

SECURITIES AND EXCHANGE COMMISSION  
WASHINGTON, DC 20549

FORM 10-K  
FOR ANNUAL AND TRANSITION REPORTS PURSUANT  
TO SECTIONS 13 OR 15(d) OF THE  
SECURITIES EXCHANGE ACT OF 1934

(MARK ONE)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES  
EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 1999

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES  
EXCHANGE ACT OF 1934

For the transition period from \_\_\_\_\_ to \_\_\_\_\_

Commission file number 0-23621

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

Massachusetts (State or other jurisdiction of incorporation or organization)	04-2277512 (I.R.S. Employer Identification No.)
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Six Shattuck Road, Andover, Massachusetts (Address of principal executive offices)	01810 (Zip Code)
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Registrant's telephone number, including area code (978) 975-2350

SECURITIES REGISTERED PURSUANT TO SECTION 12(b) OF THE ACT: NONE  
SECURITIES REGISTERED PURSUANT TO SECTION 12(g) OF THE ACT: COMMON STOCK, NO PAR  
VALUE

Indicate by check mark whether the registrant: (1) has filed all reports  
required to be filed by Section 13 or 15(d) of the Securities Exchange Act of  
1934 during the preceding 12 months (or for such shorter period that the  
registrant was required to file such reports), and (2) has been subject to such  
filing requirements for the past 90 days. Yes X No \_\_\_.

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405  
of Regulation S-K is not contained herein, and will not be contained, to the  
best of registrant's knowledge, in definitive proxy or information statements  
incorporated by reference in Part III of this Form 10-K or any amendment to  
this Form 10-K.

Aggregate market value of the voting and non-voting common equity held by  
nonaffiliates of the registrant as of February 11, 2000: \$331,073,252

Number of shares outstanding of the issuer's Common Stock, no par value, as of  
February 11, 2000: 24,770,231

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the MKS 1999 Annual Report for the year ended December 31, 1999 are  
incorporated by reference into Parts I, II and IV of this Form 10-K.

Portions of the definitive Proxy Statement for MKS' Annual Meeting of  
Stockholders to be held on May 17, 2000 are incorporated by reference into Part  
III of this Form 10-K.

## ITEM 1. BUSINESS

MKS is a leading worldwide developer, manufacturer and supplier of instruments, components and subsystems used to measure, control and analyze gases in semiconductor manufacturing and similar industrial manufacturing processes. MKS offers a comprehensive line of products which are used to manufacture, among other things:

- semiconductors
- optical filters and fiber optics cables for data and telecommunications
- flat panel displays
- magnetic and optical storage devices and media, including:
  - compact disks
  - hard disk storage devices
  - magnetic devices for reading disk data
  - digital video disks
  - optical storage disks or laser readable disks
- solar panels
- eyeglasses
- architectural glass
- cutting tools
- freeze-dried pharmaceuticals

## Products

MKS supplies products in three principal product areas. We also provide value-added integrated subsystems combining these products. Our products include:

- Pressure Measurement and Control Products
- Material Delivery and Analysis Products
- Vacuum Products

**PRESSURE MEASUREMENT AND CONTROL PRODUCTS.** MKS designs and manufactures a wide range of gas pressure measurement and control instrumentation. Each product line consists of products which are designed for a variety of pressure ranges and accuracies.

**Baratron Pressure Measurement Products.** MKS's Baratron pressure measurement products are high precision pressure measurement instruments. MKS has five Baratron product families 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 chambers, to measure process chamber pressures and to measure pressures between process chambers, vacuum pumps and exhaust lines. Baratron instruments measure pressures at ranges from two hundred times atmospheric pressure to one billionth of atmospheric pressure. MKS believes it offers the widest range of gas pressure measurement instruments in the semiconductor and advanced thin-film materials processing industries.

A key feature of Baratron instruments is the ability to 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 instruments enable users to achieve

a highly precise, accurate and repeatable measurement of gas pressure. Pressure measurement, independent of gas composition, is also useful during process steps used to remove atmospheric gases as well as those used to introduce specific amounts of various types of gases. Such processes are used to manufacture fluorescent bulbs and to fabricate gas lasers.

Automatic Pressure and Vacuum Control Products. MKS's automatic 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, MKS's Baratron pressure measurement instruments provide the pressure input to the automatic pressure control device. Together, these components create an integrated automatic pressure control system. MKS's pressure control products can also accept inputs from other measurement instruments, enabling the automatic control of gas input or exhaust based on parameters other than pressure.

MKS has recently introduced a line of integrated pressure controllers that combine the functions of its Baratron pressure measurement instrument, flow measurement instrument, control electronics and valve into a four-inch long instrument which can be placed directly on a gas line to control pressure downstream of the instrument while indicating the gas flow rate. This addresses the need for smaller components, saving valuable clean room space.

MATERIALS DELIVERY AND ANALYSIS PRODUCTS. MKS designs and manufactures a wide range of flow and composition analysis measurement and control instrumentation. Each product line consists of products which are designed for a variety of flow and composition ranges and accuracies.

Flow Measurement and Control Products. MKS'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 automatically control the mass flow rate of gases and vapors into the process chamber. MKS's broad product lines include products that allow the precise, automatic flow control of inert or corrosive gases, the automatic control of low vapor pressure gases and heated liquid source materials, and the automatic control of delicate, advanced technology liquid sources and vaporized solid sources for next generation devices.

MKS's line of thermal-based mass flow controllers, which control gas flow based on the molecular weight of gases, 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. MKS 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.

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, MKS has designed a direct liquid injection subsystem which pumps a precise volume of liquid into a vaporizer, which in turn supplies a controlled flow of vapor into the process chamber. The direct liquid injection subsystem pump and vaporizer are presently used principally for research and development applications for next generation semiconductor device conductors, diffusion barriers and insulators, such as copper, titanium nitride and dielectric materials.

MKS's flow measurement products also include a calibration system which independently measures mass flow and compares this measurement to that of the process chamber mass flow controller. The demand for the MKS 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.

Gas Composition Analysis Instruments. MKS's gas analysis instruments are sold primarily to the semiconductor industry. The residual gas analysis product lines include a quadrupole mass spectrometer sensor, which is a device that separates gases based on molecular weight. MKS's quadrupole mass spectrometer sensors include built-in electronics to analyze the composition of background and process gases in the process chamber. MKS'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 and are sold at prices ranging up to \$80,000. 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. MKS'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 semiconductor manufacturing processes, with smaller circuit patterns and larger wafer sizes, are expected to require sophisticated gas analysis instruments and/or monitoring equipment to ensure tighter process control and earlier diagnosis of equipment malfunction.

VACUUM PRODUCTS. MKS designs and manufactures a wide variety of vacuum technology products, including vacuum gauges, vacuum valves and components.

Vacuum Gauging Products. MKS 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. Unlike Baratron pressure measurement instruments, vacuum gauges 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. MKS's indirect pressure gauges use thermal conductivity and ionization gauge technologies to measure pressure from atmospheric pressure to one trillionth of atmospheric pressure. MKS'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 two hundred times atmospheric pressure to one trillionth of atmospheric pressure.

MKS 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. MKS offers both analog and digital versions of these vacuum gauge transducers.

Vacuum Valves and Components. MKS's vacuum valves are used on the gas lines between the process chamber and the pump downstream of the process chamber. MKS's vacuum components consist of flanges, fittings, 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 circuit patterns cannot tolerate contamination from atmospheric leaks or particles. MKS's vacuum components are designed to minimize such contamination and thus increase yields and uptimes.

#### MARKETS AND APPLICATIONS

MKS estimates that approximately two-thirds of its sales in 1999 were made to the semiconductor industry. MKS's products are also used in other markets and applications including the manufacture of, among other things:

- optical filters and fiber optic cables for data and telecommunications
- flat panel displays
- magnetic and optical storage media
- solar panels
- gas lasers
- eyeglasses
- architectural glass
- cutting tools

- freeze-dried pharmaceuticals

MKS sells its products primarily through its direct sales force in 22 offices in France, Germany, Japan, Korea, The Netherlands, Singapore, Taiwan, the United Kingdom and the United States. This direct sales force is supplemented by sales representatives and agents in Canada, China, India, Israel, and Italy and in selected U.S. cities. The major markets for MKS's products include:

#### Semiconductor Manufacturing

MKS's products are sold to semiconductor capital equipment manufacturers and semiconductor device manufacturers. MKS's products are used in the major semiconductor processing steps such as:

- depositing materials onto substrates
- etching circuit patterns
- implanting positively charged atoms into a substrate to alter electrical characteristics

MKS's products are also used for process facility applications such as gas distribution, pressure control and vacuum distribution in clean rooms where semiconductor manufacturing takes place. MKS 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 capital equipment manufacturers are concentrated in the United States, Japan and Europe.

#### Optical Filters, Optical Fibers and Other Coating

MKS's products are used in optical filter, optical fiber and other optical thin-film coating processes. MKS's products are sold both to coating equipment manufacturers and to manufacturers of products made using optical thin-film coating processes. Optical filters and fibers used for data transmission are manufactured using processes to deposit chemical vapors which are similar to those used in semiconductor manufacturing. The requirement for greater data transmission is driving the need for tighter control of optical filters and fiber coating processes. Optical thin films for eyeglasses, solar panels and architectural glass are deposited using processes to deposit chemical vapors and gaseous metals similar to those used in semiconductor manufacturing. Optical filter, optical fiber and other optical thin-film processing are concentrated in the United States, Japan and Europe.

#### Flat Panel Display Manufacturing

MKS's products are used in the manufacture of flat panel displays, which require the same or similar fabrication processes as semiconductor manufacturing. MKS sells its products both to flat panel original equipment manufacturers 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. The major manufacturers for flat panel displays and flat panel display equipment are concentrated in Japan.

#### Magnetic and Optical Storage Media

MKS's products are used in the manufacture of:

- magnetic storage media which store and read data magnetically
- optical storage media which store and read data using laser technology
- compact disks
- hard disks
- data storage devices
- digital video or versatile disks

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 storage media capital equipment manufacturers are concentrated in the United States, Japan and Europe.

#### Other Coating Markets

MKS's pressure and flow measurement and control instruments are also used in processes for the application of thin films to harden tool bit surfaces, for the application of diamond thin films to enhance surface hardness and durability and for coatings used for food container packaging, jewelry and ornaments. The major equipment and process providers are concentrated in the United States, Japan and Europe.

#### Other Markets

MKS's products are used 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. MKS's products are also sold to government, university and industrial laboratories for vacuum applications involving research and development in materials science, physical chemistry and electronics materials. The major equipment and process providers and research laboratories are concentrated in the United States, Japan and Europe.

#### SALES, MARKETING AND SUPPORT

MKS's worldwide sales, marketing and support organization is critical to its strategy of maintaining close relationships with semiconductor capital equipment manufacturers and semiconductor device manufacturers. MKS sells its products primarily through its direct sales force. As of December 31, 1999, MKS had 126 sales employees in 22 offices in France, Germany, Japan, Korea, The Netherlands, Singapore, Taiwan, the United Kingdom and the United States. This direct sales force is supplemented by sales representatives and agents in Canada, China, India, Israel, and Italy and in selected U.S. cities. MKS maintains a marketing staff 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, MKS 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 worldwide. MKS provides warranties from one to three years, depending upon the type of product. In addition, MKS offers training programs for its customers in a wide range of vacuum and gas processing technologies.

## RESEARCH AND DEVELOPMENT

MKS's research and development efforts are directed toward developing and improving MKS'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. MKS 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. MKS's employees also work closely with its customers' development personnel. These relationships help MKS identify and define future technical needs on which to focus its research and development efforts. In addition, MKS participates in S.I.S.A. (Semiconductor Industry Suppliers Association), 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.

## COMPETITION

The market for MKS's products is highly competitive. Principal competitive factors include:

- historical customer relationships
- product quality, performance and price
- breadth of product line
- manufacturing capabilities
- customer service and support

While MKS believes that it competes favorably with respect to these factors, there can be no assurance that it will continue to do so.

MKS encounters substantial competition in each of its product lines from a number of competitors, although no one competitor competes with MKS across all product lines. Certain of MKS's competitors have greater financial and other resources than MKS. In some cases, the competitors are smaller than MKS, but well-established in specific product niches. Millipore Corporation offers products that compete with MKS's pressure and flow products. Aera Corporation, STEC, and Unit Instruments, each offer products that compete with MKS's mass flow control products. Nor-Cal Products, Inc. and MDC Vacuum Products, Inc., each offer products that compete with MKS's vacuum components. Leybold-Inficon, Inc., offers products that compete with MKS's vacuum measuring and gas analysis products. Helix Technology Corporation offers products that compete with MKS's vacuum gauging products. Spectra International LLC offers products that compete with MKS's gas analysis products.

In some cases, particularly with respect to mass flow controllers, semiconductor device manufacturers may direct semiconductor capital equipment manufacturers to use a specified supplier's product in their equipment. Accordingly, MKS's success depends in part on its ability to have semiconductor device manufacturers specify that its products be used at their fabrication facilities and MKS may encounter difficulties in changing established relationships of competitors with a large installed base of products at such customers' fabrication facilities. In addition, MKS'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 MKS's products.

## PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

MKS relies on a combination of patent, copyright, trademark and trade secret laws and license agreements to establish and protect its proprietary rights. As of December 31, 1999, MKS held 55 U.S. patents and had 13 pending U.S. patent applications. Foreign counterparts of certain of these applications have been filed or may be filed at the appropriate time. While MKS believes that certain

patents may be important for certain aspects of its business, MKS believes that its success depends more upon close customer contact, innovation, technological expertise, responsiveness and worldwide distribution.

The Company is not engaged in any material disputes with other parties with respect to the ownership or use of the Company's proprietary technology. However, there can be no assurance that other parties will not assert technology infringement claims or other claims against the Company in the future. The litigation of such a claim may involve significant expense and management time. In addition, if any such claim were successful, the Company could be required to pay monetary damages and may also be required to either refrain from distributing the infringing product or obtain a license from the party asserting the claim (which license may not be available on commercially reasonable terms).

#### EMPLOYEES

As of December 31, 1999, MKS employed 1,006 persons. Management believes that MKS's ongoing success depends upon its continued ability to attract and retain highly skilled employees. None of MKS's employees is represented by a labor union or party to a collective bargaining agreement. MKS believes that its employee relations are good.

#### FACTORS AFFECTING FUTURE OPERATING RESULTS

MKS believes that this document contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. These statements are subject to risks and uncertainties and are based on the beliefs and assumptions of management of MKS, based on information currently available to MKS' management. Use of words such as "believes," "expects," "anticipates," "intends," "plans," "estimates," "should," "likely" or similar expressions, indicate a forward looking statement. Forward-looking statements involve risks, uncertainties and assumptions. Certain of the information contained in this Annual Report on Form 10-K consists of forward-looking statements. Important factors that could cause actual results to differ materially from the forward-looking statements include the following:

##### Cyclicality of the Semiconductor Industry

MKS estimates that approximately 66% of its sales during 1999 were to semiconductor capital equipment manufacturers and semiconductor device manufacturers, and MKS expects that sales to such customers will continue to account for a substantial majority of its sales. MKS'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. Periodic reductions in demand for the products manufactured by semiconductor capital equipment manufacturers and semiconductor device manufacturers may adversely affect MKS's business, financial condition and results of operations. Historically, the semiconductor market has been highly cyclical and has experienced periods of overcapacity, resulting in significantly reduced demand for capital equipment. For example, in 1996 and 1998 the semiconductor industry experienced a significant decline, which caused a number of MKS's customers to reduce their orders. MKS cannot be certain that semiconductor downturns will not recur. A decline in the level of orders as a result of any future downturn or slowdown in the semiconductor industry could have a material adverse effect on MKS's business, financial condition and results of operations.

##### Fluctuations in Operations Results

A substantial portion of MKS's shipments occur shortly after an order is received and therefore MKS operates with a low level of backlog. As a consequence of the just-in-time nature of shipments and the low level of backlog, a decrease in demand for MKS's products from one or more customers could occur with limited advance notice and could have a material adverse effect on MKS's results of operations in any particular period.

A significant percentage of MKS's expenses are relatively fixed and based in part on expectations of future net sales. The inability to adjust spending quickly enough to compensate for any shortfall would magnify the adverse impact of a shortfall in net sales on MKS's results of operations. Factors that could cause fluctuations in MKS's net sales include:

- The timing of the receipt of orders from major customers
- Shipment delays

- Disruption in sources of supply
- Seasonal variations of capital spending by customers
- Production capacity constraints
- Specific features requested by customers

For example, MKS was in the process of increasing production capacity when the semiconductor capital equipment market began to experience a significant downturn in 1996. This downturn had a material adverse effect on MKS's operating results in the second half of 1996 and the first half of 1997. After an increase in business in the latter half of 1997, the market experienced another downturn in 1998, which had a material adverse effect on MKS's 1998 and first quarter 1999 operating results. As a result of the factors discussed above, it is likely that MKS will in the future experience quarterly or annual fluctuations and that, in one or more future quarters, MKS's operating results will fall below the expectations of public market analysts or investors. In any such event, the price of MKS's common stock could decline significantly.

#### Customer Concentration

MKS's five largest customers in 1999 and 1998 accounted for approximately 33% and 24%, respectively, of its net sales. 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 MKS's business, financial condition and results of operations. During 1999, one customer, Applied Materials, Inc., accounted for approximately 22% of MKS's net sales. While the Company has entered into a purchase contract with Applied Materials, Inc. that expires in 2000 unless it is extended by mutual agreement, none of MKS's significant customers, including Applied Materials, Inc., has entered into an agreement requiring it to purchase any minimum quantity of MKS's products. The demand for MKS's products from its semiconductor capital equipment customers depends in part on orders received by them from their semiconductor device manufacturer customers.

Attempts to lessen the adverse effect of any 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 MKS's ability to maintain relationships with existing key customers, MKS's ability to attract new customers, and the success of MKS's customers in creating demand for their capital equipment products which incorporate MKS's products.

#### Competition

The markets for MKS's products are highly competitive. The Company's competitive success often depends upon factors outside of its control. For example, in some cases, particularly with respect to mass flow controllers, semiconductor device manufacturers may direct semiconductor capital equipment manufacturers 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 the Company's products be used at their semiconductor fabrication facilities. In addition, MKS may encounter difficulties in changing established relationships of competitors that already have a large installed base of products within such semiconductor fabrication facilities.

#### Technological Changes

New products designed by semiconductor capital equipment manufacturers typically have a lifespan of five to ten years. MKS's success depends on its products being designed into new generations of equipment for the semiconductor industry. The Company must develop products that are technologically current so that they are positioned to be chosen for use in each successive new generation of semiconductor equipment. If its products are not chosen by its customers, the Company's net sales may be reduced during the lifespan of its customers' products.

#### Expansion into New Markets

MKS plans to build upon its experience in manufacturing and selling gas measurement, control and analysis products used

by the semiconductor industry by designing and selling such products for applications in other industries which use production processes similar to those used in the semiconductor industry. For example, MKS plans to expand its business to the manufacture of, among other things, hard coatings to minimize wear on cutting tools. Any failure by the Company to penetrate additional markets would limit its ability to reduce its vulnerability to downturns in the semiconductor industry and could have a material adverse effect on MKS's business, financial condition and results of operations.

MKS has limited experience selling its products in certain markets outside the semiconductor industry. The Company cannot be certain that it will be successful in the expansion of its business outside the semiconductor industry.

MKS's future success will depend in part on its ability to:

- identify new applications for MKS's products
- adapt MKS's products for such applications
- market and sell such products to customers

#### Expansion of Manufacturing Capacity

MKS's ability to increase sales of certain products depends in part upon its ability to expand manufacturing capacity for such products in a timely manner. If the Company is unable to expand manufacturing capacity on a timely basis or to manage such expansion effectively, its customers could seek such products from others and its market share could be reduced. Because the semiconductor industry is subject to rapid demand shifts which are difficult to foresee, MKS may not be able to increase capacity quickly enough to respond to a rapid increase in demand in the semiconductor industry. Additionally, capacity expansion could increase the Company's fixed operating expenses and if sales levels do not increase to offset the additional expense levels associated with any such expansion, the Company's business, financial condition and results of operations could be materially adversely affected.

#### International Operations and Sales

International sales, which include sales by MKS's foreign subsidiaries, but exclude direct export sales which were less than 10% of total net sales, accounted for approximately 31% of net sales in 1999, and 32% of net sales in 1998. MKS anticipates that international sales will continue to account for a significant portion of net sales. In addition, certain of MKS's key domestic customers derive a significant portion of their revenues from sales in international markets. Therefore, MKS's sales and results of operations could be adversely affected by economic slowdowns and other risks associated with international sales.

Exchange rate fluctuations could have an adverse effect on MKS's net sales and results of operations and the Company could experience losses with respect to its hedging activities. Unfavorable currency fluctuations could require MKS to increase prices to foreign customers which could result in lower net sales to such customers. Alternatively, if MKS does not adjust the prices for its products in response to unfavorable currency fluctuations, its results of operations could be adversely affected. In addition, sales made by MKS's foreign subsidiaries are denominated in the currency of the country in which these products are sold and the currency MKS receives in payment for such sales could be less valuable at the time of receipt as a result of exchange rate fluctuations. While MKS enters into forward exchange contracts and local currency purchased options to reduce currency exposure arising from intercompany sales of inventory, MKS cannot be certain that its efforts will be adequate to protect the Company against significant currency fluctuations or that such efforts will not expose MKS to additional exchange rate risks.

#### Need to Retain and Attract Key Employees

MKS's success depends to a large extent upon the efforts and abilities of a number of key employees and officers, particularly those with expertise in the semiconductor manufacturing and similar industrial manufacturing industries. The loss of key employees or officers could have a material and adverse effect on MKS's business, financial condition and results of operations. MKS 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 MKS cannot be certain that it will be successful in attracting and retaining such personnel.

## Intellectual Property Matters

Although MKS seeks to protect its intellectual property rights through patents, copyrights, trade secrets and other measures, MKS cannot be certain that:

- it will be able to protect its technology adequately
- competitors will not be able to develop similar technology independently
- any of its pending patent applications will be issued
- intellectual property laws will protect its intellectual property rights
- third parties will not assert that MKS's products infringe patent, copyright or trade secrets of such parties

Litigation may be necessary in order to enforce MKS's patents, copyrights or other intellectual property rights, to protect its 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, financial condition and results of operations.

## MARKET RISK AND SENSITIVITY ANALYSIS

### Foreign Exchange Rate Risk

MKS enters into forward exchange contracts and local currency purchased options to reduce currency exposure arising from intercompany sales of inventory. The potential fair value loss for a hypothetical 10% adverse change in forward currency exchange rates on MKS's forward exchange contracts at December 31, 1999 would be \$502,000. The potential loss was estimated by calculating the fair value of the forward exchange contracts at December 31, 1999 and comparing that with those calculated using the hypothetical forward currency exchange rates.

The value of the local currency purchased options at December 31, 1999 was immaterial.

At December 31, 1999, MKS had \$12,423,000 related to short-term borrowings denominated in Japanese yen. The carrying value of these short-term borrowings approximates fair value due to their short period to maturity. Assuming a hypothetical 10% adverse change in the Japanese yen to U.S. dollar year end exchange rate, the fair value of these short-term borrowings would increase by \$1,381,000. The potential increase in fair value was estimated by calculating the fair value of short-term borrowings at December 31, 1999 and comparing that with the fair value using the hypothetical year end exchange rate.

### Interest Rate Risk

MKS is exposed to fluctuations in interest rates in connection with its variable rate term loans. In order to minimize the effect of changes in interest rates on earnings, MKS entered into an interest rate swap that fixed the interest rate on its variable rate term loans. Under the swap agreement, MKS pays a fixed rate of 5.85% on the notional amount and receives LIBOR. At December 31, 1999, the notional amount of the interest rate swap was equal to the principal amount of the variable rate term loans. The potential increase in the fair value of term loans when adjusting for the interest rate swap paying at a fixed rate resulting from a hypothetical 10% decrease in interest rates was not material.

Due to its short-term duration the fair value of the Company's cash and investment portfolio at December 31, 1999 approximated its carrying value. Interest rate risk was estimated as the potential decrease in fair value resulting from a hypothetical 10% increase in interest rates for securities contained in the investment portfolio. The resulting hypothetical fair value was not materially different from the year-end carrying value.

## ITEM 2. PROPERTIES

The following table provides information concerning MKS's principal and certain other owned and leased facilities as of December 31, 1999:

LOCATION	SQ. FT.	ACTIVITY	PRODUCTS MANUFACTURED	LEASE EXPIRES
Andover, Massachusetts	82,000	Headquarters, Manufacturing, Customer Support and Research & Development	Pressure measurement and control products	(1)
Boulder, Colorado	86,000	Manufacturing, Customer Support, Service and Research & Development	Vacuum products	(2)
Methuen, Massachusetts	85,000	Manufacturing, Customer Support, Service and Research & Development	Pressure measurement and control products; Materials delivery and analysis products	(1)
Lawrence, Massachusetts	40,000	Manufacturing	Pressure measurement and control products	(1)
Tokyo, Japan	20,700	Manufacturing, Sales, Customer Support, Service and Research & Development	Materials delivery and analysis products	(3)
Richardson, Texas	14,600	Manufacturing, Sales, Customer Support and Service	Pressure measurement and control products	8/31/01
Santa Clara, California	13,000	Sales, Customer Support and Service	Not applicable	(4)
Munich, Germany	14,100	Manufacturing, Sales, Customer Support, Service and Research & Development	Pressure measurement and control products; Materials delivery and analysis products	(1)
Le Bourget, France	13,700	Sales, Customer Support and Service	Not applicable	(1)
Austin, Texas	8,200	Sales, Customer Support and Service	Not applicable	1/30/03
Seoul, Korea	4,760	Manufacturing, Sales, Customer Support and Service	Materials delivery and analysis products	5/30/00*
Cheshire, U.K.	2,200	Manufacturing, Sales, Customer Support and Service	Materials delivery and analysis products	10/5/09
Singapore	2,050	Sales, Customer Support and Service	Not applicable	3/25/01
Taiwan	2,050	Sales, Customer Support and Service	Not applicable	12/31/01

- - - - -

- (1) This facility is owned by MKS.
- (2) MKS leases one facility which has 39,000 square feet of space and a lease term which expires 10/31/01 and owns a second and third facility with 28,000 and 19,000 square feet of space, respectively.
- (3) MKS leases a facility which has 14,000 square feet of space and a lease term which expires 4/30/01 and owns another facility with 6,700 square feet of space.
- (4) MKS leases one facility with 4,000 square feet of space on a month-to-month basis, a second facility of 4,000 square feet with a lease term which expires on 1/30/03. MKS owns a third facility of 5,000 square feet.

\* MKS has an option to extend this lease for a period of two years.

In addition to manufacturing and other operations conducted at the foregoing leased or owned facilities, MKS provides worldwide sales, customer support and services from various other leased facilities throughout the world not listed in the table above. See "Business -- Sales, Marketing and Support."

#### ITEM 3. LEGAL PROCEEDINGS

MKS is not a party to any material legal proceedings.

#### ITEM 4. SUBMISSION OF MATTERS TO A VOTE OF SECURITY HOLDERS

No matters were submitted to a vote of security holders during the fourth quarter of Fiscal 1999 through the solicitation of proxies or otherwise.

### PART II

#### ITEM 5. MARKETS FOR COMMON EQUITY AND RELATED STOCKHOLDERS MATTERS

The information required by this item is set forth under the caption "Supplemental Stockholders Information" on page 28 of our 1999 Annual Report and is incorporated herein by reference and is filed herewith as Exhibit 13.1.

#### ITEM 6. SELECTED CONSOLIDATED FINANCIAL DATA

The information required by this item is set forth under the caption "Selected Consolidated Financial Data" on page 20 of our 1999 Annual Report and is incorporated herein by reference and is filed herewith as Exhibit 13.1.

#### ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATION

The information required by this item is set forth under the caption "Management's Discussion and Analysis of Financial Condition and Results of Operation" on pages 21 through 27 of our 1999 Annual Report and is incorporated herein by reference and is filed herewith as Exhibit 13.1.

#### ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

The information required by this item is set forth under the caption "Market Risk and Sensitivity Analysis" on page 27 of our 1999 Annual Report and is incorporated herein by reference and is filed herewith as Exhibit 13.1.

#### ITEM 8. FINANCIAL STATEMENTS

The consolidated financial statements, together with the report thereon of PricewaterhouseCoopers LLP, Independent Accountants, dated January 28, 2000, and appearing on pages 29 through 43 of our 1999 Annual Report is incorporated herein by reference and is filed herewith as Exhibit 13.1.

#### ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

## PART III

## ITEM 10. DIRECTORS AND OFFICERS OF THE REGISTRANT

The information required by this item is set forth under the captions "Election of Directors" and "Executive Officers" in our Proxy Statement for the 2000 Annual Meeting of Stockholders and is incorporated herein by reference.

## ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is set forth under the caption "Executive Compensation" in our Proxy Statement for the 2000 Annual Meeting of Stockholders and is incorporated herein by reference.

## ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT

The information required by this item is set forth under the caption "Security Ownership of Certain Beneficial Owners and Management" in our Proxy Statement for the 2000 Annual Meeting of Stockholders and is incorporated herein by reference.

## ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS

The information required by this item is set forth under the caption "Certain Relationships and Related Transactions" in our Proxy Statement for the 2000 Annual Meeting of Stockholders and is incorporated herein by reference.

## ITEM 14. EXHIBITS, FINANCIAL STATEMENT SCHEDULES, AND REPORTS ON FORM 8-K

(a) The following documents are filed as part of this report

(1) FINANCIAL STATEMENTS:

PART IV  
MKS INSTRUMENTS, INC.  
INDEX TO FINANCIAL STATEMENTS

TITLE -----	ANNUAL REPORT PAGE NUMBER -----
Report of Independent Accountants	29
Consolidated Balance Sheets at December 31, 1999 and 1998	30
Consolidated Statements of Income for the Years Ended December 31, 1999, 1998 and 1997	31
Consolidated Statements of Stockholders' Equity for the Years Ended December 31, 1999, 1998 and 1997	32
Consolidated Statements of Cash Flows for the Years Ended December 31, 1999, 1998 and 1997	33
Notes to Consolidated Financial Statements	34

The consolidated financial statements and related notes, together with the report thereon of PricewaterhouseCoopers LLP dated January 28, 2000, listed in the above index that are included in our 1999 Annual Report which is filed herewith as Exhibit 13.1 are hereby incorporated by reference. With the exception of the pages listed in the above index and the portion of such report referred to in Items 5, 6, 7, 7A, and 8 of this Form 10-K, our 1999 Annual Report is not to be deemed filed as part of this report.

(2) FINANCIAL STATEMENT SCHEDULE:

The following financial statement schedule of MKS Instruments, Inc. for the years ended December 31, 1999, 1998 and 1997 is filed as part of this Form 10-K and should be read in conjunction with our Consolidated Financial Statements included in Item 8 of this Report on Form 10-K.

## SCHEDULE II - VALUATION AND QUALIFYING ACCOUNTS

DESCRIPTION	COLUMN A BALANCE AT BEGINNING OF YEAR	COLUMN B CHARGED TO COSTS AND EXPENSES	COLUMN C CHARGED TO OTHER ACCOUNTS	COLUMN D DEDUCTIONS	COLUMN E BALANCE AT END OF YEAR
YEAR ENDED DECEMBER 31, 1997: Allowance for doubtful accounts.....	\$482,000	\$258,000	\$ ----	\$130,000	\$610,000
YEAR ENDED DECEMBER 31, 1998: Allowance for doubtful accounts.....	610,000	253,000	----	207,000	656,000
YEAR ENDED DECEMBER 31, 1999: Allowance for doubtful accounts.....	656,000	257,000	----	(21,000)	934,000

REPORT OF INDEPENDENT ACCOUNTANTS ON  
FINANCIAL STATEMENT SCHEDULE

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

Our audits of the consolidated financial statements referred to in our report dated January 28, 2000 appearing in the 1999 Annual Report to Shareholders of MKS Instruments, Inc. (which report and consolidated financial statements are incorporated by reference in this Annual Report on Form 10-K) also included an audit of the financial statement schedule listed in Item 14(a)(2) of this Form 10-K. In our opinion, this financial statement schedule presents fairly, in all material respects, the information set forth therein when read in conjunction with the related consolidated financial statements.

PricewaterhouseCoopers LLP

Boston, Massachusetts  
January 28, 2000

All other financial statement schedules have been omitted because they are inapplicable, not required, or the information is included elsewhere in the Consolidated Financial Statements or Notes thereto.

## (3) EXHIBITS:

- (i) The Exhibits listed in the Exhibit Index immediately preceding such Exhibits are filed as part of this Annual Report on Form 10-K.

EXHIBIT NO. -----	TITLE -----
+3.2	Amended and Restated Articles of Organization
+3.4	Amended and Restated By-Laws
+4.1	Specimen certificate representing the common stock
+10.1	Amended and Restated 1995 Stock Incentive Plan
+10.2	1996 Amended and Restated 1996 Director Stock Option Plan
+10.3	1997 Director Stock Option Plan
+10.4	1999 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 last amended January 1, 2000, by and between the First National Bank of Boston and the Registrant
+10.10	Lease Agreement dated as of October 12, 1989, as extended November 1, 1998, by and between Aspen Industrial Park Partnership and the Registrant
10.11	Loan Agreement dated as of November 1, 1993, as last amended January 1, 2000, 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 January 28, 1999, between BankBoston, N.A., 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
+10.16	Promissory Note dated as of August 1990 between Jefferson National Life Insurance Company and the Registrant
***10.17	Comprehensive Supplier Agreement #982812 dated October 23, 1998 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 Walpole Park South II Trust and the Registrant
+10.20	Lease dated as of January 1, 1996 between MiFuji Kanzai Co. Ltd. and the Registrant (covering Floor 5)
+10.21	Lease dated as of April 21, 1997 between MiFuji Kanzai Co. Ltd. and the Registrant (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	Form of Tax Indemnification and S Corporation Distribution Agreement
+10.25	Employment Agreement dated March 7, 1997 between Joseph Maher and the Registrant
+10.26	Form of Contribution Agreement
*10.27	MKS Instruments, Inc. International Employee Stock Purchase Plan
10.28	Loan Agreement dated as of January 1, 2000 between BankBoston, N.A., The Chase Manhattan Bank, and the Registrant
10.29	Employment Agreement dated as of May 17, 1999 between Peter Younger and the Registrant
10.30	Employment Agreement dated as of December 6, 1999 between Robert Klimm and the Registrant
13.1	1999 Annual Report to Shareholders (which shall be deemed filed only with respect to those portions specifically incorporated by reference herein)
21.1	Subsidiaries of the Registrant
23.2	Consent of PricewaterhouseCoopers LLP
27	Financial Data Schedule

\* Incorporated by reference to the Registration Statement on Form S-8 (file No. 333-31224) filed with the Securities and Exchange Commission on February 28, 2000.

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

+ Incorporated by reference to the Registration Statement on Form S-1 (file No. 333-71363) filed with the Securities and Exchange Commission on January 28, 1999, as amended.

(b) Reports on Form 8-K.

No reports filed on Form 8-K were filed during the last quarter of the fiscal year ended December 31, 1999.

(c) Exhibits.

The Company hereby files as exhibits to our Annual Report on Form 10-K those exhibits listed in Item 14(a)(3) above.

(d) Financial Statement Schedules.

Not Applicable.

## SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

MKS INSTRUMENTS, INC.

By: /s/ John R. Bertucci

-----  
 John R. Bertucci  
 Chairman of the Board of Directors  
 and Chief Executive Officer  
 (Principal Executive Officer)

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the date indicated.

SIGNATURES	TITLE	DATE
/s/ John R. Bertucci ----- John R. Bertucci	Chairman of the Board of Directors and Chief Executive Officer (Principal Executive Officer)	3/29/00
/s/ Ronald C. Weigner ----- Ronald C. Weigner	Vice President and Chief Financial Officer (Principal Financial and Accounting Officer)	3/29/00
/s/ Richard S. Chute ----- Richard S. Chute	Director	3/29/00
/s/ Owen W. Robbins ----- Owen W. Robbins	Director	3/29/00
/s/ Robert J. Therrien ----- Robert J. Therrien	Director	3/29/00
/s/ Louis P. Valente ----- Louis P. Valente	Director	3/29/00

## MKS INSTRUMENTS, INC.

## FIFTH AMENDMENT

## TO LOAN AGREEMENT

This Fifth Amendment (the "Amendment") dated as of January 1, 2000 concerns the Loan Agreement dated as of October 31, 1995 (the "Loan Agreement"), between MKS Instruments, Inc. (the "Borrower") and BankBoston, N.A. (f/k/a The First National Bank of Boston, the "Lender"), as amended on February 23, 1996, February 4, 1997, February 3, 1998 and January 28, 1999. 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 agree to change certain provisions of the Loan Agreement; and

WHEREAS, the Lender is willing, on the terms, subject to the conditions and to the extent set forth below, to amend the Loan Agreement to effect such changes;

NOW, THEREFORE, the Lender and the Borrower agree as follows:

Section 1. Amendment of the Loan Agreement.

(a) Section 1.1 of the Loan Agreement is hereby amended by deleting the definition of "Consolidated Tangible Net Worth" and replacing it with the following:

"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 excluding the book amount of all minority interests in 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.

(b) Section 6.1(d) of the Loan Agreement is hereby amended by deleting the word "thirty" and replacing it with the words "forty-five".

(c) Section 7.1 of the Loan Agreement is hereby amended by deleting Section 7.1(a) in its entirety and replacing it with the following:

(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) other than assets having an aggregate fair market value less than seven percent of Borrower's Consolidated Tangible Net Worth.

(d) Section 7.1(b) of the Loan Agreement is hereby amended and restated as follows:

(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 capital stock or 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 capital stock or assets of any Person or consolidate or merge with 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(3) 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, 50% 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:

- (e) Section 7.4 of the Loan Agreement is hereby amended and restated as follows:

7.4 Investments. Except as permitted by Section 7.1, 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) three years from the date of acquisition;

(2) Repurchase agreements collateralized by securities of the U.S. Government and U.S. Government-sponsored securities;

(3) Investments in or to any Subsidiary or other Affiliate, provided Borrower remains in compliance with Section 7.1(b);

(4) Investments and obligations issued by the United States government, any agency thereof, 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) three years from the date of acquisition that are rated AA- or higher by at least one nationally recognized rating agency;

(5) Investments and obligations issued by any company (other than a bank) with maturities not to exceed three years from the date of acquisition with a long-term debt rating of A or higher or a short-term debt rating of A1 or P1 by at least one nationally recognized rating agency;

(6) 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);

(7) Shares of money market mutual funds registered under the Investment Company Act of 1940, as amended;

(8) 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;

(9) Investments in mutual funds (other than money market mutual funds) that in the aggregate shall not exceed \$5,000,000; and

(10) Other Investments existing on the Closing Date and listed on the Disclosure Schedule.

(f) Section 7.7 of the Loan Agreement is hereby amended by deleting subsection (a) and replacing it with the following:

(a) Tangible Net Worth Test. 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) \$100,000,000, plus (ii) 50% of Consolidated Net Income (excluding losses) minus (iii) all Sub S Dividends paid between January 1, 2000 and September 15, 2000 in an aggregate amount not to exceed \$6,000,000, for each consecutive fiscal quarter of the Borrower beginning with the quarter ending December 31, 1999, on a cumulative basis.

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. Loan Documents. This Amendment shall be a Loan Document for all purposes.

Section 4. 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;

(c) No Default or Event of Default under the Loan Agreement shall have occurred and be continuing;

(d) The Lender shall have received, in form and substance satisfactory to the Lender:

(i) an opinion of independent counsel to the Borrower with respect to this Amendment;

(ii) a certificate as to the Borrower's legal existence and good standing under the laws of The Commonwealth of Massachusetts and;

(iii) a certificate of the Borrower's Clerk as to (x) no changes in its charter documents and by-laws as amended, (y) corporate votes authorizing the execution and delivery of this Amendment and (z) incumbency of the officers authorized to execute this Amendment on behalf of the Borrower.

(e) The conditions set forth in Sections 5.2-5.5 of the Loan Agreement shall have been met as of the date hereof, provided that for purposes thereof and Section 4.5 of the Loan Agreement, the "Balance Sheet Date" shall mean September 30, 1999 and the financial statements referred to therein shall mean the unaudited statements for the period ended September 30, 1999, that have been furnished to the Lender.

Section 5. 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: /s/ William P. Donlan  
Title: Treasurer

BANKBOSTON, N.A.

By:  
Title:

(e) The conditions set forth in Sections 5.2-5.5 of the Loan Agreement shall have been met as of the date hereof, provided that for purposes thereof and Section 4.5 of the Loan Agreement, the "Balance Sheet Date" shall mean September 30, 1999 and the financial statements referred to therein shall mean the unaudited statements for the period ended September 30, 1999, that have been furnished to the Lender.

Section 5. 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: /s/ William P. Donlan  
Title:

BANKBOSTON, N.A.

By: /s/ Sharon A. Stone  
Title: Director

## MKS INSTRUMENTS, INC.

## TENTH AMENDMENT

## TO LOAN AGREEMENT

This Tenth Amendment (the "Amendment") dated as of January 1, 2000 concerns the Loan Agreement dated as of November 1, 1993 (the "Loan Agreement"), between MKS Instruments, Inc. (the "Borrower") and BankBoston, N.A. (f/k/a The First National Bank of Boston; the "Lender"), as amended. 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 agree to change certain provisions of the Loan Agreement; and

WHEREAS, the Lender is willing, on the terms, subject to the conditions and to the extent set forth below, to amend the Loan Agreement to effect such changes;

NOW, THEREFORE, the Lender and the Borrower agree as follows:

Section 1. Amendment of the Loan Agreement.

(a) Section 1.1 of the Loan Agreement is hereby amended by deleting the definition of "Consolidated Tangible Net Worth" and replacing it with the following:

"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 excluding the book amount of all minority interests in 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.

(b) Section 7.1(d) of the Loan Agreement is hereby amended by deleting the word "thirty" and replacing it with the words "forty-five".

(c) Section 8.1 of the Loan Agreement is hereby amended by deleting Section 8.1(a) in its entirety and replacing it with the following:

(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) other than assets having an aggregate fair market value less than seven percent of Borrower's Consolidated Tangible Net Worth.

(d) Section 8.1(b) of the Loan Agreement is hereby amended and restated as follows:

(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 capital stock or 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 capital stock or assets of any Person or consolidate or merge with 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(3) 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, 50% 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 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 8.7.

(e) Section 8.4 of the Loan Agreement is hereby amended and restated as follows:

8.4 Investments. Except as permitted by Section 8.1, 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) three years from the date of acquisition;

(2) Repurchase agreements collateralized by securities of the U.S. Government and U.S. Government-sponsored securities;

(3) Investments in or to any Subsidiary or other Affiliate, provided Borrower remains in compliance with Section 8.1(b);

(4) Investments and obligations issued by the United States government, any agency thereof, 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) three years from the date of acquisition that are rated AA- or higher by at least one nationally recognized rating agency;

(5) Investments and obligations issued by any company (other than a bank) with maturities not to exceed three years from the date of acquisition with a long-term debt rating of A or higher or a short-term debt rating of A1 or P1 by at least one nationally recognized rating agency;

(6) 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);

(7) Shares of money market mutual funds registered under the Investment Company Act of 1940, as amended;

(8) 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;

(9) Investments in mutual funds (other than money market mutual funds) that in the aggregate shall not exceed \$5,000,000; and

(10) Other Investments existing on the Closing Date and listed on the Disclosure Schedule.

(f) Section 8.7 of the Loan Agreement is hereby amended by deleting subsection (a) and replacing it with the following:

(a) Tangible Net Worth Test. 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) \$100,000,000, plus (ii) 50% of Consolidated Net Income (excluding losses) minus (iii) all Sub S Dividends paid between January 1, 2000 and September 15, 2000 in an aggregate amount not to exceed \$6,000,000, for each consecutive fiscal quarter of the Borrower beginning with the quarter ending December 31, 1999, on a cumulative basis.

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. Loan Documents. This Amendment shall be a Loan Document for all purposes.

Section 4. 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;

(c) No Default or Event of Default under the Loan Agreement shall have occurred and be continuing; and

(d) The Lender shall have received, in form and substance satisfactory to it:

(i) an opinion of independent counsel to the Borrower with respect to this Amendment;

(ii) a certificate as to the Borrower's legal existence and good standing under the laws of The Commonwealth of Massachusetts; and

(iii) a certificate of the Borrower's Clerk as to (x) no changes in its charter documents and by-laws as amended, (y) corporate votes authorizing the execution and delivery of this Amendment and (z) incumbency of the officers authorized to execute this Amendment on behalf of the Borrower;

(e) The conditions set forth in clauses (b) - (e) of Section 6.1 of the Loan Agreement shall have been met as of the date hereof, provided that for purposes thereof and Section 5.5 of the Loan Agreement, the "Balance Sheet Date" shall mean September 30, 1999

and the financial statements referred to therein shall mean the unaudited statements for the period ended September 30, 1999, that have been furnished to the Lender.

Section 5. 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: William P. Donlan  
Title: Treasurer

BANKBOSTON, N.A.

By: /s/ Sharon A. Stone  
Title: Director

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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:

BANKBOSTON, N.A.

By: /s/ Sharon A. Stone  
Title: Director

FIRST AMENDED AND RESTATED  
LOAN AGREEMENT

by and among

MKS INSTRUMENTS, INC.,  
as Borrower,

BANKBOSTON, N.A.,  
as Agent and as Lender,

and

THE CHASE MANHATTAN BANK,  
as Lender

Dated as of January 1, 2000

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FIRST AMENDED AND RESTATED  
LOAN AGREEMENT

This First Amended and Restated Loan Agreement (the "Agreement") is entered into as of the 1st day of January, 2000, by and among BankBoston, N.A. (f/k/a The First National Bank of Boston; "BankBoston"), The Chase Manhattan Bank (f/k/a Chemical Bank; "Chase"; hereinafter BankBoston and Chase may be referred to individually as a "Lender" or collectively as the "Lenders"), BankBoston 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 and the Lenders entered into a Loan Agreement as of February 23, 1996, which was amended on October 18, 1996, February 4, 1997, February 2, 1998, February 3, 1998 and January 28, 1999 (as amended, the "Loan Agreement"); and

WHEREAS, the Borrower has requested that the Lenders agree to certain changes to the Loan Agreement and the Lenders are willing to make such changes 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 to amend and restate the Loan Agreement 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:

"Adjusted LIBOR Rate" shall have the meaning set forth in Section 2.4.1.

"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 BankBoston at BankBoston'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 BankBoston from three funds brokers of recognized standing selected BankBoston.

"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 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, 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 excluding the book amount of all minority interests in 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 BankBoston dated November 1, 1993 and October 31, 1995, respectively, as amended.

"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 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.

"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 December 31, 2000 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 \$30,000,000.

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 1.25 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 equal to or greater than 1.25 to 1 but less than 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%.

Notwithstanding the preceding clauses (i) and (ii), if at any time and during any such period as the outstanding Advances exceed \$7,500,000, each of the percentages set forth in such clauses shall be increased by an additional .25%. The availability of the preceding clauses (i) and (ii) and the effect of any change to the Borrower's Debt-to-Net Worth Ratio or Cash Flow Ratio on the interest rate available pursuant to the preceding clauses (i) and (ii) shall take effect

on the first day of the month immediately following the month in which the Borrower delivers its financial statements pursuant to Section 6.1(a) or (b) and Compliance Certificate pursuant to Section 6.1(c).

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 0.35% 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 31, 2000 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.

### 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 \$30,000,000, 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, exe-

cution, 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, 1998 and the unaudited consolidated balance sheet of the Borrower and its Subsidiaries dated as of September 30, 1999 (the "Balance Sheet Date") and the related audited and unaudited, respectively, statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries for the periods ending on such dates, 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 except, in the case of unaudited statements, for the absence of footnotes and subject to normal year-end adjustments that shall not be materially adverse in the aggregate. 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 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 after the Closing Date 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, Illinois, Maryland, New Mexico, New York, Oregon, Pennsylvania and Texas, each dated as of a recent date;

(iii) a certificate of the Borrower's Clerk or Assistant 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) Concurrent with, and no later than the required date for delivery of the financial information outlined in Sections 6.1 (a) and (b), 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 forty-five 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; provided, however, that the Borrower may use proceeds of the Advances to repurchase its

outstanding capital stock so long as it does not make aggregate purchases with such exceeding \$6,000,000.

### 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 carded 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) other than assets having an aggregate fair market value less than seven percent of Borrower's Consolidated Tangible Net Worth.

(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 capital stock or 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 capital stock or assets of any Person or consolidate or merge with 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(3) 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, 50% 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 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. Except as permitted by Section 7.1, 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 (but only with funds other than proceeds of Advances):

(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) three years from the date of acquisition;

(2) Repurchase agreements collateralized by securities of the U.S. Government and U.S. Government-sponsored securities;

(3) Investments in or to any Subsidiary or other Affiliate, provided Borrower remains in compliance with Section 7.1(b);

(4) Investments and obligations issued by the United States government, any agency thereof, 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) three years from the date of acquisition that are rated AA- or higher by at least one nationally recognized rating agency;

(5) Investments and obligations issued by any company (other than a bank) with maturities not to exceed three years from the date of acquisition with a long-term debt rating of A or higher or a short-term debt rating of A1 or P1 by at least one nationally recognized rating agency;

(6) 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);

(7) Shares of money market mutual funds registered under the Investment Company Act of 1940, as amended;

(8) 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;

(9) Investments in mutual funds (other than money market mutual funds) that in the aggregate shall not exceed \$5,000,000; and

(10) 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 not be less than the sum of (i) \$100,000,000, plus (ii) 50% of Consolidated Net Income (excluding losses), minus (iii) all Sub S Dividends paid between January 1, 2000 and September 15, 2000 in an aggregate amount not to exceed \$6,000,000, for each consecutive fiscal quarter of the Borrower beginning with the quarter ending December 31, 1999, on a cumulative basis.

(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, 1999 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, 1999 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 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 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 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; Borrower;

(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 BankBoston as the Agent for the Lenders under this Agreement, and each of the Lenders hereby irrevocably authorizes BankBoston 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, 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 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 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 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 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 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 unmatured.

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:

BankBoston, N.A.  
100 Federal Street  
Boston, Massachusetts 02110  
Attn: Ms. Sharon A. Stone, Director  
Telecopier No. (617) 434-0819

with a copy to:

Arlene L. Bender, Esq.  
Foley, Hoag & Eliot LLP  
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. William P. Donlan, Treasurer  
Telecopier No. (978) 975-7663

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 to affect the construction of or to be taken into account in interpreting the substance of 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:  
Scot A. Martel

MKS INSTRUMENTS, INC.

By: William P. Donlan  
Title: Treasurer

BANKBOSTON, N.A.

By:  
Title:  
Address: 100 Federal Street  
Boston, MA 02110

THE CHASE MANHATTAN BANK

By:  
Title:  
Address: 999 Broad Street  
Bridgeport, CT 06604

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:

BANKBOSTON, N.A.

By: Sharon A. Stone  
Title: Director  
Address: 100 Federal Street  
Boston, MA 02110

THE CHASE MANHATTAN BANK

By:  
Title:  
Address: 999 Broad Street  
Bridgeport, CT 06604

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:

BANKBOSTON, N.A.

By:  
Title:  
Address: 100 Federal Street  
Boston, MA 02110

THE CHASE MANHATTAN BANK

By: Joan Considine  
Title: Vice President  
Address: 999 Broad Street  
Bridgeport, CT 06604

## EXHIBIT A

Lender -----	Revolving Credit Commitment -----	Applicable Commitment Percentage -----
BankBoston, N.A.	\$18,000,000	60%
The Chase Manhattan Bank	\$12,000,000	40%
	-----	---
	\$30,000,000	100%

## EMPLOYMENT AGREEMENT

EMPLOYMENT AGREEMENT dated May 17, 1999 ("Employment Agreement") by and between MKS Instruments, Inc., a Massachusetts Corporation (the "Corporation"), and Peter Younger of Newton Centre, MA (the "Employee").

WHEREAS, the Corporation and the Employee desire to provide for the employment of the Employee by the Corporation:

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein, the Corporation and the Employee hereby agree 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 May 17, 1999 and continuing 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 May 17, 1999 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 be employed by the Corporation in the position of President and Chief Operating Officer and shall perform such duties as shall be assigned to Employee by the Chairman and CEO of the Corporation. The Employee shall also perform such duties as are customary and appropriate in such capacity or office, including the following: Overseeing the day to day operation of the Corporation including but not limited to, product development, manufacturing and operations, marketing and sales, customer service and satisfaction, quality, human resources and internal financial control.

(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

Peter Younger

not engage in any other business activity which interferes in any way with the Employee's performance of his duties to the Corporation, 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 two hundred twenty-five thousand dollars (\$225,000) per year for the term of employment of the Employee under this Employment Agreement. The base salary shall be payable in equal biweekly installments subject to usual withholding requirements. This salary will be reviewed annually according to the established practices of the company provided, however, that upon review the Employee's salary may be increased but not decreased, unless such decrease is part of an overall cost savings program which may be in effect from time to time. 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 if the Corporation attains its consolidated financial goals during such calendar year of the Corporation. The "targeted" additional compensation goal for the Employee shall be 60% of his earnings. 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.

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.

Peter Younger

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.

The Employee will not receive any payment under the Management Incentive Program for any calendar year in which the Employee is not actively employed on the last day of that calendar year, but the Employee need not be actively employed at the time the payment is actually made. The Employee shall be entitled to participate in the Management Incentive Program in 1999 even though his employment commenced on May 17, 1999.

(c) MKS Instruments Profit Sharing and Retirement Savings Plan: The Employee shall be eligible to become a participant under the profit sharing plan of the Corporation on fulfilling the conditions set forth in the MKS Instruments Profit Sharing and Retirement Savings Plan of the Corporation.

(d) Vacation: The Employee shall be entitled to an annual vacation leave of 20 days at full pay during each year of 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. Vacation shall accrue at the rate of 1.667 days per month.

(e) Life Insurance: The Corporation shall provide, and pay all of the premiums for, term life insurance in the amount of \$250,000 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 and his eligible family members under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement. In addition, the Corporation shall provide to the Employee a supplemental medical/dental plan that

Peter Younger

will reimburse the Employee for the cost of any medically necessary services not paid under the primary medical/dental insurance plans, subject to an annual limit of \$2500.

(g) Stock Options: The Corporation hereby grants to the Employee an option to purchase 150,000 shares of common stock; no par value, of the Corporation at the fair market value of the stock at close of business on May 17, 1999. The foregoing options shall be issued pursuant to and subject to the terms of the Corporation's Amended and Restated 1995 Stock Incentive Plan.

(h) Company Car Allowance: The Corporation shall pay the Employee \$650 per month during the term of his employment as a company car allowance.

(i) 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 by the Corporation "Without Cause", the Employee shall be entitled to compensation as follows:

Peter Younger

(i) If termination "Without Cause" occurs within the first month of employment the Corporation shall pay the Employee a termination benefit of twelve (12) months compensation. If termination "Without Cause" occurs after the first month of employment, the Corporation shall reduce the termination benefit by one month's salary for each full month of employment completed thereafter until the termination benefit has reached six (6) months compensation. The termination benefit will then remain at six (6) months compensation for the duration of this agreement.

(ii) If the Employee is terminated by the Corporation "Without Cause", the Employee will be paid all accrued, but unpaid, salary, bonus, vacation and other benefits.

(iii) If the Employee is terminated by the Corporation "Without Cause", the Corporation shall continue to provide the Employee life insurance, medical insurance, and dental insurance for the duration of the Employee's termination benefit.

(b) If the employment of the Employee is terminated by death, the Corporation shall pay to the estate of the Employee all accrued, but unpaid, salary, bonus, vacation and other benefits 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 be paid all accrued, but unpaid, salary, bonus, vacation and other benefits.

(d) If the Employee is terminated by voluntary resignation by the Employee, the Employee will be paid all accrued, but unpaid, salary, bonus, vacation and other benefits earned as of his effective date of termination.

(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

Peter Younger

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.

(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

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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 nominee 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

Peter Younger

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. Provided, however, the Employee may remove such files and other items from the premises of the Corporation if required to do so during the course of his duties or if required to work at home.

(10) Non-Competition:

(a) 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

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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 and the MKS offer of employment letter dated 4/30/99 (and the documents referenced herein) supersede 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 contain all of the covenants and agreements between the parties with respect to such employment.

Peter Younger

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 or referenced herein, or as amended, 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: This Employment Agreement shall be governed by, and construed and enforced in accordance with, the internal laws of The Commonwealth of Massachusetts without reference to conflict of laws principles.

IN WITNESS WHEREOF, the parties hereto have executed, in the Commonwealth of Massachusetts, this Employment Agreement as a sealed instrument, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: /s/ John R. Bertucci  
-----  
John R. Bertucci, Chairman and CEO  
6 Shattuck Road  
Andover, MA 01810

/s/ Peter Younger  
-----  
Peter Younger

Address: 57 Dudley Road  
Newton, Centre, MA 02459

## EMPLOYMENT AGREEMENT

EMPLOYMENT AGREEMENT dated December 6, 1999 ("Employment Agreement") by and between MKS Instruments, Inc., a Massachusetts Corporation (the "Corporation"), and Robert L. Klimm of Acton, MA (the "Employee").

WHEREAS, the Corporation and the Employee desire to provide for the employment of the Employee by the Corporation:

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein, the Corporation and the Employee hereby agree 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 6, 1999 and continuing 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 6, 1999 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 be employed by the Corporation in the position of Corporate Vice President and General Manager of Flow Products and shall perform such duties as shall be assigned to Employee by the President & COO of the Corporation.

(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 which interferes in any way with the Employee's performance of his duties to the Corporation, 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 one hundred ninety thousand dollars (\$190,000) per year for the term of employment of the Employee under this Employment Agreement. The base salary shall be payable in equal biweekly installments subject to usual withholding requirements. This salary will be reviewed annually according to the established practices of the company. No overtime pay will be paid to the Employee by the Corporation.

(b) Incentive: Beginning January 1, 2000 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 if the Corporation attains its consolidated financial goals during such calendar year of the Corporation. The "targeted" additional compensation goal for the Employee shall be 40% of his earnings. 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.

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 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.

The Employee will not receive any payment under the Management Incentive Program for any calendar year in which the Employee is not actively employed on the last day of that calendar year, but the Employee need not be actively employed at the time the payment is actually made.

(c) MKS Instruments Profit Sharing and Retirement Savings Plan: The Employee shall be eligible to become a participant under the profit sharing plan of the Corporation on fulfilling the conditions set forth in the MKS Instruments Profit Sharing and Retirement Savings Plan of the Corporation.

(d) Vacation: The Employee shall be entitled to an annual vacation leave of 15 days at full pay during each year of 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. Vacation shall accrue at the rate of 1.25 days per month.

(e) Life Insurance: The Corporation shall provide, and pay all of the premiums for, term life insurance in the amount of \$250,000 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 and his eligible family members under the Plans of the Corporation applicable to the Employee during the term of employment of the Employee under this Employment Agreement. In addition, the Corporation shall provide to the Employee a supplemental medical/dental plan that will reimburse the Employee for the cost of any medically necessary services not paid under the primary medical/dental insurance plans, subject to an annual limit of \$2500.

(g) Stock Options: The Corporation hereby grants to the Employee an option to purchase 75,000 shares of common stock, no par value, of the

Corporation at the fair market value of the stock at close of business on December 6, 1999. The foregoing options shall be issued pursuant to and subject to the terms of the Corporation's Amended and Restated 1995 Stock Incentive Plan.

(h) Company Car Allowance: The Corporation shall pay the Employee \$650 per month during the term of his employment as a company car allowance.

(i) 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) (i) If the employment of the Employee is terminated by the Corporation "Without Cause", the Employee shall be entitled to a termination benefit of six (6) months compensation for the duration of this agreement.

(ii) If the Employee is terminated by the Corporation "Without Cause", the Employee will be paid all accrued, but unpaid, salary, bonus, vacation and other benefits.

(iii) If the Employee is terminated by the Corporation "Without Cause", the Corporation shall continue to provide the Employee life insurance,

medical insurance, and dental insurance for the duration of the Employee's termination benefit.

(b) If the employment of the Employee is terminated by death, the Corporation shall pay to the estate of the Employee all accrued, but unpaid, salary, bonus, vacation and other benefits 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 be paid all accrued, but unpaid, salary, bonus, vacation and other benefits.

(d) If the Employee is terminated by voluntary resignation by the Employee, the Employee will be paid all accrued, but unpaid, salary, bonus, vacation and other benefits earned as of his effective date of termination.

(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.

(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 nominee 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. Provided, however, the Employee may remove such files and other items from the premises of the Corporation if required to do so during the course of his duties or if required to work at home.

(10) Non-Competition:

(a) 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 and the MKS offer of employment letter dated 11/4/99 (and the documents referenced herein) supersede 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 contain 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 or referenced herein, or as amended, 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: This Employment Agreement shall be governed by, and construed and enforced in accordance with, the internal laws of The Commonwealth of Massachusetts without reference to conflict of laws principles.

IN WITNESS WHEREOF, the parties hereto have executed, in the Commonwealth of Massachusetts, this Employment Agreement as a sealed instrument, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: /s/ Peter R. Younger

-----  
Peter R. Younger, President & COO  
6 Shattuck Road  
Andover, MA 01810

/s/ Robert L. Klimm

-----  
Robert L. Klimm

Address: 13 Knowlton Dr.  
Acton, MA 01720

Selected Consolidated Financial Data  
(in thousands, except per share data)

	Year Ended December 31				
	1999	1998	1997	1996	1995
<b>Statement of Income Data</b>					
Net sales	\$187,083	\$139,763	\$188,080	\$170,862	\$157,164
Gross profit	79,855	55,979	80,474	68,854	69,461
Income from operations	27,611	9,135	23,963	16,068	24,106
Net income	\$ 24,037	\$ 7,186	\$ 20,290	\$ 12,503	\$ 21,658
Historical net income per share - Diluted	\$ 1.00	\$ 0.38	\$ 1.10	\$ 0.69	\$ 1.20
<b>Pro Forma Statement of Income Data (1)</b>					
Pro forma net income	\$ 18,412	\$ 5,044	\$ 13,806	\$ 8,248	\$ 13,821
Pro forma net income per share - Diluted	\$ 0.77	\$ 0.27	\$ 0.76	\$ 0.46	\$ 0.77
<b>Balance Sheet Data</b>					
Cash and cash equivalents	\$ 35,714	\$ 11,188	\$ 2,511	\$ 3,815	\$ 3,650
Working capital	87,088	31,493	30,321	22,404	32,202
Total assets	174,605	96,232	106,536	95,000	104,511
Short-term obligations	20,828	12,819	13,852	16,124	15,192
Long-term obligations, less current portion	5,662	13,786	15,624	18,899	20,462
Stockholders' equity	119,169	54,826	52,848	45,498	48,392

	Quarter Ended			
	Mar 31	Jun 30	Sep 30	Dec 31
<b>1998</b>				
<b>Statement of Income Data</b>				
Net sales	\$46,163	\$34,026	\$28,834	\$30,740
Gross profit	19,406	13,761	10,694	12,118
Income from operations	5,500	1,609	318	1,708
Net income	4,279	1,232	142	1,533
Historical net income per share - Diluted	\$ 0.23	\$ 0.07	\$ 0.01	\$ 0.08
<b>Pro Forma Statement of Income Data (1)</b>				
Pro forma net income	\$ 3,003	\$ 865	\$ 100	\$ 1,076
Pro forma net income per share - Diluted	\$ 0.16	\$ 0.05	\$ 0.01	\$ 0.06
<b>1999</b>				
<b>Statement of Income Data</b>				
Net sales	\$37,910	\$44,209	\$50,621	\$54,343
Gross profit	15,353	18,659	21,745	24,098
Income from operations	3,541	5,907	7,999	10,164
Net income	3,129	7,576	6,037	7,295
Historical net income per share - Diluted	\$ 0.16	\$ 0.30	\$ 0.24	\$ 0.28
<b>Pro Forma Statement of Income Data (1)</b>				
Pro forma net income	\$ 2,150	\$ 3,806	\$ 5,677	\$ 6,779
Pro forma net income per share - Diluted	\$ 0.11	\$ 0.15	\$ 0.22	\$ 0.26

(1) Data is computed on the same basis as Note 2 of Notes to Consolidated Financial Statements. The historical net income per share data does not include provisions for federal income taxes because prior to its initial public offering in 1999, MKS was treated as an S corporation for federal income tax purposes. The Pro Forma Statement of Income Data presents net income and net income per share data as if MKS had been subject to federal income taxes as a C corporation during the periods presented.

## Management's Discussion and Analysis of Financial Condition and Results of Operations

When used in this Annual Report, including this Management's Discussion and Analysis, the words "believes," "anticipates," "plans," "expects" and similar expressions are intended to identify forward-looking statements. These forward-looking statements reflect management's current opinions and are subject to certain risks and uncertainties that could cause actual results to differ materially from those stated or implied. MKS Instruments, Inc. (the "Company" or "MKS" ) assumes no obligation to update this information. Risks and uncertainties include, but are not limited to, those discussed in the section entitled "Management's Discussion and Analysis - Trends, Risks and Uncertainties."

### Overview

MKS was founded in 1961. MKS develops, manufactures and supplies instruments and components used to measure, control and analyze gases in semiconductor manufacturing and similar industrial manufacturing processes. During 1999, MKS estimates that approximately 66% of its net sales were to semiconductor capital equipment manufacturers and semiconductor device manufacturers. MKS expects that sales to such customers will continue to account for a substantial majority of its sales. MKS's customers include semiconductor capital equipment manufacturers, semiconductor device manufacturers, industrial manufacturing companies and university, government and industrial research laboratories. In 1999, 1998 and 1997, sales to MKS's top five customers accounted for approximately 33%, 24% and 32%, respectively, of MKS's net sales. During 1999, Applied Materials, Inc. accounted for approximately 22% of MKS's net sales. MKS typically enters into contracts with its semiconductor equipment manufacturer customers that provide for quantity discounts. MKS recognizes revenue, and accrues for anticipated returns and warranty costs, upon completion of delivery obligations.

A significant portion of MKS's sales are to operations in international markets. International sales by MKS's foreign operations, located in Japan, Korea, Europe, Singapore and Taiwan, were 31.3% and 32.4% of net sales for 1999 and 1998, respectively. Sales by MKS's Japan subsidiary comprised 16.4% and 15.1% of net sales in 1999 and 1998, respectively. MKS does not classify export sales made directly by MKS as international sales. Such export sales have generally been less than 10% of net sales. MKS currently uses, and plans to continue to use, forward exchange contracts and local currency purchased options to reduce currency exposure arising from foreign currency denominated intercompany sales 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 3 of Notes to Consolidated Financial Statements.

MKS was treated as an S corporation for federal income tax purposes prior to its initial public offering in 1999. MKS's S corporation status terminated upon the closing of the offering, at which time MKS became 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% in 1997 and 1998, and 37.1% in 1999 to reflect federal and state income taxes which would have been payable had MKS been taxed as a C corporation for each period.

On April 5, 1999 MKS closed the initial public offering of its Common Stock. In connection with this offering and the exercise of an over-allotment option by the underwriters, the Company sold 6,375,000 shares of Common Stock at a price of \$14.00 per share. The net proceeds to the Company were approximately \$82,000,000. Offering costs were approximately \$1,000,000.

On April 5, 1999 MKS distributed \$40,000,000, which was the estimated amount of the Company's undistributed S Corporation earnings as of the day prior to the closing of the offering.

### Results of Operations

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

	Year Ended December 31		
	1999	1998	1997
	----	----	----
Net sales	100.0%	100.0%	100.0%
Cost of sales	57.3	59.9	57.2
	-----	-----	-----
Gross profit	42.7	40.1	42.8
Research and development	7.1	8.7	7.8
Selling, general and administrative	20.8	24.9	22.3
	-----	-----	-----
Income from operations	14.8	6.5	12.7
Interest income (expense), net	0.4	(0.8)	(1.0)
Other income, net	0.4	0.1	0.1
	-----	-----	-----
Income before income taxes	15.6	5.8	11.8
Provision for income taxes	2.8	0.7	1.0
	-----	-----	-----
Net income	12.8%	5.1%	10.8%
	=====	=====	=====
Pro forma data:			
Historical income before income taxes	15.6	5.8	11.8

Pro forma provision for income taxes	5.8	2.2	4.5
	-----	-----	-----
Pro forma net income	9.8%	3.6%	7.3%
	=====	=====	=====

Year Ended 1999 Compared to 1998

#### Net Sales

Net sales increased 33.9% to \$187.1 million for 1999 from \$139.8 million for 1998. International net sales were approximately \$58.5 million in 1999 or 31.3% of net sales and \$45.3 million in 1998 or 32.4% of net sales. The increase in net sales was primarily due to increased sales volume of MKS's existing products in the United States and in Asia which resulted primarily from increased sales to the Company's semiconductor capital equipment manufacturing and semiconductor device manufacturer customers.

#### Gross Profit

Gross profit as a percentage of net sales increased to 42.7% for 1999 from 40.1% in 1998. The increase was primarily due to fuller utilization of existing manufacturing capacity as a result of increased net sales.

#### Research and Development

Research and development expenses increased 9.0% to \$13.2 million or 7.1% of net sales for 1999 from \$12.1 million or 8.7% of net sales for 1998. The increase was due to increased spending for development materials.

#### Selling, General and Administrative

Selling, general and administrative expenses increased 12.4% to \$39.0 million or 20.8% of net sales from \$34.7 million or 24.9% of net sales for 1998. The increase was due primarily to increased incentive compensation expense of \$3.3 million, professional fees, and other selling expenses.

#### Interest Income (Expense), Net

During 1999, the Company generated net interest income of \$0.8 million primarily from the invested net proceeds of the initial public offering, offset by interest expense on outstanding debt. Net interest expense of \$1.2 million for 1998 represents interest on outstanding loans, offset by interest income earned on cash and cash equivalents and short-term investments.

#### Other Income (Expense), Net

Other income of \$0.8 million for 1999 includes a distribution of \$0.7 million from one of MKS's mutual insurance carriers upon the initial public offering of the insurance carrier, and also includes gains recorded from foreign exchange contracts which did not qualify for hedge accounting. Other income of \$0.2 million in 1998 primarily represents foreign exchange translation gains on intercompany payables of \$1.0 million offset by \$0.7 million for costs associated with MKS's planned initial public offering in early 1998.

Effective April 1, 1999 MKS adopted Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivative Instruments and Hedging Activities." SFAS No. 133 requires that all derivative instruments be recorded on the balance sheet at their fair value. Changes in the fair value of derivatives are recorded each period in current earnings or other comprehensive income, depending on whether a derivative is designated as part of a hedge transaction and, if it is, the type of hedge transaction. The adoption of SFAS No. 133 did not have a material impact on MKS's financial position or results of operations. The derivative instruments currently held by MKS which have been designated as hedges, including forward exchange contracts, local currency purchased options, and an interest rate swap, qualify for hedge accounting under SFAS No. 133, and changes in their fair value will be recorded as a component of other comprehensive income until the hedged transaction occurs.

#### Pro Forma Provision for Income Taxes

Prior to the closing of its initial public offering in April, 1999 MKS was treated as an S corporation for tax purposes. As an S corporation, MKS was not subject to federal, and certain state, income taxes. Upon the closing of its initial public offering on April 5, 1999, MKS's status as an S corporation was terminated and it became subject to taxes as a C corporation. The pro forma provision for income taxes reflects the estimated tax expense MKS would have incurred had it been subject to federal and state income taxes as a C corporation. The pro forma provision differs from the federal statutory rate due primarily to the effects of state and foreign taxes and certain tax credits. The pro forma provision for 1999 reflects a pro forma tax rate of 37.1%. This rate differs from the pro forma tax rate of 38% for 1998 due to increased tax credits and lower nondeductible expenses in 1999.

Year Ended 1998 Compared to 1997

#### Net Sales

Net sales decreased 25.7% to \$139.8 million for 1998 from \$188.1 million for 1997. International net sales were approximately \$45.3 million in 1998 or 32.4% of net sales and \$51.4 million in 1997 or 27.3% of net sales. The decrease in net sales was primarily due to decreased sales volume of MKS's existing products in the United States and in Asia caused by the 1998 downturn in the semiconductor capital equipment market.

#### Gross Profit

Gross profit as a percentage of net sales decreased to 40.1% for 1998 from 42.8% in 1997. The change was primarily due to manufacturing overhead costs being a higher percentage of net sales due to lower sales volume in 1998.

#### Research and Development

Research and development expenses decreased 17.3% to \$12.1 million or 8.7% of

net sales for 1998 from \$14.7 million or 7.8% of net sales for 1997. The decrease was due to reduced spending for development materials primarily related to certain projects that were completed during 1998.

#### Selling, General and Administrative

Selling, general and administrative expenses decreased 17.0% to \$34.7 million or 24.9% of net sales for 1998 from \$41.8 million or 22.3% of net sales for 1997. The decrease was due primarily to a decrease of approximately \$4.2 million in compensation expense resulting from the reduction in personnel during 1998 and reduced incentive compensation. Additionally, expenses were reduced as a result of lower spending on advertising, travel, and other selling and administrative costs.

#### Interest Expense, Net

Net interest expense decreased to \$1.2 million for 1998 from \$1.9 million for 1997 primarily due to lower debt outstanding during 1998.

#### Other Income (Expense), Net

Other income of \$0.2 million in 1998 primarily represents foreign exchange translation gains on intercompany payables of \$1.0 million offset by \$0.7 million for costs associated with MKS's planned initial public offering in early 1998 which was postponed at that time. Other income of \$0.2 million in 1997 represents gains of \$1.2 million from foreign exchange contracts that did not qualify for hedge accounting, offset by a foreign exchange translation loss on an intercompany payable.

#### Pro Forma Provision for Income Taxes

The pro forma provision for income taxes for 1998 reflects the estimated tax expense MKS would have incurred had it been subject to federal and state income taxes as a C corporation under the Internal Revenue Code. The pro forma provision reflects a pro forma 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.

#### Liquidity and Capital Resources

MKS 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. On April 5, 1999 the Company completed the initial public offering of its Common Stock. In connection with this offering and the exercise of an over-allotment option by the underwriters, the Company sold 6,375,000 shares of Common Stock at a price of \$14.00 per share. The net proceeds to the Company were approximately \$82,000,000 and were received in the second quarter of 1999. Underwriting discounts and commissions were approximately \$6,200,000, and other offering costs were approximately \$1,000,000. On April 5, 1999 MKS distributed \$40,000,000, which was the estimated amount of its undistributed S Corporation earnings as of the day prior to the closing of the offering.

Operations provided cash of \$17.1 million for 1999 primarily from generating net income. This cash flow was impacted by depreciation and changes in the levels of accounts payable, accrued expenses, accounts receivable and a non-cash deferred tax credit. Investing activities utilized cash of \$33.4 million for 1999 primarily from purchasing short-term investments with the net proceeds from the initial public offering and for the purchase of property and equipment. Financing activities provided cash of \$41.2 million, with net proceeds from the initial public offering of \$82.1 million offset by the distribution to stockholders of \$40.0 million.

Working capital was \$87.1 million as of December 31, 1999, an increase of \$55.6 million from December 31, 1998. MKS has a combined \$30.0 million line of credit with two banks, expiring December 31, 2000, all of which is available.

Prior to its initial public offering, the Company entered into a Tax Indemnification and S Corporation Distribution Agreement with its then existing stockholders (the "Pre-IPO stockholders"). The agreement includes provisions for the payment, with interest, by the Pre-IPO stockholders or MKS, as the case may be, for the difference between the \$40,000,000 distributed as an estimate of the amount of the accumulated adjustments account as of April 4, 1999, which is the date the Company's S Corporation status was terminated, and the actual amount of the accumulated adjustments account on that day. The actual amount of the accumulated adjustments account cannot be determined until MKS calculates the amount of its taxable income for the year ending December 31, 1999. Based on the Company's estimate of the taxable income for the year ending December 31, 1999, MKS believes that an additional distribution to the Pre-IPO stockholders will be required under this agreement. The amount of the additional distribution, prior to interest, is currently estimated to be \$3,350,000. The amount of the additional distribution payable has been charged directly to retained earnings and had no impact on net income or earnings per share. No shareholders, other than the Pre-IPO stockholders, are parties to the Tax Indemnification and S Corporation Distribution Agreement.

#### Recently Issued Accounting Pronouncements

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

MKS believes that its working capital, 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 24 months.

#### Trends, Risks and Uncertainties

##### Year 2000 Compliance

The Year 2000 problem stems from the fact that many currently installed computer systems include software and hardware products that are unable to distinguish 21st century dates from those in the 20th century. As a result, computer software and/or hardware used by many companies and governmental agencies may need to be upgraded to comply with Year 2000 requirements or risk system failure or miscalculations causing disruptions to normal business activities. In addition, despite the fact that many computer systems are currently processing 21st century dates correctly, companies, including MKS, could experience future Year 2000 problems.

During the past few years, MKS designed and implemented a multi-phase Year 2000 project. MKS believes it has taken steps in its multi-phase Year 2000 project to identify and remediate material Year 2000 related issues. MKS has not experienced any significant disruption to normal business activities or product noncompliance related to the Year 2000 problem. However, there can be no assurance that MKS has identified and remediated all material Year 2000 related

issues. Additionally, there can be no assurance that unexpected delays or problems will not occur that would have a material adverse effect on the Company's financial condition or results of operations.

MKS's multi-phase Year 2000 project consisted of:

- - assessment of the corporate systems and operations including both information technology and non-information technology that could be affected by the Year 2000 problem
- - remediation of non-compliant systems and components
- - testing of systems and components following remediation

MKS, under the guidance of its Information Technology Steering Committee, focused its Year 2000 review on four areas:

- - internal computer software and hardware
- - product compliance
- - facilities and manufacturing equipment
- - third-party compliance

Internal Computer Software and Hardware. MKS uses information technology for its internal infrastructure, which consists of its main enterprise systems which include the systems used, in part, for purchase orders, invoicing, shipping and accounting, and individual workstations, including personal computers, and its network systems.

Because MKS's business and manufacturing systems, such as its main enterprise systems, are essential to its business, financial condition and results of operations, MKS began its assessment of these systems prior to its other non-critical information technology systems. MKS began its assessment in the fall of 1997, and in November 1997, MKS developed a remediation plan for all identified noncompliant business and manufacturing systems. This remediation plan was implemented in January 1998. By July 1998, MKS had installed new systems or upgraded existing systems. Based upon post-implementation testing and review, management believes that all business and manufacturing systems are Year 2000 compliant.

MKS's personal computer based systems were assessed in early 1998. MKS believes that all non-compliant hardware and software was identified by March 1998, at which time it made a list prioritizing databases to be remedied. Critical databases were identified and were scheduled for remediation prior to other databases. Remediation plans to convert the databases were initiated in November 1998. MKS believes its critical and non-critical personal computer based systems are Year 2000 compliant.

Product Compliance. Throughout 1998, MKS assessed and addressed the Year 2000 compliance of its products. This assessment resulted in the identification of MKS's products that were compliant and non-compliant. The substantial majority of MKS's products were deemed to be compliant.

The date related functions of all non-compliant products, other than certain residual gas analysis products, are believed by MKS to be non-critical in that such noncompliance would not affect the independent performance of the product; would not cause the MKS product to cease operating on any particular date; and independently would not pose a safety risk. MKS believes that Year 2000 problems associated with non-compliant residual gas analysis products will also be non-critical. However, these products contain components of other manufacturers and cannot be tested and therefore it is possible that such products could cause unanticipated performance problems. MKS made available to its customers a list which describes Year 2000 readiness of its products.

Facilities and Manufacturing Equipment. Some aspects of MKS's facilities and manufacturing equipment may include embedded technology, such as microcontrollers. The Year 2000 problem could cause a system failure or miscalculation in such facilities or manufacturing equipment which could disrupt MKS's operations. Affected areas include security systems, elevator controls, voice mail and phone systems, cleanroom environmental controls, numerically controlled production machinery and computer based production equipment. MKS organized a team of experienced managers in November 1998 to assess the potential problems in these areas. An assessment of all facilities and manufacturing equipment was conducted through December 1998, and a remediation plan was developed in January 1999. MKS believes its facilities and manufacturing equipment are Year 2000 compliant.

Third-Party Compliance. MKS has relationships with third-parties including customers and vendors and suppliers of goods, services and computer interfaces. The failure of such persons to implement and execute Year 2000 compliance measures in a timely manner, if at all, could, among other things:

- - adversely affect MKS's ability to obtain components in a timely manner
- - cause a reduction in the quality of components obtained by MKS
- - cause a reduction, delay or cancellation of customer orders received by MKS or a delay in payments by its customers for products shipped
- - result in the loss of services that would be necessary for MKS to operate in the normal course of business

MKS assessed which of these third-party goods, services and interfaces were critical to its operations and developed and mailed a standard survey to each third-party deemed critical in January 1998. Based on this survey and its review

of survey data, MKS believes all critical third-parties have achieved satisfactory compliance.

## Costs

MKS's costs to date associated with assessment, remediation and testing activities concerning the Year 2000 problem have been approximately \$3.1 million. MKS has funded these activities principally through cash provided by operations and existing leasing lines of credit. It is not possible for MKS to completely estimate the costs incurred in its remediation effort as many of its employees have focused significant efforts in evaluating MKS's Year 2000 state of readiness and in remediating problems that have arisen from such evaluation.

## Contingency Plan

MKS has not formulated contingency plans related to the failure of its or a third-party's Year 2000 remediation efforts. Contingency plans for the failure to implement compliance procedures have not been completed because MKS believes it completed all required modifications and tested the modifications thoroughly prior to December 31, 1999.

MKS believes it has taken steps in its multi-phase Year 2000 project to identify and remediate material Year 2000 related issues. MKS has not experienced any significant disruption to normal business activities or product noncompliance related to the Year 2000 problem. However, there can be no assurance that MKS has identified and remediated all material Year 2000 related issues. Additionally, there can be no assurance that unexpected delays or problems will not occur that would have a material adverse effect on the Company's financial condition or results of operations.

## Factors That May Affect Future Results

### Cyclicality of the Semiconductor Industry

MKS estimates that approximately 66% of its sales during 1999 were to semiconductor capital equipment manufacturers and semiconductor device manufacturers, and MKS expects that sales to such customers will continue to account for a substantial majority of its sales. MKS'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. Periodic reductions in demand for the products manufactured by semiconductor capital equipment manufacturers and semiconductor device manufacturers may adversely affect MKS's business, financial condition and results of operations. Historically, the semiconductor market has been highly cyclical and has experienced periods of overcapacity, resulting in significantly reduced demand for capital equipment. For example, in 1996 and 1998 the semiconductor industry experienced a significant decline, which caused a number of MKS's customers to reduce their orders. MKS cannot be certain that semiconductor downturns will not recur. A decline in the level of orders as a result of any future downturn or slowdown in the semiconductor industry could have a material adverse effect on MKS's business, financial condition and results of operations.

### Fluctuations in Operating Results

A substantial portion of MKS's shipments occur shortly after an order is received and therefore MKS operates with a low level of backlog. As a consequence of the just-in-time nature of shipments and the low level of backlog, a decrease in demand for MKS's products from one or more customers could occur with limited advance notice and could have a material adverse effect on MKS's results of operations in any particular period.

A significant percentage of MKS's expenses are relatively fixed and based in part on expectations of future net sales. The inability to adjust spending quickly enough to compensate for any shortfall would magnify the adverse impact of a shortfall in net sales on MKS's results of operations. Factors that could cause fluctuations in MKS's net sales include:

- - The timing of the receipt of orders from major customers
- - Shipment delays
- - Disruption in sources of supply
- - Seasonal variations of capital spending by customers
- - Production capacity constraints
- - Specific features requested by customers

For example, MKS was in the process of increasing production capacity when the semiconductor capital equipment market began to experience a significant downturn in 1996. This downturn had a material adverse effect on MKS's operating results in the second half of 1996 and the first half of 1997. After an increase in business in the latter half of 1997, the market experienced another downturn in 1998, which had a material adverse effect on MKS's 1998 and first quarter 1999 operating results. As a result of the factors discussed above, it is likely that MKS will in the future experience quarterly or annual fluctuations and that, in one or more future quarters, MKS's operating results will fall below the expectations of public market analysts or investors. In any such event, the price of MKS's common stock could decline significantly.

### Customer Concentration

MKS's five largest customers in 1999 and 1998 accounted for approximately 33% and 24%, respectively, of its net sales. 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 MKS's

business, financial condition and results of operations. During 1999, one customer, Applied Materials, Inc., accounted for approximately 22% of MKS's net sales. While the Company has entered into a purchase contract with Applied Materials, Inc. that expires in 2000 unless it is extended by mutual agreement, none of MKS's significant customers, including Applied Materials, Inc., has entered into an agreement requiring it to purchase any minimum quantity of MKS's products. The demand for MKS's products from its semiconductor capital equipment customers depends in part on orders received by them from their semiconductor device manufacturer customers.

Attempts to lessen the adverse effect of any 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 MKS's ability to maintain relationships with existing key customers, MKS's ability to attract new customers, and the success of MKS's customers in creating demand for their capital equipment products which incorporate MKS's products.

#### Competition

The markets for MKS's products are highly competitive. The Company's competitive success often depends upon factors outside of its control. For example, in some cases, particularly with respect to mass flow controllers, semiconductor device manufacturers may direct semiconductor capital equipment manufacturers 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 the Company's products be used at their semiconductor fabrication facilities. In addition, MKS may encounter difficulties in changing established relationships of competitors that already have a large installed base of products within such semiconductor fabrication facilities.

#### Technological Changes

New products designed by semiconductor capital equipment manufacturers typically have a lifespan of five to ten years. MKS's success depends on its products being designed into new generations of equipment for the semiconductor industry. The Company must develop products that are technologically current so that they are positioned to be chosen for use in each successive new generation of semiconductor equipment. If its products are not chosen by its customers, the Company's net sales may be reduced during the lifespan of its customers' products.

#### Expansion into New Markets

MKS plans to build upon its experience in manufacturing and selling gas measurement, control and analysis products used by the semiconductor industry by designing and selling such products for applications in other industries which use production processes similar to those used in the semiconductor industry. For example, MKS plans to expand its business to the manufacture of, among other things, hard coatings to minimize wear on cutting tools. Any failure by the Company to penetrate additional markets would limit its ability to reduce its vulnerability to downturns in the semiconductor industry and could have a material adverse effect on MKS's business, financial condition and results of operations.

MKS has limited experience selling its products in certain markets outside the semiconductor industry. The Company cannot be certain that it will be successful in the expansion of its business outside the semiconductor industry. MKS's future success will depend in part on its ability to:

- - identify new applications for MKS's products
- - adapt MKS's products for such applications
- - market and sell such products to customers

#### Expansion of Manufacturing Capacity

MKS's ability to increase sales of certain products depends in part upon its ability to expand manufacturing capacity for such products in a timely manner. If the Company is unable to expand manufacturing capacity on a timely basis or to manage such expansion effectively, its customers could seek such products from others and its market share could be reduced. Because the semiconductor industry is subject to rapid demand shifts which are difficult to foresee, MKS may not be able to increase capacity quickly enough to respond to a rapid increase in demand in the semiconductor industry. Additionally, capacity expansion could increase the Company's fixed operating expenses and if sales levels do not increase to offset the additional expense levels associated with any such expansion, the Company's business, financial condition and results of operations could be materially adversely affected.

#### International Operations and Sales

International sales, which include sales by MKS's foreign subsidiaries, but exclude direct export sales which were less than 10% of total net sales, accounted for approximately 31% of net sales in 1999, and 32% of net sales in 1998. MKS anticipates that international sales will continue to account for a significant portion of net sales. In addition, certain of MKS's key domestic customers derive a significant portion of their revenues from sales in international markets. Therefore, MKS's sales and results of operations could be adversely affected by economic slowdowns and other risks associated with international sales.

Exchange rate fluctuations could have an adverse effect on MKS's net sales and results of operations and the Company could experience losses with respect to its hedging activities. Unfavorable currency fluctuations could require MKS to increase prices to foreign customers which could result in lower net sales to such customers. Alternatively, if MKS does not adjust the prices for its products in response to unfavorable currency fluctuations, its results of operations could be adversely affected. In addition, sales made by MKS's foreign subsidiaries are denominated in the currency of the country in which these products are sold and the currency MKS receives in payment for such sales could be less valuable at the time of receipt as a result of exchange rate fluctuations. While MKS enters into forward exchange contracts and local currency purchased options to reduce currency exposure arising from intercompany sales of inventory, MKS cannot be certain that its efforts will be adequate to

protect the Company against significant currency fluctuations or that such efforts will not expose MKS to additional exchange rate risks.

#### Need to Retain and Attract Key Employees

MKS's success depends to a large extent upon the efforts and abilities of a number of key employees and officers, particularly those with expertise in the semiconductor manufacturing and similar industrial manufacturing industries. The loss of key employees or officers could have a material and adverse effect on MKS's business, financial condition and results of operations. MKS 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 MKS cannot be certain that it will be successful in attracting and retaining such personnel.

#### Intellectual Property Matters

Although MKS seeks to protect its intellectual property rights through patents, copyrights, trade secrets and other measures, MKS cannot be certain that:

- - it will be able to protect its technology adequately
- - competitors will not be able to develop similar technology independently
- - any of its pending patent applications will be issued
- - intellectual property laws will protect its intellectual property rights
- - third parties will not assert that MKS's products infringe patent, copyright or trade secrets of such parties

Litigation may be necessary in order to enforce MKS's patents, copyrights or other intellectual property rights, to protect its 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, financial condition and results of operations.

#### Market Risk and Sensitivity Analysis

##### Foreign Exchange Rate Risk

MKS enters into forward exchange contracts and local currency purchased options to reduce currency exposure arising from intercompany sales of inventory. The potential fair value loss for a hypothetical 10% adverse change in forward currency exchange rates on MKS's forward exchange contracts at December 31, 1999 would be \$502,000. The potential loss was estimated by calculating the fair value of the forward exchange contracts at December 31, 1999 and comparing that with those calculated using the hypothetical forward currency exchange rates.

The value of the local currency purchased options at December 31, 1999 was immaterial.

At December 31, 1999, MKS had \$12,423,000 related to short-term borrowings denominated in Japanese yen. The carrying value of these short-term borrowings approximates fair value due to their short period to maturity. Assuming a hypothetical 10% adverse change in the Japanese yen to U.S. dollar year end exchange rate, the fair value of these short-term borrowings would increase by \$1,381,000. The potential increase in fair value was estimated by calculating the fair value of the short-term borrowings at December 31, 1999 and comparing that with the fair value using the hypothetical year end exchange rate.

##### Interest Rate Risk

MKS is exposed to fluctuations in interest rates in connection with its variable rate term loans. In order to minimize the effect of changes in interest rates on earnings, MKS entered into an interest rate swap that fixed the interest rate on its variable rate term loans. Under the swap agreement, MKS pays a fixed rate of 5.85% on the notional amount and receives LIBOR. At December 31, 1999, the notional amount of the interest rate swap was equal to the principal amount of the variable rate term loans. The potential increase in the fair value of term loans when adjusting for the interest rate swap paying at a fixed rate resulting from a hypothetical 10% decrease in interest rates was not material.

Due to its short-term duration the fair value of the Company's cash and investment portfolio at December 31, 1999 approximated its carrying value. Interest rate risk was estimated as the potential decrease in fair value resulting from a hypothetical 10% increase in interest rates for securities contained in the investment portfolio. The resulting hypothetical fair value was not materially different from the year-end carrying value.

## Supplemental Stockholder Information

## Price Range of Common Stock

The Common Stock of MKS is traded on the Nasdaq National Market under the symbol MKSI. On February 11, 2000, the closing price of the Company's Common Stock, as reported on the Nasdaq National Market, was \$38.00 per share. The following table sets forth for the periods indicated the high and low closing sales prices per share of the Common Stock as reported by the Nasdaq National Market.

1999	High	Low
-----	-----	-----
First Quarter	14.0625	13.3750
Second Quarter	19.3750	12.0000
Third Quarter	22.2500	18.1250
Fourth Quarter	36.1250	19.3750

On February 11, 2000, MKS had approximately 1800 stockholders of record.

## Dividend Policy

We currently intend, subject to our contractual obligations under the Tax Indemnification and S Corporation Distribution Agreement, to retain earnings for the continued development of our business. 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 our Board of Directors.

Report of Independent Accountants

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

In our opinion, the accompanying consolidated balance sheets and related consolidated statements of income, stockholders' equity and cash flows present fairly, in all material respects, the financial position of MKS Instruments, Inc. and its subsidiaries at December 31, 1999 and 1998, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 1999 in conformity with accounting principles generally accepted in the United States. 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 of these statements in accordance with auditing standards generally accepted in the United States which 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, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for the opinion expressed above.

As discussed in Note 2 to the consolidated financial statements, the Company adopted Statement of Financial Accounting Standards No.133, "Accounting for Derivative Instruments and Hedging Activities" in 1999.

PRICEWATERHOUSECOOPERS LLP

Boston, Massachusetts  
January 28, 2000

## Consolidated Balance Sheets

	December 31	
(in thousands, except share data)	1999	1998
<hr/>		
Assets		
Current assets:		
Cash and cash equivalents	\$ 35,714	\$ 11,188
Short-term investments	28,132	538
Trade accounts receivable, net of allowance for doubtful accounts of \$934 and \$656 at December 31, 1999 and 1998, respectively	36,857	20,674
Inventories	27,650	24,464
Deferred tax asset	4,119	698
Other current assets	3,378	971
	-----	-----
Total current assets	135,850	58,533
Property, plant and equipment, net	32,826	32,725
Long-term investments	1,063	--
Other assets	4,866	4,974
	-----	-----
Total assets	\$ 174,605	\$ 96,232
	=====	=====
Liabilities and Stockholders' Equity		
Current liabilities:		
Short-term borrowings	\$ 12,423	\$ 9,687
Current portion of long-term debt	7,346	2,058
Current portion of capital lease obligations	1,059	1,074
Accounts payable	7,683	3,677
Accrued compensation	9,202	3,985
Other accrued expenses	6,314	5,280
Income taxes payable	1,385	1,279
Distribution payable	3,350	--
	-----	-----
Total current liabilities	48,762	27,040
Long-term debt	4,340	12,042
Long-term portion of capital lease obligations	1,322	1,744
Deferred tax liability	522	117
Other liabilities	490	463
Commitments and contingencies (Note 7)		
Stockholders' equity:		
Preferred Stock, \$0.01 par value, 2,000,000 shares authorized; none issued and outstanding	--	--
Common Stock, no par value, 50,000,000 shares authorized; 24,632,849 shares issued and outstanding at December 31, 1999	113	--
Common Stock, Class A, no par value; 11,250,000 shares authorized; 7,766,910 shares issued and outstanding at December 31, 1998	--	40
Common Stock, Class B (non voting) no par value; 18,750,000 shares authorized; 10,286,257 shares issued and outstanding at December 31, 1998	--	73
Additional paid-in capital	84,713	48
Retained earnings	33,166	52,479
Shareholder receivable	(856)	--
Accumulated other comprehensive income	2,033	2,186
	-----	-----
Total stockholders' equity	119,169	54,826
	-----	-----
Total liabilities and stockholders' equity	\$ 174,605	\$ 96,232
	=====	=====

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

## Consolidated Statements of Income

(in thousands, except per share data)	Year Ended December 31		
	1999	1998	1997
Net sales	\$187,083	\$139,763	\$188,080
Cost of sales	107,228	83,784	107,606
Gross profit	79,855	55,979	80,474
Research and development	13,230	12,137	14,673
Selling, general and administrative	39,014	34,707	41,838
Income from operations	27,611	9,135	23,963
Interest expense	1,346	1,483	2,132
Interest income	2,154	296	271
Other income, net	849	187	166
Income before income taxes	29,268	8,135	22,268
Provision for income taxes (Note 9)	5,231	949	1,978
Net income	\$ 24,037	\$ 7,186	\$ 20,290
Historical net income per share:			
Basic	\$ 1.05	\$ 0.40	\$ 1.12
Diluted	\$ 1.00	\$ 0.38	\$ 1.10
Historical weighted average common shares outstanding:			
Basic	22,784	18,053	18,053
Diluted	23,954	18,720	18,388
Pro forma data (unaudited):			
Historical income before income taxes	\$ 29,268	\$ 8,135	\$ 22,268
Pro forma provision for income taxes assuming C corporation tax	10,856	3,091	8,462
Pro forma net income	\$ 18,412	\$ 5,044	\$ 13,806
Pro forma net income per share:			
Basic	\$ 0.81	\$ 0.28	\$ 0.76
Diluted	\$ 0.77	\$ 0.27	\$ 0.76
Pro forma weighted average common shares outstanding:			
Basic	22,784	18,053	18,053
Diluted	23,786	18,538	18,262

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

Consolidated Statements of Stockholders' Equity For the years ended December 31, 1999, 1998 and 1997 (in thousands, except share data)

	Common Stock				Common Stock		Additional
	Class A		Class B		Shares	Amount	Paid-In Capital
	Shares	Amount	Shares	Amount			
Balance at December 31, 1996	7,766,910	\$ 40	10,286,255	\$ 73			\$ 48
Distributions to stockholders							
Comprehensive income							
Net income							
Other comprehensive income, net of taxes:							
Foreign currency translation adjustment							
Unrealized gain on investments							
Comprehensive income							
Balance at December 31, 1997	7,766,910	40	10,286,255	73			48
Distributions to stockholders							
Issuance of common stock			2				
Comprehensive income							
Net income							
Other comprehensive income, net of taxes:							
Foreign currency translation adjustment							
Unrealized loss on investments							
Comprehensive income							
Balance at December 31, 1998	7,766,910	40	10,286,257	73			48
Distributions to stockholders							
Distributions payable to stockholders							
Conversion to Common Stock	(7,766,910)	(40)	(10,286,257)	(73)	18,053,167		113
Issuance of common stock from Initial Public Offering					6,375,000		82,062
Issuance of common stock from exercise of stock options and Employee Stock Purchase Plan					204,682		1,230
Tax benefit from exercise of stock options							1,112
Stock option compensation							261
Shareholder receivable							
Comprehensive income:							
Net income							
Other comprehensive income, net of taxes:							
Non-recurring deferred tax charge to comprehensive income (Note 9)							
Impact of adopting SFAS No. 133							
Changes in value of financial instruments designated as cash flow hedges							
Foreign currency translation adjustment							
Unrealized gain (loss) on investments							
Comprehensive income							
Balance at December 31, 1999	--	\$ --	--	\$ --	24,632,849	\$ 113	\$ 84,713

	Retained Earnings	Shareholder Receivable	Accumulated Other	Comprehensive Income	Comprehensive Income	Total
			Comprehensive Income			Stockholders' Equity
			Income			Equity
Balance at December 31, 1996	\$ 43,553		\$ 1,784			\$ 45,498
Distributions to stockholders	(12,400)					(12,400)
Comprehensive income						
Net income	20,290				20,290	20,290
Other comprehensive income, net of taxes:						
Foreign currency translation adjustment			(786)	(786)		(786)
Unrealized gain on investments			246	246		246

Comprehensive income			\$ 19,750	
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Balance at December 31, 1997	51,443		1,244	52,848
Distributions to stockholders	(6,150)			(6,150)
Issuance of common stock				
Comprehensive income				
Net income	7,186		7,186	7,186
Other comprehensive income, net of taxes:				
Foreign currency translation adjustment		992	992	992
Unrealized loss on investments		(50)	(50)	(50)
Comprehensive income			\$ 8,128	
<hr/>				
Balance at December 31, 1998	52,479		2,186	54,826
Distributions to stockholders	(40,000)			(40,000)
Distributions payable to stockholders	(3,350)			(3,350)
Conversion to Common Stock				
Issuance of common stock from Initial Public Offering				82,062
Issuance of common stock from exercise of stock options and Employee Stock Purchase Plan				1,230
Tax benefit from exercise of stock options				1,112
Stock option compensation				261
Shareholder receivable		(856)		(856)
Comprehensive income:				
Net income	24,037		24,037	24,037
Other comprehensive income, net of taxes:				
Non-recurring deferred tax charge to comprehensive income (Note 9)		(660)	(660)	(660)
Impact of adopting SFAS No. 133		(16)	(16)	(16)
Changes in value of financial instruments designated as cash flow hedges		(212)	(212)	(212)
Foreign currency translation adjustment		(80)	(80)	(80)
Unrealized gain (loss) on investments		815	815	815
Comprehensive income			\$ 23,884	
<hr/>				
Balance at December 31, 1999	\$ 33,166	\$ (856)	\$ 2,033	\$ 119,169
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The accompanying notes are an integral part of the consolidated financial statements.

## Consolidated Statements of Cash Flows

(in thousands)	Year Ended December 31		
	1999	1998	1997
Cash flows from operating activities:			
Net income	\$ 24,037	\$ 7,186	\$ 20,290
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization of property, plant, and equipment	6,209	6,242	5,712
(Gain) loss on disposal of property, plant and equipment	(181)	48	552
Deferred taxes	(266)	(32)	(145)
Non-recurring deferred tax credit	(3,770)	--	--
Provision for doubtful accounts	257	253	258
Forward exchange contract loss (gain) realized	9	(1,211)	132
Stock option compensation	261	--	95
Changes in operating assets and liabilities:			
Trade accounts receivable	(15,922)	12,908	(12,509)
Inventories	(2,908)	6,479	(5,930)
Other current assets	(1,000)	554	(1,261)
Accrued compensation	5,217	(3,516)	2,386
Accrued expenses	1,019	(1,602)	3,312
Accounts payable	4,022	(3,682)	2,638
Income taxes payable	106	(647)	1,283
Net cash provided by operating activities	17,090	22,980	16,813
Cash flows from investing activities:			
Purchases of short-term and long-term investments	(45,999)	--	--
Maturities and sales of short-term and long-term investments	18,654	--	--
Purchases of property, plant and equipment	(5,505)	(3,137)	(3,269)
Proceeds from sale of property, plant and equipment	318	60	203
Increase in other assets	(853)	(270)	(123)
Cash received (used) to settle forward exchange contracts	(9)	1,211	(132)
Net cash used in investing activities	(33,394)	(2,136)	(3,321)
Cash flows from financing activities:			
Net payments on demand notes payable	--	--	(1,875)
Proceeds from short-term borrowings	11,250	15,242	24,110
Payments on short-term borrowings	(9,825)	(17,569)	(22,938)
Principal payments on long-term debt	(2,424)	(2,057)	(2,217)
Proceeds from issuance of common stock, net of issuance costs	82,062	--	--
Proceeds from exercise of stock options and Employee Stock Purchase Plan	1,230	--	--
Cash distributions to stockholders	(40,000)	(6,150)	(12,400)
Principal payments under capital lease obligations	(1,050)	(1,257)	(870)
Net cash provided by (used in) financing activities	41,243	(11,791)	(16,190)
Effect of exchange rate changes on cash and cash equivalents	(413)	(376)	1,394
Increase (decrease) in cash and cash equivalents	24,526	8,677	(1,304)
Cash and cash equivalents at beginning of period	11,188	2,511	3,815
Cash and cash equivalents at end of period	\$ 35,714	\$ 11,188	\$ 2,511
Supplemental disclosure of cash flow information:			
Cash paid during the period for:			
Interest	\$ 1,377	\$ 1,526	\$ 2,030
Income taxes	\$ 10,017	\$ 1,608	\$ 1,078
Noncash transactions during the period:			
Equipment acquired under capital leases	\$ 762	\$ 1,138	\$ 145

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

## 1} Description of Business

MKS Instruments, Inc. (the "Company" or "MKS") is a worldwide developer, manufacturer, and supplier of instruments and components that are used to measure, control and analyze gases in semiconductor manufacturing and similar industrial manufacturing processes. The Company's products include pressure and flow measurement and control instruments; vacuum gauges, valves and components; and gas analysis instruments. 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.

## Historical and Pro Forma (Unaudited) Net Income Per Share

The Company computes basic and diluted earnings per share in accordance with Statement of Financial Accounting Standards No. 128 ("SFAS 128") "Earnings per Share." SFAS 128 requires both basic earnings per share, which is based on the weighted average number of common shares outstanding, and diluted earnings per share, which is based on the weighted average number of common shares outstanding and all dilutive potential common equivalent shares outstanding. The dilutive effect of options is determined under the treasury stock method using the average market price for the period. Common equivalent shares are included in the per share calculations where the effect of their inclusion would be dilutive.

Historical net income per share is not meaningful because of the Company's conversion from an S corporation to a C corporation upon the closing of its initial public offering. 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 38.0% in 1998 and 1997, and at a pro forma tax rate of 37.1% in 1999.

The following is a reconciliation of basic to diluted pro forma and historical net income per share:

	For the Year Ended December 31					
	1999		1998		1997	
	Pro forma	Historical	Pro forma	Historical	Pro forma	Historical
Net income	\$18,412	\$24,037	\$5,044	\$7,186	\$13,806	\$20,290
Shares used in net income per common share-- basic	22,784	22,784	18,053	18,053	18,053	18,053
Effect of dilutive securities:						
Employee and director stock options	1,002	1,170	485	667	209	335
Shares used in net income per common share-- diluted	23,786	23,954	18,538	18,720	18,262	18,388
Net income per common share-- basic	\$0.81	\$1.05	\$0.28	\$0.40	\$0.76	\$1.12
Net income per common share-- diluted	\$0.77	\$1.00	\$0.27	\$0.38	\$0.76	\$1.10

For purposes of computing diluted earnings per share, weighted average common share equivalents do not include stock options with an exercise price greater than the average market price of the common shares during the period. Options to purchase 33,500, 24,643 and zero shares of common stock were outstanding during 1999, 1998, and 1997, respectively, but were not included in the calculation of diluted net income per common share because the option price was greater than the average market price of the common shares during the period.

## 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 included in accumulated other comprehensive income in consolidated stockholders' equity.

## Revenue Recognition

The Company recognizes revenue, and accrues for anticipated returns and warranty costs, upon completion of delivery obligations.

## Cash and Cash Equivalents and Investments

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 the following:

	December 31,	
	1999	1998
-----		
Cash and Money Market Instruments	\$22,156	\$11,188
Commercial Paper	5,558	--
Federal Government and Government Agency Obligations	6,000	--
Corporate Obligations	2,000	--
	-----	-----
	\$35,714	\$11,118
	=====	=====

Short-term available-for-sale investments maturing within one year consist of the following:

	December 31,	
	1999	1998
-----		
Federal Government and Government Agency Obligations	\$16,245	
Corporate Obligations	5,501	
Commercial Paper	4,641	
Equity Securities	1,745	\$538
	-----	-----
	\$28,132	\$538
	=====	=====

Long-term available-for-sale investments maturing within two years consist of the following at December 31, 1999:

Federal Government and Government Agency Obligations	\$1,063
	=====

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 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 included in accumulated other comprehensive income in consolidated stockholders' equity. Unrealized gains and losses on securities classified as trading are reported in earnings. The cost of securities sold is based on the specific identification method.

## 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 leased asset.

## Research and Development

Research and development costs are expensed as incurred.

## New Accounting Pronouncements

In June 1998, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivative Instruments and Hedging Activities." SFAS No. 133 requires that all derivative instruments be recorded on the balance sheet at their fair value. Changes in the fair value of derivatives are recorded each period in current earnings or other comprehensive income, depending on whether a derivative is designated as part of a hedge transaction and, if it is, the type of hedge transaction. The Company adopted the provisions of SFAS No. 133 effective April 1, 1999. The impact of adopting SFAS No. 133 was the recording of an unrealized loss of \$16,000, net of taxes, in other comprehensive income.

In December 1999, the Securities and Exchange Commission issued Staff Accounting

Bulletin No 101 ("SAB 101"), "Revenue Recognition". SAB 101 summarizes the staff's view in applying generally accepted accounting principles to revenue recognition. The application of the guidance in SAB 101 will be required in the Company's first quarter of the fiscal year 2000. Any effect of applying this guidance will be reported as a cumulative effect adjustment resulting from a change in accounting principle. The Company does not expect the application to have a material affect on its financial statements.

## 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 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.

## 3} Financial Instruments and Risk Management

## Foreign Exchange Risk Management

The Company adopted the provisions of SFAS No. 133 effective April 1, 1999. The Company hedges a portion of its forecasted foreign currency denominated intercompany sales of inventory, over a maximum period of fifteen months, using forward exchange contracts and currency options primarily related to Japanese and European currencies. These derivatives are designated as cash-flow hedges, and changes in their fair value are carried in accumulated other comprehensive income until the underlying forecasted transaction occurs. Once the underlying forecasted transaction is realized, the appropriate gain or loss from the derivative designated as a hedge of the transaction is reclassified from accumulated other comprehensive income to cost of sales. The Company utilizes an interest rate swap to fix the interest rate on certain variable term loans in order to minimize the effect of changes in interest rates on earnings. Since the adoption of SFAS No. 133 on April 1, 1999, net realized losses recorded in earnings were \$104,000. As of December 31, 1999 the amount that will be reclassified from accumulated other comprehensive income to earnings over the next twelve months is an unrealized loss of \$228,000, net of taxes. The ineffective portion of the derivatives is primarily related to option premiums, and was \$307,000 in 1999.

Prior to the adoption of SFAS No. 133, the Company entered into forward exchange contracts and local currency purchased options to hedge a portion of its probable anticipated, but not firmly committed transactions. The anticipated transactions whose risks were being hedged were the intercompany sales of inventory by the U.S. parent to the foreign subsidiary payable in the foreign subsidiary's local currency. The time period of the anticipated transactions that were hedged generally approximated one year. The Company also used forward exchange contracts to hedge firm commitments. Market value gains and losses on forward exchange contracts were recognized immediately in earnings unless a firm commitment existed. 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 were recognized when the hedged transaction occurred. These contracts, which related primarily to Japanese and European currencies generally had terms of twelve months or less. Forward exchange contracts received hedge accounting on firmly committed transactions when they were designated as a hedge of the designated currency exposure and were effective in minimizing such exposure. Options received hedge accounting on probable anticipated transactions when they were designated as a hedge of the currency exposure and were effective in minimizing such exposure.

Realized and unrealized gains and losses on forward exchange contracts and local currency purchased option contracts 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. The company does not hold or issue derivative financial instruments for trading purposes.

Forward exchange contracts with notional amounts totaling \$4,000,000, \$8,000,000, and \$9,800,000 to exchange foreign currencies for U.S. dollars were outstanding at December 31, 1999, 1998, and 1997, respectively. Of such forward exchange contracts, \$4,000,000, \$7,800,000 and \$6,900,000 to exchange Japanese yen for U.S. dollars, were outstanding at December 31, 1999, 1998, and 1997, respectively. Local currency purchased options with notional amounts totaling \$11,800,000, \$10,221,000, and \$12,738,000 to exchange foreign currencies for U.S. dollars were outstanding at December 31, 1999, 1998, and 1997, respectively.

Foreign exchange gains of \$415,000, foreign exchange losses of \$168,000, and foreign exchange gains of \$1,166,000 on forward exchange contracts which did not qualify for hedge accounting were recognized in earnings during 1999, 1998, and 1997, respectively, and are classified in Other income, net. Gains and losses on forward exchange contracts and local currency purchased options that qualify for hedge accounting are classified in cost of goods sold and totaled a loss of \$104,000 and gains of \$310,000 and \$1,178,000 for the years ended December 31, 1999, 1998, and 1997, respectively.

The fair values of forward exchange contracts at December 31, 1999 and 1998, determined by applying period end currency exchange rates to the notional contract amounts, amounted to an unrealized loss of \$547,000 and \$349,000, respectively. The fair values of local currency purchased options at December 31, 1999 and 1998, which were obtained through dealer quotes were immaterial.

The Company recorded a foreign exchange translation gain on intercompany payables of \$1,000,000 and a foreign exchange translation loss on intercompany payables of \$1,000,000 in Other income, net in 1998 and 1997, respectively. During 1999 the Company has hedged certain intercompany payables with currency options. Since these derivatives hedge existing amounts that are denominated in foreign currencies, the options do not qualify for hedge accounting under SFAS No. 133.

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.

#### 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 1998, the Company entered into a four-year interest rate swap agreement on a declining notional amount basis which coincides with the scheduled principal payments with a major financial institution for the notional amount of \$10,528,000 equal to the term loans described in Note 6. Under the agreement, the Company pays a fixed rate of 5.85% on the notional amount and receives LIBOR. The interest differential payable or accruable on the swap agreement is recognized on an accrual basis as an adjustment to interest expense. The criteria used to apply hedge accounting for this interest rate swap is based upon management designating the swap as a hedge against the variable rate debt combined with the terms of the swap matching the underlying debt including the notional amount, the timing of the interest reset dates, the indices used and the paydates. At December 31, 1999, 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 \$49,000, based on dealer quotes. The variable rate received on the swap at December 31, 1999 was 6.48%.

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 credit worthiness 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 investments, forward exchange contracts, and trade accounts receivable. The Company maintains cash and cash equivalents with financial institutions including the bank it has borrowings with. The Company maintains cash investments primarily in U.S. Treasury and government agency securities and corporate debt securities, rated AA or higher, which have minimal credit risk. The Company places forward currency contracts with high credit-quality financial institutions in order to minimize credit risk exposure. Concentrations of credit risk with respect to accounts receivable are limited due to the large number of diverse and 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 marketable securities is based on quoted market prices. 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.

#### 4} Inventories

Inventories consist of the following:

	December 31	
	1999	1998
Raw material	\$6,644	\$7,544
Work in process	7,026	5,718
Finished goods	13,980	11,202
	<u>\$27,650</u>	<u>\$24,464</u>

#### 5} Property, Plant and Equipment

Property, plant and equipment consist of the following:

	December 31	
	1999	1998
Land	\$9,100	\$8,834
Buildings	26,081	26,020
Machinery and equipment	30,175	27,394
Furniture and fixtures	12,968	10,578
Leasehold improvements	1,966	1,814
	<u>80,290</u>	<u>74,640</u>
Less: accumulated depreciation and amortization	47,464	41,915
	<u>\$32,826</u>	<u>\$32,725</u>

#### 6} Debt

Credit Agreements and Short-Term Borrowings

In February 1996, the Company entered into loan agreements with two banks, which provided access to a revolving credit facility. The revolving credit facility provided for uncollateralized borrowings up to \$30,000,000, and expired on December 31, 1999. Interest on borrowings was payable quarterly at either the banks' base rate or the LIBOR Rate, as defined in the agreement, at the Company's option. At December 31, 1999 and 1998, the Company had no borrowings under this revolving credit facility.

Effective January 1, 2000, the Company entered into a loan agreement with the same two banks, which provides access to a revolving credit facility. The revolving credit facility provides for uncollateralized borrowings up to \$30,000,000, and expires December 31, 2000. Interest on borrowings is payable quarterly at either the banks' base rate, or the LIBOR Rate, as defined in the agreement.

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 December 31, 1999 of up to \$17,289,000, which generally expire and are renewed at six month intervals. At December 31, 1999 and 1998, total borrowings outstanding under these arrangements were \$12,423,000, and \$9,687,000, respectively, at interest rates ranging from 1.2% to 1.7%, and 1.3% to 1.7%, 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	
	1999	1998
Term loans	\$8,862	\$10,528
Mortgage notes	2,824	3,572
Total long-term debt	11,686	14,100
Less: current portion	7,346	2,058
Long-term debt less current portion	\$4,340	\$12,042

On November 1, 1993, the Company entered into a term loan agreement with a bank, which 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. Interest is payable monthly at either the bank's base rate, at a rate based on the long-term funds rate, or at the LIBOR Rate, as defined in the agreement, at the Company's option. On October 31, 1995, the Company also entered into a term loan agreement with the same bank, which provided additional uncollateralized borrowings of \$7,000,000. Principal payments are payable in equal monthly installments of \$83,000 through June 1, 2002, with the remaining principal payment due on June 30, 2002. Interest is payable monthly at either the bank's base rate or at the LIBOR Rate, as defined in the agreement, at the Company's option.

At December 31, 1999 and 1998, the interest rates in effect for the term loan borrowings were 7.40% and 7.131%, respectively.

The terms of the revolving credit facility and term 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 has loans outstanding from various foreign banks in the form of mortgage notes at interest rates ranging from 1.9% to 6.2%. Principal and interest are payable in monthly installments through 2010. The loans are collateralized by mortgages on certain of the Company's foreign properties.

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

Year ending December 31	Aggregate Maturities
2000	\$7,346
2001	1,406
2002	1,327
2003	414
2004	419
Thereafter	774
	-----
	\$11,686
	=====

#### 7} Commitments and Contingencies

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 \$2,950,000, \$2,388,000, and \$2,478,000 for the years ended December 31, 1999, 1998, and 1997, respectively.

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

Year ending December 31,	Operating Leases		Capital Leases
	Real Estate	Equipment	Equipment
2000	\$1,875	\$515	\$1,203
2001	1,062	329	684
2002	207	176	450
2003	130	78	234
2004	52	45	86
Thereafter	--	41	--
Total minimum lease payments	\$3,326	\$1,184	\$2,657
Less: amounts representing interest			276
Present value of minimum lease payments			2,381
Less: current portion			1,059
Long-term portion			\$1,322

Prior to its initial public offering, the Company entered into a Tax Indemnification and S Corporation Distribution Agreement with its then existing stockholders (the "Pre-IPO stockholders"). The agreement includes provisions for the payment, with interest, by the pre-IPO stockholders or MKS, as the case may be, for the difference between the \$40,000,000 distributed as an estimate of the amount of the accumulated adjustments account as of April 4, 1999, which is the date the Company's S Corporation status was terminated, and the actual amount of the accumulated adjustments account on that day. The actual amount of the accumulated adjustments account cannot be determined until MKS calculates the amount of its taxable income for the year ending December 31, 1999. Based on the Company's estimate of the taxable income for the year ending December 31, 1999, MKS believes that an additional future distribution to the Pre-IPO stockholders will be required under this agreement. The amount of the additional distribution, prior to interest, is currently estimated to be \$3,350,000. The amount of the additional distribution payable has been charged directly to retained earnings and had no impact on net income or earnings per share. No shareholders, other than the Pre-IPO stockholders, are parties to the Tax Indemnification and S Corporation Distribution Agreement.

#### 8} Stockholders' Equity

##### Common Stock

In March 1999, the Company amended its Articles of Organization to: i) eliminate the authorized shares of Class A Common Stock and Class B Common Stock; ii) increase the authorized number of shares of Common Stock to 50,000,000 shares; iii) authorize 2,000,000 shares of Preferred Stock, \$0.01 par value per share; and iv) provide that each outstanding share of Class A Common Stock and Class B Common Stock be converted into one share of Common Stock.

On April 5, 1999 the Company closed the initial public offering of its Common Stock. In connection with this offering and the exercise of an over-allotment option by the underwriters, the Company sold 6,375,000 shares of Common Stock at a price of \$14.00 per share. The net proceeds to the Company were approximately \$82,000,000. Underwriting discounts and commissions were approximately \$6,200,000 and other offering costs were approximately \$1,000,000.

On April 5, 1999 the Company distributed \$40,000,000, which was the estimated amount of the Company's undistributed S corporation earnings as of the day prior to the closing of the offering.

##### Stock Purchase Plan

The Company's Amended and Restated 1999 Employee Stock Purchase Plan (the "Purchase Plan") authorizes the issuance of up to an aggregate of 450,000 shares of Common Stock to participating employees. Offerings under the Purchase Plan commence on June 1 and December 1 and terminate, respectively, on November 30 and May 31. Under the Purchase Plan, eligible employees may purchase shares of Common Stock through payroll deductions of up to 10% of their compensation. The price at which an employee's option is exercised is the lower of (1) 85% of the closing price of the Common Stock on the NASDAQ National Market on the day that each offering commences or (2) 85% of the closing price on the day that each offering terminates. On November 30, 1999 the Company issued 36,520 shares of Common Stock to employees who participated in the Purchase Plan, at an exercise price of \$12.94 per share. As of December 31, 1999 there were 413,480 shares reserved for issuance.

##### Stock Option Plans

On January 9, 1998, the stockholders of the Company approved the following: (1) an increase in the number of shares that may be granted under the 1995 Stock Incentive Plan to 3,750,000 shares of common stock; (2) the adoption of the 1997 Director Stock Option Plan pursuant to which options may be granted to purchase up to an aggregate of 300,000 shares of common stock; (3) the adoption of the 1997 Employee Stock Purchase Plan pursuant to which the Company may issue up to an aggregate of 450,000 shares of common stock; and (4) that 3,750,000 shares, 300,000 shares, and 450,000 shares of common stock be reserved for issuance under the 1995 Stock Incentive Plan, the 1997 Director Stock Option Plan, and the 1997 Employee Stock Purchase Plan, respectively. The 1997 Employee Stock

Purchase Plan was amended and restated on April 22, 1999, and the Plan's name was changed to the Amended and Restated 1999 Employee Stock Purchase Plan.

The Company grants options to employees under the 1995 Stock Incentive Plan (the "Plan") and to directors under the 1996 Director Stock Option Plan and the 1997 Director Stock Option Plan (the "Director Plans").

At December 31, 1999, 1,029,613 options to purchase shares of the Company's common stock were reserved for issuance under the Plan. At December 31, 1999, under the Director Plans, options to purchase 234,000 shares of common stock were reserved for issuance. Stock options are granted at 100% of the fair value of 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 Director Plans, certain options granted in 1999 vest immediately. The remainder of the options granted in 1997 and later vest at the earlier of (1) the next annual meeting, (2) 13 months from date of grant, or (3) the effective date of an acquisition as defined in the Director Plans.

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

	Year Ended December 31					
	1999		1998		1997	
	Options	Weighted Average Exercise Price	Options	Weighted Average Exercise Price	Options	Weighted Average Exercise Price
Outstanding-- beginning of period	2,098,207	\$5.20	1,564,449	\$4.50	810,442	\$4.43
Granted	678,971	16.40	629,969	6.80	785,657	4.57
Exercised	(168,162)	4.56	(2)	4.43	--	--
Forfeited or Expired	(56,793)	5.76	(96,209)	4.43	(31,650)	4.43
Outstanding-- end of period	2,552,223	\$8.21	2,098,207	\$5.20	1,564,449	\$4.50
Exercisable at end of period	1,047,748	\$4.82	778,473	\$4.46	476,451	\$4.43

The following table summarizes information with respect to options outstanding and exercisable under the Plan at December 31, 1999:

Range of Exercise Prices	Options Outstanding			Options Exercisable	
	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life (In Years)	Number of Shares	Weighted Average Exercise Price
\$4.43 - \$8.00	1,881,152	\$5.27	7.45	1,047,748	\$4.82
\$13.56 - \$14.50	524,571	\$14.13	9.28	--	--
\$19.00 - \$27.25	146,500	\$24.63	9.81	--	--
	2,552,223	\$8.21	7.96	1,047,748	\$4.82

The following table presents activity for options under the Director Plans:

	Year Ended December 31					
	1999		1998		1997	
	Options	Weighted Average Exercise Price	Options	Weighted Average Exercise Price	Options	Weighted Average Exercise Price
Outstanding-- beginning of period	34,368	\$4.81	30,748	\$4.43	27,128	\$4.43
Granted	66,000	14.15	3,620	8.00	3,620	4.43
Outstanding-- end of period	100,368	\$10.95	34,368	\$4.81	30,748	\$4.43
Exercisable at end of period	76,368	\$9.86	26,228	\$4.43	13,564	\$4.43

The following table summarizes information with respect to options outstanding and exercisable under the Director Plans at December 31, 1999

Range of Exercise Prices	Options Outstanding			Options Exercisable	
	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life (In Years)	Number of Shares	Weighted Average Exercise Price
\$4.43 - \$8.00	34,368	\$4.81	6.86	34,368	\$4.81
\$14.00 - \$14.40	66,000	\$14.15	9.20	42,000	\$14.00

100,368

\$10.95

8.40

76,368

\$9.86

The Company has adopted the disclosure-only provisions of Statement of Financial Accounting Standards No. 123 (SFAS No. 123), "Accounting for Stock-Based Compensation." 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. The Company is required to disclose pro forma net income and net income per common share amounts had compensation cost for the Company's stock based compensation plans been determined based on the fair value at the grant date for awards under the plans. Had compensation expense for the stock based compensation plans been consistent with the method of SFAS No. 123, the amounts reported for 1999 would have been:

	As Reported	Pro forma for SFAS No. 123
Historical net income	\$24,037	\$23,098
Historical net income per share:		
Basic	\$1.05	\$1.01
Diluted	\$1.00	\$0.96
Pro forma net income	\$18,412	\$17,559
Pro forma net income per share:		
Basic	\$0.81	\$0.77
Diluted	\$0.77	\$0.74

The weighted average fair value of options at the date of grant was estimated using the Black-Scholes model and was \$9.54 with the following assumptions in 1999: expected life of 5 years, weighted average interest rate of 5.49%, expected volatility of 64%, and no dividend yield. Had the fair value based method prescribed in SFAS No. 123 been used to account for stock-based compensation cost in 1998 and 1997, there would have been no change in net income and net income per share from that reported based on the following assumptions: dividend yield of 8%, interest rate of 5.44% and an expected life of 8 years.

The fair value of purchase rights granted in 1999 under the Purchase Plan was \$5.11. The fair value of the employees' purchase rights was estimated using the Black-Scholes model with the following assumption in 1999: expected life of 6 months, interest rate of 4.87%, expected volatility of 64%, and no dividend yield.

#### Accumulated Other Comprehensive Income

The balance of accumulated other comprehensive income was comprised of the following:

	Cumulative Translation Adjustments	Unrealized Gain on Investments	Financial Instruments Designated as Cash Flow Hedges	Accumulated Other Comprehensive Income
Balance at December 31, 1998	\$1,875	\$311	--	\$2,186
Non-recurring deferred tax charge	(497)	(163)	--	(660)
Foreign currency translation adjustment, net of taxes of \$(55)	(80)	--	--	(80)
Unrealized gain on investments, net of taxes of \$377	--	815	--	815
Changes in value of financial instruments designated as cash flow hedges, net of taxes of \$(232)	--	--	(228)	(228)
Balance at December 31, 1999	\$1,298	\$963	\$(228)	\$2,033

#### Shareholder Receivable

The Company has an agreement with certain shareholders whereby the Company has paid the premiums for life insurance policies of the shareholders. The agreement provides for the reimbursement of the premiums to the Company upon receipt of proceeds from the policies. The present value discount related to the premiums is \$856,000.

#### 9) Income Taxes

Prior to its initial public offering, the Company was treated as an S corporation for federal income tax purposes. As an S corporation, the Company was not subject to federal, and certain state, income taxes. The Company terminated its S corporation status upon the closing of its initial public offering in 1999 and became subject to taxes at C corporation tax rates. This change in tax status and tax rates resulted in a non-recurring, non-cash deferred tax credit to net income of \$3,770,000 and a deferred tax charge to other comprehensive income of \$660,000.

The Pre-IPO stockholders are liable for individual Federal, and certain state, income taxes on their allocated portions of the Company's taxable income as an S corporation. For the tax year ending December 31, 1999, the Pre-IPO stockholders will be allocated a portion of the Company's 1999 taxable income. A reconciliation of the Company's 1999 effective tax rate to the U.S. federal statutory rate follows:

U.S. Federal income tax statutory rate	35.0%
Non-recurring deferred tax credit	(12.8)
Pre-IPO stockholder 1999 allocated taxable income	(6.8)
State income taxes, net of federal benefit	2.5
Effect of foreign operations taxed at various rates	2.1
Foreign sales corporation tax benefit	(1.6)
Other	(0.5)
	-----
	17.9%
	=====

As the Company was not subject to Federal income taxes in 1998 and 1997, a reconciliation of the effective tax rate to the Federal statutory rate is not meaningful for those years.

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

	Year Ended December 31		
	1999	1998	1997
Income before income taxes:			
United States	\$25,590	\$6,169	\$21,858
Foreign	3,678	1,966	410
	-----	-----	-----
	29,268	8,135	22,268
Current taxes:			
United States Federal	6,269	--	--
State	1,192	197	1,331
Foreign	1,806	784	792
	-----	-----	-----
	9,267	981	2,123
Deferred taxes:			
United States Federal	(4,025)	--	--
State	(27)	(39)	(72)
Foreign	16	7	(73)
	-----	-----	-----
	(4,036)	(32)	(145)
Provision for income taxes	\$5,231	\$949	\$1,978
	=====	=====	=====

At December 31, 1999, 1998, and 1997 the components of the deferred tax asset and deferred tax liability were as follows:

	Year Ended December 31		
	1999	1998	1997
Deferred tax assets (liabilities):			
Inventories	\$1,434	\$265	\$344
Intercompany profits	1,362	152	214
Depreciable assets	746	(234)	(20)
Compensation	362	127	77
Investment booked under the equity method	(557)	(59)	(41)
Other	250	330	(25)
	-----	-----	-----
Total	\$3,597	\$581	\$549
	=====	=====	=====

#### 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 \$1,182,000 and \$2,500,000 for the years ended December 31, 1998 and 1997. Approximately \$2,316,000 has been accrued as the estimated Company contribution for the year ended December 31, 1999 and is included in accrued compensation.

The Company maintains a bonus plan which provides cash awards to key employees, at the discretion of the Compensation Committee of the Board of Directors, based upon operating results and employee performance. Bonus expense to key employees was \$3,213,000, none and \$1,425,000, for the years ended December 31, 1999, 1998, and 1997, respectively.

11} Geographic Financial Information and Significant Customer

See Note 1 for a brief description of the Company's business. The Company is organized around two similar product lines domestically and by geographic locations internationally and has three reportable segments: North America, Far East, and Europe. Net sales to unaffiliated

customers are based on the location in which the sale originated. Transfers between geographic areas are at negotiated transfer prices and have been eliminated from consolidated net sales. Income from operations consists of total net sales less operating expenses and does not include either interest income, interest expense or income taxes. The Company had one customer comprising 22%, 16% and 22% of net sales for the years ended December 31, 1999, 1998, and 1997, respectively. This data is presented in accordance with SFAS 131, "Disclosures About Segments of an Enterprise and Related Information," which the Company has retroactively adopted for all periods presented.

	Year Ended December 31, 1999			
	North America	Far East	Europe	Total
Net sales to unaffiliated customers	\$128,562	\$38,734	\$19,787	\$187,083
Intersegment net sales	36,884	706	986	38,576
Depreciation and amortization	5,543	252	414	6,209
Income from operations	24,608	1,413	1,590	27,611
Segment assets	132,971	31,272	10,362	174,605
Long-lived assets	29,656	6,524	2,575	38,755
Capital expenditures	5,013	241	251	5,505

	Year Ended December 31, 1998			
	North America	Far East	Europe	Total
Net sales to unaffiliated customers	\$95,607	\$23,902	\$20,254	\$139,763
Intersegment net sales	26,657	290	1,015	27,962
Depreciation and amortization	5,627	210	405	6,242
Income from operations	6,319	1,298	1,518	9,135
Segment assets	65,560	20,768	9,904	96,232
Long-lived assets	28,960	5,655	3,084	37,699
Capital expenditures	2,635	179	323	3,137

	Year Ended December 31, 1997			
	North America	Far East	Europe	Total
Net sales to unaffiliated customers	\$138,186	\$31,559	\$18,335	\$188,080
Intersegment net sales	35,429	225	749	36,403
Depreciation and amortization	5,096	259	357	5,712
Income from operations	22,847	886	230	23,963
Segment assets	77,302	19,906	9,328	106,536
Long-lived assets	30,738	4,904	3,015	38,657
Capital expenditures	2,899	128	242	3,269

Included in North America are the United States and Canada. Net sales to unaffiliated customers from the United States were \$128,560,000, \$94,449,000 and \$136,653,000 for the years ended December 31, 1999, 1998 and 1997, respectively. Long-lived assets within the United States amounted to \$28,729,000, \$28,902,000 and \$30,667,000 at December 31, 1999, 1998, and 1997, respectively.

Included in the Far East are Japan, Korea, Singapore and Taiwan. Included in Europe are Germany, France and the United Kingdom. Net sales to unaffiliated customers from Japan were \$30,696,000, \$21,153,000 and \$28,184,000 for the years ended December 31, 1999, 1998 and 1997, respectively. Long-lived assets within Japan amounted to \$6,266,000, \$5,431,000 and \$4,792,000 at December 31, 1999, 1998 and 1997, respectively.

## Corporate Information

## Board of Directors

John R. Bertucci, Chairman and Chief Executive Officer  
MKS Instruments, Inc.

Richard S. Chute, Esquire  
Hill & Barlow

Owen W. Robbins, Executive Vice President (retired)  
Teradyne, Inc.

Robert J. Therrien, President and Chief Executive Officer  
Brooks Automation, Inc.

Louis P. Valente, Chairman and Chief Executive Officer  
Palomar Medical Technologies, Inc.

## Management

John R. Bertucci, Chairman of the Board and Chief  
Executive Officer

Dr. Peter R. Younger, President and Chief Operating Officer

Ronald C. Weigner, Vice President and Chief Financial Officer

John J. Sullivan, Executive Vice President, Technology

William D. Stewart, Corporate Vice President and General Manager, Vacuum  
Products

Joseph A. Maher, Jr., Corporate Vice President and General Manager, Pressure  
Measurement and Control Products

Robert L. Klimm, Corporate Vice President and General Manager, Materials  
Delivery and Analysis Products

Leo Berlinghieri, Corporate Vice President,  
Customer Support Operations

Paul A. Blackborow, Corporate Vice President, Marketing

Gerald G. Colella, Corporate Vice President,  
Business Operations

George E. Manning, Corporate Vice President,  
Human Resources

William P. Donlan, Treasurer and Corporate Controller

## Business Operations

MKS Instruments, Inc.  
Pressure Measurement and Control Products Group  
Andover, Massachusetts

MKS Instruments, Inc.  
Materials Delivery and Analysis Products Group  
Methuen, Massachusetts

MKS Instruments, Inc.  
Vacuum Products Group  
Boulder, Colorado

MKS Instruments, Inc.  
Austin, Texas

MKS Instruments, Inc.  
Santa Clara, California

MKS Instruments France s.a.  
Le Bourget, France

MKS Instruments Deutschland GmbH  
Munich, Germany

MKS Instruments Benelux  
Delft, The Netherlands

MKS Instruments, U.K. Ltd.  
Altricham, England  
Livingston, Scotland  
Kildare, Republic of Ireland

MKS Japan, Inc.  
Tokyo, Japan

MKS Korea Co., Ltd.  
Seoul, Korea

MKS Instruments, Inc. Singapore  
Singapore

MKS Instruments, Inc. Taiwan  
Hsinchu, Taiwan

Shareholder Information  
Stock Listing

NASDAQ National Market, Symbol: MKSI

Transfer Agent and Registrar  
BankBoston, N.A.  
Boston, Massachusetts

Independent Auditors  
PricewaterhouseCoopers LLP  
Boston, Massachusetts

Outside Counsel  
Hale and Dorr LLP  
Boston, Massachusetts

Hill and Barlow  
Boston, Massachusetts

Inquiries Concerning the Company  
Stockholder inquiries about MKS Instruments may be addressed to Ronald Weigner,  
Vice President and Chief Financial Officer, Six Shattuck Road, Andover, MA  
01810; or inquiries may be sent through the MKS website at  
<http://www.mksinst.com>.

Licensed Trademarks  
Baratron, (R) Mass-Flo, (R) and Orion (R) are registered trademarks of MKS  
Instruments, Inc., Andover, MA and are used under license. HPS(TM) is a  
trademark of MKS Instruments, Inc., Andover, MA and is used under license.  
DeviceNet(TM) is a trademark of the Open DeviceNet Vendor Association. SDS(R) is  
a registered trademark of Matheson Tri-Gas and ATMI, Inc.

Annual Meeting  
The Company's 2000 Annual Meeting of the shareholders will be held at 10:00 A.M.  
on May 17, 2000 at the Andover Country Club, 60 Canterbury Street, Andover,  
Massachusetts 01810.

EXHIBIT 21. LIST OF SUBSIDIARIES

- - 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.
- - MKS MSC, Inc.

## CONSENT OF INDEPENDENT ACCOUNTANTS

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (No. 333 - 78069, 333 - 78071, 333 - 78073, 333 - 31224) of MKS Instruments, Inc. of our report dated January 28, 2000 relating to the financial statements, which appears in the Annual Report to Shareholders, which is incorporated in this Annual Report on Form 10-K. We also consent to the incorporation by reference of our report dated January 28, 2000 relating to the financial statement schedules, which appears in this Form 10-K.

PricewaterhouseCoopers LLP

Boston, Massachusetts  
March 27, 2000

12-MOS  
DEC-31-1999  
JAN-01-1999  
DEC-31-1999  
35,714  
28,132  
36,857  
934  
27,650  
135,850  
80,290  
47,464  
174,605  
48,762  
5,662  
0  
0  
113  
119,056  
174,605  
187,083  
187,083  
107,228  
107,228  
49,241  
257  
1,346  
29,268  
5,231  
24,037  
0  
0  
0  
24,037  
0.81  
0.77