

SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-Q

(MARK ONE)

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

For the quarterly period ended June 30, 2002

or

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

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 ___.

Number of shares outstanding of the issuer's common stock as of July 31, 2002:
51,242,229

MKS INSTRUMENTS, INC.
FORM 10-Q
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PART I. FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS

MKS INSTRUMENTS, INC.
CONSOLIDATED BALANCE SHEETS
(in thousands, except share data)

	June 30, 2002 ----- (Unaudited)	December 31, 2001 -----
ASSETS		
Current assets:		
Cash and cash equivalents.....	\$ 76,892	\$ 120,869
Short-term investments.....	28,015	16,625
Trade accounts receivable, net.....	54,773	35,778
Inventories.....	88,094	56,954
Deferred tax asset.....	20,236	16,426
Other current assets.....	16,173	16,353
	-----	-----
Total current assets.....	284,183	263,005
Property, plant and equipment, net.....	86,181	69,634
Goodwill.....	258,891	31,113
Acquired intangible assets, net.....	75,276	21,172
Long-term investments.....	16,092	11,029
Other assets.....	13,148	15,236
	-----	-----
Total assets.....	\$ 733,771	\$ 411,189
	=====	=====
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Short-term borrowings	\$ 8,440	\$ 9,238
Current portion of long-term debt	4,729	5,074
Current portion of capital lease obligations	417	503
Accounts payable.....	23,675	9,668
Accrued compensation.....	7,135	6,116
Other accrued expenses.....	25,841	15,551
	-----	-----
Total current liabilities.....	70,237	46,150
Long-term debt.....	12,878	10,916
Long-term portion of capital lease obligations.....	192	341
Deferred tax liability.....	20,895	---
Other liabilities.....	1,562	911
Commitments and contingencies (Note 11)		
Stockholders' equity:		
Preferred Stock, \$0.01 par value, 2,000,000 shares authorized; none issued and outstanding.....	---	---
Common Stock, no par value, 200,000,000 shares authorized; 51,258,774 and 37,998,699 issued and outstanding at June 30, 2002 and December 31, 2001, respectively.....	113	113
Additional paid-in capital.....	575,147	285,252
Retained earnings.....	51,679	68,160
Accumulated other comprehensive income (loss).....	1,068	(654)
	-----	-----
Total stockholders' equity.....	628,007	352,871
	-----	-----
Total liabilities and stockholders' equity.....	\$ 733,771	\$ 411,189
	=====	=====

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

MKS INSTRUMENTS, INC.
CONSOLIDATED STATEMENTS OF INCOME
(in thousands, except per share data)
(Unaudited)

	Three Months Ended		Six Months Ended	
	June 30,		June 30,	
	2002	2001	2002	2001
	----	----	----	----
Net sales.....	\$85,932	\$ 72,656	\$144,999	\$183,544
Cost of sales.....	56,217	46,838	96,064	114,531
	-----	-----	-----	-----
Gross profit.....	29,715	25,818	48,935	69,013
Research and development.....	12,053	9,453	21,185	20,604
Selling, general and administrative.....	20,721	17,576	37,779	36,633
Amortization of goodwill and acquired intangible assets.....	4,137	2,745	6,342	4,985
Goodwill impairment charge.....	---	---	---	3,720
Merger expenses.....	---	---	---	7,708
Purchase of in-process research and development.....	2,290	2,340	8,390	2,340
	-----	-----	-----	-----
Loss from operations.....	(9,486)	(6,296)	(24,761)	(6,977)
Interest expense.....	252	371	581	773
Interest income.....	608	1,380	1,363	3,174
	-----	-----	-----	-----
Loss before income taxes.....	(9,130)	(5,287)	(23,979)	(4,576)
Provision (benefit) for income taxes	(4,436)	(1,105)	(7,498)	1,711
	-----	-----	-----	-----
Net loss.....	\$(4,694)	\$ (4,182)	\$(16,481)	\$ (6,287)
Net loss per share:				
Basic and diluted.....	\$ (0.09)	\$ (0.11)	\$ (0.34)	\$ (0.17)
	=====	=====	=====	=====
Weighted average common shares outstanding:				
Basic and diluted.....	51,152	37,475	48,720	37,172
	=====	=====	=====	=====

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

MKS INSTRUMENTS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)
(Unaudited)

	Six Months Ended June 30,	
	2002	2001
Cash flows from operating activities:		
Net loss.....	\$ (16,481)	\$ (6,287)
Adjustments to reconcile net loss to net cash provided by operating activities:		
Depreciation and amortization.....	13,522	10,552
Goodwill impairment charge.....	---	3,720
Purchase of in-process research and development.....	8,390	2,340
Other.....	464	21
Changes in operating assets and liabilities net of effects of businesses acquired:		
Trade accounts receivable.....	(13,324)	36,390
Inventories.....	(8,458)	2,109
Other current assets.....	3,063	(1,916)
Accrued expenses and other current liabilities.....	(3,048)	(22,281)
Accounts payable.....	7,345	(9,818)
Net cash provided by (used in) operating activities.....	(8,527)	14,830
Cash flows from investing activities:		
Maturities and sales of short-term and long-term investments.....	33,354	9,790
Purchases of short-term and long-term investments.....	(49,970)	(8,718)
Purchases of property, plant and equipment.....	(3,940)	(9,539)
Increase in other assets.....	(511)	(2,413)
Purchases of businesses, net of cash acquired.....	(16,298)	(6,991)
Net cash used in investing activities.....	(37,365)	(17,871)
Cash flows from financing activities:		
Proceeds from short-term borrowings.....	6,968	21,647
Payments on short-term borrowings.....	(9,193)	(24,382)
Principal payments on long-term debt.....	(3,616)	(1,371)
Proceeds from long-term debt.....	---	833
Proceeds from exercise of stock options.....	7,518	3,248
Principal payments under capital lease obligations.....	(231)	(409)
Net cash provided by (used in) financing activities.....	1,446	(434)
Effect of exchange rate changes on cash and cash equivalents.....	469	(430)
Decrease in cash and cash equivalents.....	(43,977)	(3,905)
Cash and cash equivalents at beginning of period.....	120,869	123,082
Effect of excluded results of ASTeX (Note 1).....	---	(3,142)
Cash and cash equivalents at end of period.....	\$ 76,892	\$ 116,035
Supplemental disclosure of cash flow information:		
Cash paid during the period for:		
Interest.....	\$ 442	\$ 651
Income taxes.....	\$ 1,901	\$ 12,092
Noncash transactions during the period:		
Stock and options issued for acquisitions.....	\$ 282,341	\$ 12,110

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

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Tables in thousands, except per share data)

1)

Basis of Presentation

The interim financial data as of June 30, 2002 and for the three and six months ended June 30, 2002 and 2001 is unaudited; however, in the opinion of MKS Instruments, Inc., the interim data includes all adjustments, consisting only of normal recurring adjustments, necessary for a fair statement of the results for the interim periods. The terms "MKS" and the "Company" refer to MKS Instruments, Inc. and its subsidiaries. The unaudited financial statements presented herein have been prepared in accordance with the instructions to Form 10-Q and do not include all the information and note disclosures required by generally accepted accounting principles. The financial statements should be read in conjunction with the December 31, 2001 audited financial statements and notes thereto included in the MKS Annual Report on Form 10-K filed with the Securities and Exchange Commission on April 1, 2002.

On January 26, 2001, MKS completed its acquisition of Applied Science and Technology, Inc. ("ASTeX") in a transaction accounted for under the pooling of interests method of accounting. Under the terms of the agreement, each outstanding share of ASTeX common stock was exchanged for 0.7669 newly issued shares of common stock of MKS, resulting in the issuance of approximately 11.2 million shares of common stock of MKS, representing approximately 30% of its then outstanding shares.

As a result of conforming dissimilar fiscal year-ends, ASTeX's results of operations for the six-month period ended December 31, 2000 are excluded from the consolidated financial statements. As a result, the statement of cash flows for the six month period ended June 30, 2001 reflects an adjustment of \$3,142,000, which represents the ASTeX cash flow during the excluded period.

2)

Use of Estimates

The consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. On an on-going basis, management evaluates its estimates and judgments, including those related to revenue recognition, in-process research and development, merger expenses, intangible assets and goodwill, inventories and investments. Management bases its estimates and judgments on historical experience and on various other factors that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

3)

Recent Accounting Pronouncements

In August 2001, the Financial Accounting Standards Board ("FASB") issued Statement of Financial Accounting Standards No. 143, "Accounting for Obligations Associated with the Retirement of Long-Lived Assets" ("SFAS 143"). The objective of SFAS 143 is to provide accounting guidance for legal obligations associated with the retirement of long-lived assets. The retirement obligations included within the scope of this pronouncement are those that an entity cannot avoid as a result of either the acquisition, construction or normal operation of a long-lived asset. Components of larger systems also fall under this pronouncement, as well as tangible long-lived assets with indeterminable lives. The provisions of SFAS 143 are effective for financial statements issued for fiscal years beginning after June 15, 2002. The Company is currently evaluating the expected impact of the adoption of SFAS 143 on the Company's financial condition, cash flows and results of operations. The Company will adopt the standard in the first quarter of fiscal 2003.

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(Tables in thousands, except per share data)

In October 2001, the FASB issued Statement of Financial Accounting Standards No. 144, "Accounting for the Impairment or Disposal of Long-Lived Assets" ("SFAS 144"). SFAS 144 addresses significant issues relating to the implementation of SFAS No. 121, "Accounting for the Impairment of Long-Lived Assets and for Long-Lived Assets to Be Disposed Of," and develops a single accounting method under which long-lived assets that are to be disposed of by sale are measured at the lower of book value or fair value less cost to sell. Additionally, SFAS 144 expands the scope of discontinued operations to include all components of an entity with operations that (1) can be distinguished from the rest of the entity and (2) will be eliminated from the ongoing operations of the entity in a disposal transaction. SFAS 144 is effective for financial statements issued for fiscal years beginning after December 15, 2001. Effective January 1, 2002, the Company adopted SFAS 144. The adoption of SFAS 144 did not have a material impact on the Company's financial position and results of operations.

In June 2002, Statement of Financial Accounting Standards No. 146, "Accounting for Costs Associated with Exit or Disposal Activities" ("SFAS 146") was issued. This Statement addresses financial accounting and reporting for costs associated with exit or disposal activities and nullifies Emerging Issues Task Force (EITF) Issue No. 94-3, "Liability Recognition for Certain Employee Termination Benefits and Other Costs to Exit an Activity (including Certain Costs Incurred in a Restructuring)." The provisions of SFAS 146 are effective for exit or disposal activities that are initiated after December 31, 2002, with early application encouraged. The Company is currently reviewing the provisions of SFAS 146 to determine the standard's impact upon adoption.

4) Goodwill and Intangible Assets

In July 2001, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards No. 142, "Goodwill and Other Intangible Assets" ("SFAS 142"). SFAS 142 requires, among other things, the discontinuance of goodwill amortization. In addition, the standard includes provisions upon adoption for the reclassification of certain existing recognized intangibles such as goodwill, reassessment of the useful lives of existing recognized intangible assets, and reclassification of certain intangibles out of previously reported goodwill.

Intangible Assets

The Company adopted SFAS 142 on January 1, 2002. In accordance with this statement, the Company reassessed the classification of its goodwill and intangible assets. This analysis, which was completed during the quarter ended March 31, 2002, resulted in the reclassification of workforce related intangible assets of \$2,023,000 to goodwill. Also, in accordance with this statement, the Company reassessed the useful lives of its amortizable intangible assets and determined that the lives were appropriate.

Acquired amortizable intangible assets consisted of the following as of June 30, 2002:

	Gross Carrying Amount -----	Accumulated Amortization -----	Net Carrying Amount -----	Weighted Average Useful Life -----
Completed technology.....	\$ 69,394	\$ (9,465)	\$ 59,929	6 years
Customer relationships.....	6,640	(1,283)	5,357	7 years
Patents, trademarks, tradenames and other.....	12,394	(2,404)	9,990	7 years
	-----	-----	-----	
	\$ 88,428	\$ (13,152)	\$ 75,276	6 years
	=====	=====	=====	

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(Tables in thousands, except per share data)

Amortizable intangible assets consisted of the following as of December 31, 2001:

	Gross Carrying Amount -----	Accumulated Amortization -----	Net Carrying Amount -----
Completed technology.....	\$16,564	\$(4,402)	\$12,162
Customer relationships.....	4,040	(851)	3,189
Patents, trademarks, tradenames and other.....	8,132	(2,311)	5,821
	-----	-----	-----
	\$28,736	\$(7,564)	\$21,172
	=====	=====	=====

Aggregate amortization expense related to acquired intangibles for the three and six months ended June 30, 2002 was \$4,137,000 and \$6,342,000, respectively. Estimated amortization expense related to acquired intangibles for each of the five succeeding fiscal years is as follows:

Year -----	Amount -----
2002	\$13,805
2003	14,576
2004	14,251
2005	13,351
2006	11,249

Goodwill

SFAS 142 requires the Company to complete a transitional goodwill impairment test six months from the date of adoption. As of June 30, 2002, the Company completed the transitional goodwill impairment test and no adjustment to goodwill was necessary. The changes in the carrying amount of goodwill by reportable segments during the three and six months ended June 30, 2002 were as follows:

	North America -----	Far East -----	Europe -----	Total -----
Balance at December 31, 2001.....	\$ 29,606	\$296	\$ 1,211	\$ 31,113
Workforce reclassification.....	2,023	---	---	2,023
Goodwill acquired during the quarter.....	203,496	---	14,678	218,174
	-----	-----	-----	-----
Balance at March 31, 2002.....	235,125	296	15,889	251,310
Finalization of identifiable intangible assets allocation.....	(6,089)	---	---	(6,089)
Finalization of purchase price allocation.....	---	---	4,022	4,022
Goodwill acquired during the quarter.....	---	---	9,648	9,648
	-----	-----	-----	-----
Balance at June 30, 2002.....	\$229,036	\$296	\$29,559	\$258,891
	=====	=====	=====	=====

The following is the effect on net income and net income per share had SFAS No. 142 been in effect for the following periods:

	Three Months Ended June 30, 2001 -----	Six Months Ended June 30, 2001 -----
Reported net loss.....	\$ (4,182)	\$ (6,287)
Add back: impact of goodwill amortization, net of taxes.....	1,420	2,330
	-----	-----
Adjusted net loss.....	\$ (2,762)	\$ (3,957)
	=====	=====
Basic and diluted net loss per share.....	\$ (0.11)	\$ (0.17)
Add back: impact of goodwill amortization, net of taxes.....	0.04	0.06
	-----	-----
Adjusted basic and diluted net loss per share.....	\$ (0.07)	\$ (0.11)
	=====	=====

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(Tables in thousands, except per share data)

5) Cash and Cash Equivalents and Investments
Cash and Cash equivalents consist of the following:

	June 30, 2002 ----	December 31, 2001 ----
Cash and Money Market Instruments.....	\$ 30,957	\$ 101,045
Commercial Paper.....	24,500	8,094
Federal Government and Government Agency Obligations.....	16,011	11,730
State and Municipal Government Obligations.....	4,126	---
Corporate Obligations.....	1,298	---
	-----	-----
	<u>\$ 76,892</u>	<u>\$ 120,869</u>
	=====	=====

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

	June 30, 2002 ----	December 31, 2001 ----
Federal Government and Government Agency Obligations.....	\$ 22,387	\$ 5,442
Corporate Obligations.....	3,219	---
Certificate of Deposits.....	2,409	---
Commercial Paper.....	---	8,083
State and Municipal Government Obligations.....	---	3,100
	-----	-----
	<u>\$ 28,015</u>	<u>\$ 16,625</u>
	=====	=====

Long-term available-for-sale investments at market value with maturities of 1 to 5 years consist of the following:

	June 30, 2002 ----	December 31, 2001 ----
Federal Government and Government Agency Obligations.....	\$ 6,069	\$ 1,008
State and Municipal Government Obligations.....	150	7,021
Corporate Obligations.....	9,873	3,000
	-----	-----
	<u>\$ 16,092</u>	<u>\$ 11,029</u>
	=====	=====

6) Net Loss Per Share
The following table sets forth the computation of basic and diluted net loss per share:

	Three Months Ended June 30, 2002 ----	2001 ----
Numerator		
Net loss.....	<u>\$ (4,694)</u>	<u>\$ (4,182)</u>
	=====	=====
Denominator		
Shares used in net loss per common share - basic and diluted.....	<u>51,152</u>	<u>37,475</u>
	=====	=====
Net loss per common share		
Basic and diluted.....	<u>\$ (0.09)</u>	<u>\$ (0.11)</u>
	=====	=====

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(Tables in thousands, except per share data)

	Six Months Ended June 30, 2002	2001
	----	----
Numerator		
Net loss.....	\$ (16,481)	\$ (6,287)
	=====	=====
Denominator		
Shares used in net loss per common share - basic and diluted.....	48,720	37,172
	=====	=====
Net loss per common share		
Basic and diluted.....	\$ (0.34)	\$ (0.17)
	=====	=====

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. All options outstanding during the three and six months ended June 30, 2002 and 2001 are excluded from the calculation of diluted net loss per common share because their inclusion would be anti-dilutive. There were options to purchase approximately 7,203,000 and 5,168,000 shares of the Company's common stock outstanding as of June 30, 2002 and 2001, respectively.

7) Inventories
Inventories consist of the following:

	June 30, 2002	December 31, 2001
	----	----
Raw material.....	\$ 35,663	\$ 21,019
Work in process.....	23,233	15,362
Finished goods.....	29,198	20,573
	-----	-----
	\$ 88,094	\$ 56,954
	=====	=====

8) Stockholders' Equity
Total comprehensive loss was as follows:

	Three Months Ended June 30, 2002	2001
	----	----
Net loss.....	\$(4,694)	\$(4,182)
Other comprehensive income (loss), net of taxes:		
Changes in value of financial instruments designated as hedges of currency and interest rate exposures.....	4	(145)
Foreign currency translation adjustment.....	2,151	(359)
Unrealized gain (loss) on investments.....	118	(1)
	-----	-----
Other comprehensive income (loss), net of taxes.....	2,273	(505)
	-----	-----
Total comprehensive loss.....	\$(2,421)	\$(4,687)
	=====	=====

	Six Months Ended June 30, 2002	2001
	----	----
Net loss.....	\$(16,481)	\$(6,287)
Other comprehensive income (loss), net of taxes:		
Changes in value of financial instruments designated as hedges of currency and interest rate exposures.....	(152)	613
Foreign currency translation adjustment.....	1,811	(965)
Unrealized gain (loss) on investments.....	63	(314)
	-----	-----
Other comprehensive income (loss), net of taxes.....	1,722	(666)
	-----	-----
Total comprehensive loss.....	\$(14,759)	\$(6,953)
	=====	=====

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(Tables in thousands, except per share data)

9) Income Taxes

Deferred tax assets and liabilities are determined based on differences between financial reporting and tax bases of assets and liabilities and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. The measurement of deferred tax assets is reduced by a valuation allowance if, based upon weighted available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized.

The Company does not provide for a U.S. income tax liability on undistributed earnings of its foreign subsidiaries. The earnings of non-U.S. subsidiaries, which reflect full provision for non-U.S. income taxes, are indefinitely reinvested in non-U.S. operations or will be remitted substantially free of additional tax. As of June 30, 2002, the unrecognized deferred tax liability associated with these unremitted earnings was approximately \$800,000.

10) Segment Information and Significant Customer

Segment information for the three months ended June 30, 2002 and 2001 was as follows:

		North America -----	Far East -----	Europe -----	Total -----
Net sales to unaffiliated customers	2002	\$58,294	\$18,773	\$8,865	\$85,932
	2001	49,064	12,440	11,152	72,656
Intersegment net sales	2002	16,895	4,530	319	21,744
	2001	10,015	358	323	10,696
Income (loss) from operations	2002	(11,090)	1,692	(88)	(9,486)
	2001	(9,770)	1,462	2,012	(6,296)

Segment information for the six months ended June 30, 2002 and 2001 was as follows:

		North America -----	Far East -----	Europe -----	Total -----
Net sales to unaffiliated customers	2002	\$97,688	\$30,109	\$17,202	\$144,999
	2001	130,196	29,803	23,545	183,544
Intersegment net sales	2002	27,029	4,654	656	32,339
	2001	28,407	688	715	29,810
Income (loss) from operations	2002	(28,287)	2,592	934	(24,761)
	2001	(14,782)	3,347	4,458	(6,977)

The Company had one customer comprising 27% and 16% of net sales for the three months ended June 30, 2002 and 2001, respectively, and 23% and 20% for the six months ended June 30, 2002 and 2001, respectively.

11)

Commitments and Contingencies

On November 3, 1999, On-Line Technologies Inc., which was acquired by the Company in April 2001, brought suit in federal district court in Connecticut against Perkin-Elmer, Inc. and certain other defendants for infringement of On-Line's patent related to its FTIR spectrometer product. The suit seeks injunctive relief and damages for infringement. Perkin-Elmer, Inc. has filed a counterclaim seeking invalidity of the patent, costs, and attorneys' fees. The Company believes that the counterclaim is without merit.

On November 30, 2000, ASTeX, which was acquired by the Company in January 2001, brought suit in federal district court in Delaware against Advanced Energy Industries, Inc. ("Advanced Energy") for infringement of ASTeX's patent related to its Astron product. The Company is seeking injunctive relief and damages for infringement. Advanced Energy has filed a counterclaim seeking judgements that the patent is invalid, unenforceable, and not infringed, in addition to costs, and attorneys' fees. The Company believes that the counterclaim is without merit. On May 17, 2002, a jury affirmed the validity of the Company's patent and found that Advanced Energy infringed the patent. The jury awarded the Company \$4.2 million in damages. On May 31, 2002, based on the jury's findings, the Court entered a judgement on the infringement claim and damage amount in favor of the Company and against Advanced Energy. The Court awarded \$4.2 million in damages to compensate the Company for Advanced Energy's infringing activity. Advanced Energy filed motions to overturn the verdict. Accordingly, the Company has not recorded the awarded amount as of June 30, 2002.

The Company cannot be certain of the outcome of the foregoing litigation, but does plan to assert its claims against other parties and oppose the counterclaims against it vigorously.

The Company is subject to other legal proceedings and claims, which have arisen in the ordinary course of business.

In the opinion of management, the ultimate disposition of these matters will not have a material adverse effect on the Company's results of operations, financial condition or cash flows.

12)

Acquisitions

On January 31, 2002, MKS completed its acquisition of the ENI Business of Emerson Electric Co. ("ENI"), a supplier of solid-state radio frequency (RF) and direct current (DC) plasma power supplies, matching networks and instrumentation to the semiconductor thin-film processing industries. The reasons for the acquisition of ENI were based upon the ability to offer higher value and more integrated application solutions by combining ENI's solid-state power conversion technology with the Company's core competency in plasma and reactive gas solutions. The acquisition has been accounted for under the purchase method of accounting. The purchase price was approximately \$266,530,000 and consisted of approximately 12,000,000 shares of MKS common stock valued at approximately \$261,264,000 and transaction expenses of approximately \$5,266,000. The value of MKS common stock was approximately \$21.7720 per share based on the average closing price of MKS' common stock for the five-day period including the date of the announcement of the signing of the merger agreement and the two days preceding and succeeding such date.

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(Tables in thousands, except per share data)

During the three months ended June 30, 2002, the valuation of the acquired identifiable intangible assets was finalized. The finalization of the valuation resulted in a \$14,100,000 increase in the value of acquired intangible assets, a \$1,400,000 increase in the value of purchased in-process research and development, a \$5,214,000 increase in deferred tax liabilities related to acquired intangible assets, and a \$6,089,000 reduction in goodwill. The purchase price was allocated to the assets acquired based upon their estimated fair values and resulted in an allocation of approximately \$197,407,000 to goodwill. The results of operations are included in the Company's consolidated statement of income as of and since the date of the purchase. The allocation of the purchase price to certain fixed assets is preliminary and dependent upon the completion of a valuation analysis. The preliminary allocation of the purchase price is as follows:

Current assets.....	\$ 31,038
Other assets.....	2,123
Fixed assets.....	18,882
Completed technology.....	39,600
Patents.....	6,500
Customer relationships.....	2,600
In-process research and development.....	7,500
Goodwill.....	197,407
Other liabilities.....	(14,167)
Long term liabilities.....	(24,953)

	\$ 266,530
	=====

The amounts allocated to acquired intangible assets are being amortized using the straight-line method over their respective estimated useful lives: 6 years for completed technology, 8 years for patents, and 8 years for customer relationships. The total weighted average amortizable life of the acquired intangible assets is 6 years.

In connection with the acquisition of ENI, the Company obtained an appraisal from an independent appraiser of the fair value of its intangible assets. This appraisal valued purchased in-process research and development ("IPR&D") of various projects for the development of new products and technologies at approximately \$7,500,000. Because the technological feasibility of products under development had not been established and no future alternative uses existed, the purchased IPR&D was written off during the six months ended June 30, 2002. The value of the purchased IPR&D was determined using the income approach, which discounts expected future cash flows from projects under development to their net present value. Each project was analyzed to determine the technological innovations included; the utilization of core technology; the complexity, cost and time to complete development; any alternative future use or current technological feasibility; and the stage of completion. The cash flows derived from the IPR&D projects were discounted at rates ranging from 25% to 30%. The Company believes these rates were appropriate given the risks associated with the technologies for which commercial feasibility had not been established. The percentage of completion for each in-process project was determined by identifying the cost incurred to date of the project as a ratio of the total estimated cost required to bring the project to technical and commercial feasibility. The percentage of completion for in-process projects acquired ranged from 65% to 80%, based on management's estimates of tasks completed and the tasks to be completed to bring the projects to technological and commercial feasibility. The projects were generally expected to have durations of up to 12 months. As of June 30, 2002, the actual development timelines and costs were in line with management's estimates.

In connection with the acquisition of On-Line, the Company obtained an appraisal from an independent appraiser of the fair value of its intangible assets. This appraisal valued purchased IPR&D of various projects for the development of new products and technologies at approximately \$2,340,000. The projects were generally expected to have durations of 24 to 48 months. Because the technological feasibility of products under development had not been established and no future alternative uses existed, the purchased IPR&D was written off during the quarter ended June 30, 2001. The value of the purchased IPR&D was determined using the income approach, which discounts expected future cash flows from projects under development to their net present value.

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(Tables in thousands, except per share data)

Each project was analyzed to determine the technological innovations included; the utilization of core technology; the complexity, cost and time to complete development; any alternative future use or current technological feasibility; and the stage of completion. The cash flows derived from the in-process technology projects were discounted at a rate of 25%. The Company believes this rate was appropriate given the risks associated with the technologies for which commercial feasibility had not been established. The percentage of completion for each in-process project was determined by identifying the elapsed time invested in the project as a ratio of the total time required to bring the project to technical and commercial feasibility. The percentage of completion for in-process projects acquired ranged from 55% to 65%, based on management's estimates of tasks completed and the tasks to be completed to bring the projects to technological and commercial feasibility.

Development of in-process technology remains a substantial risk to the Company due to a variety of factors including the remaining effort to achieve technical feasibility, rapidly changing customer requirements and competitive threats from other companies and technologies.

On March 13, 2002, MKS completed its acquisition of Tenta Technology Ltd. ("Tenta"), a supplier of modular, computer-based process control systems that are designed for 300mm semiconductor process tool applications. The reasons for the acquisition of Tenta were based upon the ability to offer higher value and more integrated application solutions by integrating Tenta's process controllers with MKS' digital network products to provide a more complete process control solution. The acquisition has been accounted for under the purchase method of accounting. The purchase price was allocated to the net assets acquired based upon their estimated fair values. The results of operations are included in the Company's consolidated statement of income as of and since the date of the purchase.

On April 5, 2002, the Company completed its acquisition of privately held IPC Fab Automation GmbH ("IPC"), a developer and provider of web-based hardware and software that enable e-diagnostics and advanced process control for advanced manufacturing customers. The reasons for the acquisition of IPC were based upon the ability to offer higher value and more integrated application solutions by integrating IPC's connectivity hardware and software with MKS' digital network products to provide a more complete process control solution. The acquisition has been accounted for under the purchase method of accounting. The purchase price was allocated to the net assets acquired based upon their estimated fair values. The purchase price allocation is preliminary and dependent upon the completion of an acquired intangibles valuation report. The results of operations are included in the Company's consolidated statement of income as of and since the date of the purchase.

The following unaudited pro forma information presents a summary of the historical results of operations of the Company as if the ENI, Tenta, and IPC acquisitions had occurred at the beginning of each period.

	Three months ended June 30,		Six months ended June 30,	
	2002	2001	2002	2001
	----	----	----	-----
Net sales.....	\$85,932	\$ 99,523	\$ 149,446	\$ 250,274
Net loss.....	\$(2,404)	\$ (7,255)	\$ (10,671)	\$ (5,890)
Net loss per share:				
Basic and diluted.....	\$ (0.05)	\$ (0.14)	\$ (0.21)	\$ (0.12)

The unaudited pro forma results for the three and six months ended June 30, 2002 excludes approximately \$1.3 million of non-recurring charges directly related to the transaction that were incurred by Tenta prior to the date of the acquisition. Additionally, the charges for purchased IPR&D were not included in the unaudited pro forma results, because they were non-recurring and directly related to the transactions.

MKS INSTRUMENTS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)
(Tables in thousands, except per share data)

These unaudited pro forma results have been prepared for comparative purposes only and do not purport to be indicative of the results of operations which actually would have resulted had the acquisitions occurred at the beginning of the period, or which may result in the future.

- 13) **Goodwill Impairment Charge**
When the Company acquired the Shamrock product line, it was expected that sales of the existing system design and development of new system designs would generate future revenues. The Company had provided potential customers with purchase quotations for Shamrock systems, including a significant quotation to a potential customer in January 2001 for the sale of several systems. The customer did not purchase the systems, and the quotation expired in March 2001. The Company was unsuccessful in selling any systems of the product line after the acquisition and, with the expiration of the significant quote in March 2001, the Company evaluated the recoverability of the long-lived assets, primarily goodwill. As a result, based on discounted cash flow analysis, the Company recorded an impairment charge for the carrying value of the related goodwill of approximately \$3,720,000 in the quarter ended March 31, 2001.
- 14) **Merger Costs**
On January 26, 2001 MKS completed its acquisition of ASTeX in a transaction accounted for under the pooling of interests method of accounting. Under the pooling of interests method of accounting, fees and expenses related to the merger are expensed in the period of the merger. During the three months ended March 31, 2001, MKS expensed approximately \$7.7 million of merger related expenses, consisting of \$6.9 million of investment banking, legal, accounting, printing and other professional fees, and \$0.8 million of regulatory and other costs.

MKS INSTRUMENTS, INC.
MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION
AND RESULTS OF OPERATIONS

ITEM 2.

This Quarterly Report on Form 10-Q contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. When used herein, 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 results to differ materially from those stated or implied. MKS Instruments, Inc. assumes no obligation to update this information. Risks and uncertainties include, but are not limited to those discussed in the section entitled "Factors That May Affect Future Results."

OVERVIEW

MKS develops, manufactures and provides instruments, components and integrated subsystems used to measure, control, power and monitor critical parameters of semiconductor and other advanced manufacturing process environments. The Company estimates that during 2001 approximately 64% of its net sales were to semiconductor capital equipment manufacturers and semiconductor device manufacturers.

On January 31, 2002, MKS completed its acquisition of the ENI Business of Emerson Electric Co. ("ENI"), a supplier of solid-state radio frequency (RF) and direct current (DC) plasma power supplies, matching networks and instrumentation to the semiconductor thin-film processing industries. The reasons for the acquisition of ENI were based upon the ability to offer higher value and more integrated application solutions by combining ENI's solid-state power conversion technology with the Company's core competency in plasma and reactive gas solutions. The acquisition has been accounted for under the purchase method of accounting. The purchase price was approximately \$266,530,000 and consisted of approximately 12,000,000 shares of MKS common stock valued at approximately \$261,264,000 and transaction expenses of approximately \$5,266,000. The value of MKS common stock was approximately \$21.7720 per share based on the average closing price of MKS' common stock for the five-day period including the date of the announcement of the signing of the merger agreement and the two days preceding and succeeding such date. The purchase price was allocated to the assets acquired based upon their estimated fair values and resulted in an allocation of approximately \$197,407,000 to goodwill. The results of operations are included in the Company's consolidated statement of income as of and since the date of the purchase.

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' consolidated statement of income data.

	Three months ended June 30,		Six months ended June 30,	
	2002	2001	2002	2001
Net sales.....	100.0%	100.0%	100.0%	100.0%
Cost of sales.....	65.4	64.5	66.3	62.4
Gross profit.....	34.6	35.5	33.7	37.6
Research and development.....	14.0	13.0	14.6	11.2
Selling, general and administrative.....	24.1	24.2	26.1	20.0
Amortization of goodwill and acquired intangible assets.....	4.8	3.8	4.3	2.7
Goodwill impairment charge.....	---	---	---	2.0
Merger expenses.....	---	---	---	4.2
In-process research and development.....	2.7	3.2	5.8	1.3
Loss from operations.....	(11.0)	(8.7)	(17.1)	(3.8)
Interest income, net.....	0.4	1.4	0.6	1.3
Loss before income taxes.....	(10.6)	(7.3)	(16.5)	(2.5)
Provision (benefit) for income taxes.....	(5.1)	(1.5)	(5.1)	0.9
Net loss.....	(5.5)%	(5.8)%	(11.4)%	(3.4)%

Net Sales. Net sales increased 18.3% to \$85.9 million for the three months ended June 30, 2002 from \$72.7 million for the three months ended June 30, 2001. International net sales were approximately \$27.6 million for the three months ended June 30, 2002 or 32.2% of net sales and \$23.6 million for the same period of 2001 or 32.5% of net sales. The increase in net sales was due to the revenues of the companies acquired in 2002, the ENI, Tenta, and IPC businesses.

Net sales decreased 21.0% to \$145.0 million for the six months ended June 30, 2002 from \$183.5 million for the same period of 2001. International net sales were approximately \$47.3 million for the six months ended June 30, 2002 or 32.6% of net sales and \$53.3 million for the same period of 2001 or 29.1% of net sales. The decrease in net sales was due to the worldwide slowdown in demand for semiconductors, which resulted in a decline in demand for the Company's products from the Company's semiconductor capital equipment manufacturer and semiconductor device manufacturer customers. The decline in net sales was partially offset by the revenues of the companies acquired in 2002, the ENI, Tenta, and IPC businesses.

Gross Profit. Gross profit as a percentage of net sales decreased to 34.6% for the three months ended June 30, 2002 from 35.5% for the three months ended June 30, 2001. Gross profit as a percentage of net sales decreased to 33.7% for the six months ended June 30, 2002 from 37.6% for the same period of 2001. The decrease was primarily due to lower absorption of manufacturing overhead costs.

Research and Development. Research and development expense increased 27.5% to \$12.1 million or 14.0% of net sales for the three months ended June 30, 2002 from \$9.5 million or 13.0% of net sales for the three months ended June 30, 2001. The increase was primarily due to increased compensation expense of \$ 1.6 million and increased expenses for project materials of \$1.0 million. Research and development expense increased 2.8% to \$21.2 million or 14.6% of net sales for the six months ended June 30, 2002 from \$20.6 million or 11.2% of net sales for the same period of 2001. The increase was due to increased compensation expense.

Selling, General and Administrative. Selling, general and administrative expenses increased 17.9% to \$20.7 million or 24.1% of net sales for the three months ended June 30, 2002 from \$17.6 million or 24.2% of net sales for the three months ended June 30, 2001. The increase was due primarily to increased professional fees of \$1.5 million and other selling expenses. Selling, general and administrative expenses increased 3.1% to \$37.8 million or 26.1% of net sales for the six months ended June 30, 2002 from \$36.6 million or 20.0% of net sales for the same period of 2001. The increase was due primarily to increased professional fees.

Amortization of Goodwill and Acquired Intangible Assets. Amortization expense of \$4.1 million and \$6.3 million for the three and six months ended June 30, 2002, respectively, represents the amortization of the identifiable intangibles resulting from the acquisitions completed by MKS. In accordance with SFAS No. 142, the Company ceased to amortize goodwill on January 1, 2002. Amortization of goodwill was \$1.7 million and \$2.9 million for the three and six months ended June 30, 2001, respectively. Amortization of the identifiable intangibles was \$1.0 million and \$2.1 million for the three and six months ended June 30, 2001, respectively.

Goodwill Impairment Charge. When the Company acquired the Shamrock product line, it was expected that sales of the existing system design and development of new system designs would generate future revenues. The Company had provided potential customers with purchase quotations for Shamrock systems, including a significant quotation to a potential customer in January 2001 for the sale of several systems. The customer did not purchase the systems, and the quotation expired in March 2001. The Company was unsuccessful in selling any systems of the product line after the acquisition and, with the expiration of the significant quote in March 2001, the Company evaluated the recoverability of the long-lived assets, primarily goodwill. As a result, based on discounted cash flow analysis, the Company recorded an impairment charge for the carrying value of the related goodwill of approximately \$3.7 million in the quarter ended March 31, 2001.

Merger Costs. On January 26, 2001 MKS completed its acquisition of ASTeX in a transaction accounted for under the pooling of interests method of accounting. Under the pooling of interests method of accounting, fees and expenses related to the merger are expensed in the period of the merger. During the six months ended June 30, 2001, MKS expensed approximately \$7.7 million of merger related expenses, consisting of \$6.9 million of investment banking, legal, accounting, printing and other professional fees, and \$0.8 million of regulatory and other costs.

Purchase of In-process Technology. In-process research and development of \$2.3 million for the three months ended June 30, 2002 consisted of \$1.4 million related to the increase in the value of the in-process research and development resulting from the finalization of the ENI purchase price allocation and \$0.9 million from the purchase of Tenta and IPC. In-process research and development of \$8.4 million for the six months ended June 30, 2002 arose from the acquisitions the Company made in 2002.

In January 2002, the Company acquired ENI in a transaction accounted for under the purchase method. The purchase price was allocated to the assets acquired, including intangible assets, based on their estimated fair values. The intangible assets include approximately \$7.5 million for acquired in-process technology for projects, generally expected to have durations of 12 months, that did not have future alternative uses. The value of the purchased in-process technology was determined using the income approach, which discounts expected future cash flows from projects under development to their net present value. Each project was analyzed to determine the technological innovations included; the utilization of core technology; the complexity, cost and time to complete development; any alternative future use or current technological feasibility; and the stage of completion. The cash flows derived from the in-process technology projects were discounted at rates ranging from 25% to 30%. The Company believes these rates were appropriate given the risks associated with the technologies for which commercial feasibility had not been established. The percentage of completion for each in-process project was determined by identifying the cost incurred to date of the project as a ratio of the total cost required to bring the project to technical and commercial feasibility. The percentage completion for in-process projects acquired ranged from 65% to 80% complete, based on management's estimates of tasks completed and the tasks to be completed to bring the projects to technological and commercial feasibility. At the date of the acquisition, the development of these projects had not yet reached technological feasibility, and the technology in progress had no alternative future uses. Accordingly, these costs were expensed in the first and second quarters of 2002.

In April 2001, the Company acquired On-Line in a transaction accounted for as a purchase. The purchase price was allocated to the assets acquired, including intangible assets, based on their estimated fair values. The intangible assets include approximately \$2.3 million for acquired in-process technology for various projects, generally expected to have durations of 24 to 48 months, that did not have future alternative uses. The value of the purchased in-process technology was determined using the income approach, which discounts expected future cash flows from projects under development to their net present value. Each project was analyzed to determine the technological innovations included; the utilization of core technology; the complexity, cost and time to complete development; any alternative future use or current technological feasibility; and the stage of completion. The cash flows derived from the in-process technology projects were discounted at a rate of 25%. The Company believes this rate was appropriate given the risks associated with the technologies for which commercial feasibility had not been established. The percentage of completion for each in-process project was determined by identifying the elapsed time invested in the project as a ratio of the total time required to bring the project to technical and commercial feasibility. The percentage of completion for in-process projects acquired ranged from 55% to 65%, based on management's estimates of tasks completed and the tasks to be completed to bring the projects to technological and commercial feasibility. At the date of the acquisition, the development of these projects had not yet reached technological feasibility, and the technology in progress had no alternative future uses. Accordingly, these costs were expensed in the second quarter of 2001.

Interest Income (Expense), Net. During the three and six months ended June 30, 2002, the Company generated net interest income of \$0.4 million and \$0.8 million, respectively, primarily from the invested net proceeds of its common stock offerings, offset by interest expense on outstanding debt.

Provision (Benefit) for Income Taxes. The effective tax rates for the three and six months ended June 30, 2002 were 49% and 31%, respectively, and differed from the statutory rate of 35% due to favorable tax attributes from its foreign subsidiaries, partially offset by non-deductible charges associated with acquisitions made in 2002. The effective tax rate for the three and six months ended June 30, 2001 were 21% and 37%, respectively and differed from the statutory rate of 35% due to non-deductible charges associated with acquisitions made in 2001.

LIQUIDITY AND CAPITAL RESOURCES

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

Operations used cash of \$8.5 million for the six months ended June 30, 2002. The cash flow from operations for the six months ended June 30, 2002 was impacted by the net loss of \$16.5 million, increases in accounts receivable and inventories of \$13.3 million and \$8.5 million, respectively, and offset by non-cash charges for in-process research and development of \$8.4 million, depreciation and amortization of \$13.5 million, and an increase in accounts payable of \$7.3 million. Investing activities utilized cash of \$37.4 million for the six months ended June 30, 2002 primarily from purchases of investments and purchases of businesses. Financing activities provided cash of \$1.4 million, primarily from proceeds from employees exercising stock options.

Working capital was \$213.9 million as of June 30, 2002, a decrease of \$3.0 million from December 31, 2001. MKS entered into a credit agreement on July 31, 2002 whereby MKS has a combined \$40.0 million line of credit with two banks. The credit agreement expires on July 31, 2003 and has no collateral provisions.

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 12 months.

FACTORS THAT MAY AFFECT FUTURE 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 Quarterly Report on Form 10-Q consists of forward-looking statements. Important factors that could cause actual results to differ materially from the forward-looking statements include the following:

MKS' BUSINESS DEPENDS SUBSTANTIALLY ON CAPITAL SPENDING IN THE SEMICONDUCTOR INDUSTRY WHICH IS CHARACTERIZED BY PERIODIC FLUCTUATIONS THAT MAY CAUSE A REDUCTION IN DEMAND FOR MKS' PRODUCTS.

MKS estimates that approximately 64% of its sales during 2001 were to semiconductor capital equipment manufacturers and semiconductor device manufacturers, and it expects that sales to such customers will continue to account for a substantial majority of its sales. MKS' business depends upon the capital expenditures of semiconductor device manufacturers, which in turn depend upon the demand for semiconductors. Periodic reductions in demand for the products manufactured by semiconductor capital equipment manufacturers and semiconductor device manufacturers may adversely affect MKS' 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 capital equipment industry experienced significant declines, which caused a number of MKS' customers to reduce their orders. More recently, MKS has experienced a significant reduction in demand from OEM customers, and lower gross margins due to reduced absorption of manufacturing overhead at the lower revenue levels. MKS incurred special charges for excess and obsolete inventory of \$14.0 million in the fourth quarter of 2001 and \$2.6 million in the second quarter of 2001. The charges were significantly higher than normal and were primarily caused by a significant reduction in demand including reduced demand for older technology products. In addition, many semiconductor manufacturers have operations and customers in Asia, a region which in recent years has experienced serious economic problems including currency devaluations, debt defaults, lack of liquidity and recessions. 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 capital equipment industry could have a material adverse effect on MKS' business, financial condition and results of operations.

MKS' QUARTERLY OPERATING RESULTS HAVE VARIED, AND ARE LIKELY TO CONTINUE TO VARY SIGNIFICANTLY. THIS MAY RESULT IN VOLATILITY IN THE MARKET PRICE FOR MKS' SHARES.

A substantial portion of MKS' shipments occur shortly after an order is received and therefore MKS operates with a low level of backlog. As a result, a decrease in demand for MKS' products from one or more customers could occur with limited advance notice and could have a material adverse effect on MKS' results of operations in any particular period. A significant percentage of MKS' 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' results of operations. Factors that could cause fluctuations in MKS' 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; and
- - specific features requested by customers.

For example, MKS was in the process of increasing its production capacity when the semiconductor capital equipment market began to experience a significant downturn in 1996. This downturn had a material adverse effect on MKS' 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' 1998 and first quarter 1999 operating results. More recently, the semiconductor capital equipment market experienced a significant downturn during 2001 and continuing through the second quarter of 2002. As a result, MKS has experienced a reduction in demand from OEM customers, which has had a material adverse effect on MKS' operating results. During 2001 gross margins were negatively affected by special charges for excess and obsolete inventory of \$14.0 million in the fourth quarter of 2001 and \$2.6 million in the second quarter of 2001. The charges were significantly higher than normal and were primarily caused by a significant reduction in demand including reduced demand for older technology products. 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, its operating results will fall below the expectations of public market analysts or investors. In any such event, the price of MKS' common stock could decline significantly.

THE LOSS OF NET SALES TO ANY ONE OF MKS' MAJOR CUSTOMERS WOULD LIKELY HAVE A MATERIAL ADVERSE EFFECT ON MKS.

MKS' top ten customers accounted for approximately 39% of its net sales in 2001, 52% of its net sales in 2000 and 46% of its net sales in 1999. The loss of a major customer or any reduction in orders by these customers, including reductions due to market or competitive conditions, would likely have a material adverse effect on MKS' business, financial condition and results of operations. During 2001 and 2000, one customer, Applied Materials, accounted for approximately 18% and 30%, respectively, of MKS' net sales. None of MKS' significant customers, including Applied Materials, has entered into an agreement requiring it to purchase any minimum quantity of MKS' products. The demand for MKS' 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. MKS' future success will continue to depend upon:

- - its ability to maintain relationships with existing key customers;
- - its ability to attract new customers; and
- - the success of its customers in creating demand for their capital equipment products which incorporate MKS' products.

AS PART OF MKS' BUSINESS STRATEGY, MKS HAS ENTERED INTO AND MAY ENTER INTO OR SEEK TO ENTER INTO BUSINESS COMBINATIONS AND ACQUISITIONS THAT MAY BE DIFFICULT TO INTEGRATE, DISRUPT ITS BUSINESS, DILUTE STOCKHOLDER VALUE OR DIVERT MANAGEMENT ATTENTION.

MKS acquired Compact Instrument Technology, LLC ("Compact Instrument") in March 2000, Telvac Engineering, Ltd. ("Telvac") in May 2000, Spectra Instruments, LLC ("Spectra") in July 2000, D.I.P., Inc. ("D.I.P.") in September 2000, Applied Science and Technology, Inc. ("ASTeX") in January 2001, On-Line Technologies, Inc. ("On-Line") in April 2001, the ENI Business ("ENI") of Emerson Electric Co. in January 2002, Tenta Technologies Ltd. ("Tenta") in March 2002, and IPC Fab Automation GmbH ("IPC") in April 2002. As a part of its business strategy, MKS may enter into additional business combinations and acquisitions. Acquisitions are typically accompanied by a number of risks, including the difficulty of integrating the operations and personnel of the acquired companies, the potential disruption of MKS' ongoing business and distraction of management, expenses related to the acquisition and potential unknown liabilities associated with acquired businesses.

If MKS is not successful in completing acquisitions that it may pursue in the future, it may be required to reevaluate its growth strategy, and MKS may have incurred substantial expenses and devoted significant management time and resources in seeking to complete proposed acquisitions that will not generate benefits for it.

In addition, with future acquisitions, MKS could use substantial portions of its available cash as all or a portion of the purchase price. MKS could also issue additional securities as consideration for these acquisitions, which could cause significant stockholder dilution. MKS' acquisitions of Compact Instrument, Telvac, Spectra, D.I.P., ASTeX, On-Line, ENI, Tenta, and IPC and any future acquisitions may not ultimately help MKS achieve its strategic goals and may pose other risks to MKS.

AN INABILITY TO CONVINCING SEMICONDUCTOR DEVICE MANUFACTURERS TO SPECIFY THE USE OF MKS' PRODUCTS TO MKS' CUSTOMERS, WHO ARE SEMICONDUCTOR CAPITAL EQUIPMENT MANUFACTURERS, WOULD WEAKEN MKS' COMPETITIVE POSITION.

The markets for MKS' products are highly competitive. Its 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, MKS' success will depend in part on its ability to have semiconductor device manufacturers specify that MKS' 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.

IF MKS' PRODUCTS ARE NOT DESIGNED INTO SUCCESSIVE NEW GENERATIONS OF ITS CUSTOMERS' PRODUCTS, MKS WILL LOSE SIGNIFICANT NET SALES DURING THE LIFESPAN OF THOSE PRODUCTS.

New products designed by semiconductor capital equipment manufacturers typically have a lifespan of five to ten years. MKS' success depends on its products being designed into new generations of equipment for the semiconductor industry. MKS must develop products that are technologically current so that they are positioned to be chosen for use in each successive new generation of semiconductor capital equipment. If MKS products are not chosen by its customers, MKS' net sales may be reduced during the lifespan of its customers' products. In addition, MKS must make a significant capital investment to develop products for its customers well before its products are introduced and before it can be sure that it will recover its capital investment through sales to the customers in significant volume. MKS is thus also at risk during the development phase that its products may fail to meet its customers' technical or cost requirements and may be replaced by a competitive product or alternative technology solution. If that happens, MKS may be unable to recover MKS' development costs.

THE SEMICONDUCTOR INDUSTRY IS SUBJECT TO RAPID DEMAND SHIFTS WHICH ARE DIFFICULT TO PREDICT. AS A RESULT, MKS' INABILITY TO EXPAND ITS MANUFACTURING CAPACITY IN RESPONSE TO THESE RAPID SHIFTS MAY CAUSE A REDUCTION IN ITS MARKET SHARE.

MKS' ability to increase sales of certain products depends in part upon its ability to expand its manufacturing capacity for such products in a timely manner. If MKS is unable to expand its manufacturing capacity on a timely basis or to manage such expansion effectively, its customers could implement its competitors' products and, as a result, 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 MKS' fixed operating expenses and if sales levels do not increase to offset the additional expense levels associated with any such expansion, its business, financial condition and results of operations could be materially adversely affected.

SALES TO FOREIGN MARKETS CONSTITUTE A SUBSTANTIAL PORTION OF MKS' NET SALES; THEREFORE, MKS' NET SALES AND RESULTS OF OPERATIONS COULD BE ADVERSELY AFFECTED BY DOWNTURNS IN ECONOMIC CONDITIONS IN COUNTRIES OUTSIDE OF THE UNITED STATES.

International sales, which include sales by MKS' foreign subsidiaries, but exclude direct export sales (which were less than 10% of MKS' total net sales), accounted for approximately 31% of net sales in 2001, 23% of net sales in 2000 and 25% of net sales in 1999.

MKS anticipates that international sales will continue to account for a significant portion of MKS' net sales. In addition, certain of MKS' key domestic customers derive a significant portion of their revenues from sales in international markets. Therefore, MKS' sales and results of operations could be adversely affected by economic slowdowns and other risks associated with international sales.

RISKS RELATING TO MKS' INTERNATIONAL OPERATIONS COULD ADVERSELY AFFECT MKS' OPERATING RESULTS.

MKS has substantial international sales, service and manufacturing operations in Europe and Asia, which exposes MKS to foreign operational and political risks that may harm MKS' business. MKS' international operations are subject to inherent risks, which may adversely affect MKS, including:

- - political and economic instability in countries where MKS has sales, service and manufacturing operations, particularly in Asia;
- - fluctuations in the value of currencies and high levels of inflation, particularly in Asia;
- - changes in labor conditions and difficulties in staffing and managing foreign operations, including, but not limited to, labor unions;
- - greater difficulty in collecting accounts receivable and longer payment cycles;
- - burdens and costs of compliance with a variety of foreign laws;
- - increases in duties and taxation;
- - imposition of restrictions on currency conversion or the transfer of funds;
- - changes in export duties and limitations on imports or exports;
- - expropriation of private enterprises; and
- - unexpected changes in foreign regulations.

If any of these risks materialize, MKS' operating results may be adversely affected.

UNFAVORABLE CURRENCY EXCHANGE RATE FLUCTUATIONS MAY LEAD TO LOWER GROSS MARGINS, OR MAY CAUSE MKS TO RAISE PRICES WHICH COULD RESULT IN REDUCED SALES.

Currency exchange rate fluctuations could have an adverse effect on MKS' net sales and results of operations and MKS 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 by MKS 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' foreign subsidiaries are denominated in the currency of the country in which these products are sold and the currency it receives in payment for such sales could be less valuable at the time of receipt as a result of exchange rate fluctuations. MKS enters into forward exchange contracts and local currency purchased options to reduce currency exposure arising from intercompany sales of inventory. However, MKS cannot be certain that its efforts will be adequate to protect it against significant currency fluctuations or that such efforts will not expose it to additional exchange rate risks.

KEY PERSONNEL MAY BE DIFFICULT TO ATTRACT AND RETAIN.

MKS' 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 adverse effect on MKS' 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. MKS cannot be certain that it will be successful in attracting and retaining such personnel.

MKS' PROPRIETARY TECHNOLOGY IS IMPORTANT TO THE CONTINUED SUCCESS OF ITS BUSINESS. MKS' FAILURE TO PROTECT THIS PROPRIETARY TECHNOLOGY MAY SIGNIFICANTLY IMPAIR MKS' COMPETITIVE POSITION.

As of June 30, 2002, MKS owned 127 U.S. patents and 87 foreign patents and had 66 pending U.S. patent applications and 136 pending foreign patent applications. Although MKS seeks to protect its intellectual property rights through patents, copyrights, trade secrets and other measures, it cannot be certain that:

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

PROTECTION OF MKS' INTELLECTUAL PROPERTY RIGHTS MAY RESULT IN COSTLY LITIGATION.

Litigation may be necessary in order to enforce MKS' 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. For example, on November 3, 1999, On-Line Technologies Inc., which was acquired by MKS in April 2001, brought suit in federal district court in Connecticut against Perkin-Elmer, Inc. and certain other defendants for infringement of On-Line's patent related to its FTIR spectrometer product. Such litigation could result in substantial costs and diversion of resources and could have a material adverse effect on MKS' business, financial condition and results of operations.

THE MARKET PRICE OF MKS' COMMON STOCK HAS FLUCTUATED AND MAY CONTINUE TO FLUCTUATE FOR REASONS OVER WHICH MKS HAS NO CONTROL.

The stock market has from time to time experienced, and is likely to continue to experience, extreme price and volume fluctuations. Recently, prices of securities of technology companies have been especially volatile and have often fluctuated for reasons that are unrelated to the operating performance of the companies. The market price of shares of MKS' common stock has fluctuated greatly since its initial public offering and could continue to fluctuate due to a variety of factors. In the past, companies that have experienced volatility in the market price of their stock have been the objects of securities class action litigation. If MKS were the object of securities class action litigation, it could result in substantial costs and a diversion of MKS' management's attention and resources.

MKS' DEPENDENCE ON SOLE AND LIMITED SOURCE SUPPLIERS COULD AFFECT ITS ABILITY TO MANUFACTURE PRODUCTS AND SYSTEMS.

MKS relies on sole and limited source suppliers for a few of its components and subassemblies that are critical to the manufacturing of MKS' products. This reliance involves several risks, including the following:

- - the potential inability to obtain an adequate supply of required components;
- - reduced control over pricing and timing of delivery of components; and
- - the potential inability of its suppliers to develop technologically advanced products to support MKS' growth and development of new systems.

MKS believes that in time MKS could obtain and qualify alternative sources for most sole and limited source parts. Seeking alternative sources of the parts could require MKS to redesign its systems, resulting in increased costs and likely shipping delays. MKS may be unable to redesign its systems, which could result in further costs and shipping delays. These increased costs would decrease MKS' profit margins if it could not pass the costs to its customers. Further, shipping delays could damage MKS' relationships with current and potential customers and have a material adverse effect on MKS' business and results of operations.

MKS IS SUBJECT TO GOVERNMENTAL REGULATIONS.

MKS is subject to federal, state, local and foreign regulations, including environmental regulations and regulations relating to the design and operation of MKS' power supply products. MKS must ensure that these systems meet certain safety standards, many of which vary across the countries in which MKS' systems are used. For example, the European Union has published directives specifically relating to power supplies. MKS must comply with these directives in order to ship MKS' systems into countries that are members of the European Union. MKS believes it is in compliance with current applicable regulations, directives and standards and has obtained all necessary permits, approvals, and authorizations to conduct MKS' business. However, compliance with future regulations, directives and standards could require it to modify or redesign certain systems, make capital expenditures or incur substantial costs. If MKS does not comply with current or future regulations, directives and standards:

- - MKS could be subject to fines;
- - MKS' production could be suspended; or
- - MKS could be prohibited from offering particular systems in specified markets.

CERTAIN STOCKHOLDERS HAVE A SUBSTANTIAL INTEREST IN MKS AND MAY BE ABLE TO EXERT SUBSTANTIAL INFLUENCE OVER MKS' ACTIONS.

As of January 31, 2002, John R. Bertucci, president, chairman and chief executive officer of MKS, and certain members of his family, in the aggregate, beneficially owned approximately 29.8% of MKS' outstanding common stock. As a result, these stockholders, acting together, are able to exert substantial influence over the actions of MKS. Pursuant to the acquisition of the ENI Business of Emerson Electric Co. ("Emerson"), MKS issued approximately 24% of its then outstanding shares of common stock to Emerson. Accordingly, Emerson is able to exert substantial influence over MKS' actions.

SOME PROVISIONS OF MKS' RESTATED ARTICLES OF ORGANIZATION, AS AMENDED, MKS' AMENDED AND RESTATED BY-LAWS AND MASSACHUSETTS LAW COULD DISCOURAGE POTENTIAL ACQUISITION PROPOSALS AND COULD DELAY OR PREVENT A CHANGE IN CONTROL OF MKS.

Anti-takeover provisions could diminish the opportunities for stockholders to participate in tender offers, including tender offers at a price above the then current market value of the common stock. Such provisions may also inhibit increases in the market price of the common stock that could result from takeover attempts. For example, while MKS has no present plans to issue any preferred stock, MKS' board of directors, without further stockholder approval, may issue preferred stock that could have the effect of delaying, deterring or preventing a change in control of MKS. The issuance of preferred stock could adversely affect the voting power of the holders of MKS' common stock, including the loss of voting control to others. In addition, MKS' amended and restated by-laws provide for a classified board of directors consisting of three classes. The classified board could also have the effect of delaying, deterring or preventing a change in control of MKS.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Information concerning market risk is contained in the Management's Discussion and Analysis of Financial Condition and Results of Operations contained in the Consolidated Financial Statements for year ended December 31, 2001, which was filed on Form 10-K on April 1, 2002. MKS enters into local currency purchased options and forward exchange contracts to reduce currency exposure arising from intercompany sales of inventory. The potential fair value loss for a hypothetical 10% adverse change in currency exchange rates on MKS' local currency purchased options at June 30, 2002 would be approximately \$72,000. The potential loss was estimated by calculating the fair value of the local currency purchased options at June 30, 2002 and comparing that with those calculated using the hypothetical currency exchange rates. The potential fair value loss for a hypothetical 10% adverse change in the forward currency exchange rate on MKS' forward exchange contracts at June 30, 2002 would be \$224,000. The potential loss was estimated by calculating the fair value of the forward exchange contracts at June 30, 2002 and comparing that with those calculated using the hypothetical forward currency exchange rate.

As of June 30, 2002, MKS had \$4.0 million in inter-company debt denominated in Japanese Yen. MKS entered into forward exchange contracts to reduce the currency exposure arising from this debt. The potential fair value loss for a hypothetical 10% adverse change in the forward currency exchange rates on MKS' forward exchange contracts would be \$523,000. However, since the forward contracts hedge the inter-company debt denominated in Yen, any change in the fair value of the contracts would be offset by opposite changes in the underlying value of the inter-company debt being hedged. The potential loss was estimated by calculating the fair value of the forward exchange contracts at June 30, 2002 and comparing that with those calculated using the hypothetical forward currency exchange rate.

There were no other material changes in MKS' exposure to market risk from December 31, 2001.

PART II OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

On November 30, 2000, Applied Science and Technology, Inc. ("ASTex"), which was acquired by the Company in January 2001, brought suit in federal district court in Delaware against Advanced Energy Industries, Inc. ("Advanced Energy") for infringement of ASTex's patent related to its Astron product. The Company is seeking injunctive relief and damages for infringement. Advanced Energy has filed a counterclaim seeking judgements that the patent is invalid, unenforceable, and not infringed, in addition to costs, and attorneys' fees. The Company believes that the counterclaim is without merit. On May 17, 2002, a jury affirmed the validity of the Company's patent and found that Advanced Energy infringed the patent. The jury awarded the Company \$4.2 million in damages. On May 31, 2002, based on the jury's findings, the Court entered a judgement on the infringement claim and damage amount in favor of the Company and against Advanced Energy. The Court awarded \$4.2 million in damages to compensate the Company for Advanced Energy's infringing activity. Advanced Energy filed motions to overturn the verdict. Accordingly, the Company has not recorded the awarded amount as of June 30, 2002.

There were no other material litigation developments since the filing of MKS Annual Report on Form 10-K on April 1, 2002.

ITEM 2. CHANGES IN SECURITIES AND USE OF PROCEEDS

(d) Use of Proceeds from Sales of Registered Securities.

The Company has previously provided information on Form 10-Q for the quarter ended September 30, 2000 relating to the use of proceeds from the sale of securities by the Company pursuant to the Registration Statement on Form S-1 (Reg. No. 333-71363) that was declared effective by the Securities and Exchange Commission on March 29, 1999. As of June 30, 2002, approximately \$30.8 million of the net proceeds from the securities sold has been used to acquire businesses. There has been no other change to the information previously provided.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES

None.

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

At the Company's Annual Meeting of stockholders held on May 16, 2002 (the "Annual Meeting"), the following proposals were approved as further specified below:

1. Election of Directors:

	For ---	Withheld Authority -----
John R. Bertucci	44,847,475	3,288,877
Robert R. Anderson	47,819,739	316,613

2. Amendment to the Restated Articles of Organization, as amended, increasing the number of authorized shares of common stock from 75,000,000 to 200,000,000.

For -----	Against -----	Abstain/Broker Non-Votes -----
44,941,542	3,179,352	15,459

3. Amendment to the Company's Amended and Restated 1995 Stock Incentive Plan, as amended, increasing the number of authorized shares of common stock from 9,750,000 to 15,000,000.

For -----	Against -----	Abstain/Broker Non-Votes -----
34,895,172	10,447,436	2,793,744

4. Amendment to the Company's Amended and Restated 1999 Employee Stock Purchase Plan, as amended, increasing the number of authorized shares of common stock from 450,000 to 700,000.

For -----	Against -----	Abstain/Broker Non-Votes -----
44,821,412	545,554	2,769,387

5. Amendment to the Company's International Employee Stock Purchase Plan, as amended, increasing the number of authorized shares of common stock from 50,000 to 75,000.

For -----	Against -----	Abstain/Broker Non-Votes -----
44,764,779	605,750	2,765,824

6. Ratification of appointment of PricewaterhouseCoopers LLP as independent accountants.

For -----	Against -----	Abstain/Broker Non-Votes -----
47,351,954	754,844	29,555

ITEM 5. OTHER INFORMATION

None.

ITEM 6. EXHIBITS AND REPORTS ON FORM 8-K

(a) Exhibits

Exhibit No. -----	Exhibit Description -----
3.5	Articles of Amendment to Restated Articles of Organization, as amended
10.1	Second Restated 1995 Stock Incentive Plan
10.6	Second Restated 1999 Employee Stock Purchase Plan
10.7	Restated International Employee Stock Purchase Plan
10.35	First Amended and Restated Credit Agreement dated July 31, 2002 by and among MKS Instruments, Inc. as Borrower, Fleet National Bank as Agent and Lender, and JPMorgan Chase Bank as Lender
21.1	List of Subsidiaries
99.1	Statement Pursuant to 18 U.S.C. (sec) 1350

(b) Reports on Form 8-K

The Company filed with the Securities and Exchange Commission a Current Report on Form 8-K/A on April 15, 2002 which report amended a Current Report on Form 8-K originally filed with the Securities and Exchange Commission on February 12, 2002, to report under Item 7 (Financial Statements, Pro Forma Financial Information and Exhibits) the following financial statements:

Report of Independent Accountants

Combined Balance Sheets as of September 30, 2001 and 2000

Combined Statements of Income for the Years ended September 30, 2001, 2000 and 1999

Combined Statements of Divisional Control and Comprehensive Income for the Years ended September 30, 2001, 2000 and 1999

Combined Statements of Cash Flows for the Years ended September 30, 2001, 2000 and 1999

Notes to the Combined Financial Statements

Unaudited Pro Forma Combined Consolidated Balance Sheet as of December 31, 2001

Unaudited Pro Forma Combined Consolidated Statement of Operations for the Year ended December 31, 2001

Notes to the Unaudited Pro Forma Combined Consolidated Financial Statements

SIGNATURE

Pursuant to the requirements 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.

August 13, 2002

By: /s/ Ronald C. Weigner

Ronald C. Weigner
Vice President and Chief Financial Officer
(Principal Financial Officer)

EXHIBIT INDEX

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FEDERAL IDENTIFICATION
NO. 04-2277512

THE COMMONWEALTH OF MASSACHUSETTS
WILLIAM FRANCIS GALVIN
Secretary of the Commonwealth
One Ashburton Place, Boston, Massachusetts 02108-1512

ARTICLES OF AMENDMENT
(GENERAL LAWS, CHAPTER 156B, SECTION 72)

We, John R. Bertucci, * President, *President/*Vice President,
and Richard S. Chute, *Clerk, *Clerk/*Assistant Clerk,
of MKS Instruments, Inc.,
(Exact name of corporation)
located at Six Shattuck Rd., Andover, MA 01810,
(Street address of corporation in Massachusetts)

certify that these Articles of Amendment affecting articles numbered:

Article III

(Number those articles 1, 2, 3, 4, 5 and/or 6 being amended)

of the Articles of Organization were duly adopted at a meeting held on
May 16, 2002, by vote of: 44,783,983 shares of Common Stock of 50,975,323
(type, class & series, if any)

shares outstanding, shares of of
(type, class & series, if any)

shares outstanding, and shares of of
shares outstanding.
(type, class & series, if any)

(1)** being at least a majority of each type, class or series outstanding and
entitled to vote thereon:/ or (2)** being at least two-thirds of each type,
class or series outstanding and entitled to vote thereon and of each type, class
or series of stock whose rights are adversely affected thereby:

* DELETE THE INAPPLICABLE WORDS. ** DELETE THE INAPPLICABLE CLAUSE.

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

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

NOTE: IF THE SPACE PROVIDED UNDER ANY ARTICLE OR ITEM ON THIS FORM IS
INSUFFICIENT, ADDITIONS SHALL BE SET FORTH ON ONE SIDE ONLY OF SEPARATE
8 1/2 X 11 SHEETS OF PAPER WITH A LEFT MARGIN OF AT LEAST 1 INCH. ADDITIONS TO
MORE THAN ONE ARTICLE MAY BE MADE ON A SINGLE SHEET SO LONG AS EACH ARTICLE
REQUIRING EACH ADDITION IS CLEARLY INDICATED.

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

Later effective date: _____

SIGNED UNDER THE PENALTIES OF PERJURY, this 16th day of May, 2002, _____

/s/ John R. Bertucci

John R. Bertucci _____, *President

/s/ Richard S. Chute

Richard S. Chute _____, *Clerk

*Delete the inapplicable words.

MKS INSTRUMENTS, INC.

SECOND RESTATED 1995 STOCK INCENTIVE PLAN

1. PURPOSE

The purpose of this Second Restated 1995 Stock Incentive Plan (the "Plan") of MKS Instruments, Inc., a Massachusetts corporation (the "Company"), is to advance the interests of the Company's stockholders by enhancing the Company's ability to attract, retain and motivate persons who make (or are expected to make) important contributions to the Company by providing such persons with equity ownership opportunities and performance-based incentives and thereby better aligning the interests of such persons with those of the Company's stockholders. Except where the context otherwise requires, the term "Company" shall include any present or future subsidiary corporations of MKS Instruments, Inc. as defined in Section 424(f) of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "Code").

2. ELIGIBILITY

All of the Company's employees, officers, directors, consultants and advisors are eligible to be granted options, restricted stock, or other stock-based awards (each, an "Award") under the Plan. Any person who has been granted an Award under the Plan shall be deemed a "Participant."

3. ADMINISTRATION, DELEGATION

a. ADMINISTRATION BY BOARD OF DIRECTORS. The Plan will be administered by the Board of Directors of the Company (the "Board"). The Board shall have authority to grant Awards and to adopt, amend and repeal such administrative rules, guidelines and practices relating to the Plan as it shall deem advisable. The Board may correct any defect, supply any omission or reconcile any inconsistency in the Plan or any Award in the manner and to the extent it shall deem expedient to carry the Plan into effect and it shall be the sole and final judge of such expediency. All decisions by the Board shall be made in the Board's sole discretion and shall be final and binding on all persons having or claiming any interest in the Plan or in any Award. No director or person acting pursuant to the authority delegated by the Board shall be liable for any action or determination relating to or under the Plan made in good faith.

b. DELEGATION TO EXECUTIVE OFFICERS. To the extent permitted by applicable law, the Board may delegate to one or more executive officers of the Company, who are also members of the Board, if required by law, the power to make Awards and exercise such other powers under the Plan as the Board may determine, provided that the Board shall fix the maximum number of shares subject to Awards and the maximum number of shares for any one Participant to be made by such executive officers. The Chief Executive Officer of the Company may grant Awards to non-executive officer employees of the Company in amounts not to exceed 35,000 shares to any one employee.

c. APPOINTMENT OF COMMITTEES. To the extent permitted by applicable law, the Board may delegate any or all of its powers under the Plan to one or more committees or

subcommittees of the Board (a "Committee"). If and when the common stock, no par value per share, of the Company (the "Common Stock") is registered under the Securities Exchange Act of 1934 (the "Exchange Act"), the Board shall appoint one such Committee of not less than two members, each member of which shall be an "outside director" within the meaning of Section 162(m) of the Code and a "non-employee director" as defined in Rule 16b-3 promulgated under the Exchange Act." All references in the Plan to the "Board" shall mean the Board or a Committee of the Board or the executive officer referred to in Section 3(b) to the extent that the Board's powers or authority under the Plan have been delegated to such Committee or executive officer.

4. STOCK AVAILABLE FOR AWARDS

a. NUMBER OF SHARES. Effective January 1, 2002 and subject to adjustment under Section 4(c), the number of shares of Common Stock available for Awards under the Plan: (i) shall annually increase by 5% of the total shares of the Company's outstanding Common Stock on January 1 of each year; and (ii) in the event of an increase in the total shares of the Company's Common Stock after January 1 of any such year in connection with the acquisition of any corporation, partnership or other business entity by the Company (whether by merger, stock purchase or otherwise), shall increase by 5% of such increased amount. Such increases shall occur until such time as the aggregate number of shares of Common Stock which may be issued under the Plan is 15,000,000 shares, subject to adjustment under Section 4(c)." If any Award expires or is terminated, surrendered or canceled without having been fully exercised or is forfeited in whole or in part or results in any Common Stock not being issued, the unused Common Stock covered by such Award shall again be available for the grant of Awards under the Plan, subject, however, in the case of Incentive Stock Options (as hereinafter defined), to any limitation required under the Code. Shares issued under the Plan may consist in whole or in part of authorized but unissued shares or treasury shares. All share amounts set forth in this plan reflect the 2,110-for-1 stock split approved by the Board of Directors of the Company on December 31, 1997 (the "1997 Stock Split").

b. PER-PARTICIPANT LIMIT. Subject to adjustment under Section 4(c), for Awards granted after the Common Stock is registered under the Exchange Act, the maximum number of shares with respect to which Awards may be granted to any Participant under the Plan shall be 900,000 per calendar year. The per-participant limit described in this Section 4(b) shall be construed and applied consistently with Section 162(m) of the Code.

c. ADJUSTMENT TO COMMON STOCK. In the event of any stock split, stock dividend, recapitalization, reclassification, reorganization, merger, consolidation, combination, exchange of shares, liquidation, spin-off or other similar change in capitalization or event, or any distribution to holders of Common Stock other than a normal cash dividend, (i) the number and class of securities available under this Plan, (ii) the number and class of security and exercise price per share subject to each outstanding Option, (iii) the repurchase price per security subject to each outstanding Restricted Stock Award, (iv) the per-Participant limit set forth in Section 4(b) and (v) the terms of each other outstanding stock-based Award shall be appropriately adjusted by the Company (or substituted Awards may be made, if applicable) to the extent the Board shall determine, in good faith, that such an adjustment (or substitution) is necessary and

appropriate. If this Section 4(c) applies and Section 8(e)(1) also applies to any event, Section 8(e)(1) shall be applicable to such event and this Section 4(c) shall not be applicable.

5. STOCK OPTIONS

a. GENERAL. The Board may grant options to purchase Common Stock (each, an "Option") and determine the number of shares of Common Stock to be covered by each Option, the exercise price of each Option and the conditions and limitations applicable to the exercise of each Option, including conditions relating to applicable federal or state securities laws, as it considers necessary or advisable. An Option which is not intended to be an Incentive Stock Option (as hereinafter defined) shall be designated a "Nonstatutory Stock Option."

b. INCENTIVE STOCK OPTIONS. An Option that the Board intends to be an "incentive stock option" as defined in Section 422 of the Code (an "Incentive Stock Option") shall only be granted to employees of the Company and shall be subject to and shall be construed consistently with the requirements of Section 422 of the Code. The Company shall have no liability to a Participant, or any other party, if an Option (or any part thereof) which is intended to be an Incentive Stock Option is not an Incentive Stock Option.

c. EXERCISE PRICE. The Board shall establish the exercise price at the time each Option is granted and specify it in the applicable option agreement.

d. DURATION OF OPTIONS. Each Option shall be exercisable at such times and subject to such terms and conditions as the Board may specify in the applicable option agreement. No Option will be granted for a term in excess of 10 years.

e. EXERCISE OF OPTION. Options may be exercised only by delivery to the Company of a written notice of exercise signed by the proper person together with payment in full as specified in Section 5(f) for the number of shares for which the Option is exercised.

f. PAYMENT UPON EXERCISE. Common Stock purchased upon the exercise of an Option granted under the Plan shall be paid for as follows:

i. in cash or by check, payable to the order of the Company;

ii. except as the Board may otherwise provide in an Option Agreement, delivery of an irrevocable and unconditional undertaking by a creditworthy broker to deliver promptly to the Company sufficient funds to pay the exercise price, delivery by the Participant to the Company of a copy of irrevocable and unconditional instructions to a creditworthy broker to deliver promptly to the Company cash or a check sufficient to pay the exercise price, or by delivery of shares of Common Stock owned by the Participant valued at the fair market value as determined by the Board in good faith ("Fair Market Value"), which Common Stock was owned by the Participant at least six months prior to such delivery;

iii. to the extent permitted by the Board and explicitly provided in an Option Agreement (i) by delivery of a promissory note of the Participant to the Company on terms determined by the Board, or (ii) by payment of such other lawful consideration as the Board may determine; or

iv. any combination of the above permitted forms of payment.

6. RESTRICTED STOCK

a. GRANTS. The Board may grant Awards entitling recipients to acquire shares of Common Stock, subject to the right of the Company to repurchase all or part of such shares at their issue price or other stated or formula price (or to require forfeiture of such shares if issued at no cost) from the recipient in the event that conditions specified by the Board in the applicable Award are not satisfied prior to the end of the applicable restriction period or periods established by the Board for such Award (each, "Restricted Stock Award").

b. TERMS AND CONDITIONS. The Board shall determine the terms and conditions of any such Restricted Stock Award, including the conditions for repurchase (or forfeiture) and the issue price, if any. Any stock certificates issued in respect of a Restricted Stock Award shall be registered in the name of the Participant and, unless otherwise determined by the Board, deposited by the Participant, together with a stock power endorsed in blank, with the Company (or its designee). At the expiration of the applicable restriction periods, the Company (or such designee) shall deliver the certificates no longer subject to such restrictions to the Participant or if the Participant has died, to the beneficiary designated, in a manner determined by the Board, by a Participant to receive amounts due or exercise rights of the Participant in the event of the Participant's death (the "Designated Beneficiary"). In the absence of an effective designation by a Participant, Designated Beneficiary shall mean the Participant's estate.

7. OTHER STOCK-BASED AWARDS

The Board shall have the right to grant other Awards based upon the Common Stock, having such terms and conditions as the Board may determine including the grant of shares based upon certain conditions, the grant of securities convertible into Common Stock and the grant of stock appreciation rights.

8. GENERAL PROVISIONS APPLICABLE TO AWARDS

a. TRANSFERABILITY OF AWARDS. Except as the Board may otherwise determine or provide in an Award, Awards shall not be sold, assigned, transferred, pledged or otherwise encumbered by the person to whom they are granted, either voluntarily or by operation of law, except by will or the laws of descent and distribution, and, during the life of the Participant, shall be exercisable only by the Participant. References to a Participant, to the extent relevant in the context, shall include references to authorized transferees.

b. DOCUMENTATION. Each Award under the Plan shall be evidenced by a written instrument in such form as the Board shall determine. Each Award may contain terms and conditions in addition to those set forth in the Plan.

c. BOARD DISCRETION. Except as otherwise provided by the Plan, each type of Award may be made alone or in addition or in relation to any other type of Award. The terms of each type of Award need not be identical, and the Board need not treat Participants uniformly.

d. TERMINATION OF STATUS. The Board shall determine the effect on an Award of the disability, death, retirement, authorized leave of absence or other change in the employment or other status of a Participant and the extent to which, and the period during which, the Participant, the Participant's legal representative, conservator, guardian or Designated Beneficiary may exercise rights under the Award.

e. ACQUISITION EVENTS

(1) CONSEQUENCES OF ACQUISITION EVENTS. Upon the occurrence of an Acquisition Event (as defined below), or the execution by the Company of any agreement with respect to an Acquisition Event, the Board shall take any one or more of the following actions with respect to then outstanding Awards: (i) provide that outstanding Options shall be assumed, or equivalent Options shall be substituted, by the acquiring or succeeding corporation (or an affiliate thereof), provided that any such Options substituted for Incentive Stock Options shall satisfy, in the determination of the Board, the requirements of Section 424(a) of the Code; (ii) if the acquisition or succeeding corporation refuses or is unable to assume outstanding Options or grant Options in substitution therefor pursuant to clause (i), upon written notice to the Participants, provide that all then unexercised Options will become exercisable in full as of a specified time (the "Acceleration Time") prior to the Acquisition Event and will terminate immediately prior to the consummation of such Acquisition Event, except to the extent exercised by the Participants between the Acceleration Time and the consummation of such Acquisition Event; (iii) in the event of an Acquisition Event under the terms of which holders of Common Stock will receive upon consummation thereof a cash payment for each share of Common Stock surrendered pursuant to such Acquisition Event (the "Acquisition Price"), provide that all outstanding Options shall terminate upon consummation of such Acquisition Event and each Participant shall receive, in exchange therefor, a cash payment equal to the amount (if any) by which (A) the Acquisition Price multiplied by the number of shares of Common Stock subject to such outstanding Options (whether or not then exercisable), exceeds (B) the aggregate exercise price of such Options; (iv) provide that all Restricted Stock Awards then outstanding shall become free of all restrictions prior to the consummation of the Acquisition Event; and (v) provide that any other stock-based Awards outstanding (A) shall become exercisable, realizable or vested in full, or shall be free of all conditions or restrictions, as applicable to each such Award, prior to the consummation of the Acquisition Event, or (B), if applicable, shall be assumed, or equivalent Awards shall be substituted, by the acquiring or succeeding corporation (or an affiliate thereof).

An "Acquisition Event" shall mean: (a) any merger or consolidation which results in the voting securities of the Company outstanding immediately prior thereto representing immediately thereafter (either by remaining outstanding or by being converted into voting securities of the surviving or acquiring entity) less than 50% of the combined voting power of the voting securities of the Company or such surviving or acquiring entity outstanding immediately after such merger or consolidation; (b) any sale of all or substantially all of the assets of the Company; or (c) the complete liquidation of the Company.

(2) ASSUMPTION OF OPTIONS UPON CERTAIN EVENTS. The Board may grant Awards under the Plan in substitution for stock and stock-based awards held by employees of another corporation who become employees of the Company as a result of a

merger or consolidation of the employing corporation with the Company or the acquisition by the Company of property or stock of the employing corporation. The substitute Awards shall be granted on such terms and conditions as the Board considers appropriate in the circumstances.

f. WITHHOLDING. Each Participant shall pay to the Company, or make provision satisfactory to the Board for payment of, any taxes required by law to be withheld in connection with Awards to such Participant no later than the date of the event creating the tax liability. The Board may allow Participants to satisfy such tax obligations in whole or in part in shares of Common Stock, including shares retained from the Award creating the tax obligation, valued at their Fair Market Value; provided, however, that the total tax withholding where stock is being used to satisfy such tax obligations cannot exceed the Company's minimum statutory withholding obligations (based on minimum statutory withholding rates for federal and state tax purposes, including payroll taxes, that are applicable to such supplemental taxable income). The Company may, to the extent permitted by law, deduct any such tax obligations from any payment of any kind otherwise due to a Participant.

g. AMENDMENT OF AWARD. The Board may amend, modify or terminate any outstanding Award, including but not limited to, substituting therefor another Award of the same or a different type, changing the date of exercise or realization, and converting an Incentive Stock Option to a Nonstatutory Stock Option, provided that the Participant's consent to such action shall be required unless the Board determines that the action, taking into account any related action, would not materially and adversely affect the Participant.

h. CONDITIONS ON DELIVERY OF STOCK. The Company will not be obligated to deliver any shares of Common Stock pursuant to the Plan or to remove restrictions from shares previously delivered under the Plan until (i) all conditions of the Award have been met or removed to the satisfaction of the Company, (ii) in the opinion of the Company's counsel, all other legal matters in connection with the issuance and delivery of such shares have been satisfied, including any applicable securities laws and any applicable stock exchange or stock market rules and regulations, and (iii) the Participant has executed and delivered to the Company such representations or agreements as the Company may consider appropriate to satisfy the requirements of any applicable laws, rules or regulations.

i. ACCELERATION. The Board may at any time provide that any Options shall become immediately exercisable in full or in part, that any Restricted Stock Awards shall be free of all restrictions or that any other stock-based Awards may become exercisable in full or in part or free of some or all restrictions or conditions, or otherwise realizable in full or in part, as the case may be.

9. MISCELLANEOUS

a. NO RIGHT TO EMPLOYMENT OR OTHER STATUS. No person shall have any claim or right to be granted an Award, and the grant of an Award shall not be construed as giving a Participant the right to continued employment or any other relationship with the Company. The Company expressly reserves the right at any time to dismiss or otherwise terminate its relationship with a Participant free from any liability or claim under the Plan, except as expressly provided in the applicable Award.

b. NO RIGHTS AS STOCKHOLDER. Subject to the provisions of the applicable Award, no Participant or Designated Beneficiary shall have any rights as a stockholder with respect to any shares of Common Stock to be distributed with respect to an Award until becoming the record holder of such shares.

c. EFFECTIVE DATE AND TERM OF PLAN. The Plan shall become effective on the date on which it is adopted by the Board, but no Award granted to a Participant designated as subject to Section 162(m) by the Board shall become exercisable, vested or realizable, as applicable to such Award, unless and until the Plan has been approved by the Company's stockholders. No Awards shall be granted under the Plan after the completion of ten years from the earlier of (i) the date on which the Plan was adopted by the Board or (ii) the date the Plan was approved by the Company's stockholders, but Awards previously granted may extend beyond that date.

d. AMENDMENT OF PLAN. The Board may amend, suspend or terminate the Plan or any portion thereof at any time, provided that no Award granted to a Participant designated as subject to Section 162(m) by the Board after the date of such amendment shall become exercisable, realizable or vested, as applicable to such Award (to the extent that such amendment to the Plan was required to grant such Award to a particular Participant), unless and until such amendment shall have been approved by the Company's stockholders.

e. STOCKHOLDER APPROVAL. For purposes of this Plan, stockholder approval shall mean approval by a vote of the stockholders in accordance with the requirements of Section 162(m) of the Code.

f. GOVERNING LAW. The provisions of the Plan and all Awards made hereunder shall be governed by and interpreted in accordance with the laws of The Commonwealth of Massachusetts, without regard to any applicable conflicts of law rules or provisions.

Adopted by the Board of Directors on
November 30, 1995

Approved by the Stockholders on May
17, 1996

Amended and Restated by the Board of
Directors on December 31, 1997

Amended and Restated by the
Stockholders on January 9, 1998

Amended and Restated by the Board of
Directors on August 1, 2002

MKS INSTRUMENTS, INC.

SECOND RESTATED 1999 EMPLOYEE STOCK PURCHASE PLAN

The purpose of this Plan is to provide eligible employees of MKS Instruments, Inc. (the "Company") and certain of its subsidiaries with opportunities to purchase shares of the Company's Common Stock, no par value per share (the "Common Stock"), commencing on June 1, 1999; provided, that at such time the Company's Common Stock shall be listed for trading on the Nasdaq National Market or a national securities exchange. Seven hundred thousand (700,000) shares of Common Stock in the aggregate have been approved for this purpose. This Plan is intended to qualify as an "employee stock purchase plan" as defined in Section 423 of the Internal Revenue Code of 1986, as amended (the "Code") and the regulations promulgated thereunder, and shall be interpreted consistent therewith.

1. ADMINISTRATION. The Plan will be administered by the Company's Board of Directors (the "Board") or by a Committee appointed by the Board (the "Committee"). The Board or the Committee has authority to make rules and regulations for the administration of the Plan and its interpretation and decisions with regard thereto shall be final and conclusive.

2. ELIGIBILITY. All employees of the Company, including Directors who are employees, and all employees of any subsidiary of the Company (as defined in Section 424(f) of the Code) designated by the Board or the Committee from time to time (a "Designated Subsidiary"), including employees of the Company or any Designated Subsidiary who are "highly compensated" within the meaning of Section 414(q) of the Code, are eligible to participate in any one or more of the Offerings (as defined in Section 9) to purchase Common Stock under the Plan provided that:

(a) they are customarily employed by the Company or a Designated Subsidiary for more than 20 hours a week and for more than five months in a calendar year; and

(b) they have been employed by the Company or a Designated Subsidiary for at least three (3) months prior to enrolling in the Plan; and

(c) they are employees of the Company or a Designated Subsidiary on the first day of the applicable Plan Period (as defined below).

No employee may be granted an option hereunder if such employee, immediately after the option is granted, owns 5% or more of the total combined voting power or value of the stock of the Company or any subsidiary. For purposes of the preceding sentence, the attribution rules of Section 424(d) of the Code shall apply in determining the stock ownership of an employee, and all stock which the employee has a contractual right to purchase shall be treated as stock owned by the employee.

3. OFFERINGS. The Company will make one or more offerings ("Offerings") to employees to purchase stock under this Plan. Offerings will begin each June 1 and December 1, or the first business day thereafter (the "Offering Commencement Dates"). Each Offering Commencement Date will begin a six (6) month period (a "Plan Period") during which Payroll deductions will be made and held for the purchase of Common Stock at the end of the Plan Period. The Board or the Committee may, at its discretion, choose a different Plan Period of twelve (12) months or less for subsequent Offerings.

4. PARTICIPATION. An employee eligible on the Offering Commencement Date of any Offering may participate in such Offering by completing and forwarding a payroll deduction authorization form to the employee's appropriate payroll office at least 30 days prior to the applicable Offering Commencement Date. The form will authorize a regular payroll deduction from the Compensation, as defined below, received by the employee during the Plan Period. Unless an employee files a new form or withdraws from the Plan, his deductions and purchases will continue at the same rate for future Offerings under the Plan as long as the Plan remains in effect. The term "Compensation" means the amount of money reportable on the employee's Federal Income Tax Withholding Statement, including overtime, shift premium, incentive or bonus awards and any other variable sales compensation and excluding allowances and reimbursements for expenses such as relocation allowances for travel expenses, income or gains on the exercise of Company stock options or stock appreciation rights, and similar items, whether or not shown on the employee's Federal Income Tax Withholding Statement, but including, in the case of salespersons, sales commissions to the extent determined by the Board or the Committee.

5. DEDUCTIONS. The Company will maintain payroll deduction accounts for all participating employees. With respect to any Offering made under this Plan, an employee may authorize a payroll deduction in any whole percent amount up to a maximum of 10% (or such lower percentage as may be established by the Board or the Committee) of the Compensation he or she receives during the Plan Period or such shorter period during which deductions from payroll are made. The minimum payroll deduction is such percentage of compensation as may be established from time to time by the Board or the Committee.

No employee may be granted an Option (as defined in Section 9) which permits his rights to purchase Common Stock under this Plan and any other employee stock purchase plan (as defined in Section 423(b) of the Code) of the Company and its subsidiaries, to accrue at a rate which exceeds \$25,000 of the fair market value of such Common Stock (determined at the Offering Commencement Date of the Plan Period) for each calendar year in which the Option is outstanding at any time.

6. DEDUCTION CHANGES. An employee may decrease, subject to section 5 hereof or discontinue his payroll deduction once during any Plan Period, by filing a new payroll deduction authorization form. However, an employee may not elect to increase his payroll deduction during a Plan Period. If an employee elects to discontinue his payroll deductions during a Plan Period, but does not elect to withdraw his funds pursuant to Section 8 hereof, funds deducted prior to his election to discontinue will be applied to the purchase of Common Stock on the Exercise Date (as defined below).

7. INTEREST. Interest will not be paid on employee accounts.

8. WITHDRAWAL OF FUNDS. An employee may at any time prior to the close of business on the last business day in a Plan Period and for any reason permanently draw out the balance accumulated in the employee's account and thereby withdraw from participation in an Offering. Partial withdrawals are not permitted. The employee may not begin participation again during the remainder of the Plan Period. The employee may participate in any subsequent Offering in accordance with terms and conditions established by the Board or the Committee.

9. PURCHASE OF SHARES. On the Offering Commencement Date of each Plan Period, the Company will grant to each eligible employee who is then a participant in the Plan an option ("Option") to purchase on the last business day of such Plan Period (the "Exercise Date"), at the Option Price hereinafter provided for, the largest number of shares (fractional or whole) of Common Stock of the Company as does not exceed the number of shares determined by multiplying \$2,083 by the number of full months in the Offering Period and dividing the results by the closing price (as defined below) on the Offering Commencement Date of such Plan Period.

The purchase price for each share purchased will be 85% of the closing price of the Common Stock on (i) the first business day of such Plan Period or (ii) the Exercise Date, whichever closing price shall be less. Such closing price shall be (a) the closing price on any national securities exchange on which the Common Stock is listed, (b) the closing price of the Common Stock on the Nasdaq National Market or (c) the average of the closing bid and asked prices in the over-the-counter-market, whichever is applicable, as published in The Wall Street Journal. If no sales of Common Stock were made on such a day, the price of the Common Stock for purposes of clauses (a) and (b) above shall be the reported price for the next preceding day on which sales were made.

Each employee who continues to be a participant in the Plan on the Exercise Date shall be deemed to have exercised his Option at the Option Price on such date and shall be deemed to have purchased from the Company the number of full shares of Common Stock reserved for the

purpose of the Plan that his accumulated payroll deductions on such date will pay for, but not in excess of the maximum number determined in the manner set forth above.

Any balance remaining in an employee's payroll deduction account at the end of a Plan Period will be automatically refunded to the employee, except that any balance which is less than the purchase price of one share of Common Stock will be carried forward into the employee's payroll deduction account for the following Offering, unless the employee elects not to participate in the following Offering under the Plan, in which case the balance in the employee's account shall be refunded.

10. ISSUANCE OF CERTIFICATES. Certificates representing shares of Common Stock purchased under the Plan may be issued only in the name of the employee, in the name of the employee and another person of legal age as joint tenants with rights of survivorship, or (in the Company's sole discretion) in the name of a brokerage firm, bank or other nominee holder designated by the employee. The Company may, in its sole discretion and in compliance with applicable laws, authorize the use of book entry registration of shares in lieu of issuing stock certificates.

11. RIGHTS ON RETIREMENT, DEATH OR TERMINATION OF EMPLOYMENT. In the event of a participating employee's termination of employment prior to the last business day of a Plan Period, no payroll deduction shall be taken from any pay due and owing to an employee and the balance in the employee's account shall be paid to the employee or, in the event of the employee's death, (a) to a beneficiary previously designated in a revocable notice signed by the employee (with any spousal consent required under state law) or (b) in the absence such a designated beneficiary, to the executor or administrator of the employee's estate or (c) if no such executor or administrator has been appointed to the knowledge of the Company, to such other person(s) as the Company may, in its discretion, designate. If, prior to the last business day of the Plan Period, the Designated Subsidiary by which an employee is employed shall cease to be a subsidiary of the Company, or if the employee is transferred to a subsidiary of the Company that is not a Designated Subsidiary, the employee shall be deemed to have terminated employment for the purposes of this Plan.

12. OPTIONEES NOT STOCKHOLDERS. No employee shall have any rights as a stockholder with respect to any shares of Common Stock to be distributed with respect to an Option until becoming the record holder or such shares. Notwithstanding the foregoing, in the event the Company effects a split of the Common Stock by means of a stock dividend (and the exercise price of and the number of shares subject to such Option are adjusted as of the date of the distribution of the dividend rather than as of the record date for such dividend), then an optionee who is deemed to have exercised an Option between the record date and the distribution

date for such stock dividend shall be entitled to receive, on the distribution date, the stock dividend with respect to the shares of Common Stock.

13. RIGHTS NOT TRANSFERABLE. Rights under this Plan are not transferable by a participating employee other than by will or the laws of descent and distribution, and are exercisable during the employee's lifetime only by the employee.

14. APPLICATION OF FUNDS. All funds received or held by the Company under this Plan may be combined with other corporate funds and may be used for any corporate purpose.

15. ADJUSTMENT IN CASE OF CHANGES AFFECTING COMMON STOCK. In the event of a subdivision of outstanding shares of Common Stock, or the payment of a dividend in Common Stock, the number of shares approved for this Plan, and the share limitation set forth in Section 9, shall be increased proportionately, and such other adjustment shall be made as may be deemed equitable by the Board or the Committee. In the event of any other change affecting the Common Stock, such adjustment shall be made as may be deemed equitable by the Board or the Committee to give proper effect to such event.

16. MERGER. If the Company shall at any time merge or consolidate with another corporation and the holders of the capital stock of the Company immediately prior to such merger or consolidation continue to hold at least 80% by voting power of the capital stock of the surviving corporation ("Continuity of Control"), the holder of each Option then outstanding will thereafter be entitled to receive at the next Exercise Date upon the exercise of such Option for each share as to which such Option shall be exercised the securities or property which a holder of one share of the Common Stock was entitled to upon and at the time of such merger or consolidation, and the Board or the Committee shall take such steps in connection with such merger or consolidation as the Board or the Committee shall deem necessary to assure that the provisions of Section 15 shall thereafter be applicable, as nearly as reasonably may be, in relation to the said securities or property as to which such holder of such Option might thereafter be entitled to receive thereunder.

In the event of a merger or consolidation of the Company with or into another corporation which does not involve Continuity of Control, or of a sale of all or substantially all of the assets of the Company while unexercised Options remain outstanding under the Plan, all outstanding Options shall be cancelled by the Board or the Committee as of the effective date of any such transaction, provided that notice of such cancellation shall be given to each holder of an Option, and each holder of an Option shall have the right to exercise such Option in full based on payroll deductions then credited to his account as of a date determined by the Board or the Committee, which date shall not be less than ten (10) days preceding the effective date of such transaction.

17. AMENDMENT OF THE PLAN. The Board may at any time, and from time to time, amend this Plan in any respect, except that (a) if the approval of any such amendment by the shareholders of the Company is required by Section 423 of the Code, such amendment shall not be effected without such approval, and (b) in no event may any amendment be made which would cause the Plan to fail to comply with Section 423 of the Code.

18. SUFFICIENT SHARES. In the event that the total number of shares of Common Stock specified in elections to be purchased under any Offering plus the number of shares purchased under previous Offerings under this Plan exceeds the maximum number of shares issuable under this Plan, the Board or the Committee will allot the shares then available on a pro rata basis.

19. TERMINATION OF THE PLAN. This Plan may be terminated at any time by the Board. Upon termination of this Plan all amounts in the accounts of participating employees shall be promptly refunded.

20. GOVERNMENTAL REGULATIONS. The Company's obligation to sell and deliver Common Stock under this Plan is subject to listing on a national stock exchange or quotation on the Nasdaq National Market and the approval of all governmental authorities required in connection with the authorization, issuance or sale of such stock.

21. GOVERNING LAW. The Plan shall be governed by Massachusetts law except to the extent that such law is preempted by federal law.

22. ISSUANCE OF SHARES. Shares may be issued upon exercise of an Option from authorized but unissued Common Stock, from shares held in the treasury of the Company, or from any other proper source.

23. NOTIFICATION UPON SALE OF SHARES. Each employee agrees, by entering the Plan, to promptly give the Company notice of any disposition of shares purchased under the Plan where such disposition occurs within two years after the date of grant of the Option pursuant to which such shares were purchased or one year after the date of exercise of the Option.

24. WITHHOLDING. Each employee shall, no later than the date of the event creating the tax liability, make provision satisfactory to the Board for payment of any taxes required by law to be withheld in connection with any transaction related to Options granted to or shares acquired by such employee pursuant to the Plan. The Company may, to the extent permitted by law, deduct any such taxes from any payment of any kind otherwise due to an employee.

25. EFFECTIVE DATE. The effective date of the plan is June 1, 1999.

Adopted by the Board of Directors on February 10, 1999

Approved by the Stockholders on February 17, 1999

Amended and Restated by the Board of Directors on April 22, 1999

Amended and Restated by the Board of Directors on August 1, 2002

MKS INSTRUMENTS, INC.

RESTATED INTERNATIONAL EMPLOYEE STOCK PURCHASE PLAN

The purpose of this Plan is to provide eligible employees of certain non-U.S. subsidiaries of MKS Instruments, Inc. (the "Company") with opportunities to purchase shares of the Company's common stock (the "Common Stock"), commencing on March 1, 2000. Seventy-five thousand (75,000) shares of Common Stock in the aggregate have been approved for this purpose.

1. Administration. The Plan will be administered by the Company's Board of Directors (the "Board") or by a Committee appointed by the Board (the "Committee"). The Board or the Committee has authority to make rules and regulations for the administration of the Plan and its interpretation and decisions with regard thereto shall be final and conclusive.

2. Eligibility. All employees of any non-U.S. subsidiary of the Company designated by the Board or the Committee from time to time (a "Subsidiary"), excluding Officers and Directors of the Company who are employees of a Subsidiary, are eligible to participate in any one or more of the offerings of Options (as defined in Section 9) to purchase Common Stock under the Plan provided that:

- a. they have been employed by the Subsidiary for at least three (3) months prior to enrolling in the Plan;
- b. they are employees of the Subsidiary on the first day of the applicable Plan Period (as defined below);
- c. to the extent local law permits such a requirement, they are customarily employed by a Subsidiary for more than twenty (20) hours a week and for more than five (5) months in a calendar year; and
- d. they meet any other requirements imposed from time to time by the Board or the Committee on employees of one or more subsidiaries.

No employee may be granted an option hereunder if such employee, immediately after the option is granted, owns 5% or more of the total combined voting power or value of the stock of the Company or any subsidiary. For purposes of the preceding sentence, the attribution rules of Section 424(d) of the U.S. Internal Revenue Code of 1986, as amended (the "Code") shall apply in determining the stock ownership of an employee, and all stock which the employee has a contractual right to purchase shall be treated as stock owned by the employee.

3. Offerings. The Company will make one or more offerings ("Offerings") to employees to purchase stock under this Plan. The first Offering will begin on March 1, 2000 or the first business day thereafter (the "Offering Commencement Dates") and end on May 31, 2000. Thereafter, each June 1 and December 1 or the first business day thereafter will be an Offering Commencement Date. Each Offering Commencement Date after March 1, 2000 will

begin a six (6) month period (a "Plan Period") during which payroll deductions will be made and held for the purchase of Common Stock at the end of the Plan Period. The Board or the Committee may, at its discretion, choose a different Plan Period of twelve (12) months or less for subsequent Offerings.

4. Participation.

a. Enrollment. An employee eligible on the Offering Commencement Date of any Offering may participate in such Offering by enrolling, in such manner and at such time approved, from time to time, by the Board or the Committee, prior to the applicable Offering Commencement Date in said Offering. The enrollment will authorize a regular payroll deduction from the Compensation received by the employee during the Plan Period. Unless an employee changes his enrollment in a manner prescribed by the Committee from time to time or withdraws from the Plan, his deductions and purchases will continue at the same rate for future Offerings under the Plan as long as the Plan remains in effect. The term "Compensation" shall be defined by the Board or the Committee from time to time, but until modified shall mean regular base salary, including overtime, shift premium, incentive or bonus awards and sales commissions and excluding allowances and reimbursements for expenses such as relocation allowances for travel expenses, income or gains on the exercise of Company stock options or stock appreciation rights, and similar items whether or not taxable.

b. Tax Withholding Authorized. The enrollment of each employee shall constitute such participating employee's authorization of his or her employer to deduct from such employee's compensation in the relevant month or months (or subsequent months, if appropriate) any amount necessary for the payment or reimbursement of any tax liability payable by such employee with respect to the grant or exercise of the options hereunder, or the sale of any stock acquired through the exercise of such option.

5. Deductions. The Company will maintain payroll deduction accounts for all participating employees. With respect to any Offering made under this Plan, an employee may authorize a payroll deduction in any whole percent amount between one and ten percent (1-10%) of the Compensation he or she receives during the Plan Period or such shorter period during which deductions from payroll are made (or such other percentages as may be established by the Board or the Committee). Any change in Compensation during the Plan Period will result in an automatic corresponding change in the amount withheld. The payroll deductions shall be made in the applicable local currency and will be converted into United States currency at the prevailing rate of exchange in effect on such date as the Board or Committee shall determine. All amounts deducted may be transferred to an account of the Company or the Subsidiary outside the country in which such employee is employed.

No employee may be granted an Option (as defined in Section 9) which permits his rights to purchase Common Stock under this Plan and any other employee stock purchase plan (as defined by the Committee or Board) of the Company and its subsidiaries, to accrue at a rate which exceeds \$25,000 of the fair market value of such Common Stock (determined at the Offering Commencement Date of the Plan Period) for each calendar year in which the Option is outstanding at any time.

6. Deduction Changes. An employee may decrease, subject to Section 5 hereof, or discontinue his payroll deduction once during any Plan Period, up to such date prior to the close of business on the last business day, and in such manner as is permitted by the Board or Committee. However, an employee may not elect to increase his payroll deduction during a Plan Period. If an employee elects to discontinue his payroll deductions during a Plan Period but does not elect to withdraw his funds pursuant to Section 8 hereof, amounts previously withheld will be applied to the purchase of Common Stock on the Exercise Date (as defined below).

7. Interest. Interest will not be paid on any employee accounts.

8. Withdrawal of Funds. An employee may at any time up to a deadline established by the Committee or the Board, prior to the close of business on the last business day in a Plan Period, and for any reason, permanently draw out the balance accumulated in the employee's account, which will be paid in the local currency or, in Euros, at the discretion of the Board or the Committee if such employee is employed in a country which maintains a fixed exchange rate between its local currency and the Euro ("Repayment in Euros"), and thereby withdraw from participation in an Offering. Partial withdrawals are not permitted. The employee may not begin participation again during the remainder of the Plan Period. The employee may participate in any subsequent Offering in accordance with terms and conditions established by the Board or the Committee.

9. Purchase of Shares. On the Offering Commencement Date of each Plan Period, the Company will grant to each eligible employee who is then a participant in the Plan an option ("Option") to purchase on the last business day of such Plan Period (the "Exercise Date"), at the Option Price hereinafter provided for, the largest number of shares (fractional or whole) of Common Stock of the Company as does not exceed the number of shares determined by multiplying \$2,083 by the number of full months in the Offering Period and dividing the results by the closing price (as defined below) on the Offering Commencement Date of such Plan Period.

The purchase price for each share purchased will be 85% of the Fair Market Value of the Common Stock on (i) the first business day of such Plan Period or (ii) the Exercise Date, whichever Fair Market Value shall be less. Such Fair Market Value shall be (a) the closing price on any national securities exchange on which the Common Stock is listed, (b) the closing price of the Common Stock on the Nasdaq National Market or (c) the average of the closing bid price and asked price in the over-the-counter-market, whichever is applicable, as published in The Wall Street Journal. If no sales of Common Stock were made on such a day, the price of the Common Stock for purposes of clauses (a) and (b) above shall be based on the reported price for the next preceding day on which sales were made.

Each employee who continues to be a participant in the Plan on the Exercise Date shall be deemed to have exercised his Option at the Option Price on such date and shall be deemed to have purchased from the Company the number of shares of Common Stock (including fractional shares) reserved for the purpose of the Plan that his accumulated payroll deductions on such date will pay for, in United State currency as of that date, but not in excess of the maximum number

determined in the manner set forth above. The Board or the Committee may, in its discretion, limit the purchase to only whole shares and not fractional shares.

Any balance remaining in an employee's payroll deduction account at the end of a Plan Period will be automatically refunded to the employee in the local currency or at the discretion of the Committee or the Board there may be Repayment in Euros, except that any balance which is less than the purchase price of one share of Common Stock will be carried forward into the employee's payroll deduction account for the following Offering, unless the employee elects not to participate in the following Offering under the Plan, in which case the balance shall be refunded.

10. Issuance of Certificates. Certificates representing shares of Common Stock purchased under the Plan may be issued only in the name of the employee, in the name of the employee and another person of legal age as joint tenants with rights of survivorship, or (in the Company's sole discretion) in the name of a brokerage firm, bank or other nominee holder designated by the employee. The Company may, in its sole discretion and in compliance with applicable laws, authorize the use of book entry registration of shares in lieu of issuing stock certificates.

11. Rights on Retirement Death or Termination of Employment. In the event of a participating employee's termination of employment prior to the last business day of a Plan Period, no payroll deduction shall be taken from any pay due and owing to an employee and the balance in the employee's account shall be paid to the employee or, in the event of the employee's death, and subject to the terms of applicable law, (a) to a beneficiary previously designated in a revocable notice signed by the employee (with any spousal consent required under local law) or (b) in the absence of such a designated beneficiary, to the personal representative of the employee's estate or (c) if no such personal representative has been appointed to the knowledge of the Company, to such other person(s) as the Company may, in its discretion, designate. If, prior to the last business day of the Plan Period, the designated Subsidiary by which an employee is employed shall cease to be a subsidiary of the Company, or if the employee is transferred to a subsidiary of the Company that is not a Subsidiary under the Plan, the employee shall be deemed to have terminated employment for the purposes of this Plan.

12. Optionees Not Stockholders. Neither the granting of an Option to an employee nor the deductions from his pay shall constitute such employee a stockholder of the shares of Common Stock covered by an Option under this Plan until such shares have been purchased by and issued to him or to an account for his benefit. Notwithstanding the foregoing, in the event the Company effects a split of the Common Stock by means of a stock dividend (and the exercise price of and the number of shares subject to such Option are adjusted as of the date of the distribution of the dividend rather than as of the record date for such dividend), then an optionee who is deemed to have exercised an Option between the record date and the distribution date for such stock dividend shall be entitled to receive, on the distribution date, the stock dividend with respect to the shares of Common Stock.

13. Rights Not Transferable. Rights under this Plan are not transferable by a participating employee other than by will or the laws of descent and distribution, and are exercisable during the employee's lifetime only by the employee.

14. Application of Funds. To the extent consistent with applicable law, all funds received or held by the Company or any Subsidiary under this Plan may be combined with other corporate funds and may be used for any corporate purpose and transferred outside the country in which they are deducted from payroll.

15. Adjustment in Case of Changes Affecting Common Stock. In the event of a subdivision of outstanding shares of Common Stock, or the payment of a dividend in Common Stock, the number of shares approved for this Plan, and the share limitation set forth in Section 9, shall be increased proportionately, and such other adjustment shall be made as may be deemed equitable by the Board or the Committee. In the event of any other change affecting the Common Stock, such adjustment shall be made as may be deemed equitable by the Board or the Committee to give proper effect to such event.

16. Merger. If the Company shall at any time merge or consolidate with another corporation and the holders of the capital stock of the Company immediately prior to such merger or consolidation continue to hold at least 80% by voting power of the capital stock of the surviving corporation ("Continuity of Control"), the holder of each Option then outstanding will thereafter be entitled to receive at the next Exercise Date upon the exercise of such Option for each share as to which such Option shall be exercised the securities or property which a holder of one share of the Common Stock was entitled to upon and at the time of such merger or consolidation, and the Board or the Committee shall take such steps in connection with such merger or consolidation as the Board or the Committee shall deem necessary to assure that the provisions of Section 15 shall thereafter be applicable, as nearly as reasonably may be, in relation to the said securities or property as to which such holder of such Option might thereafter be entitled to receive thereunder.

In the event of a merger or consolidation of the Company with or into another corporation which does not involve Continuity of Control, or of a sale of all or substantially all of the assets of the Company while unexercised Options remain outstanding under the Plan, all outstanding Options shall be cancelled by the Board or the Committee as of the effective date of any such transaction, provided that notice of such cancellation shall be given to each holder of an Option, and each holder of an Option shall have the right to exercise such Option in full based on payroll deductions then credited to his account as of a date determined by the Board or the Committee, which date shall not be less than ten (10) days preceding the effective date of such transaction.

17. Amendment of the Plan. The Board may at any time, and from time to time, amend this Plan in any respect.

18. Insufficient Shares. In the event that the total number of shares of Common Stock specified in elections to be purchased under any Offering plus the number of shares purchased under previous Offerings under this Plan exceeds the maximum number of shares issuable under this Plan, the Board or the Committee will allot the shares then available on a pro rata basis.

19. Termination of the Plan. This Plan may be terminated at any time by the Board. Upon termination of this Plan all amounts in the accounts of participating employees shall be promptly refunded in local currency or at the discretion of the Committee or the Board there may be Repayment in Euros.

20. Governmental Regulations. The Company's obligation to sell and deliver Common Stock under this Plan is subject to listing on a U.S. national stock exchange or quotation on the Nasdaq National Market and the approval of all applicable governmental authorities required in connection with the authorization, issuance or sale of such stock.

21. Governing Law. The Plan shall be governed by Massachusetts law except to the extent that such law is preempted by U.S. federal law or other applicable law.

22. Issuance of Shares. Shares may be issued upon exercise of an Option from authorized but unissued Common Stock, from shares held in the treasury of the Company, or from any other proper source.

23. Notification upon Sale of Shares. Each employee agrees, by entering the Plan, to promptly give the Company notice of any disposition of shares purchased under the Plan.

24. Withholding. Each employee shall, no later than the date of the event creating the tax liability, make provision satisfactory to the Board for payment of any taxes required by law to be withheld in connection with any transaction related to Options granted to or shares acquired by such employee pursuant to the Plan. The Company may, to the extent permitted by law, deduct any such taxes from any payment of any kind otherwise due to an employee.

25. Effective Date. The Plan shall take effect on March 1, 2000.

26. Additional Conditions. The Committee or the Board may establish additional conditions or provisions for the participation of eligible employees in the Plan in order to comply with the tax, securities and other laws and regulation of the countries in which such employees reside, even if such conditions or provisions increase the benefits accruing to such employees under the Plan.

Adopted by the Board of Directors on February 18, 2000

Amended and Restated by the Board of Directors on August 1, 2002

FIRST AMENDED AND RESTATED CREDIT AGREEMENT

by and among

MKS INSTRUMENTS, INC.,
as Borrower,

FLEET NATIONAL BANK
as Agent and as Lender,

and

JPMORGAN CHASE BANK,
as Lender

Dated as of July 31, 2002

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FIRST AMENDED AND RESTATED CREDIT AGREEMENT

This First Amended and Restated Credit Agreement (the "Agreement") is entered into as of the 31st day of July, 2002, by and among Fleet National Bank ("Fleet"), JPMorgan Chase Bank ("Chase"; hereinafter Fleet and Chase may be referred to individually as a "Lender" or collectively as the "Lenders"), Fleet in its capacity as agent for the Lenders (in such capacity, together with any successor agent appointed in accordance with the terms of Section 10.8, the "Agent"), and MKS Instruments, Inc., a Massachusetts corporation ("Borrower").

Whereas Borrower, the Lenders and the Agent entered into a Credit Agreement dated as of July 31, 2001 (as amended, the "Original Credit Agreement"), which the parties now desire to amend and restate in order to modify certain terms thereof,

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 Original Credit 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:

"Accounts" shall mean, at any time, all accounts receivable of Borrower and its subsidiaries on a consolidated basis determined in accordance with GAAP appearing on the Borrower's consolidated balance sheet.

"Adjustment Date" shall mean the first day of the month immediately following the month in which a Compliance Certificate is to be delivered by the Borrower pursuant to Section 7.1(c).

"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 Commitment and the denominator of which shall be the Total 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 11.1.

"Applicable Margin" shall mean for each period commencing on an Adjustment Date through the date immediately preceding the next Adjustment Date, the applicable margin set forth below with respect to the Total Liabilities-To-Tangible Net Worth Ratio, as determined for the most recent fiscal quarter for which the Borrower has delivered its financial statements pursuant to Section 7.1(a) or (b) and Compliance Certificate pursuant to Section 7.1(c), provided that if and so long as the Total Outstandings exceed \$10,000,000, each applicable margin set forth below shall be increased by 0.50% (e.g., 2.00% would increase to 2.50%):

TOTAL LIABILITIES-TO-TANGIBLE NET WORTH RATIO	APPLICABLE MARGIN FOR LIBOR LOANS AND LETTER OF CREDIT FEE	APPLICABLE MARGIN FOR UNUSED COMMITMENT FEE
Greater than or equal to 0.50:1.00	2.00%	0.40%
Less than 0.50:1.00 but greater than or equal to 0.25:1.00	1.50%	0.40%
Less than 0.25:1.00	1.25%	0.30%

If for any reason the Borrower shall fail to deliver the financial statements or Compliance Certificate as required, the Applicable Margin shall in each case be the highest percentage set forth above.

"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 11.1.

"Base Rate" shall mean the higher of (a) the annual rate of interest announced from time to time by Fleet at Fleet'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 Fleet from three funds brokers of recognized standing selected by Fleet.

"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.

"Change in Control" shall be deemed to have occurred at such time after the date hereof that any person (other than, in the case of clause (ii) below, John R. Bertucci, together with its affiliates and associates (as defined in Rule 12b-2 under the Securities Exchange Act of 1934 (the "Exchange Act") or any successor rule thereto):

(i) shall file with the Securities and Exchange Commission and deliver to the Borrower a report under or in response to Schedule 13D or 14D-1 (or any successor schedule, form or report) pursuant to the Exchange Act disclosing that such person has become the beneficial owner (as defined in Rule 13D-3 under the Exchange Act, or any successor provisions) of more than 25% of the total voting power of all classes of voting stock of the Borrower or

(ii) shall succeed in having a sufficient number of its nominees elected to the board of directors of the Borrower such that such nominees so elected (whether new or continuing as directors) shall constitute a majority of the board of directors of the Borrower.

"Closing Date" shall mean the date of this Agreement.

"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 Commitment.

"Compliance Certificate" shall have the meaning set forth in Section 7.1(c).

"Consolidated Indebtedness" shall mean the Indebtedness of the Borrower and its Subsidiaries, determined on a consolidated basis in accordance with GAAP.

"Consolidated Net Cash" shall mean, at any time, the sum of the cash, Short Term Investments and Long Term Fixed Income Investments of the Borrower and its Subsidiaries, less Consolidated Indebtedness (excluding forward contracts for foreign currency).

"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 in accordance with GAAP.

"Consolidated Operating Loss" shall mean, for any period, operating loss for such period of the Borrower and its Subsidiaries, determined on a consolidated basis in accordance with GAAP.

"Consolidated Tangible Net Worth" shall mean, at any time, the stockholders' equity of the Borrower and its Subsidiaries determined in accordance with GAAP 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.

"Consolidated Total Liabilities" shall mean, at any time, all liabilities of the Borrower and its Subsidiaries on a consolidated basis that in accordance with GAAP are properly classified as liabilities on the Borrowers' consolidated balance sheet plus the sum of (i) the face amount of outstanding Letters of Credit, (ii) sales of receivables described in clause (f) of the definition of "Indebtedness" below and (iii) Synthetic Leases. In computing such aggregate liabilities, the "amount" of the liability with respect to any such sale of receivables shall be the amount of unrecovered capital or principal investment of the purchaser (other than the Borrower or any of its wholly-owned Subsidiaries) thereof, excluding amounts representative of yield or interest earned on such investment, and the "amount" of any Synthetic Lease shall be the stipulated loss value, termination value or other equivalent amount.

"Costs" shall have the meaning set forth in Section 11.4.

"Default" shall mean any event that, with the lapse of time, the giving of notice, or both, would become an Event of Default hereunder.

"ERISA" shall have the meaning set forth in Section 5.12.

"Event of Default" shall have the meaning set forth in Section 9.1.

"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.

"GAAP" shall mean generally accepted accounting principles.

"Hazardous Substances" shall mean any hazardous waste, as defined by 42 U.S.C. [sec] 6903(5), any hazardous substances, as defined by 42 U.S.C. [sec] 9601(14), any pollutant or contaminant, as defined by 42 U.S.C. [sec] 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 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,

(b) 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,

(c) Financing Lease Obligations of such Person,

(d) every reimbursement obligation of such Person with respect to letters of credit, bankers' acceptances or similar facilities issued for the account of such Person,

(e) every obligation of such Person under any Synthetic Lease,

(f) all sales by such Person of (i) accounts or general intangibles for money due or to become due, (ii) chattel paper, instruments or documents creating or evidencing a right to payment of money or (iii) other receivables (collectively "receivables"), whether pursuant to a purchase facility or otherwise, other than in connection with the disposition of the business operations of such Person relating thereto or a disposition of defaulted receivables for collection

and not as a financing arrangement, and together with any obligation of such Person to pay any discount, interest, fees, indemnities, penalties, recourse, expenses or other amounts in connection therewith, and

(g) every obligation of such Person (an "equity related purchase obligation") to purchase, redeem, retire or otherwise acquire for value any shares of capital stock of any class issued by such Person, any warrants, options or other rights to acquire any such shares, or any rights measured by the value of such shares, warrants, options or other rights.

"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.

"International Standby Practices" shall mean International Standby Practices (ISP98), International Chamber of Commerce Publication No. 590, or any successor code of standby letter of credit practices among banks adopted by the Issuing Bank in the ordinary course of its business as a standby letter of credit issuer and in effect at the time of issuance of such Letter of Credit.

"Investments" shall have the meaning set forth in Section 8.6.

"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.

"Lenders" shall mean the Lenders as of the date hereof so long as they maintain Commitments hereunder and any other institutions to which all or part of the Total Commitment is assigned hereafter.

"Letter of Credit" shall have the meaning set forth in Section 3.1.

"Letter of Credit Application" shall have the meaning set forth in Section 3.1.

"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 5.8.

"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 or any of its Affiliates in favor of the Lenders in connection with the transactions contemplated hereby.

"Long Term Fixed Income Investments" shall mean investment grade bonds with long-term debt ratings of A- or A3 or higher by at least one nationally recognized rating agency and maturities of three years or less.

"Maximum Draw" shall mean the maximum aggregate amount from time to time that beneficiaries may draw under outstanding Letters of Credit, as such aggregate amount may be reduced from time to time pursuant to the terms of the Letters of Credit.

"Material Subsidiary" shall mean each domestic Subsidiary of the Borrower (other than Massachusetts securities corporations) with gross revenues in excess of 5% of the total gross revenues of the Borrower and its Subsidiaries, determined on a consolidated basis, or assets in excess of 5% of the total assets of Borrower and its Subsidiaries, determined on a consolidated basis, in each case as of the end of Borrower's last fiscal quarter.

"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 8.2.

"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.

"Reimbursement Obligation" shall mean the Borrower's obligation to reimburse the Lender on account of any drawing under any Letter of Credit as provided in Section 3.2.

"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, provided that a minimum of two Lenders shall be required at any time. 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 Commitment.

"Revolver Termination Date" shall mean July 30, 2003 or any subsequent anniversary thereof if the Total Commitment shall have been renewed by the Lenders.

"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.

"Short Term Investments" shall mean short term investments as determined in accordance with GAAP.

"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.

"Synthetic Lease" shall mean any lease that is treated as an operating lease under GAAP and as a loan or financing for U.S. income tax purposes.

"Total Commitment" shall mean, subject to Section 2.1.3, a principal amount equal to \$40,000,000.

"Total Liabilities-to-Tangible Net Worth Ratio" shall have the meaning set forth in Section 8.10.

"Total Outstandings" shall mean at any time the sum of Revolving Credit Outstandings, the Maximum Draw and Unpaid Reimbursement Obligations.

"Uniform Customs" shall mean the Uniform Customs and Practice for Documentary Credits (1993 Revision), International Chamber of Commerce Publication No. 500 or any successor version thereto adopted by the Issuing Bank in the ordinary course of its business as a letter of credit issuer and in effect at the time of issuance of such Letter of Credit.

"Unpaid Reimbursement Obligation" shall mean any Reimbursement Obligation for which the Borrower does not reimburse the Lenders on the date specified in, and in accordance with, Section 3.2.

1.2 Accounting Terms. Accounting terms not specifically defined in this Agreement shall have the meanings given to them under GAAP.

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.

2.1.1 Except as provided in Section 2.1.2 hereof and 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 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 Total Outstandings shall not exceed the Total 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 one month shall be made at any time in a principal amount of less than \$1,000,000.

2.1.2 At any time on or prior to the date 90 days after the Closing, the Borrower may (so long as no Event of Default has occurred and is continuing) request that either Lender increase its Commitment up to an amount that would increase the Total Commitment to no more than \$50,000,000. If neither Lender is willing to increase its Commitment, the Borrower may during such period (so long as no Event of Default has occurred and is continuing) by irrevocable written notice to the Agent, request on one occasion that the Total Commitment be increased to an amount not greater than \$50,000,000 by engaging Fleet Securities, Inc. (the "Arranger") to locate one or more additional Lenders to hold Commitments for the requested increase (the "Syndication"). Fleet shall cause the Arranger to use commercially reasonable efforts to locate such additional Lenders including any potential lenders proposed by the Borrower. The Borrower shall provide all information requested by the Arranger and reasonably necessary for the successful completion of the Syndication, which information will be distributed on a confidential basis to selected financial institutions. In addition, the management of the Borrower, will, at the request of the Agent or the Arranger, make themselves and their advisors available at reasonable times to meet with and answer questions of potential lenders. In the event that the Borrower engages the Arranger, the Borrower shall not offer, or permit any of its Subsidiaries to offer, any debt or equity securities (other than Common Stock of the Borrower) prior to the completion of the Syndication except with the prior written consent of the Agent and the Arranger. The Borrower shall pay the Arranger an engagement fee as provided in a separate writing between the Borrower and the Arranger, of which one-half shall be payable on the date the Arranger is engaged and the balance shall be payable on the date on which a closing on the Syndication shall occur.

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.

2.2.4 Notwithstanding the notice requirement set forth above in this Section 2.2, the Lenders agree to make Advances to the Borrower sufficient to pay to the Issuing Bank any Unpaid Reimbursement Obligations on the date on which such Reimbursement Obligations become Unpaid Reimbursement Obligations. The Borrower hereby requests and authorizes the Lenders to make from time to time such Advances, which shall be Base Rate Loans, by means of paying Unpaid Reimbursement Obligations. The Borrower acknowledges and agrees that the making of such Advances shall, in each case, be subject in all respects to the provisions of this Agreement, including, without limitation, the limitations set forth in Section 2.1 and the requirements of the applicable conditions in ARTICLE VI. All actions taken by the Lenders pursuant to the provisions of this Section 2.2.4 shall be conclusive and binding on the Borrower.

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 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 LIBOR Rate plus the Applicable Margin; provided, however, that the Applicable Margin shall not be less than 1.50% prior to the first day of the month following the month in which the Borrower shall deliver to the Lenders the financial statements required by Section 7.1(b) for the year ended December 31, 2002 and related Compliance Certificate.

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 2% 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 the Applicable Margin multiplied by the average daily amount by which (a) the Total Commitment exceeds (b) the Total 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 September 30, 2002 to and on the Revolver Termination Date. Notwithstanding the foregoing, so long as any Lender fails to make available any portion of its 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 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.
LETTER OF CREDIT FACILITY

3.1 Letter of Credit Commitment.

3.1.1 Subject to the terms and conditions hereof, Fleet (the "Issuing Bank") at the risk of the Lenders to the extent of their Applicable Commitment Percentages, in reliance upon the representations and warranties of the Borrower contained herein, shall issue, extend and renew from time to time from the date hereof until but not including the date which is fourteen (14) days prior to the then scheduled Revolver Termination Date, for the account of the Borrower, standby and documentary letters of credit (each a "Letter of Credit"), in such form as may be requested by the Borrower and agreed to by the Issuing Bank so long as (i) the Borrower shall have executed and delivered a letter of credit application on the Issuing Bank's customary form (a "Letter of Credit Application"), (ii) after giving effect to such request, the sum of the aggregate Maximum Draw and all Unpaid Reimbursement Obligations shall not exceed \$10,000,000 at any one time and (iii) the sum of the principal amount of Total Outstandings shall not exceed the Total Commitment.

3.1.2 Each Letter of Credit Application shall be completed to the satisfaction of the Issuing Bank at least two Business Days prior to the desired date of issuance. In the event that any provision of any Letter of Credit Application shall be inconsistent with any provision of this Agreement, then the provisions of this Agreement shall, to the extent of any such inconsistency, govern.

3.1.3 Each Letter of Credit issued, extended or renewed hereunder shall, among other things, (a) provide for the payment of sight drafts for honor thereunder when presented in accordance with the terms thereof and when accompanied by the documents described therein, and (b) have an expiry date no later than the date which is fourteen (14) days (or, if the Letter of Credit is confirmed by a confirmer or otherwise provides for one or more nominated persons, forty-five (45) days) prior to the Revolver Termination Date. Each Letter of Credit so issued, extended or renewed shall be subject to the Uniform Customs or, in the case of a standby Letter of Credit, either the Uniform Customs or the International Standby Practices. The Issuing Bank shall give the other Lenders reasonably prompt notice of the issuance and amount of each Letter of Credit and the expiration of each Letter of Credit.

3.2 Reimbursement Obligation of the Borrower. In order to induce the Lenders to issue, extend and renew each Letter of Credit, the Borrower hereby agrees to reimburse the Lenders for or to pay to the Lenders with respect to each Letter of Credit issued, extended or renewed by the Lenders hereunder,

3.2.1 except as otherwise expressly provided in Section 3.2.2, on each date that any draft presented under such Letter of Credit is honored by the Issuing Bank, or the Issuing Bank otherwise makes a payment with respect thereto, (i) the amount paid by the Issuing Bank under or with respect to such Letter of Credit, and (ii) the amount of any taxes, fees, charges or other costs and expenses whatsoever incurred by the Issuing Bank in connection with any payment made by the Issuing Bank under, or with respect to, such Letter of Credit;

3.2.2 upon the termination of the Commitment, or the acceleration of the Reimbursement Obligations with respect to all Letters of Credit in accordance with ARTICLE IX an amount equal to the Maximum Draw, which amount shall be held by the Issuing Bank as cash collateral for all Reimbursement Obligations.

Unless funded by an Advance, each such payment shall be made to the Issuing Bank at its office at 100 Federal Street, Boston, Massachusetts 02110 in immediately available funds. Interest on any and all amounts remaining unpaid by the Borrower under this Section 3.2 and not required to be funded by an Advance pursuant to Section 2.2.4 at any time from the date such amounts become due and payable (whether as stated in this Section 3.2, by acceleration or otherwise) until payment in full (whether before or after judgment) shall be payable to the Issuing Bank on demand at the rate specified in Section 2.4.2 following an Event of Default.

3.3 Letter of Credit Payments. If any draft shall be presented or other demand for payment shall be made under any Letter of Credit, the Issuing Bank shall notify the Borrower of the date and amount of the draft presented or demand for payment and of the date and time when it expects to pay such draft or honor such demand for payment. The responsibility of the Issuing Bank to the Borrower shall be only to determine that the documents (including each draft) delivered under each Letter of Credit in connection with such presentment shall be in conformity in all material respects with such Letter of Credit.

3.4 Obligations Absolute. The Borrower's obligations under this ARTICLE III shall be absolute and unconditional under any and all circumstances and irrespective of the occurrence of any Default or Event of Default or any condition precedent whatsoever or any setoff,

counterclaim or defense to payment which the Borrower may have or have had against the Lenders or any beneficiary of a Letter of Credit. The Borrower further agrees with the Lenders that the Lenders shall not be responsible for, and the Reimbursement Obligations shall not be affected by, among other things, the validity or genuineness of documents or of any endorsements thereon, even if such documents should in fact prove to be in any or all respects invalid, fraudulent or forged, or any dispute between or among the Borrower, the beneficiary of any Letter of Credit or any financing institution or other party to which any Letter of Credit may be transferred or any claims or defenses whatsoever of the Borrower against the beneficiary of any Letter of Credit or any such transferee. The Lenders shall not be liable for any error, omission, interruption or delay in transmission, dispatch or delivery of any message or advice, however transmitted, in connection with any Letter of Credit. The Borrower agrees that any action taken or omitted by the Lenders under or in connection with each Letter of Credit and the related drafts and documents, if done in good faith, shall be binding upon the Borrower and shall not result in any liability on the part of the Lenders to the Borrower.

3.5 Reliance by Issuer. To the extent not inconsistent with Section 3.4, the Lenders shall be entitled to rely, and shall be fully protected in relying upon, any Letter of Credit, draft, writing, resolution, notice, consent, certificate, affidavit, letter, cablegram, telegram, telecopy, telex or teletype message, statement, order or other document believed by them to be genuine and correct and to have been signed, sent or made by the proper person or entity and upon advice and statements of legal counsel, independent accountants and other experts selected by the Lenders.

3.6 Letter of Credit Fees. The Borrower shall pay a fee to the Lenders in respect of each Letter of Credit equal to the Applicable Margin per annum multiplied by the face amount of such Letter of Credit. In addition, the Borrower shall pay to the Issuing Bank for its own account a fee of 1/8% per annum of the face amount of each Letter of Credit. Both fees shall be payable 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.

ARTICLE IV.
ADDITIONAL TERMS

4.1 Payments.

4.1.1 The Borrower shall have the right to prepay the Notes, in whole at any time or in part from time to time, without premium or penalty, provided that, except as set forth in Section 4.3, 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 4.3, 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 Total Outstandings exceed \$40,000,000, the Borrower will immediately pay the amount of such excess to the Agent.

4.1.2 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.

4.1.3 Whenever any payment to be made hereunder or under any other Loan Document shall be stated to be due on a day that is not a Business Day, such payment may be made on the next succeeding Business Day, and such extension of time shall in such case be included in computing interest or other fees or charges provided for under this Agreement or any other Loan Document; provided, however, that with respect to LIBOR Loans, if the next succeeding Business Day falls in another calendar month, such payment shall be made on the next preceding Business Day.

4.1.4 All payments made by the Borrower on 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 Sections 2.6 and 3.6 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.

4.1.5 The Borrower may elect to reduce or terminate the Commitment by a minimum principal amount of \$5,000,000 and integral multiples of \$1,000,000 but not by an amount greater than the Maximum Draw at such time, upon written notice to the Agent given by 10:00 a.m. Boston time at least five days prior to the date of such reduction or termination. The Borrower shall not be entitled to reinstate the Commitment following such reduction or termination.

4.1.6 If the Borrower sells any of its capital stock or other equity interests or any warrants, rights or options to acquire its capital stock or other equity interests other than sales of common stock upon the exercise of stock options held by employees and directors and sales of common stock under Borrower's employee stock purchase plan, the Borrower shall prepay its current Advances by the amount of the excess of the gross cash proceeds received from such sale after deduction of reasonable and customary transaction expenses (including without limitation, underwriting discounts and commissions) incurred in connection with such sale.

4.2 Capital Adequacy.

4.2.1 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 4.2.2, 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).

4.2.2 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 4.2 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 4.2 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 4.2. 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.

4.3 Special Provisions Governing LIBOR Loans. Notwithstanding any other provisions of this Agreement, the following provisions shall govern with respect to LIBOR Loans as to the matters covered:

4.3.1 Increased Costs, Illegality, etc. (a) In the event that the 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 4.3.1(b) as promptly as possible and, in any event, within the time period required by law.

(b) At any time that any LIBOR Loan is affected by the circumstances described in Section 4.3.1(a)(ii) or (iii), the Borrower may (and in the case of a LIBOR Loan affected pursuant to Section 4.3.1(a)(iii) shall) either (x) if the affected LIBOR Loan is then being made, withdraw the related Notice of Borrowing by giving the Agent telephonic (confirmed in writing) notice thereof on the same date that the Borrower was notified by the Agent pursuant to Section 4.3.1(a), or (y) if the affected LIBOR Loans are then outstanding, upon at least three Business Days' written notice to the Agent, require the Agent to convert each LIBOR Loan so affected into a Base Rate Loan.

4.3.2 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 4.3.1(b)(x) above), (ii) if any payment or prepayment of any LIBOR Loans occurs for any reason whatsoever (including, without limitation, by reason of Section 4.3.1(b)) on a date that is prior to the last day of an Interest Period applicable thereto, (iii) if any prepayment of any of its LIBOR Loans is not made on the date specified in a notice of payment given by the Borrower pursuant to Section 4.1 or (iv) as a consequence of an election made by the Borrower pursuant to Section 4.3.1(b)(y).

4.4 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 V.
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.

5.1 Organization, Existence and Power. Each of the Borrower and each Material Subsidiary is duly incorporated, validly existing and in good standing under the laws of the jurisdiction of its incorporation. Each of the Borrower and each Material Subsidiary 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. Each of

the Borrower and each Material Subsidiary is duly qualified or licensed to transact business in all places where the nature of the properties owned by it or the business conducted by it makes such qualification necessary and where the failure to be so qualified or licensed would have a material adverse effect upon the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole.

5.2 Authorization of Loan Documents; Binding Effect. The execution and delivery of this Agreement and the other Loan Documents and the performance of the transactions contemplated hereby and thereby have been duly authorized by all necessary corporate actions of the Borrower and each Material Subsidiary. Each of the Loan Documents constitutes the legal, valid and binding obligation of the Borrower, enforceable against the Borrower in accordance with its terms. Each Guaranty constitutes the legal, valid and binding obligation of the Material Subsidiary executing it, enforceable against such Material Subsidiary in accordance with its terms.

5.3 Authority. The Borrower has all requisite corporate power and authority to execute, deliver and perform its obligations under the Loan Documents. Each Material Subsidiary has all requisite corporate power and authority to execute, deliver and perform its obligations under its Guaranty. Neither the authorization, execution, delivery, or performance by the Borrower of this Agreement or of any other Loan Document nor the authorization, execution, delivery, or performance by each Material Subsidiary of its Guaranty 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 any Material Subsidiary, 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 or any Material Subsidiary pursuant to, any material instrument, agreement or other document to which the Borrower or any Material Subsidiary is a party or by which the Borrower, any Material Subsidiary or any of their properties may be bound or affected.

5.4 Capital Structure. The number of shares of stock of which the Borrower's authorized capital stock consists, the par value per share of such stock, the number of shares of such stock that have been issued and are outstanding and the number of shares that have been issued and are held by the Borrower as treasury shares are all disclosed on the Disclosure Schedule. Set forth on 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. The Disclosure Schedule sets forth the name of each Material Subsidiary.

5.5 Financial Condition. The audited consolidated balance sheet of the Borrower and its Subsidiaries dated as of December 31, 2001 and the unaudited consolidated balance sheet of the Borrower and its Subsidiaries dated as of March 31, 2002 (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 and its Material Subsidiaries have 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.

5.6 Pending Litigation. Except as set forth in the Disclosure Schedule, there are no suits or proceedings pending or, to the knowledge of the Borrower, threatened before any court or arbitration tribunal or by or before any governmental or regulatory authority, commission, bureau or agency or public regulatory body against the Borrower or any Material Subsidiary that if adversely determined would have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries taken as a whole.

5.7 Certain Agreements; Material Contracts. Neither the Borrower nor any Material Subsidiary is a party to any agreement or instrument or subject to any court order or governmental decree adversely affecting in any material respect the business, properties, assets or financial condition of the Borrower and its Subsidiaries taken as a whole.

5.8 Authorization, Etc. All authorizations, consents, approvals, accreditations, certifications and licenses required under the corporate charters or by-laws of the Borrower and its Material Subsidiaries or under applicable law or regulation for the ownership or operation of the property owned or operated by the Borrower or any Material Subsidiary or the conduct of any business or activity conducted by the Borrower or any Material Subsidiary, 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 and its Material Subsidiaries have fulfilled and performed all of their 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 or any Material Subsidiary have been made, other than any such filings or registrations as to which the failure to make same would not have a material adverse effect on the consolidated financial condition, assets or results of operations of the Borrower and its Subsidiaries, taken as a whole. Except as expressly contemplated hereby, no approval, consent or authorization of or filing or registration with any governmental commission, bureau or other regulatory authority or agency is required with respect to the execution, delivery or performance of any of the Loan Documents.

5.9 No Violation. The execution, delivery and performance by the Borrower of the Loan Documents and by each Material Subsidiary of its Guaranty do not and will not violate any provision of law or regulation applicable to the Borrower or any Material Subsidiary, or any writ, order or decree of any court or governmental or regulatory authority or agency applicable to the Borrower or any Material Subsidiary. Neither the Borrower nor any Material Subsidiary is 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 or any Material Subsidiary 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. Neither the Borrower nor any Material Subsidiary is 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," neither the Borrower nor any Material Subsidiary has received notice of any violation of any federal, state or local environmental law, rule or regulation or assertion that the Borrower or any Material Subsidiary has any obligation to clean up or contribute to the cost of cleaning up any waste or pollutants.

5.10 Payment of Taxes. The Borrower and its Subsidiaries have properly prepared and filed or caused to be properly prepared and filed all federal tax returns and all material state and local tax returns that are required to be filed and have paid all taxes shown thereon to be due and all other taxes, assessments and governmental charges or levies imposed upon the Borrower and its Subsidiaries, their income or profits or any properties belonging to the Borrower. No extensions of any statute of limitations are in effect with respect to any tax liability of the Borrower or any Subsidiary of the Borrower. No deficiency assessment or proposed adjustment of the federal income taxes of the Borrower or any Subsidiary of the Borrower is pending and the Borrower has no knowledge of any proposed liability of a substantial nature for any tax to be imposed upon any of its properties or assets.

5.11 Transactions With Affiliates, Officers, Directors and 1% Shareholders. Except as set forth on the Disclosure Schedule, neither the Borrower nor any Material Subsidiary has any Indebtedness to or material contractual arrangement or understanding with any Affiliate, officer or director of the Borrower or any Material Subsidiary, nor any shareholder holding of record at least 1% of the equity of the Borrower or any Material Subsidiary nor, to the best of the Borrower's knowledge (without independent inquiry), any of their respective relatives.

5.12 ERISA. Neither the Borrower nor any Material Subsidiary has ever 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 or any Material Subsidiary 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 or any Material Subsidiary any prohibited transaction within the meaning of ERISA or Section 4975 of the Internal Revenue Code. Neither the Borrower nor any Material Subsidiary has ever maintained, contributed to or been obligated to contribute to any "multiemployer plan," as defined in Section 3(37) of ERISA. Neither the Borrower nor any Material Subsidiary has ever incurred any "withdrawal liability" calculated under Section 4211 of ERISA, and there has been no event or circumstance that would cause the Borrower or any Material Subsidiary to incur any such liability.

5.13 Ownership of Properties; Liens. The Borrower and its Subsidiaries have good and marketable title to all their material properties and assets, real and personal, that are now carried on their books, including, without limitation, those reflected in the Financial Statements (except those disposed of in the ordinary course since the date thereof), and have valid leasehold interests in their properties and assets, real and personal, which they purport 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 material leasehold interests and material obligations with respect to real property of the Borrower and its Subsidiaries are described on the Disclosure Schedule.

5.14 Employment Matters. Except as set forth on the Disclosure Schedule, there are no material grievances, disputes or controversies pending or, to the knowledge of the Borrower, threatened between the Borrower and its employees or any Material Subsidiary and its employees, nor is any strike, work stoppage or slowdown pending or threatened against the Borrower or any Material Subsidiary.

5.15 Insurance. Each of The Borrower and each Material Subsidiary maintains in force fire, casualty, comprehensive liability and other insurance covering its properties and business that is adequate and customary for the type and scope of its properties and business.

5.16 Indebtedness. Except as reflected in the Financial Statements or set forth in the Disclosure Schedule, and other than Indebtedness incurred in the ordinary course of business since the Balance Sheet Date, the Borrower and its Material Subsidiaries have no outstanding Indebtedness.

5.17 Securities Law Compliance. Neither the Borrower nor any Material Subsidiary is an "investment company" as defined in the Investment Company Act of 1940, as amended. All of the Borrower's and each Material Subsidiary's outstanding stock was offered, issued and sold in compliance with all applicable state and federal securities laws.

5.18 Accuracy of Information. None of the information furnished to the Lenders by or on behalf of the Borrower or any Material Subsidiary for purposes of this Agreement or any Loan Document or any transaction contemplated hereby or thereby contains, and none of such information hereinafter furnished will contain any material misstatement of fact, nor does or will any such information omit any material fact necessary to make such information not misleading at such time.

ARTICLE VI.
CONDITIONS TO ADVANCES

The Lenders shall not be obligated to make any Advances unless the following conditions have been satisfied:

6.1 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 V of this Agreement are untrue as a result of circumstances that have changed subsequent to the date hereof, which change has caused no non-compliance by the Borrower with the covenants, conditions and agreements in this Agreement and (ii) except that the references in Section 5.5 of this Agreement to the financial statements and the term "Balance Sheet Date" are deemed to refer to the most recent financial statements (inclusive of consolidated balance sheets and statements of operations, cash flows and stockholders' equity of the Borrower and its Subsidiaries) furnished to the Lenders pursuant to Section 7.1(a) and (b) of this Agreement and the date of such financial statements, respectively.

(c) No Litigation; Certain Other Conditions. There shall be no suit or proceeding (other than suits or proceedings disclosed on the Disclosure Schedule on the date of this Agreement) pending or threatened before any court or arbitration tribunal or by or before any governmental or regulatory authority, commission, bureau or agency or public regulatory body that, if determined adversely to the Borrower or any Subsidiary of the Borrower, is reasonably likely to have a material adverse effect on the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole.

(d) No Material Adverse Change. There shall have been no material adverse change in the consolidated financial condition or results of operations of the Borrower and its Subsidiaries taken as a whole since the Balance Sheet Date.

(e) Loan Documents. All Loan Documents shall be in full force and effect.

6.2 First Advance. 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 all states in which it is qualified to do business, 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 or treasurer dated the Advance Date or Closing Date, as the case may be, to the effect that each of the conditions set forth in the foregoing Section 6.1 has been met as of such date; and

(vi) an executed guaranty of the Obligations in form and substance acceptable to the Lenders (a "Guaranty") from each Material Subsidiary.

(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 VII.
AFFIRMATIVE COVENANTS OF THE BORROWER

The Borrower covenants and agrees that from the date of execution of this Agreement and until the payment in full of the principal of and interest upon the Notes and payment and performance of all other Obligations, unless the Required Lenders shall otherwise consent in writing:

7.1 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 beginning with the quarter ended June 30, 2002, (i) an unaudited consolidated and consolidating balance sheet of the Borrower and its Subsidiaries as of the end of such quarter and (ii) unaudited 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 or treasurer 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 or treasurer 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 7.1(a) and (b), a certificate signed by the chief financial officer or treasurer 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 Material 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 or treasurer 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;

(i) Promptly after Borrower becomes aware thereof, written notice of any noncompliance with ERISA that with the passage of time, the giving of notice or otherwise, is reasonably likely to result in a liability to the Borrower in excess of \$1,000,000; and

(j) 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.

7.2 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 proceeds exceeding \$6,000,000.

7.3 Maintenance of Business and Properties; Insurance.

(a) The Borrower will continue to engage in business of the same general nature as the business currently engaged in by the Borrower. The Borrower will at all times maintain, preserve and protect all material franchises and trade names and preserve all the Borrower's material tangible property used or useful in the conduct of its business and keep the same in good repair, working order and condition, ordinary wear and tear excepted, and from time to time make all needful and proper repairs, renewals, replacements, betterments, and improvements thereto so that the business carried on in connection therewith may be conducted properly and advantageously at all times; provided that nothing in this Section 7.3 shall prevent the Borrower from discontinuing the operation and maintenance of any of its properties or any of those of its Subsidiaries (including the voluntary liquidation and dissolution of a Subsidiary other

than a Material Subsidiary) if such discontinuance is, in the judgment of the Borrower, desirable in the conduct of its or their business and does not materially adversely affect the business of the Borrower and its Subsidiaries on a combined basis.

(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.

7.4 Payment of Taxes. The Borrower shall pay and discharge, or cause to be paid and discharged, all material taxes, assessments, and governmental charges or levies imposed upon the Borrower and its Subsidiaries or their income or profits, or upon any other properties belonging to the Borrower prior to the date on which penalties attach thereto, and all lawful claims that, if unpaid, might become a lien or charge upon any material properties of the Borrower, except for such taxes, assessments, charges, levies or claims as are being contested by the Borrower in good faith by appropriate proceedings promptly initiated and diligently prosecuted, for which adequate book reserves have been established in accordance with generally accepted accounting principles, as to which no foreclosure, distraint, sale or other similar proceedings shall have been commenced, or, if commenced, have been effectively stayed.

7.5 Compliance with Laws, etc. The Borrower shall comply with the requirements of all applicable laws, rules, regulations and orders of any governmental authority, and obtain or maintain all Licenses required under applicable law or regulation for the operation of the Borrower's business, where noncompliance or failure to obtain or maintain would have a material adverse effect on the consolidated financial condition, assets, or results of operations of the Borrower and its Subsidiaries taken as a whole; provided, however, that such compliance or the obtaining of such Licenses may be delayed while the applicability or validity of any such law, rule, regulation or order or the necessity for obtaining any such License is being contested by the Borrower in good faith by appropriate proceedings promptly initiated and diligently prosecuted.

7.6 Books, Records and Accounts. The Borrower shall keep true and correct books, records and accounts, in which entries will be made in accordance with generally accepted accounting principles consistently applied, and that shall comply with the requirements of the Foreign Corrupt Practices Act of 1977 to the extent applicable to the Borrower. 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.

7.7 Further Assurances. The Borrower shall execute and deliver, at the Borrower's expense, all notices and other instruments and documents and take all actions, including, but not limited to, making all filings and recordings, that 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.

7.8 Bank Accounts. The Borrower shall maintain its principal operating accounts with the Agent.

7.9 Guaranties. The Borrower shall cause any Subsidiary that becomes a Material Subsidiary promptly thereafter to execute and deliver a Guaranty to the Agent.

ARTICLE VIII.
NEGATIVE COVENANTS OF THE BORROWER

The Borrower covenants and agrees that from the date of execution of this Agreement and until the payment in full of the principal of and interest upon the Notes and payment and performance of all other Obligations, unless the Required Lenders shall otherwise consent in writing, the Borrower will not, and will not cause or permit any of its Subsidiaries to:

8.1 Sale of Assets; Mergers, Etc.

(a) Sale of Assets. Except for sales 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 five percent (5%) of Borrower's Consolidated Tangible Net Worth.

(b) Mergers, Etc. 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, or sell, assign, lease or otherwise dispose of any or all of its assets to, 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 between the date hereof and the Revolver Termination Date, including all contingent liabilities, when aggregated

with all such acquisitions and any Investments permitted under Section 8.6(3) during such period shall not exceed the greater of \$25,000,000 or the sum equal to 20% of Consolidated Net Cash at such time, and if 80% or more of the purchase price is paid in capital stock of the Borrower, such aggregate purchase price liability shall not exceed 30% of Consolidated Tangible Net Worth as of the end of the most recent fiscal quarter, (iii) in the case of an acquisition of an entity that would be deemed to be a Material Subsidiary upon consummation of such acquisition, based on a pro forma calculation of the ratios set forth in Sections 8.9 - 8.11 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 Sections 8.9 - 8.11, and (iv) all contingent liability and contingent payment obligations incurred by Borrower or any of its Subsidiaries in connection with such transaction shall be reasonably acceptable to the Agent.

8.2 Liens and Encumbrances.

(a) Create, incur, assume or permit to exist any of its real or personal property, whether now owned or subsequently acquired, to be subject to any Lien other than Liens described below (which may herein be referred to as "Permitted Liens"):

(1) Liens securing the payment of taxes, assessments or governmental charges or levies or the demands of suppliers, mechanics, carriers, warehousemen, landlords and other like Persons, which payments are not yet due and payable or (as to taxes) may be paid without interest or penalty; provided, that, if such payments are due and payable, such Liens shall be permitted hereunder only to the extent that (A) all claims that the Liens secure are being actively contested in good faith and by appropriate proceedings, (B) adequate book reserves have been established with respect thereto to the extent required by generally accepted accounting principles, and (C) such Liens do not in the aggregate materially interfere with the owning company's use of property necessary or material to the conduct of the business of the Borrower and its Subsidiaries taken as a whole;

(2) Liens incurred or deposits made in the ordinary course of business (A) in connection with worker's compensation, unemployment insurance, social security and other like laws, or (B) to secure the performance of letters of credit, bids, tenders, sales contracts, leases, statutory obligations, surety, appeal and performance bonds and other similar obligations, in each case not incurred in connection with the borrowing of money, the obtaining of advances or the payment of the deferred purchase price of property;

(3) Liens not otherwise described in Section 8.2(a)(1) or (2) that are incurred in the ordinary course of business and are incidental to the conduct of its business or ownership of its property, were not incurred in connection with the

borrowing of money, the obtaining of advances or the payment of the deferred purchase price of property and do not in the aggregate materially detract from the value of, or materially interfere with the owning company's use of, property necessary or material to the conduct of the business of the Borrower and its Subsidiaries taken as a whole;

(4) Liens in favor of the Agent for the benefit of the Lenders;

(5) Judgment liens or attachments that shall not have been in existence for a period longer than 30 days after the creation thereof, or if a stay of execution shall have been obtained, for a period longer than 30 days after the expiration of such stay or if such an attachment is being actively contested in good faith and by appropriate proceedings, for a period longer than 30 days after the creation thereof;

(6) Liens existing as of the Closing Date and disclosed on the Disclosure Schedule hereto;

(7) Liens provided for in equipment or Financing Leases (including financing statements and undertakings to file financing statements) provided that they are limited to the equipment subject to such leases and the proceeds thereof;

(8) Leases or subleases with third parties or licenses and sublicenses granted to third parties not interfering in any material respect with the business of the Borrower or any Subsidiary of the Borrower;

(9) Any Lien on any asset of any corporation existing at the time such corporation is merged into or consolidated with (or acquired in accordance with Section 8.1(b) by) the Borrower or a Subsidiary of the Borrower and not created in contemplation of such event;

(10) Any Lien existing on any asset prior to the acquisition thereof by the Borrower or any Subsidiary of the Borrower and not created in contemplation of such event;

(11) Liens in respect of any purchase money obligations for tangible property used in its business, 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;

(12) Easements, rights of way, restrictions and other similar charges or Liens relating to real property and not interfering in a material way with the ordinary conduct of its business;

(13) Liens on its property or assets created in connection with the refinancing of Indebtedness secured by Permitted Liens on such property, provided that the amount of Indebtedness secured by any such Lien shall not be

increased as a result of such refinancing and no such Lien shall extend to property and assets of the Borrower or any Subsidiary not encumbered prior to any such refinancing; and

(14) Cash collateral not to exceed 497,463 Pounds Sterling delivered to Chase with respect to Borrower's Letters of Credit issued by Chase for account party MKS Instruments UK Limited in an aggregate amount not exceeding 497,463 Pounds Sterling.

(b) In case any property is subjected to a Lien in violation of Section 8.2(a), the Borrower will make or cause to be made provision whereby the Notes will be secured equally and ratably with all other obligations secured by such property, and in any case the Notes shall have the benefit, to the full extent that the holders may be entitled thereto under applicable law, of an equitable Lien equally and ratably securing the Notes. Such violation of Section 8.2(a) shall constitute an Event of Default hereunder, whether or not any such provision is made pursuant to this Section 8.2(b).

(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).

(d) (i) Cause or permit or (ii) agree or consent to cause or permit in the future (upon the happening of a contingency or otherwise), any of its equity interests in any Subsidiary to be subject to any Lien (including any Permitted Lien).

8.3 Sales and Leasebacks. 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).

8.4 Indebtedness. Create, incur or assume any Indebtedness other than:

(1) Indebtedness to the Lenders pursuant to this Agreement;

(2) Financing Lease Obligations, not to exceed \$10,000,000 in the aggregate at any one time outstanding;

(3) Endorsements for collection, deposit or negotiation and warranties of products or services, in each case incurred in the ordinary course of business;

(4) Indebtedness of the Borrower owing to Subsidiaries that is subordinated to the payment of the Obligations pursuant to an agreement in the form of Exhibit E hereto in an aggregate principal amount at any time outstanding not to exceed \$50,000,000;

(5) Indebtedness of the Borrower owing to Subsidiaries not otherwise permitted by this Section 8.4 in an aggregate principal amount at any time outstanding not to exceed \$5,000,000;

(6) Indebtedness of Subsidiaries owing to the Borrower not otherwise permitted by this Section 8.4 in an aggregate principal amount at any time outstanding not to exceed \$15,000,000;

(7) Indebtedness of any wholly-owned Subsidiary owing to any other wholly-owned Subsidiary;

(8) Guarantees by Material Subsidiaries of the Obligations;

(9) Indebtedness with respect to Investments permitted by Section 8.6(3) so long as such entities remain Subsidiaries or Affiliates of the Borrower; and

(10) Indebtedness not included above and listed on the Disclosure Schedule.

8.5 Dividends and Distributions. Declare or pay, directly or indirectly, any dividend (other than a dividend payable solely in the Common Stock of the Borrower) or make any other distribution (by reduction of capital or otherwise), whether in cash, property, securities or a combination thereof, with respect to any shares of its capital stock or, directly or indirectly, except to the extent permitted by Section 7.2 hereof, redeem, purchase, retire or otherwise acquire for value any shares of any class of its capital stock or set aside any amount for any such purpose; provided, however, that any Subsidiary of the Borrower may declare and pay dividends or make other distributions to the Borrower or another Subsidiary.

8.6 Investments. Except as permitted by Section 8.1, 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 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 and short term bond funds with individual maturities under three years and aggregate ratings of A- or A3 or higher by at least one nationally recognized rating agency) that in the aggregate shall not exceed \$5,000,000;

(10) Investments in the form of advances to employees in the ordinary course of business for moving, entertainment, travel and other similar expenses, but not more than \$3,000,000 in the aggregate outstanding at any time; and

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

8.7 Transactions with Affiliates. Enter into any transaction (including the purchase, sale or exchange of property or the rendering of any service) with any Affiliate except upon fair and reasonable terms that are at least as favorable to the Borrower or the Subsidiary as would be obtained in a comparable arm's-length transaction with a non-Affiliate.

8.8 ERISA Compliance. Permit any employee pension benefit plan (as such term is defined in Section 3 of ERISA) maintained by the Borrower or any of its Subsidiaries or in which employees of the Borrower or any of its Subsidiaries is entitled to participate to:

- (a) engage in any "prohibited transaction" as such term is defined in Section 4975 of the Internal Revenue Code of 1986, as amended, or described in Section 406 of ERISA;
- (b) incur any "accumulated funding deficiency" as such term is defined in Section 302 of ERISA, whether or not waived; or
- (c) terminate under circumstances that could result in the imposition of a Lien on the property of the Borrower or any Subsidiary of the Borrower pursuant to Section 4068 of ERISA.

8.9 Tangible Net Worth Test. Permit the Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower to be less than the sum of (i) \$260,000,000, plus (ii) 80% of Consolidated Net Income (excluding losses), plus (iii) the net proceeds of any equity securities sold by the Borrower after June 30, 2002, for each consecutive fiscal quarter of the Borrower beginning with the quarter ended June 30, 2002, on a cumulative basis.

8.10 Total Liabilities-to-Tangible Net Worth Ratio. Permit the ratio ("Total Liabilities-to-Tangible Net Worth Ratio") of the Consolidated Total Liabilities as of the end of each fiscal quarter of the Borrower beginning with the fiscal quarter ended June 30, 2002 to its Consolidated Tangible Net Worth as of the end of each fiscal quarter of the Borrower beginning with the fiscal quarter ended June 30, 2002 to exceed 1 to 1.

8.11 Consolidated Net Cash Test. Permit the Consolidated Net Cash at any time to be less than \$65,000,000.

8.12 Capital Expenditures. Make capital expenditures that in the aggregate and on a consolidated basis exceed during each fiscal quarter of the Borrower the sum of \$10,000,000 plus the amount by which such expenditures during the immediately preceding quarter, beginning with the quarter ended June 30, 2002, were less than \$10,000,000.

8.13 Consolidated Operating Loss Test. Permit the Consolidated Operating Loss as of the end of each fiscal quarter of the Borrower beginning with the quarter ended June 30, 2002 to be greater than 10% of Consolidated Tangible Net Worth.

8.14 Contracts Prohibiting Compliance with Agreement. Enter into any contract or other agreement that would prohibit or in any way restrict the ability of the Borrower to comply with any provision of this Agreement.

ARTICLE IX.
EVENTS OF DEFAULT

9.1 Default. If any one of the following events ("Events of Default") shall occur:

- (a) Any representation or warranty made by the Borrower herein or in any other Loan Document, or in any certificate or report furnished by the Borrower hereunder or thereunder, shall prove to have been incorrect in any material respect when made;

(b) Payment of any principal or interest due under any Note shall not be made on or before the date due;

(c) A final judgment or settlement for in excess of \$3,000,000 shall be rendered against or agreed to by the Borrower or any of its Subsidiaries for the payment of money that, after deducting the amount of any insurance proceeds paid or payable to or on behalf of the Borrower or its Subsidiary in connection with such judgment or settlement, as the case may be, is in excess of \$3,000,000, 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 (except to the extent explicitly permitted by this Agreement), 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 domestic 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 \$500,000 against the Borrower or any Subsidiary;

(g) Default shall be made in the due observance or performance of any covenant or agreement under Article VIII;

(h) Default shall be made in the due observance or performance of any covenant or agreement contained herein (and not constituting an Event of Default under any other clause in this Article IX) or in any other Loan Document or in any other agreement between 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 \$500,000 by the Borrower or any of its Subsidiaries;

(j) There shall occur a Change in Control;

(k) There shall occur any material adverse change in the financial condition of the Borrower;

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.

9.2 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.

9.3 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.

9.4 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.

9.5 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 IX, 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 11.4;

(b) amounts due to the Agent pursuant to Section 10.10 and to the Arranger pursuant to Section 2.1.3;

(c) payments of interest on the Notes to be applied for the ratable benefit of the Lenders;

(d) payments of principal of the 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 X.
THE AGENT

10.1 Appointment. Each Lender hereby irrevocably designates and appoints Fleet as the Agent for the Lenders under this Agreement, and each of the Lenders hereby irrevocably authorizes Fleet 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.

10.2 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.

10.3 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.

10.4 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.

10.5 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.

10.6 Indemnification. Each of the Lenders agrees to indemnify the Agent in its capacity as such (to the extent not reimbursed by the Borrower and without limiting any obligations of the Borrower to do so), ratably according to the respective principal amount of the Notes held by them (or, if no Notes are outstanding, ratably in accordance with their respective Applicable Commitment Percentages as then in effect) from and against any and all liabilities, obligations, losses (excluding any losses suffered by the Agent as a result of Borrower's failure to pay any fee owing to the Agent), damages, penalties, actions, judgments, suits, costs, expenses or disbursements of any kind or nature whatsoever that may at any time (including without limitation at any time following the payment of the Notes) be imposed on, incurred by or asserted against the Agent in any way relating to or arising out of any Loan Document or any other Document contemplated by or referred to therein or the transactions contemplated thereby or any action taken or omitted by the Agent under or in connection with any of the foregoing; provided that no Lender shall be liable for the payment of any portion of such liabilities, obligations, losses, damages, penalties, actions, judgments, suits, costs, expenses or disbursements resulting from the Agent's gross negligence or willful misconduct. The agreements in this subsection shall survive the payment of the Obligations and the termination of this Agreement.

10.7 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 and shall have the right to determine the order in which amounts are applied to such obligations.

10.8 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 10.8 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 X shall inure to its benefit as to any actions taken or omitted to be taken by it while it was Agent under this Agreement.

10.9 Sharing of Payments, Etc. Each Lender agrees that if it shall, through the exercise of a right of banker's lien, set-off, counterclaim or otherwise, obtain payment with respect to its Obligations (other than pursuant to Article VI) 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 4.2 or 4.3), then (a) such Lender shall be deemed to have simultaneously purchased from the other Lenders a share in their Obligations so that the amount of the Obligations held by each of the Lenders shall be pro rata and (b) such other adjustments shall be made from time to time as shall be equitable to insure that the Lenders share such payments ratably; provided, however, that for purposes of this Section 10.9, the term "pro rata" shall be determined with respect to the 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 10.9 shall be rescinded to the extent of such recovery, without interest. The Borrower expressly consents to the foregoing arrangements and agrees that each Lender so purchasing a portion of the other Lenders' Obligations may exercise all rights of payment (including, without limitation, all rights of set-off, banker's lien or counterclaim) with respect to such portion as fully as if such Lender were the direct holder of such portion.

10.10 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 XI. MISCELLANEOUS

11.1 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 Commitment that shall be assigned is \$1,000,000, (iv) such assignee shall have an office located in the United States, (v) the assigning Lender shall pay the Agent a transaction fee of \$2500, and (vi) no consent of the Borrower or the Agent shall be required in connection with any assignment by a Lender to another Lender or to an Affiliate of any Lender. Upon such execution, delivery, approval and acceptance, from and after the effective date specified in each Assignment and Acceptance, (x) the assignee thereunder shall be a party hereto and, to the extent that rights and obligations hereunder or under any such Note have been assigned or negotiated to it pursuant to such Assignment and Acceptance, have the rights and obligations of a Lender hereunder and a holder of such Note and (y) the assignor thereunder shall, to the extent that rights and obligations hereunder or under such Note have been assigned or negotiated by it pursuant to such Assignment and Acceptance, relinquish its rights and be released from its obligations under this Agreement.

(b) By executing and delivering an Assignment and Acceptance, the Lender assignor thereunder and the assignee thereunder confirm to and agree with each other and the other parties hereto as follows: (i) the assignment made under such Assignment and Acceptance is made under such Assignment and Acceptance without recourse; (ii) such assigning Lender makes no representation or warranty and assumes no responsibility with respect to the financial condition of the Borrower or its Subsidiaries or the performance or observance by the Borrower of any of its obligations under any Loan Document or any other instrument or Document furnished pursuant hereto; (iii) such assignee confirms that it has received a copy of this Agreement, together with copies of the financial statements delivered pursuant to Section 5.5 or Section 7.1, 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.

11.2 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.

11.3 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.

11.4 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 LLP, 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.

11.5 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:

Fleet National Bank
100 Federal Street
Boston, Massachusetts 02110
Attn: Mr. Daniel G. Head, Jr., Director
Telecopier No. (617) 434-0819

with a copy to:

Arlene L. Bender, Esq.
Foley Hoag LLP
155 Seaport Boulevard
Boston, Massachusetts 02210
Telecopier No. (617) 832-7000

(b) If to the Borrower:

MKS Instruments, Inc.
Six Shattuck Road
Andover, Massachusetts 01810
Attn: Mr. Ronald C. Weigner, CFO
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.

11.6 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).

11.7 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.

11.8 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

11.9 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 11.9 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 11.9.

11.10 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 4.1.4, Section 10.9 or this Section 11.10, 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 Commitment of any Lender or the Total 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.

11.11 Headings. The headings of this Agreement are for convenience only and are not to affect the construction of or to be taken into account in interpreting the substance of this Agreement.

11.12 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.

11.13 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.

11.14 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.

11.15 Compliance with Covenants. All computations determining compliance with Article VIII shall utilize accounting principles in conformity with those used in the preparation of the financial statements referred to in Section 5.5. If any subsequent financial reports of the Borrower shall be prepared in accordance with accounting principles different from those used in the preparation of the financial statements referred to in Section 5.5, the Borrower shall inform

the 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.

11.16 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.

11.17 WAIVER OF TRIAL BY JURY. THE BORROWER WAIVES ANY AND ALL RIGHTS THAT IT MAY HAVE TO A TRIAL BY JURY ON ANY CLAIM OR ACTION, OF ANY NATURE WHATSOEVER, RELATING TO OR ARISING OUT OF THIS AGREEMENT OR ANY OF THE OTHER LOAN DOCUMENTS.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as an agreement under seal as of the date first above written.

Witness: MKS INSTRUMENTS, INC.

JM Tocci By: /s/ Ronald C. Weigner

Title: Vice President and Chief_Financial Officer

FLEET NATIONAL BANK

By: /s/ Daniel G. Head Jr.

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

JPMORGAN CHASE BANK

By: /s/ Neil Sweeny

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

EXHIBIT A

Lender	Commitment	Applicable Commitment Percentage
Fleet National Bank	\$24,000,000	60%
JP Morgan Chase Bank	\$16,000,000	40%
	-----	-----
	\$40,000,000	100%

REVOLVING CREDIT NOTE

\$24,000,000

Boston, Massachusetts

July 31, 2002

FOR VALUE RECEIVED, MKS INSTRUMENTS, INC., a Massachusetts corporation having its principal place of business located in Andover, Massachusetts (the "Borrower"), hereby promises to pay to the order of FLEET NATIONAL BANK (the "Lender"), in its individual capacity, at the office of FLEET NATIONAL BANK, as agent for the Lender (the "Agent"), located at 100 Federal Street, Boston, Massachusetts (or at such other place or places as the Agent may designate in writing) at the times set forth in the First Amended and Restated Credit Agreement dated as of July 31, 2002, as it may be amended, among the Borrower, the financial institutions party thereto (collectively, the "Lenders") and the Agent (the "Agreement" -- all capitalized terms not otherwise defined herein shall have the respective meanings set forth in the Agreement), in lawful money of the United States of America, in immediately available funds, the principal amount of TWENTY-FOUR MILLION DOLLARS (\$24,000,000) or, if less than such principal amount, the aggregate unpaid principal amount of all Advances made by the Lender to the Borrower pursuant to the Agreement, on the Revolver Termination Date or such earlier date as may be required pursuant to the terms of the Agreement, and to pay interest from the date hereof on the unpaid principal amount hereof, in like money, at said office, on the dates and at the rates provided in the Agreement. All or any portion of the principal amount of Advances may be prepaid as provided in the Agreement.

If payment of all sums due hereunder is accelerated under the terms of the Agreement or under the terms of the other Loan Documents executed in connection with the Agreement, the then remaining principal amount and accrued but unpaid interest shall bear interest, which shall be payable on demand, at the rate per annum set forth in Section 2.4.2 of the Agreement. Further, in the event of such acceleration, this Revolving Credit Note shall become immediately due and payable, without presentation, demand, protest or notice of any kind, all of which are hereby waived by the Borrower.

In the event this Revolving Credit Note is not paid when due at any stated or accelerated maturity, the Borrower agrees to pay, in addition to the principal and interest, all costs of collection, including reasonable attorneys' fees, and interest thereon at the rates set forth above.

Interest hereunder shall be computed as provided in the Agreement.

This Revolving Credit Note is one of the Revolving Credit Notes referred to in the Agreement and is issued pursuant to and entitled to the benefits of the Agreement to which reference is hereby made for a more complete statement of the terms and conditions upon which the Advances evidenced hereby were or are made and are to be repaid. This Revolving Credit Note is subject to certain restrictions on transfer or assignment as provided in the Agreement. This Revolving Credit Note is issued in replacement of the Revolving Credit Note dated July 31, 2001 (the "2001 Note") issued to the Lender in the principal amount of \$24,000,000 in connection with the Credit Agreement dated as of July 31, 2001, and the Borrower remains liable for any interest or fees under the 2001 Note unpaid as of the date hereof.

No delay or omission on the part of the Lender in exercising any right hereunder shall operate as a waiver of such right or of any other right of the Lender, nor shall any delay, omission or waiver on any one occasion be deemed a bar to or waiver of the same or any other right on any future occasion. Every maker, endorser and guarantor of this Revolving Credit Note or the obligations represented hereby waives presentment, demand, notice, protest and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Revolving Credit Note, assents to any extension or postponement of the time of payment or any other indulgence, to any substitution, exchange or release of collateral and to the addition or release of any other party or person primarily or secondarily liable.

IN WITNESS WHEREOF, the Borrower has caused this Revolving Credit Note to be made, executed and delivered by its duly authorized representative under seal as of the date and year first above written.

MKS INSTRUMENTS, INC.

WITNESS:

JM Tocci

By: /s/ Ronald C. Weigner

Name: Ronald C. Weigner
Title: Vice President and Chief Financial Officer

REVOLVING CREDIT NOTE

\$16,000,000

Boston, Massachusetts

July 31, 2002

FOR VALUE RECEIVED, MKS INSTRUMENTS, INC., a Massachusetts corporation having its principal place of business located in Andover, Massachusetts (the "Borrower"), hereby promises to pay to the order of JPMORGAN CHASE BANK (the "Lender"), in its individual capacity, at the office of FLEET NATIONAL BANK, as agent for the Lender (the "Agent"), located at 100 Federal Street, Boston, Massachusetts (or at such other place or places as the Agent may designate in writing) at the times set forth in the First Amended and Restated Credit Agreement dated as of July 31, 2002, as it may be amended, among the Borrower, the financial institutions party thereto (collectively, the "Lenders") and the Agent (the "Agreement" -- all capitalized terms not otherwise defined herein shall have the respective meanings set forth in the Agreement), in lawful money of the United States of America, in immediately available funds, the principal amount of SIXTEEN MILLION DOLLARS (\$16,000,000) or, if less than such principal amount, the aggregate unpaid principal amount of all Advances made by the Lender to the Borrower pursuant to the Agreement, on the Revolver Termination Date or such earlier date as may be required pursuant to the terms of the Agreement, and to pay interest from the date hereof on the unpaid principal amount hereof, in like money, at said office, on the dates and at the rates provided in the Agreement. All or any portion of the principal amount of Advances may be prepaid as provided in the Agreement.

If payment of all sums due hereunder is accelerated under the terms of the Agreement or under the terms of the other Loan Documents executed in connection with the Agreement, the then remaining principal amount and accrued but unpaid interest shall bear interest, which shall be payable on demand, at the rate per annum set forth in Section 2.4.2 of the Agreement. Further, in the event of such acceleration, this Revolving Credit Note shall become immediately due and payable, without presentation, demand, protest or notice of any kind, all of which are hereby waived by the Borrower.

In the event this Revolving Credit Note is not paid when due at any stated or accelerated maturity, the Borrower agrees to pay, in addition to the principal and interest, all costs of collection, including reasonable attorneys' fees, and interest thereon at the rates set forth above.

Interest hereunder shall be computed as provided in the Agreement.

This Revolving Credit Note is one of the Revolving Credit Notes referred to in the Agreement and is issued pursuant to and entitled to the benefits of the Agreement to which reference is hereby made for a more complete statement of the terms and conditions upon which the Advances evidenced hereby were or are made and are to be repaid. This Revolving Credit Note is subject to certain restrictions on transfer or assignment as provided in the Agreement. This Revolving Credit Note is issued in replacement of the Revolving Credit Note dated July 31, 2001 (the "2001 Note") issued to The Chase Manhattan Bank in the principal amount of \$16,000,000 in connection with the Credit Agreement dated as of July 31, 2001, and the Borrower remains liable for any interest or fees under the 2001 Note unpaid as of the date hereof.

No delay or omission on the part of the Lender in exercising any right hereunder shall operate as a waiver of such right or of any other right of the Lender, nor shall any delay, omission or waiver on any one occasion be deemed a bar to or waiver of the same or any other right on any future occasion. Every maker, endorser and guarantor of this Revolving Credit Note or the obligations represented hereby waives presentment, demand, notice, protest and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Revolving Credit Note, assents to any extension or postponement of the time of payment or any other indulgence, to any substitution, exchange or release of collateral and to the addition or release of any other party or person primarily or secondarily liable.

IN WITNESS WHEREOF, the Borrower has caused this Revolving Credit Note to be made, executed and delivered by its duly authorized representative under seal as of the date and year first above written.

MKS INSTRUMENTS, INC.

WITNESS:

JM Tocci

By: /s/ Ronald C. Weigner

Name: Ronald C. Weigner
Title: Vice President and Chief Financial Officer

SUBSIDIARIES OF THE REGISTRANT

SUBSIDIARY	JURISDICTION OF INCORPORATION
MKS International, Inc.	Massachusetts
MKS Instruments France S.A.	France
MKS Instruments Canada Ltd.	Canada
MKS Instruments, U.K. Limited	United Kingdom
MKS East, Inc.	Massachusetts
MKS Japan, Inc.	Japan
Spectra International Japan Co. Ltd.	Japan
MKS Korea Co., Ltd.	Korea
MKS FSC, Inc.	Barbados
D.I.P., Inc.	Ohio
Telvac Engineering Limited	United Kingdom
Spectra Sensortech, Ltd.	United Kingdom
Applied Science and Technology, Inc.	Delaware
MKS MSC, Inc.	Massachusetts
ASTeX CPI, Inc.	Massachusetts
ASTeX Plasmaquest, Inc.	Texas
ASTeX Realty Corporation	Massachusetts
Newton Engineering Services, Inc.	Massachusetts
Klee Corporation	Delaware
Shamrock Technology Corporation	Delaware
ETO, Inc.	Nevada
MKS (Bermuda) Ltd.	Bermuda
MKS Luxembourg S.A.R.L.	Luxembourg
MKS Germany Holding GmbH	Germany
MKS Instruments Deutschland GmbH	Germany
ASTeX Sorbios GmbH	Germany
ENI Technology, Inc.	Delaware
MKS (Asia) Ltd.	Bermuda
MKS Hong Kong	Hong Kong
MKS China	China
ENI Taiwan Ltd.	Taiwan
M.K.S. Tenta Products Ltd.	Israel
IPC Fab Automation GmbH	Germany
US Branches of MKS Instruments, Inc.	
MKS Taiwan	Taiwan
MKS Singapore	Singapore

STATEMENT PURSUANT TO 18 U.S.C. (sec) 1350

Pursuant to 18 U.S.C. (sec) 1350, each of the undersigned certifies that this Quarterly Report on Form 10-Q for the period ended June 30, 2002 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that the information contained in this report fairly presents, in all material respects, the financial condition and results of operations of MKS Instruments, Inc.

August 13, 2002

By: /s/ Ronald C. Weigner

Ronald C. Weigner
Vice President and Chief Financial Officer

August 13, 2002

By: /s/ John R. Bertucci

John R. Bertucci
Chairman, Chief Executive Officer and
President