiring Approval)

If Lessee is to perform any of the following, Lessee must submit a written report of the intentions thereof to Lessor and receive Lessor's approval before carrying out such actions.

1. When Lessee desires to modify or establish new fixtures, furniture, designs or room dividers, etc., of the leased property.
2. When Lessee desires to modify or expand existing equipment which was previously installed by Lessor on the leased property.
3. When Lessee desires to install new auxiliary equipment.
4. When Lessee desires to establish a display such as a signboard, bulletin board, sign, billboard or the like.

However, this restriction shall not apply to cases in which the leased property is not modified or to acts approved by Lessor prior to the contract.

Paragraph 14 (Prohibited Items)

Lessee is prohibited from carrying out any of the following.

1. Regardless of pretext, any act to transfer the rights in this contract, such as the rights to use, lease, or conduct business on the leased property, etc., to a third party, or to use such as collateral.
2. Any act to sub-lease to a third party or let others use or manage part or all of the leased property.
3. Any change to the purpose of use of the leased property.
4. Any act to display the company name, or post a sign, etc., in a location or using a method other than that which has been designated by Lessor, or any other act to display the name of a third party.
5. Any act that is detrimental to the maintenance and upkeep of the building or any act which cause damage to the building.
6. Any act that disturbs the neighbors.

Paragraph 15 (Responsibility for Repair Expenses)

1. Lessor shall carry out repairs necessary for the maintenance and upkeep of the building itself and its attachments.
2. Lessee shall be responsible for carrying out repairs and replacements on the leased property including those relating to the walls, ceilings, floors, windows, light fixtures and other electrical equipment, gas equipment, water equipment and all such equipment and facilities used daily by Lessee, as well as to all equipment and facilities directly used by clients and visitors of Lessee.
3. If Lessee discovers in the building owned by Lessor that a repair is needed in the area leased by Lessee, Lessee has the obligation to notify Lessor immediately, and even if Lessee is responsible for the repair expenses, repairs shall always be carried out upon consent of Lessor.

[5]

Paragraph 16 (Obligation to Notify)

Lessee must notify Lessor promptly when measures required for maintaining the building must be carried out.

Paragraph 17 (Obligation to Take Necessary Precautions)

Lessee must take the precautions necessary of a good manager when using the leased property.

Paragraph 18 (Entering the Premises for Inspections)

1. Lessor or a party designated by Lessor shall be allowed to enter and inspect the leased property after notifying Lessee, in order to check on the maintenance and upkeep of the building, as well as its sanitation, security and fire prevention status, or for any other reason required for managing the building; Lessor may request that Lessee take appropriate actions or Lessor itself can take any action necessary.

2. In the above case, before entering and inspecting the premises, Lessor shall provide Lessee with notification to that effect, however, this restriction shall not apply in the case of an emergency.

Paragraph 19 (Exemptions)

1. When damages have occurred as a result of a disaster such as an earthquake, fire, or flood, etc., if the Lessee suffers damages originating from or relating to the building equipment and facilities such as those for electricity, gas, water, or the cooling and heating system, etc., despite the Lessor, as landlord and owner of the building, having taken proper care with regard to the maintenance and management thereof, Lessor shall in no way be held responsible for such damage.

2. Lessor shall not be held responsible when services are interrupted, partially suspended, or the use of the leased property is partially restricted due to inspection, maintenance, repair, or renovation work on the building carried out by Lessor.

Paragraph 20 (Compensation for Damages)

When Lessee, an agent, employee, independent contractor, or any other party related to Lessee, has either intentionally or accidentally damaged or harmed Lessor or a third party, Lessee shall be responsible for providing compensation for the entire amount suffered as a result of such damage.

Paragraph 21 (Taxes and Other Public Charges)

1. Lessor shall be responsible for paying taxes and other public charges on the building stipulated in this contract.

2. When Lessee has installed a sign, billboard or other equipment etc., or has carried out an installation categorized as being a project that is the responsibility of the Lessee, Lessee shall be responsible for paying taxes or other public charges imposed as a result thereof including real estate acquisition taxes and taxes on fixed assets, etc.

Paragraph 22 (Destruction and Damage of Building)

1. If as a result of a natural disaster, earthquake, or other reason for which neither Lessor nor Lessee is responsible, all or a part of the leased property is destroyed or damaged, Lessor and Lessee shall consult with each other with regard to how to handle the situation after this contract.

2. When all or part of the leased property has been lost or damaged, and it is acknowledged that it would be impossible or extremely difficult to continue this contract, this contract shall be terminated as of that point in time at which the loss or damage occurred.

In this case, the security deposit shall be refunded in accordance with Paragraph 7, Section 1.

[6]

Paragraph 23 (Petition to Terminate Contract Prior to Expiration of Lease)
If Lessee desires to terminate this contract before the lease has expired, six (6) months prior to the expiration of the lease, Lessee must submit in writing to the other party the reasons for terminating the contract.

Paragraph 24 (Termination of the Contract)

When any of the following has occurred, Lessor can terminate this contract without providing prior notification to Lessee, and if Lessor has suffered damages, Lessor can demand compensation for those damages from Lessee.

1. When Lessee has failed to pay rent or other obligations for two (2) months or more.
2. When Lessee has violated this contract or any of the attachments hereto.
3. When Lessee has violated a provision under Paragraph 12.
4. When a foreclosure, compulsory execution, bankruptcy, composition proceedings, or consolidation, reorganization or dissolution of the corporation has occurred.

Paragraph 25 (Obligation to Dismantle, Remove from and Vacate the Premises)

1. If this contract is terminated before it expires due to circumstances of Lessee, or is terminated because the term of the lease agreement has expired, Lessee shall, at the expense of the Lessee, promptly return the leased property to its original condition, and shall completely vacate the premises by the date designated by Lessor.
2. In the preceding case, when vacating the premises Lessee shall not leave any fixtures, equipment, devices, furnishings or any other object in the leased property.

However, upon the consent of the Lessor, objects may remain on the premises without remuneration.

3. In the case of Section 1 above, if Lessee does not vacate the leased property promptly before the date designated by Lessor, from the day after the expiration date of this contract up until the date by which the premises have been completely vacated, Lessee shall pay compensation to Lessor which is double the amount of the regular rent and shall also pay an appropriate amount to cover expenses; and if Lessor sustains damages as a result of the delay in Lessee's vacating of the premises, Lessee shall also pay compensation to Lessor for such damages.

4. In the preceding case, if Lessee does not promptly complete dismantling and removal, Lessor shall take measures for dismantling and removal at the expense of Lessee, and Lessee shall not object to this action.

5. In the preceding case, Lessee shall pay compensation to Lessor which is double the amount of the regular rent and shall also pay an appropriate amount to cover expenses; and if Lessor sustains damages as a result of the delay in Lessee's dismantling and removing property from the premises, Lessee shall also pay compensation to Lessor for such damages.

Paragraph 26 (Demands for Purchasing Installations, etc.)

Lessee can for no reason demand any reimbursement to cover expenses incurred when vacating the leased property or dismantling and removing property therefrom, nor can the Lessee demand a refund to cover the necessary costs associated with expenditures on fixtures and equipment and expenditures benefiting Lessor, nor demand moving expenses, dispossession expenses, or concession money, etc. Also, Lessee can not demand that Lessor purchase any installations, fixtures, decorations, or equipment ,etc., that have been established in the leased property at the Lessee's own expense.

[7]

Paragraph 27 (Drafting of Notarized Document)

For the purpose of making the content of this contract explicit, when requested by either Lessor or Lessee, this contract can at any time be handed over to a Notary Public and a notarized document drafted.

Paragraph 28 (Court of Jurisdiction)

Should a dispute arise with regard to the rights and responsibilities relating to this contract, the Tokyo District Court shall be the court of jurisdiction.

Paragraph 29 (Special Clauses)

1. This contract shall be notarized.
2. Only rent between January 1, 1996 and March 31, 1996 shall be excused.
3. Fees for shared services shall be paid from January 1, 1996 on.

Paragraph 30 (Other items)

Lessor and Lessee shall carry out the terms of this contract honestly. If questions should arise concerning items not laid out in this contract, or if doubt should arise with regard to the interpretation of an item in this contract, both parties shall deliberate on the matter with sincerity and honesty and endeavor to resolve any differences in accordance with civil and other laws and regulations, and commercial customs.

As proof of this lease agreement, two copies thereof shall be made and signed and sealed by both Lessor and Lessee, with one copy to remain in the possession of each signatory.

January 1, 1996

Lessor

Address: 5-17-13, Narita-higashi, Suginami-ku, Tokyo

Name: Mifuji Kanzai K.K.

C.E.O.: Yuichiro Sato [Seal]

Lessee

1-20-32, Miyamae, Suginami-ku, Tokyo

Name: MKS Japan Inc.

C.E.O.: Kiyoshi Hoshino [Seal]

[8]

Mifuji Group K.K.

1-9-2, Asagaya-kita,

Mifuji Building

Suginami-ku, Tokyo

Tel: 03-3336-3141 (Main)

Fax: 03-3336-3418

[The Legal Translating Service Letterhead]

Certification of Translation

COMMONWEALTH OF MASSACHUSETTS

COUNTY OF MIDDLESEX

On this day of November 13, 1997

Gregory J. Krauth

of the Legal Translating Service, a division of Linguistic Systems, Inc., 130 Bishop Richard Allen Drive, Cambridge, Massachusetts 02139, being duly sworn, declared the attached translation to have been made faithfully of his own knowledge by himself and that the attached translation is a true and correct English version of the original document, to the best of his knowledge and belief.

His qualifications as translator include familiarity with English as a native language and with Japanese as an acquired language, and with said languages as languages of instruction and use for more than 10 years, and that he received a Master's degree from Indiana University and that he is employed as a freelance translator by Linguistic Systems, Inc.

My commission expires March 16, 2001

/s/ Hugh McAden Oechler

Hugh McAden Oechler
Notary Public

[1]
Lease Agreement

MKS Japan Co., Ltd.

Harmonize Building
First and Second Floors

MIFUJI

[2]
Lease Agreement (Offices in Building)
Lessor: Mifuji Kanzai K.K.
Lessee: MKS Japan Co., Inc.

The aforementioned Lessor and Lessee conclude this lease agreement according to the terms and conditions set forth below.

Paragraph 1 (Leased Property)
Lessor leases to Lessee, and Lessee leases from Lessor the property indicated below.

Address of Property: 5-17-13, Narita-higashi, Suginami-ku, Tokyo
Structure and Scale the Building: Steel-framed reinforced concrete structure with roof, with one underground floor and eight above ground floors.

Name: Harmonize Building

Leased area:

First floor: 467.6 square meters (141.7 tsubo)
Second floor: 506.5 square meters (153.5 tsubo)

Paragraph 2 (Purpose of Use)

Lessee shall use the leased property as an office, and shall not use it for any other purpose.

Paragraph 3 (Term of Lease)

The term of the lease is established as set forth below.

A two (2) year period from May 1, 1997 to April 30, 1999 shall be established as the term of the lease.

However, if within at least 6 months but no more than 1 year from the date the term of the lease expires, either party indicates to the other party in writing a desire to renew the lease, this lease can be renewed upon the mutual consent of both parties. At the time of the renewal, Lessee shall pay Lessor one month's rent as a renewal fee.

Paragraph 4 (Rent)

1. Total Monthly Rent: 4,729,997 yen (including 5% consumption tax of 225,237 yen)

(1) Rent:

First floor: 1,934,205 yen (including 5% consumption tax of 92,105 yen)
Second floor: 1,772,925 yen (including 5% consumption tax of 84,425 yen)

(2) Fee for Shared Services

First floor: 490,990 yen (including 5% consumer tax of 23,380 yen)
Second floor: 531,877 yen (including 5% consumer tax of 25,327 yen)

[3]

2. By the end of every month Lessee shall pay the following month's rent by transferring funds to a bank account designated by Lessor, and Lessee shall be responsible for paying the fees for transferring funds.

3. If the term of the lease ends before the end of a month or if the rent is increased or decreased for any other reason, the rent shall be calculated on a per diem basis based on the number of days in that month.

Paragraph 5 (Adjustments to Rent)

The rent in this contract shall be reviewed every two (2) years from the commencement of the lease, and adjustments thereto carried out upon the mutual consent of both parties.

However, if as a result of changes in prices, increases in taxes or other public charges, or changes in other economic conditions, etc., the rent has become unreasonable, Lessor can adjust the rent even before the term of the lease has expired upon the consent of Lessee.

Paragraph 6 (Security Deposit)

1. As security to ensure that Lessee fulfills its obligations as set forth in the terms of this contract, Lessee shall provide 35,306,000 yen, an amount equivalent to ten (10) months rent, to Lessor at the time this contract is signed.

2. When Lessee has failed to pay the rent on time, has caused damages or has failed to fulfill any other of its obligations as set forth in the terms of this contract, upon notification thereof, Lessor is entitled to appropriate all or some of the deposit to pay for such.

3. Lessee shall not be entitled to claim that the possession of the security deposit as established in this contract offsets any monetary obligation Lessee is responsible for paying to Lessor.

4. In the case of Paragraph 6, Section 2 above, within a week after receiving the notification of appropriation, Lessee must supply the amount necessary to restore the security deposit to the amount prior to the appropriation.

5. Lessee shall not transfer claim to the security deposit to a third party, nor offer such for use as collateral.

Paragraph 7 (Return of the Security Deposit)

When the contract has terminated due to the expiration of the term thereof, Lessor shall return the deposit to Lessee within one month after Lessor has confirmed that Lessee has returned the leased property to its original condition, has completely vacated the premises, and has completed dismantling and removal operations.

Paragraph 8 (Termination of Lease Before Expiration)

If this contract is terminated before it expires due to circumstances of Lessee, or if it is terminated for reasons that are the fault of Lessee, an amount equivalent to 10% of the total in Paragraph 6, Section 1 above shall be paid as compensation.

Paragraph 9 (Category of Project)

None

Paragraph 10 (Responsibility for Expenses)

Lessee shall be responsible for expenses produced as a result of the daily work carried out within the area contracted for use by Lessee, such as the fees for use of utilities such as electricity, water, gas.

[4]

Paragraph 11 (Late Payment Penalty)

When Lessee is late in paying obligations set forth in this contract, upon notification thereof by Lessor, Lessee shall pay a late payment penalty based on a per annum rate of 14.6%.

Paragraph 12 (Matters to be Reported)

When matters pertaining to any of the following occurs, Lessee must promptly submit a written report of the gist thereof to Lessor.

1. When there has been a significant change with regard to the representative of the company or any other item pertaining to the commercial registration of the company.
2. When a merger, etc., has occurred.
3. When there has been a change in the type of business.

Paragraph 13 (Items Requiring Approval)

If Lessee is to perform any of the following, Lessee must submit a written report of the intentions thereof to Lessor and receive Lessor's approval before carrying out such actions.

1. When Lessee desires to modify or establish new fixtures, furniture, designs or room dividers, etc., of the leased property.
2. When Lessee desires to modify or expand existing equipment which was previously installed by Lessor on the leased property.
3. When Lessee desires to install new auxiliary equipment.
4. When Lessee desires to establish a display such as a signboard, bulletin board, sign, billboard or the like.

However, this restriction shall not apply to cases in which the leased property is not modified or to acts approved by Lessor prior to the contract.

Paragraph 14 (Prohibited Items)

Lessee is prohibited from carrying out any of the following.

1. Regardless of pretext, any act to transfer the rights in this contract, such as the rights to use, lease, or conduct business on the leased property, etc., to a third party, or to use such as collateral.
2. Any act to sub-lease to a third party or let others use or manage part or all of the leased property.
3. Any change to the purpose of use of the leased property.
4. Any act to display the company name, or post a sign, etc., in a location or using a method other than that which has been designated by Lessor, or any other act to display the name of a third party.
5. Any act that is detrimental to the maintenance and upkeep of the building or any act which cause damage to the building.
6. Any act that disturbs the neighbors.

Paragraph 15 (Responsibility for Repair Expenses)

1. Lessor shall carry out repairs necessary for the maintenance and upkeep of the building itself and its attachments.
2. Lessee shall be responsible for carrying out repairs and replacements on the leased property including those relating to the walls, ceilings, floors, windows, light fixtures and other electrical equipment, gas equipment, water equipment and all such equipment and facilities used daily by Lessee, as well as to all equipment and facilities directly used by clients and visitors of Lessee.
3. If Lessee discovers in the building owned by Lessor that a repair is needed in the area leased by Lessee, Lessee has the obligation to notify Lessor immediately, and even if Lessee is responsible for the repair expenses, repairs shall always be carried out upon consent of Lessor.

[5]

Paragraph 16 (Obligation to Notify)

Lessee must notify Lessor promptly when measures required for maintaining the building must be carried out.

Paragraph 17 (Obligation to Take Necessary Precautions)

Lessee must take the precautions necessary of a good manager when using the leased property.

Paragraph 18 (Entering the Premises for Inspections)

1. Lessor or a party designated by Lessor shall be allowed to enter and inspect the leased property after notifying Lessee, in order to check on the maintenance and upkeep of the building, as well as its sanitation, security and fire prevention status, or for any other reason required for managing the building; Lessor may request that Lessee take appropriate actions or Lessor itself can take any action necessary.

2. In the above case, before entering and inspecting the premises, Lessor shall provide Lessee with notification to that effect, however, this restriction shall not apply in the case of an emergency.

Paragraph 19 (Exemptions)

1. When damages have occurred as a result of a disaster such as an earthquake, fire, or flood, etc., if the Lessee suffers damages originating from or relating to the building equipment and facilities such as those for electricity, gas, water, or the cooling and heating system, etc., despite the Lessor, as landlord and owner of the building, having taken proper care with regard to the maintenance and management thereof, Lessor shall in no way be held responsible for such damage.

2. Lessor shall not be held responsible when services are interrupted, partially suspended, or the use of the leased property is partially restricted due to inspection, maintenance, repair, or renovation work on the building carried out by Lessor.

Paragraph 20 (Compensation for Damages)

When Lessee, an agent, employee, independent contractor, or any other party related to Lessee, has either intentionally or accidentally damaged or harmed Lessor or a third party, Lessee shall be responsible for providing compensation for the entire amount suffered as a result of such damage.

Paragraph 21 (Taxes and Other Public Charges)

1. Lessor shall be responsible for paying taxes and other public charges on the building stipulated in this contract.

2. When Lessee has installed a sign, billboard or other equipment etc., or has carried out an installation categorized as being a project that is the responsibility of the Lessee, Lessee shall be responsible for paying taxes or other public charges imposed as a result thereof including real estate acquisition taxes and taxes on fixed assets, etc.

Paragraph 22 (Destruction and Damage of Building)

1. If as a result of a natural disaster, earthquake, or other reason for which neither Lessor nor Lessee is responsible, all or a part of the leased property is destroyed or damaged, Lessor and Lessee shall consult with each other with regard to how to handle the situation after this contract.

2. When all or part of the leased property has been lost or damaged, and it is acknowledged that it would be impossible or extremely difficult to continue this contract, this contract shall be terminated as of that point in time at which the loss or damage occurred.

In this case, the security deposit shall be refunded in accordance with Paragraph 7, Section 1.

[6]

Paragraph 23 (Petition to Terminate Contract Prior to Expiration of Lease)

If Lessee desires to terminate this contract before the lease has expired, six (6) months prior to the expiration of the lease, Lessee must submit in writing to the other party the reasons for terminating the contract.

Paragraph 24 (Termination of the Contract)

When any of the following has occurred, Lessor can terminate this contract without providing prior notification to Lessee, and if Lessor has suffered damages, Lessor can demand compensation for those damages from Lessee.

1. When Lessee has failed to pay rent or other obligations for two (2) months or more.
2. When Lessee has violated this contract or any of the attachments hereto.
3. When Lessee has violated a provision under Paragraph 12.
4. When a foreclosure, compulsory execution, bankruptcy, composition proceedings, or consolidation, reorganization or dissolution of the corporation has occurred.

Paragraph 25 (Obligation to Dismantle, Remove from and Vacate the Premises)

1. If this contract is terminated before it expires due to circumstances of Lessee, or is terminated because the term of the lease agreement has expired, Lessee shall, at the expense of the Lessee, promptly return the leased property to its original condition, and shall completely vacate the premises by the date designated by Lessor.
2. In the preceding case, when vacating the premises Lessee shall not leave any fixtures, equipment, devices, furnishings or any other object in the leased property.

However, upon the consent of the Lessor, objects may remain on the premises without remuneration.

3. In the case of Section 1 above, if Lessee does not vacate the leased property promptly before the date designated by Lessor, from the day after the expiration date of this contract up until the date by which the premises have been completely vacated, Lessee shall pay compensation to Lessor which is double the amount of the regular rent and shall also pay an appropriate amount to cover expenses; and if Lessor sustains damages as a result of the delay in Lessee's vacating of the premises, Lessee shall also pay compensation to Lessor for such damages.

4. In the preceding case, if Lessee does not promptly complete dismantling and removal, Lessor shall take measures for dismantling and removal at the expense of Lessee, and Lessee shall not object to this action.

5. In the preceding case, Lessee shall pay compensation to Lessor which is double the amount of the regular rent and shall also pay an appropriate amount to cover expenses; and if Lessor sustains damages as a result of the delay in Lessee's dismantling and removing property from the premises, Lessee shall also pay compensation to Lessor for such damages.

Paragraph 26 (Demands for Purchasing Installations, etc.)

Lessee can for no reason demand any reimbursement to cover expenses incurred when vacating the leased property or dismantling and removing property therefrom, nor can the Lessee demand a refund to cover the necessary costs associated with expenditures on fixtures and equipment and expenditures benefiting Lessor, nor demand moving expenses, dispossession expenses, or concession money, etc. Also, Lessee can not demand that Lessor purchase any installations, fixtures, decorations, or equipment, etc., that have been established in the leased property at the Lessee's own expense.

Paragraph 27 (Drafting of Notarized Document)

For the purpose of making the content of this contract explicit, when requested by either Lessor or Lessee, this contract can at any time be handed over to a Notary Public and a notarized document drafted.

Paragraph 28 (Court of Jurisdiction)

Should a dispute arise with regard to the rights and responsibilities relating to this contract, the Tokyo District Court shall be the court of jurisdiction.

Paragraph 29 (Special Clauses)

1. Lessor gives permission to Lessee to exhibit merchandise and equipment of the work site in the leased rooms.
2. Use of storage room(s) and closet(s) not included in the leased rooms shall be allowed during the term of the lease.

Paragraph 30 (Other items)

Lessor and Lessee shall carry out the terms of this contract honestly. If questions should arise concerning items not laid out in this contract, or if doubt should arise with regard to the interpretation of an item in this contract, both parties shall deliberate on the matter with sincerity and honesty and endeavor to resolve any differences in accordance with civil laws, other laws and regulations, and commercial customs.

As proof of this lease agreement, two copies thereof shall be made, signed and sealed by both Lessor and Lessee, with one copy to remain in the possession of each signatory.

April 21, 1997

Lessor

Address: 5-17-13, Narita-higashi, Suginami-ku, Tokyo

Name: Mifuji Kanzai K.K.

C.E.O.: Yuichiro Sato [Seal]

Lessee

1-20-32, Miyamae, Suginami-ku, Tokyo

Name: MKS Japan Inc.

C.E.O.: Kiyoshi Hoshino [Seal]

1-20-32 Miyamae, Suginami-ku, Tokyo

Name: MKS Japan Inc.

C.E.O.: John R. Bertucci [Seal]

[8]

Agreement

As proof of the agreement relating to the lease of the 1st and 2nd floors (offices in the building) of the Harmonize Building, two copies shall be made thereof, and each shall be signed and sealed by both Lessor and Lessee, with one copy to remain in the possession of each signatory.

Items of the Agreement:

1. At that point in time when the rent has been adjusted when the lease agreement is renewed, we agree that the amount of the security deposit shall be increased or decreased based on the difference with the previous rent.

2. Six (6) months before the term of the lease agreement has expired, both the Lessor and the Lessee shall indicate their intentions to the other party in writing. Also, if the indication of the intentions of either party is accidentally delayed, both Lessor and Lessee shall handle this matter with sincerity and honesty.

April 21, 1997

Lessor

Address: 5-17-13 Narita-higashi, Suginami-ku, Tokyo

Name: Mifuji Kanzai K.K.

C.E.O.: Yuichiro Sato [Seal]

Lessee

1-20-32 Miyamae, Suginami-ku, Tokyo

Name: MKS Japan Inc.

C.E.O.: Kiyoshi Hoshino [Seal]

[9]

Security Deposit Receipt

[Revenue stamp]

To: MKS Japan Inc.

We hereby accept payment and shall retain throughout the term of the lease 35,306,000 yen as a security deposit as set forth in the lease agreement for leasing the 1st and 2nd floors of the Harmonize Building.

April 21, 1997

Lessor
Mifuji Kanzai K.K.
C.E.O.: Yuichiro Sato

[10]
Mifuji Group K.K.
Mifuji Kanzai K.K.

5-17-13 Narita-higashi,
Suginami-ku, Tokyo, 116
Harmonize Building 8F
Tel: 03-3393-6661 (Main)
Fax: 03-3393-6660
Governor of Tokyo (7): #30401: Corporation/Member of Tokyo Association of Real Estate Agents, Suginami Branch

[THE LEGAL TRANSLATING SERVICE LETTERHEAD]

CERTIFICATION OF TRANSLATION

COMMONWEALTH OF MASSACHUSETTS
COUNTY OF MIDDLESEX
On this day of November 13, 1997

Gregory J. Krauth

of the Legal Translating Service, a division of Linguistic Systems, Inc., 130 Bishop Richard Allen Drive, Cambridge, Massachusetts 02139, being duly sworn, declared the attached translation to have been made faithfully of his own knowledge by himself and that the attached translation is a true and correct English version of the original document, to the best of his knowledge and belief.

His qualifications as translator include familiarity with English as a native language and with Japanese as an acquired language, and with said languages as languages of instruction and use for more than 10 years, and that he received a Master's degree from Indiana University and that he is employed as a freelance translator by Linguistic Systems, Inc.

My commission expires March 16, 2001

/s/ Hugh McAden Oechler
Hugh McAden Oechler
Notary Public

SPLIT-DOLLAR AGREEMENT

AGREEMENT dated as of September 12, 1991 (the "Agreement") by and among MKS Instruments, Inc., a Massachusetts corporation (the "Corporation"), John R. Bertucci of Lexington, Massachusetts (the "Employee"), and Claire R. Bertucci of Lexington, Massachusetts and Richard S. Chute of Cambridge, Massachusetts, as Trustees of the John R. Bertucci Insurance Trust of January 10, 1986 (the "Owner").

WHEREAS, the Employee is employed by the Corporation; and

WHEREAS, the Employee wishes to provide life insurance protection for his family in the event of his death under a policy of life insurance insuring his life and the life of Claire R. Bertucci (the "Policy") which is described in Exhibit A hereto (and by this reference is hereby made subject to this Agreement) issued by Pacific Mutual Life Insurance Company (the "Insurer"); and

WHEREAS, the Corporation is willing to pay the premiums due on the Policy as an additional employment benefit for the Employee on the terms and conditions hereinafter set forth; and

WHEREAS, the Owner is the owner of the Policy and, as such, possesses all incidents of ownership in and to the Policy; and

WHEREAS, the Corporation wishes to have the Policy collaterally assigned to it by the Owner in order to secure the repayment of the amounts which the Corporation will pay toward the premiums on the Policy; and

WHEREAS, the parties hereto intend that by such collateral assignment the Corporation shall receive only the right to such repayment with the Owner retaining all other ownership rights in and to the Policy:

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein and for other valuable consideration, the receipt of which is hereby acknowledged, the parties hereto hereby agree as follows:

(1). Purchase of Policy: The Owner will, contemporaneously with the execution hereof, purchase the Policy from the Insurer in the total face amount of \$5,000,000. The parties hereto agree that they will take all necessary action to cause the Insurer to issue the Policy and shall take any further action which may be necessary to cause the Policy to conform to the provisions of this Agreement. The parties hereto agree that the Policy shall be subject to the terms and conditions of this Agreement and of the collateral assignment filed with the Insurer relating to the Policy.

(2). Ownership of Policy:

(a). The Owner shall be the sole and absolute owner of the Policy and may exercise all ownership rights granted to the owner thereof by the terms of the Policy, except as may otherwise be provided herein.

(b). It is the intention of the parties to this Agreement and to the collateral assignment referred to herein that the Owner shall retain all rights which the Policy grants to the owner thereof and that the sole right of the Corporation hereunder shall be to be repaid the amounts which it has paid toward the premiums of the Policy. Specifically, but without limitation, the Corporation shall neither have nor exercise any right as collateral assignee of the Policy which could in any way

defeat or impair the right of the Owner to receive the cash surrender value or the death proceeds of the Policy in excess of the amount due the Corporation hereunder.

(3). Payment of Premiums: Except as otherwise provided herein, on or before the due date of each Policy premium, or within the grace period provided therein, the Corporation shall pay the full amount of the premium to the Insurer, and shall, upon request, promptly furnish the Employee evidence of timely payment of such premium. The Corporation shall annually furnish the Employee a statement of the amount of income reportable by the Employee for federal and state income tax purposes as a result of the insurance protection provided the Owner as the beneficiary of the Policy.

(4). Collateral Assignment: To secure the repayment to the Corporation of the amount of the premiums on the Policy paid by the Corporation under the terms of this Agreement, the Owner has, contemporaneously with the execution hereof, assigned the Policy to the Corporation as collateral under the form used by the Insurer for such assignments, which collateral assignment specifically provides that the sole right of the Corporation thereunder is to be repaid the amounts it has paid toward the premiums on the Policy. Such repayment shall be made from the cash surrender value of the Policy (as defined therein) if this Agreement is terminated or if the Owner surrenders or cancels the Policy or from the death proceeds of the Policy, if any, if the Employee or any other insured should die while the Policy and this Agreement remain in force. In no event shall the Corporation have any right to borrow against or make withdrawals from the Policy or to surrender or cancel the

Policy or to take any other action which would impair or defeat the rights of the Owner in and to the Policy. The collateral assignment of the Policy to the Corporation hereunder shall not be terminated, altered, or amended by the Owner while this Agreement is in effect. The parties hereto agree to take all action necessary to cause such collateral assignment to conform to the provisions of this Agreement.

(5). Limitations on Rights of Owner in and to Policy:

(a). The Owner shall take no action with respect to the Policy which would in any way compromise or jeopardize the right of the Corporation to be repaid the amounts it has paid toward the premiums on the Policy while this Agreement is in effect.

(b). The Owner may pledge or assign the Policy, subject to the terms and conditions of this Agreement, in order to secure a loan from the Insurer or from a third party, in an amount which shall not exceed the cash surrender value of the Policy (as defined therein) as of the date to which premiums have been paid, less the amount paid toward the premiums on the Policy by the Corporation. Interest charges on such loan shall be the responsibility of and be paid by the Owner. For any Policy year in which the Owner borrows hereunder, the Corporation shall be correspondingly relieved of its obligation to pay any amounts toward premiums for such Policy year to the extent of such borrowing.

(c). The Owner shall have the sole right to surrender or cancel the Policy and to receive the full cash surrender value of the Policy directly from the Insurer. Upon the surrender or cancellation of the Policy, the Corporation shall have

the unqualified right to receive a portion of the cash surrender value equal to the total amount of the premiums paid by the Corporation under the terms of this Agreement. Immediately upon receipt of the cash value of the Policy from the Insurer, the Owner shall pay to the Corporation the portion of such cash value to which the Corporation is entitled under the terms of this Agreement and shall retain the balance, if any. Upon such receipt and payment this Agreement shall thereupon terminate.

(6). Collection of Death Proceeds:

(a). Upon the death of the second to die of the Employee and Claire R. Bertucci, the Corporation and the Owner shall cooperate to take whatever action is necessary to collect the death benefit, if any, provided under the Policy, and when such death benefit, if any, has been collected and paid as provided herein, this Agreement shall thereupon terminate.

(b). Upon the death of the second to die of the Employee and Claire R. Bertucci, the Corporation shall have the unqualified right to receive a portion of such death benefit, if any, equal to the total amount of the premiums paid by the Corporation under the terms of this Agreement; provided, however, that, if the Owner shall deem it to be in the best interests of the Owner as evidenced by the written consent of the Owner, the Owner may, upon the death of the first to die of the Employee and Claire R. Bertucci, repay the Corporation the total amount of the premiums paid by the Corporation under the terms of this Agreement. The balance of the death benefit provided under the Policy, if any, shall be paid directly to the

Owner in the manner and in the amount or amounts provided in the beneficiary designation provision of the Policy. In no event shall the amount payable to the Corporation hereunder exceed the proceeds of the Policy payable at the death of the second to die of the Employee and Claire R. Bertucci. No amount shall be paid from such death benefit to the Owner until the full amount due the Corporation hereunder has been paid. The parties hereto agree that the beneficiary designation provision of the Policy shall conform to the provisions hereof.

(c). Notwithstanding any provision hereof to the contrary, in the event that, for any reason whatsoever, no death benefit is payable under the Policy upon the death of the second to die of the Employee and Claire R. Bertucci and in lieu thereof the Insurer refunds all or any part of the premiums paid for the Policy, the Corporation and the Owner shall have the unqualified right to share such premiums based on their respective cumulative contributions thereto.

(7). Termination of Agreement During Lifetime of Employee:

(a). This Agreement shall terminate during the lifetime of the Employee without notice upon the occurrence of any of the following events: (a) total cessation of the business of the Corporation; or (b) the bankruptcy, receivership, or dissolution of the Corporation.

(b). In addition, the Owner may terminate this Agreement, while no premium under the Policy is overdue, by written notice to the other parties hereto. Such termination shall be effective as of the date of such written notice.

(8). Disposition of Policy on Termination of Agreement During Lifetime of Employee:

(a). For sixty (60) days after the date of the termination of this Agreement during the lifetime of the Employee, the Owner shall have the option of obtaining the release of the collateral assignment of the Policy to the Corporation. To obtain such release, the Owner shall repay to the Corporation the total amount of the premium payments made by the Corporation under the terms of this Agreement. Upon receipt of such amount, the Corporation shall release the collateral assignment of the Policy by the execution and delivery of an appropriate instrument of release.

(b). If the Owner fails to exercise such option described in Section (8)(a) above within such sixty (60) day period, then, at the request of the Corporation, the Owner shall execute any document or documents required by the Insurer to transfer the interest of the Owner in the Policy to the Corporation. Alternatively, the Corporation may enforce its right to be repaid the amount of the premiums on the Policy paid by it from the cash surrender value of the Policy under the collateral assignment of the Policy; provided, however, that, in the event the cash surrender value of the Policy exceeds the amount due the Corporation, such excess shall be paid to the Owner. Thereafter, neither the Owner nor its successors or assigns shall have any further interest in and to the Policy either under the terms thereof or under this Agreement.

(9). Insurer Not a Party: The Insurer shall be fully discharged from its obligations under the Policy by payment of the Policy death benefit to the beneficiary

or beneficiaries named in the Policy, subject to the terms and conditions of the Policy. In no event shall the Insurer be considered a party to this Agreement or any modification or amendment hereof. No provision of this Agreement, nor of any modification or amendment hereof, shall in any way be construed as enlarging, changing, varying, or in any other way affecting the obligations of the Insurer as expressly provided in the Policy, except insofar as the provisions hereof are made a part of the Policy by the collateral assignment executed by the Owner and filed with the Insurer in connection herewith.

(10). Named Fiduciary; Determination of Benefits; Claims Procedure and Administration:

(a). The Corporation is hereby designated as the named fiduciary under this Agreement. The Corporation, as the named fiduciary under this Agreement, shall have authority to control and manage the operation and administration of this Agreement, and the Corporation shall be responsible for establishing and carrying out a funding policy and method consistent with the objectives of this Agreement.

(b). (1) Claim. A person who believes that he or she is being denied a benefit to which he or she is entitled under this Agreement (a "Claimant") may file a written request for such benefit with the Corporation setting forth his or her claim. The request must be addressed to the President of the Corporation at its principal place of business.

(2) Claim Decision. Upon receipt of a claim, the Corporation shall advise the Claimant in writing that a reply will be forthcoming within ninety (90) days and shall deliver such reply within such ninety (90) day period. The Corporation may, however, extend the reply period for an additional ninety (90) days for reasonable cause. If the claim is denied in whole or in part, the Corporation shall adopt a written opinion, using language calculated to be understood by the Claimant, setting forth: (a) the specific reason or reasons for such denial; (b) the specific reference to pertinent provisions of this Agreement on which such denial is based; (c) a description of any additional material or information necessary for the Claimant to perfect his or her claim and an explanation why such material or such information is necessary; (d) appropriate information as to the steps to be taken if the Claimant wishes to submit the claim for review; and (e) the time limits for requesting a review under Subsection (3) of this Section and for review under Subsection (4) of this Section.

(3) Request for Review. Within sixty (60) days after the receipt by the Claimant of the written opinion described above, the Claimant may request in writing that the Clerk of the Corporation review the determination of the Corporation. Such request shall be addressed to the Clerk of the Corporation at its principal place of business. The Claimant or his or her duly authorized representative may, but need not, review the pertinent documents and submit issues and comments in writing for consideration by the Clerk of the Corporation. If the Claimant does not request a review by the Clerk of the Corporation of the

determination by the Corporation within such sixty (60) day period, the Claimant shall be barred and estopped from challenging the determination of the Corporation.

(4) Review of Decision. Within sixty (60) days after the Clerk's receipt of a request for review, he or she will review the determination of the Corporation. After considering all materials presented by the Claimant, the Clerk will render a written opinion, written in a manner calculated to be understood by the Claimant, setting forth the specific reasons for the decision and containing specific references to the pertinent provisions of this Agreement on which the decision is based. If special circumstances require that the sixty (60) day time period be extended, the Clerk will so notify the Claimant and will render the decision as soon as possible, but no later than one hundred twenty (120) days after receipt of the request for review.

(11). Amendment: This Agreement may not be amended, altered, or modified, except by a written instrument signed by all of the parties hereto, or their respective successors or assigns, and may not be otherwise terminated, except as provided herein.

(12). Binding Effect: This Agreement shall be binding upon, and inure to the benefit of, the parties hereto and their respective successors, assigns, heirs, executors, administrators, and beneficiaries.

(13). Notice: Any notice, consent, or demand required or permitted to be given under the provisions of this Agreement shall be in writing, and shall be signed by the party giving or making the same. If such notice, consent, or demand is mailed

to a party hereto, it shall be sent by United States certified mail, postage prepaid, return receipt requested, addressed to such party's last known address as shown on the records of the Corporation. The date of such mailing shall be deemed the date of the notice, consent, or demand.

(14). Governing Law: This Agreement shall be governed by, and construed in accordance with, the laws of The Commonwealth of Massachusetts applicable to a contract made and to be performed solely within The Commonwealth of Massachusetts.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as an instrument under seal, all as of the day, month, and year first written above.

MKS INSTRUMENTS, INC.

By:
Ronald C. Weigner, Controller

John R. Bertucci

JOHN R. BERTUCCI INSURANCE
TRUST OF JANUARY 10, 1986

By:
Claire R Bertucci, as Trustee
and not individually

By:
Richard S. Chute, as Trustee
and not individually

EXHIBIT A

The following described life insurance policy is subject to the Split-Dollar Agreement to which this Exhibit A is attached:

Insurer: Pacific Mutual Life Insurance Company

Insured: John R. Bertucci and Claire R. Bertucci

Owner: Claire R. Bertucci and Richard S. Chute as Trustees of the John R. Bertucci Insurance Trust of January 10, 1986

Policy Number: 1A2246049

Face Amount: \$5,000,000

Date of Issue: September 1, 1991

SPLIT-DOLLAR AGREEMENT

AGREEMENT dated as of September 12, 1991 (the "Agreement") by and among MKS Instruments, Inc., a Massachusetts corporation (the "Corporation"), John R. Bertucci of Lexington, Massachusetts (the "Employee"), and John R. Bertucci of Lexington, Massachusetts and Thomas H. Belknap of Hamilton, Massachusetts, as Trustees of the Claire R. Bertucci Insurance Trust of January 10, 1986 (the "Owner").

WHEREAS, the Employee is employed by the Corporation; and

WHEREAS, the Employee wishes to provide life insurance protection for his family in the event of his death under a policy of life insurance insuring his life and the life of Claire R. Bertucci (the "Policy") which is described in Exhibit A hereto (and by this reference is hereby made subject to this Agreement) issued by Pacific Mutual Life Insurance Company (the "Insurer"); and

WHEREAS, the Corporation is willing to pay the premiums due on the Policy as an additional employment benefit for the Employee on the terms and conditions hereinafter set forth; and

WHEREAS, the Owner is the owner of the Policy and, as such, possesses all incidents of ownership in and to the Policy; and

WHEREAS, the Corporation wishes to have the Policy collaterally assigned to it by the Owner in order to secure the repayment of the amounts which the Corporation will pay toward the premiums on the Policy; and

WHEREAS, the parties hereto intend that by such collateral assignment the Corporation shall receive only the right to such repayment with the Owner retaining all other ownership rights in and to the Policy:

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein and for other valuable consideration, the receipt of which is hereby acknowledged, the parties hereto hereby agree as follows:

(1). Purchase of Policy: The Owner will, contemporaneously with the execution hereof, purchase the Policy from the Insurer in the total face amount of \$5,000,000. The parties hereto agree that they will take all necessary action to cause the Insurer to issue the Policy and shall take any further action which may be necessary to cause the Policy to conform to the provisions of this Agreement. The parties hereto agree that the Policy shall be subject to the terms and conditions of this Agreement and of the collateral assignment filed with the Insurer relating to the Policy.

(2). Ownership of Policy:

(a). The Owner shall be the sole and absolute owner of the Policy and may exercise all ownership rights granted to the owner thereof by the terms of the Policy, except as may otherwise be provided herein.

(b). It is the intention of the parties to this Agreement and to the collateral assignment referred to herein that the Owner shall retain all rights which the Policy grants to the owner thereof and that the sole right of the Corporation hereunder shall be to be repaid the amounts which it has paid toward the premiums of the Policy. Specifically, but without limitation, the Corporation shall neither have nor exercise any right as collateral assignee of the Policy which could in any way

defeat or impair the right of the Owner to receive the cash surrender value or the death proceeds of the Policy in excess of the amount due the Corporation hereunder.

(3). Payment of Premiums: Except as otherwise provided herein, on or before the due date of each Policy premium, or within the grace period provided therein, the Corporation shall pay the full amount of the premium to the Insurer, and shall, upon request, promptly furnish the Employee evidence of timely payment of such premium. The Corporation shall annually furnish the Employee a statement of the amount of income reportable by the Employee for federal and state income tax purposes as a result of the insurance protection provided the Owner as the beneficiary of the Policy.

(4). Collateral Assignment: To secure the repayment to the Corporation of the amount of the premiums on the Policy paid by the Corporation under the terms of this Agreement, the Owner has, contemporaneously with the execution hereof, assigned the Policy to the Corporation as collateral, which collateral assignment specifically provides that the sole right of the Corporation thereunder is to be repaid the amounts it has paid toward the premiums on the Policy. Such repayment shall be made from the cash surrender value of the Policy (as defined therein) if this Agreement is terminated or if the Owner surrenders or cancels the Policy or from the death proceeds of the Policy, if any, if the Employee or any other insured should die while the Policy and this Agreement remain in force. In no event shall the Corporation have any right to borrow against or make withdrawals from the Policy or to surrender or cancel the Policy or to take any other action which would impair

or defeat the rights of the Owner in and to the Policy. The collateral assignment of the Policy to the Corporation hereunder shall not be terminated, altered, or amended by the Owner while this Agreement is in effect. The parties hereto agree to take all action necessary to cause such collateral assignment to conform to the provisions of this Agreement.

(5). Limitations on Rights of Owner in and to Policy:

(a). The Owner shall take no action with respect to the Policy which would in any way compromise or jeopardize the right of the Corporation to be repaid the amounts it has paid toward the premiums on the Policy while this Agreement is in effect.

(b). The Owner may pledge or assign the Policy, subject to the terms and conditions of this Agreement, in order to secure a loan from the Insurer or from a third party, in an amount which shall not exceed the cash surrender value of the Policy (as defined therein) as of the date to which premiums have been paid, less the amount paid toward the premiums on the Policy by the Corporation. Interest charges on such loan shall be the responsibility of and be paid by the Owner. For any Policy year in which the Owner borrows hereunder, the Corporation shall be correspondingly relieved of its obligation to pay any amounts toward premiums for such Policy year to the extent of such borrowing.

(c). The Owner shall have the sole right to surrender or cancel the Policy and to receive the full cash surrender value of the Policy directly from the Insurer. Upon the surrender or cancellation of the Policy, the Corporation shall have

the unqualified right to receive a portion of the cash surrender value equal to the total amount of the premiums paid by the Corporation under the terms of this Agreement. Immediately upon receipt of the cash value of the Policy from the Insurer, the Owner shall pay to the Corporation the portion of such cash value to which the Corporation is entitled under the terms of this Agreement and shall retain the balance, if any. Upon such receipt and payment this Agreement shall thereupon terminate.

(6). Collection of Death Proceeds:

(a). Upon the death of the second to die of the Employee and Claire R. Bertucci, the Corporation and the Owner shall cooperate to take whatever action is necessary to collect the death benefit, if any, provided under the Policy, and when such death benefit, if any, has been collected and paid as provided herein, this Agreement shall thereupon terminate.

(b). Upon the death of the second to die of the Employee and Claire R. Bertucci, the Corporation shall have the unqualified right to receive a portion of such death benefit, if any, equal to the total amount of the premiums paid by the Corporation under the terms of this Agreement; provided, however, that, if the Owner shall deem it to be in the best interests of the Owner as evidenced by the written consent of the Owner, the Owner may, upon the death of the first to die of the Employee and Claire R. Bertucci, repay the Corporation the total amount of the premiums paid by the Corporation under the terms of this Agreement. The balance of the death benefit provided under the Policy, if any, shall be paid directly to the

Owner in the manner and in the amount or amounts provided in the beneficiary designation provision of the Policy. In no event shall the amount payable to the Corporation hereunder exceed the proceeds of the Policy payable at the death of the second to die of the Employee and Claire R. Bertucci. No amount shall be paid from such death benefit to the Owner until the full amount due the Corporation hereunder has been paid. The parties hereto agree that the beneficiary designation provision of the Policy shall conform to the provisions hereof.

(c). Notwithstanding any provision hereof to the contrary, in the event that, for any reason whatsoever, no death benefit is payable under the Policy upon the death of the second to die of the Employee and Claire R. Bertucci and in lieu thereof the Insurer refunds all or any part of the premiums paid for the Policy, the Corporation and the Owner shall have the unqualified right to share such premiums based on their respective cumulative contributions thereto.

(7). Termination of Agreement During Lifetime of Employee:

(a). This Agreement shall terminate during the lifetime of the Employee without notice upon the occurrence of any of the following events: (a) total cessation of the business of the Corporation; or (b) the bankruptcy, receivership, or dissolution of the Corporation.

(b). In addition, the Owner may terminate this Agreement, while no premium under the Policy is overdue, by written notice to the other parties hereto. Such termination shall be effective as of the date of such written notice.

(8). Disposition of Policy on Termination of Agreement During Lifetime of Employee:

(a). For sixty (60) days after the date of the termination of this Agreement during the lifetime of the Employee, the Owner shall have the option of obtaining the release of the collateral assignment of the Policy to the Corporation. To obtain such release, the Owner shall repay to the Corporation the total amount of the premium payments made by the Corporation under the terms of this Agreement. Upon receipt of such amount, the Corporation shall release the collateral assignment of the Policy by the execution and delivery of an appropriate instrument of release.

(b). If the Owner fails to exercise such option described in Section (8)(a) above within such sixty (60) day period, then, at the request of the Corporation, the Owner shall execute any document or documents required by the Insurer to transfer the interest of the Owner in the Policy to the Corporation. Alternatively, the Corporation may enforce its right to be repaid the amount of the premiums on the Policy paid by it from the cash surrender value of the Policy under the collateral assignment of the Policy; provided, however, that, in the event the cash surrender value of the Policy exceeds the amount due the Corporation, such excess shall be paid to the Owner. Thereafter, neither the Owner nor its successors or assigns shall have any further interest in and to the Policy either under the terms thereof or under this Agreement.

(9). Insurer Not a Party: The Insurer shall be fully discharged from its obligations under the Policy by payment of the Policy death benefit to the beneficiary

or beneficiaries named in the Policy, subject to the terms and conditions of the Policy. In no event shall the Insurer be considered a party to this Agreement or any modification or amendment hereof. No provision of this Agreement, nor of any modification or amendment hereof, shall in any way be construed as enlarging, changing, varying, or in any other way affecting the obligations of the Insurer as expressly provided in the Policy, except insofar as the provisions hereof are made a part of the Policy by the collateral assignment executed by the Owner and filed with the Insurer in connection herewith.

(10). Named Fiduciary; Determination of Benefits; Claims Procedure and Administration:

(a). The Corporation is hereby designated as the named fiduciary under this Agreement. The Corporation, as the named fiduciary under this Agreement, shall have authority to control and manage the operation and administration of this Agreement, and the Corporation shall be responsible for establishing and carrying out a funding policy and method consistent with the objectives of this Agreement.

(b). (1) Claim. A person who believes that he or she is being denied a benefit to which he or she is entitled under this Agreement (a "Claimant") may file a written request for such benefit with the Corporation setting forth his or her claim. The request must be addressed to the President of the Corporation at its principal place of business.

(2) Claim Decision. Upon receipt of a claim, the Corporation shall advise the Claimant in writing that a reply will be forthcoming within ninety (90) days and shall deliver such reply within such ninety (90) day period. The Corporation may, however, extend the reply period for an additional ninety (90) days for reasonable cause. If the claim is denied in whole or in part, the Corporation shall adopt a written opinion, using language calculated to be understood by the Claimant, setting forth: (a) the specific reason or reasons for such denial; (b) the specific reference to pertinent provisions of this Agreement on which such denial is based; (c) a description of any additional material or information necessary for the Claimant to perfect his or her claim and an explanation why such material or such information is necessary; (d) appropriate information as to the steps to be taken if the Claimant wishes to submit the claim for review; and (e) the time limits for requesting a review under Subsection (3) of this Section and for review under Subsection (4) of this Section.

(3) Request for Review. Within sixty (60) days after the receipt by the Claimant of the written opinion described above, the Claimant may request in writing that the Clerk of the Corporation review the determination of the Corporation. Such request shall be addressed to the Clerk of the Corporation at its principal place of business. The Claimant or his or her duly authorized representative may, but need not, review the pertinent documents and submit issues and comments in writing for consideration by the Clerk of the Corporation. If the Claimant does not request a review by the Clerk of the Corporation of the

determination by the Corporation within such sixty (60) day period, the Claimant shall be barred and estopped from challenging the determination of the Corporation.

(4) Review of Decision. Within sixty (60) days after the Clerk's receipt of a request for review, he or she will review the determination of the Corporation. After considering all materials presented by the Claimant, the Clerk will render a written opinion, written in a manner calculated to be understood by the Claimant, setting forth the specific reasons for the decision and containing specific references to the pertinent provisions of this Agreement on which the decision is based. If special circumstances require that the sixty (60) day time period be extended, the Clerk will so notify the Claimant and will render the decision as soon as possible, but no later than one hundred twenty (120) days after receipt of the request for review.

(11). Amendment: This Agreement may not be amended, altered, or modified, except by a written instrument signed by all of the parties hereto, or their respective successors or assigns, and may not be otherwise terminated, except as provided herein.

(12). Binding Effect: This Agreement shall be binding upon, and inure to the benefit of, the parties hereto and their respective successors, assigns, heirs, executors, administrators, and beneficiaries.

(13). Notice: Any notice, consent, or demand required or permitted to be given under the provisions of this Agreement shall be in writing, and shall be signed by the party giving or making the same. If such notice, consent, or demand is mailed

to a party hereto, it shall be sent by United States certified mail, postage prepaid, return receipt requested, addressed to such party's last known address as shown on the records of the Corporation. The date of such mailing shall be deemed the date of the notice, consent, or demand.

(14). Governing Law: This Agreement shall be governed by, and construed in accordance with, the laws of The Commonwealth of Massachusetts applicable to a contract made and to be performed solely within The Commonwealth of Massachusetts.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as an instrument under seal, all as of the day, month, and year first written above.

MKS INSTRUMENTS, INC.

By:
Ronald C. Weigner, Controller

John R. Bertucci

CLAIRE R. BERTUCCI INSURANCE
TRUST OF JANUARY 10, 1986

By:
John R. Bertucci, as Trustee
and not individually

By:
Thomas H. Belknap, as Trustee
and not individually

EXHIBIT A

The following described life insurance policy is subject to the Split-Dollar Agreement to which this Exhibit A is attached:

Insurer: Pacific Mutual Life Insurance Company

Insured: John R. Bertucci and Claire R. Bertucci

Owner: John R. Bertucci and Thomas H. Belknap as Trustees of the Claire R. Bertucci Insurance Trust of January 10, 1986

Policy Number: 1A22406290

Face Amount: \$5,000,000

Date of Issue: September 1, 1991

MKS INSTRUMENTS, INC.

STATEMENT RE COMPUTATION OF EARNINGS PER SHARE

| | YEAR ENDED | |
|---|----------------------|----------------------|
| | PRIMARY | FULLY DILUTED |
| | DECEMBER 31, 1996 | DECEMBER 31, 1996 |
| Weighted average common stock outstanding during the period.... | 12,035,440 | 12,035,440 |
| Shares issuable from the assumed exercise of stock options, computed in accordance with the treasury stock method..... | -- | -- |
| Dilutive effect of cheap stock computed in accordance with the treasury stock method(1)..... | 265,706 | 265,706 |
| Number of shares assumed issued at an assumed initial public offering price per share necessary to fund the S corporation distribution as of January 1, 1997, to be made out of the proceeds of this offering..... | 1,692,857 | 1,692,857 |
| Pro forma weighted average common shares outstanding..... | 13,994,003 | 13,994,003 |
| Pro forma net income..... | \$ 8,248,000 | \$ 8,248,000 |
| Pro forma net income per share..... | \$ 0.59 | \$ 0.59 |

| | NINE MONTHS ENDED | |
|---|-----------------------|-----------------------|
| | PRIMARY | FULLY DILUTED |
| | SEPTEMBER 30, 1997 | SEPTEMBER 30, 1997 |
| Weighted average common stock outstanding during the period.... | 12,035,440 | 12,035,440 |
| Shares issuable from the assumed exercise of stock options, computed in accordance with the treasury stock method..... | 139,596 | 279,836 |
| Dilutive effect of cheap stock computed in accordance with the treasury stock method(1)..... | 265,706 | 265,706 |
| Number of shares assumed issued at an assumed initial public offering price per share necessary to fund the S corporation distribution as of January 1, 1997, to be made out of the proceeds of this offering..... | 1,692,857 | 1,692,857 |
| Pro forma weighted average common shares outstanding..... | 14,133,599 | 14,273,839 |
| Pro forma net income..... | \$ 8,731,000 | \$ 8,731,000 |
| Pro forma net income per share..... | \$ 0.62 | \$ 0.61 |

(1) Pursuant to SEC Staff Accounting Bulletin No 83, all common and common equivalent shares issued at prices below the mid-point of the estimated initial public offering price range during the twelve-month period prior to the initial filing of the Registration Statement have been included in the calculation as outstanding for all periods presented using the treasury stock method.

MKS International, Inc.
MKS Instruments Deutschland GmbH
MKS Instruments France S.A.
MKS Instruments Canada Ltd.
MKS Instruments, U.K. Limited
MKS East, Inc.
MKS Japan, Inc.
MKS Korea Co., Ltd.
MKS FSC, Inc.

CONSENT OF INDEPENDENT ACCOUNTANT

We consent to the inclusion in this registration statement on Form S-1 of our report dated October 28, 1997, on our audits of the financial statements and financial statement schedules of MKS Instruments, Inc. We also consent to the reference to our firm under the caption "Experts."

COOPERS & LYBRAND L.L.P.

Boston, Massachusetts
November 12, 1997

S-6

5
1,000

9-MOS

DEC-31-1997
JAN-01-1997
SEP-30-1997
5,421
918
32,018
618
28,081
67,558
69,261
34,918
106,685
38,079
16,348
0
0
113
51,643
106,685
134,629
134,629
78,456
78,456
40,481
255
1,610
14,082
1,190
12,892
0
0
0
12,892
0.62
0.61

YEAR

| | |
|-------------|---------|
| DEC-31-1996 | |
| JAN-01-1996 | |
| DEC-31-1996 | 3,815 |
| | 391 |
| | 21,734 |
| | 482 |
| | 25,500 |
| | 52,494 |
| | 69,121 |
| | 31,114 |
| | 95,000 |
| 30,090 | |
| | 18,899 |
| 0 | |
| | 0 |
| | 113 |
| 95,000 | |
| | 45,385 |
| | 170,862 |
| | 170,862 |
| | 102,008 |
| | 102,008 |
| | 53,173 |
| | (20) |
| | 2,378 |
| | 13,303 |
| | 800 |
| 12,503 | |
| | 0 |
| | 0 |
| | 0 |
| | 12,503 |
| | 0.59 |
| | 0.59 |