

AS FILED WITH THE SECURITIES AND EXCHANGE COMMISSION ON MARCH 23, 1999

REGISTRATION NO. 333-71363

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 SECURITIES AND EXCHANGE COMMISSION  
 WASHINGTON, D.C. 20549  
 -----

AMENDMENT NO. 3

TO

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

MKS INSTRUMENTS, INC.  
 (EXACT NAME OF REGISTRANT AS SPECIFIED IN ITS CHARTER)

MASSACHUSETTS  
 (STATE OR OTHER JURISDICTION OF  
 INCORPORATION OR ORGANIZATION)

3823  
 (PRIMARY STANDARD INDUSTRIAL  
 CLASSIFICATION CODE NUMBER)

04-2277512  
 (I.R.S. EMPLOYER  
 IDENTIFICATION NUMBER)

SIX SHATTUCK ROAD  
 ANDOVER, MA 01810  
 (978) 975-2350  
 (ADDRESS, INCLUDING ZIP CODE, AND TELEPHONE NUMBER,  
 INCLUDING AREA CODE, OF REGISTRANT'S PRINCIPAL EXECUTIVE OFFICES)  
 -----

JOHN R. BERTUCCI  
 CHAIRMAN, CHIEF EXECUTIVE OFFICER, AND PRESIDENT  
 MKS INSTRUMENTS, INC.  
 SIX SHATTUCK ROAD  
 ANDOVER, MA 01810  
 (978) 975-2350  
 (NAME, ADDRESS, INCLUDING ZIP CODE, AND TELEPHONE  
 NUMBER, INCLUDING AREA CODE, OF AGENT FOR SERVICE)  
 -----

COPIES TO:

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 ONE INTERNATIONAL PLACE  
 BOSTON, MASSACHUSETTS 02110  
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-----  
 APPROXIMATE DATE OF COMMENCEMENT OF PROPOSED SALE TO THE PUBLIC: As soon as  
 practicable after the effective date hereof.

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

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

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

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

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

THE REGISTRANT HEREBY AMENDS THIS REGISTRATION STATEMENT ON SUCH DATE OR  
 DATES AS MAY BE NECESSARY TO DELAY ITS EFFECTIVE DATE UNTIL THE REGISTRANT SHALL  
 FILE A FURTHER AMENDMENT WHICH SPECIFICALLY STATES THAT THIS REGISTRATION

STATEMENT SHALL THEREAFTER BECOME EFFECTIVE IN ACCORDANCE WITH SECTION 8 (a) OF THE SECURITIES ACT OF 1933 OR UNTIL THE REGISTRATION STATEMENT SHALL BECOME EFFECTIVE ON SUCH DATE AS THE COMMISSION, ACTING PURSUANT TO SECTION 8(a), MAY DETERMINE.

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The information contained in this prospectus is not complete and may be changed. The underwriters may not confirm sales of these securities until the registration statement filed with the Securities and Exchange Commission becomes effective. This prospectus is not an offer to sell these securities, and is not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED MARCH 23, 1999

6,500,000 SHARES  
[MKS LOGO]

COMMON STOCK

MKS Instruments, Inc. is offering 6,000,000 shares of its common stock and the selling stockholders are selling an additional 500,000 shares. This is MKS's initial public offering and no public market currently exists for its shares. We have been approved for quotation on the Nasdaq National Market under the symbol "MKSI" for the shares we are offering. We estimate that the initial public offering price will be between \$15.00 and \$17.00.

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INVESTING IN OUR COMMON STOCK INVOLVES A HIGH DEGREE OF RISK. SEE "RISK FACTORS" BEGINNING ON PAGE 7.

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	Per Share -----	Total -----
Public Offering Price	\$	\$
Discounts and Commissions to Underwriters	\$	\$
Proceeds to MKS	\$	\$
Proceeds to the Selling Stockholders	\$	\$

NEITHER THE SECURITIES AND EXCHANGE COMMISSION NOR ANY STATE SECURITIES COMMISSION HAS APPROVED OR DISAPPROVED OF THESE SECURITIES OR DETERMINED IF THIS PROSPECTUS IS TRUTHFUL OR COMPLETE. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.

MKS has granted the underwriters a 30-day option to purchase up to an additional 975,000 shares of common stock to cover over-allotments.

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NATIONSBANC MONTGOMERY SECURITIES LLC  
DONALDSON, LUFKIN & JENRETTE

LEHMAN BROTHERS

The date of this prospectus is \_\_\_\_\_, 1999

MKS INSTRUMENTS, INC.  
 PROSPECTUS COVER  
 MARCH 2, 1999

INSIDE FRONT COVER (PG. 2):

This page is produced in four-color process. Amidst a dark background, the MKS logo appears at the top right of the page, and to the top left is the phrase "A Wide Range of Products Made Using MKS Process Control Instruments." Two paragraphs describing the role MKS plays in complex advanced materials manufacturing processes also appear on this page, and are as follows:

(first paragraph) "MKS Surrounds the Process. Technologically complex, gas-related manufacturing processes are used to create such products as semiconductor devices, flat panel displays, fiber optic cables, solar panels, magnetic and optical storage media, and gas lasers. These processes build up very thin layers of materials, step by step, through the interaction of specific gases and materials inside tightly controlled process chambers. Maintaining control of these complex steps throughout the entire manufacturing process is critical to maximizing uptime, yield and throughput (second paragraph) MKS's process control instruments are integrated into many gas-related processes--managing the flow rates of gases entering and exiting the process chamber; controlling the gas composition and pressure inside the chamber; analyzing and monitoring the composition of the gases; and isolating the gases from the outside environment."

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

MKS, MKS Instruments, Baratron and ORION are trademarks of MKS. This prospectus contains trademarks, service marks and trade names of companies and organizations other than MKS.

INSIDE SPREAD (PGS. 3 AND 4):

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

DIRECT LIQUID INJECTION SUBSYSTEMS

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

AUTOMATIC PRESSURE CONTROLLERS WITH INTEGRATED BARATRON(R) PRESSURE TRANSDUCERS

A compact, integrated measurement and control package for use in controlling upstream or downstream process chamber pressure.

ULTRA-CLEAN MASS FLOW CONTROLLERS

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

ULTRA-CLEAN MINI-BARATRON(R) PRESSURE TRANSDUCERS

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

PRESSURE CONTROL VALVES

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

GAS BOX RATE OF RISE CALIBRATORS

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

DIGITAL COLD CATHODE IONIZATION AND CONVECTION VACUUM GAUGES

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

ORION(R) PROCESS MONITORS AND RESIDUAL GAS ANALYZERS

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

PRESSURE SWITCHES

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

BARATRON(R) PRESSURE MEASURING INSTRUMENTS

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

IN-SITU DIAGNOSTICS ACCESS VALVE

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

EXHAUST THROTTLE VALVES AND AUTOMATIC PRESSURE CONTROLLERS

For isolation and downstream control of process chamber pressures and pressure

control within the exhaust systems.

HIGH VACUUM VALVES

To isolate the process chamber from both the pumps and atmospheric gases.

HEATED PUMPING LINES

To reduce contaminants in the vacuum pump and pump exhaust stream.

VAPOR SUBLIMATION TRAP

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

Prices of products shown above range from \$200 to \$80,000.

The above graphic depicts a generalized process chamber with a number of MKS's manufactured products shown.

YOU SHOULD RELY ONLY ON THE INFORMATION CONTAINED IN THIS PROSPECTUS. WE HAVE NOT AUTHORIZED ANYONE TO PROVIDE YOU WITH INFORMATION DIFFERENT FROM THAT CONTAINED IN THIS PROSPECTUS. WE ARE OFFERING TO SELL, AND SEEKING OFFERS TO BUY, SHARES OF COMMON STOCK ONLY IN JURISDICTIONS WHERE OFFERS AND SALES ARE PERMITTED. THE INFORMATION CONTAINED IN THIS PROSPECTUS IS ACCURATE ONLY AS OF THE DATE OF THIS PROSPECTUS, REGARDLESS OF THE TIME OF DELIVERY OF THIS PROSPECTUS OR OF ANY SALE OF OUR COMMON STOCK. IN THIS PROSPECTUS, "MKS," "WE," "US" AND "OUR" REFER TO MKS INSTRUMENTS, INC. (UNLESS THE CONTEXT OTHERWISE REQUIRES).

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## PROSPECTUS SUMMARY

This summary highlights information contained elsewhere in this prospectus. You should read this entire prospectus carefully. Unless otherwise indicated, all information contained in this prospectus assumes that the underwriters will not exercise their over-allotment option. This prospectus contains forward-looking statements, which involve risks and uncertainties. MKS's actual results could differ materially from those anticipated in these forward-looking statements as a result of certain factors, including those set forth under "Risk Factors" and elsewhere in this prospectus. All information contained in this prospectus reflects an amendment to MKS's Articles of Organization to be effected prior to the closing of this offering to convert the shares of Class A common stock and Class B common stock into a single class of common stock.

## MKS INSTRUMENTS, INC.

We are a leading worldwide developer, manufacturer and supplier of instruments and components used to measure, control and analyze gases in semiconductor manufacturing and similar industrial manufacturing processes. We sold products to over 4,000 customers in 1998. In addition to semiconductors, our products are used in processes to manufacture a diverse range of products, such as flat panel displays, solar cells, gas lasers, fiber optic cables, diamond thin films and coatings for food packagings.

The ability of semiconductor device manufacturers to offer integrated circuits with smaller geometries and greater functionality at higher speeds requires continuous improvements in semiconductor process equipment and process controls. Manufacturing a semiconductor, or a similar industrial product, requires hundreds of process steps, many of which involve the precise measurement and control of gases. In the fabrication of semiconductors, for example, these process steps take place within a process chamber. Specific gas mixtures at precisely controlled pressures are used in the process chamber to control the required process atmosphere and are used as a source of material to manufacture a semiconductor.

Given the complexity of the semiconductor manufacturing process, the value of the products manufactured and the significant cost of semiconductor manufacturing equipment and facilities, significant importance is placed upon:

- uptime, which is the amount of time that semiconductor manufacturing equipment is available for processing
- yield, which is the ratio of acceptable output to total output
- throughput, which is the aggregate output that can be processed per hour

The design and performance of instruments that control the pressure or flow of gases are becoming more critical to the semiconductor manufacturing process since they directly affect uptime, yield and throughput. In addition, the increasing sophistication of semiconductor devices requires an increase in the number of components and subsystems used in the design of semiconductor manufacturing process tools. To address manufacturing complexity, improve quality and reliability, and ensure long-term service and support, semiconductor device manufacturers and semiconductor capital equipment manufacturers are increasingly seeking to reduce their supplier base and are, therefore, choosing to work with suppliers that provide a broad range of integrated, technologically advanced products backed by worldwide service and support.

We believe that we offer the widest range of pressure and vacuum measurement and control products serving the semiconductor industry. Our products measure pressures from as low as one trillionth of atmospheric pressure to as high as two hundred times atmospheric pressure. Our objective is to be the leading worldwide supplier of instruments and components used to measure, control and analyze gases in semiconductor and other advanced thin-film processing applications and to help semiconductor device manufacturers achieve improvements in their return on investment capital. Our strategy to accomplish this objective includes:

- extending our technology leadership
- continuing to broaden our comprehensive product offering
- building upon our close working relationships with customers
- expanding the application of our existing technologies to related markets
- leveraging our global infrastructure and world class manufacturing capabilities

For over 25 years, we have focused on satisfying the needs of semiconductor capital equipment manufacturers and semiconductor device manufacturers. As a result, we have established long-term relationships with many of our customers. We sell our products primarily to:

- semiconductor capital equipment manufacturers
- semiconductor device manufacturers
- industrial manufacturing companies
- university, government and industrial research laboratories

Our customers include Applied Materials, Inc., Lam Research Corporation, Novellus Systems, Inc., Tokyo Electron Limited, Inc., Air Products and Chemicals, Inc. and Motorola, Inc. We sell our products primarily through our direct sales force located in 22 offices worldwide.

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

## THE OFFERING

Common stock offered by MKS.....	6,000,000 shares
Common stock offered by the selling stockholders.....	500,000 shares
Common stock to be outstanding after this offering.....	24,053,167 shares
Use of proceeds.....	For distributions to current stockholders and general corporate purposes. See "Use of Proceeds" and "S Corporation and Termination of S Corporation Status."
Nasdaq National Market symbol.....	MKSI

The common stock to be outstanding after this offering is based on shares outstanding as of December 31, 1998 and excludes 2,132,575 shares of common stock issuable upon the exercise of options outstanding as of such date at a weighted average exercise price of \$5.19 per share. See "Capitalization" and Note 8 of Notes to Consolidated Financial Statements.

## SUMMARY CONSOLIDATED FINANCIAL DATA

MKS has been treated as an S corporation for federal income tax purposes since July 1, 1987. As an S corporation, MKS has not been subject to federal, and certain state, income taxes. The pro forma net income reflects the provision for income taxes that would have been recorded had MKS been a C corporation, assuming an effective tax rate of 39.0% for 1994 and 1995, and 38.0% for 1996, 1997 and 1998. As a result of terminating its S corporation status upon the closing of this offering, MKS will record a one-time non-cash credit to historical earnings for additional deferred taxes. If this credit to earnings had occurred at December 31, 1998, the amount would have been approximately \$3.9 million. This amount is expected to increase through the closing of this offering and is excluded from pro forma net income. See Notes 2 and 9 of Notes to Consolidated Financial Statements.

Pro forma balance sheet data set forth below reflects the liability for the distribution of an estimated \$35.9 million, calculated as of December 31, 1998, of cumulative undistributed S corporation taxable income for which stockholders of record on the day prior to the effective date of the registration statement have been or will be taxed. The pro forma net income per share for 1998 set forth below reflects the effect of an assumed issuance of sufficient shares to fund this distribution as of January 1, 1998. The distribution will be made out of the proceeds of this offering. The actual amount to be distributed is expected to be \$40.0 million which is the estimated balance of the accumulated adjustments account as of the day prior to the closing of this offering, subject to adjustments. See "S Corporation and Termination of S Corporation Status." The pro forma as adjusted balance sheet data reflects the sale of 6,000,000 shares of common stock at an assumed initial public offering price of \$16.00 per share, after deducting the estimated underwriting discount and offering expenses payable by MKS. THE HISTORICAL NET INCOME PER SHARE DATA SET FORTH BELOW DOES NOT INCLUDE PROVISIONS FOR FEDERAL INCOME TAXES BECAUSE PRIOR TO THE CLOSING OF THIS OFFERING, MKS WAS TREATED AS AN S CORPORATION FOR FEDERAL INCOME TAX PURPOSES.

	YEAR ENDED DECEMBER 31,				
	1994	1995	1996	1997	1998
	(IN THOUSANDS, EXCEPT PER SHARE DATA)				
STATEMENT OF INCOME DATA:					
Net sales.....	\$106,829	\$157,164	\$170,862	\$188,080	\$139,763
Gross profit.....	47,016	69,461	68,854	80,474	55,979
Income from operations.....	12,087	24,106	16,068	23,963	9,135
Net income.....	\$ 10,003	\$ 21,658	\$ 12,503	\$ 20,290	\$ 7,186
HISTORICAL NET INCOME PER SHARE:					
Basic.....	\$ 0.55	\$ 1.20	\$ 0.69	\$ 1.12	\$ 0.40
Diluted.....	\$ 0.55	\$ 1.20	\$ 0.69	\$ 1.10	\$ 0.38
PRO FORMA STATEMENT OF INCOME DATA(1):					
Pro forma net income.....	\$ 6,590	\$ 13,821	\$ 8,248	\$ 13,806	\$ 5,044
Pro forma net income per share:					
Basic.....	\$ 0.37	\$ 0.77	\$ 0.46	\$ 0.76	\$ 0.25
Diluted.....	\$ 0.37	\$ 0.77	\$ 0.46	\$ 0.76	\$ 0.24

DECEMBER 31, 1998

	ACTUAL	PRO FORMA	PRO FORMA AS ADJUSTED
(IN THOUSANDS)			
BALANCE SHEET DATA:			
Cash and cash equivalents.....	\$ 11,188	\$ 11,188	\$ 63,942
Working capital (deficit).....	31,493	(4,433)	84,247
Total assets.....	96,232	96,232	148,986
Short-term obligations.....	12,819	12,819	12,819
Long-term obligations, less current portion.....	13,786	13,786	13,786
Stockholders' equity.....	54,826	18,900	107,580

(1) Data is computed on the same basis as Note 2 of Notes to Consolidated Financial Statements.

## RISK FACTORS

You should consider carefully the risks described below before you decide to buy our common stock. If any of the following risks actually occur, our business, financial condition or results of operations would likely suffer. In such case, the trading price of our common stock could fall, and you may lose all or part of the money you paid to buy our common stock.

This prospectus contains forward-looking statements that involve risks and uncertainties. These forward-looking statements are usually accompanied by words such as "believes," "anticipates," "plans," "expects" and similar expressions. Our actual results may differ materially from the results discussed in the forward-looking statements because of factors such as the Risk Factors discussed below.

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

We estimate that approximately 60% of our sales during 1997 and 1998 were to semiconductor capital equipment manufacturers and semiconductor device manufacturers, and we expect that sales to such customers will continue to account for a substantial majority of our sales. Our business depends substantially upon the capital expenditures of semiconductor device manufacturers, which in turn depend upon the demand for semiconductors and other products utilizing semiconductors. Periodic reductions in demand for the products manufactured by semiconductor capital equipment manufacturers and semiconductor device manufacturers may adversely affect our business, financial condition and results of operations. Historically, the semiconductor market has been highly cyclical and has experienced periods of overcapacity, resulting in significantly reduced demand for capital equipment. For example, in 1996 and 1998 the semiconductor industry experienced a significant decline, which caused a number of our customers to reduce their orders. We cannot be certain that the current semiconductor downturn that began in 1998 will not continue. A further decline in the level of orders as a result of any future downturn or slowdown in the semiconductor industry could have a material adverse effect on our business, financial condition and results of operations.

WE DERIVE A SIGNIFICANT PORTION OF OUR REVENUE FROM THE ASIAN MARKETS, AS DO OUR SEMICONDUCTOR CAPITAL EQUIPMENT CUSTOMERS, AND THEREFORE, AN ECONOMIC DOWNTURN IN THE ASIAN MARKETS WOULD LIKELY REDUCE DEMAND FOR OUR PRODUCTS

The financial markets in Asia, one of our principal international markets, have experienced significant turbulence. Turbulence in the Asian markets can adversely affect our net sales and results of operations. Our direct net sales to customers in Asian markets have been approximately 17% to 18% of total net sales for the past three years. Our sales include both direct sales to the semiconductor industry in Asia, as well as to semiconductor capital equipment manufacturers that derive a significant portion of their revenue from sales to the Asian semiconductor industry. Turbulence in the Asian markets began to adversely affect the semiconductor device manufacturers and semiconductor capital equipment manufacturers in the fourth quarter of 1997 and continued to adversely affect them in 1998. We expect the turbulence in the Asian markets will continue to adversely affect sales of semiconductor capital equipment manufacturers for at least the first quarter of 1999. As a result, for at least the first quarter we currently expect that our 1999 quarterly net sales and net income will be less than net sales and net income for the comparable quarter of 1998.

OUR QUARTERLY NET SALES ARE BASED ON SHIPMENTS MADE SHORTLY AFTER CUSTOMER ORDERS ARE PLACED AND THEREFORE, FLUCTUATIONS IN DEMAND WITHIN A QUARTER WILL CAUSE A FLUCTUATION IN THAT QUARTER'S NET SALES

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

DUE TO OUR FIXED COSTS WE MAY BE UNABLE TO ADJUST SPENDING QUICKLY ENOUGH TO COMPENSATE FOR SHORTFALLS IN NET SALES WHICH MAY LEAD TO REDUCED OPERATING RESULTS IF OUR NET SALES ARE BELOW EXPECTATIONS

A significant percentage of our 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 our results of operations. Factors that could cause fluctuations in our net sales include:

- - the timing of the receipt of orders from major customers
- - shipment delays
- - disruption in sources of supply
- - seasonal variations of capital spending by customers
- - production capacity constraints
- - specific features requested by customers

For example, we were in the process of increasing production capacity when the semiconductor capital equipment market began to experience a significant downturn in 1996. This downturn had a material adverse effect on our 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 our 1998 operating results. As a result of the factors discussed above, it is likely that we will in the future experience quarterly or annual fluctuations and that, in one or more future quarters, our operating results will fall below the expectations of public market analysts or investors. In any such event, the price of our common stock could decline significantly.

THE LOSS OF NET SALES TO ANY ONE OF OUR MAJOR CUSTOMERS WOULD LIKELY HAVE A MATERIAL ADVERSE EFFECT ON US

Our five largest customers in 1996, 1997 and 1998 accounted for approximately 26%, 32% and 24%, respectively, of our net sales. The loss of a major customer or any reduction in orders by such customers, including reductions due to market or competitive conditions, would likely have a material adverse effect on our business, financial condition and results of operations. During 1998, one customer, Applied Materials, Inc., accounted for approximately 16% of our net sales. While we have entered into a purchase contract with Applied Materials, Inc. which expires in 2000 unless it is extended by mutual agreement, none of our significant customers, including Applied Materials, Inc., has entered into an agreement requiring it to purchase any minimum quantity of our products. The demand for our products from our 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. Our future success will continue to depend upon:

- our ability to maintain relationships with existing key customers
- our ability to attract new customers
- the success of our customers in creating demand for their capital equipment products which incorporate our products

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

The markets for our products are highly competitive. Our competitive success often depends upon factors outside of our 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, our success will depend in part on our ability to have semiconductor device manufacturers specify that our

products be used at their semiconductor fabrication facilities. In addition, we may encounter difficulties in changing established relationships of competitors that already have a large installed base of products within such semiconductor fabrication facilities.

IF OUR PRODUCTS ARE NOT DESIGNED INTO SUCCESSIVE NEW GENERATIONS OF OUR CUSTOMERS' PRODUCTS, WE 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. Our success depends on our products being designed into new generations of equipment for the semiconductor industry. We must develop products that are technologically current so that they are positioned to be chosen for use in each successive new generation of semiconductor equipment. If our products are not chosen by our customers, our net sales may be reduced during the lifespan of our customers' products.

FAILURE BY US TO IDENTIFY AND REMEDIATE ALL MATERIAL YEAR 2000 RISKS COULD CAUSE A SIGNIFICANT DISRUPTION TO OUR BUSINESS IF WE ARE FORCED TO EXPEND SIGNIFICANT INTERNAL RESOURCES ON YEAR 2000 REMEDIATION OR IF THE YEAR 2000 PROBLEMS OF OUR SUPPLIERS OR CUSTOMERS CAUSE A DELAY IN SUPPLYING GOODS AND SERVICES TO US OR IN DELAYING PAYMENT FOR PRODUCTS THAT WE HAVE SHIPPED

We have implemented a multi-phase Year 2000 project consisting of assessment and remediation, and testing following remediation. We cannot, however, be certain that we have identified all of the potential risks. Failure by us to identify and remediate all material Year 2000 risks could adversely affect our business, financial condition and results of operations. We have identified the following risks you should be aware of:

- we cannot be certain that the entities on whom we rely for certain goods and services that are important for our business will be successful in addressing all of their software and systems problems in order to operate without disruption in the year 2000 and beyond
- our customers or potential customers may be affected by Year 2000 issues that may, in part:
  - cause a delay in payments for products shipped
  - cause customers to expend significant resources on Year 2000 compliance matters, rather than investing in our products
- we have not developed a contingency plan related to the failure of our or a third-party's Year 2000 remediation efforts and may not be prepared for such an event

Further, while we have made efforts to notify our customers who have purchased potential non-compliant products, we cannot be sure that customers who purchased such products will not assert claims against us alleging that such products should have been Year 2000 compliant at the time of purchase, which could result in costly litigation and divert management's attention.

WE INTEND TO EXPAND OUR BUSINESS OUTSIDE OF THE SEMICONDUCTOR INDUSTRY TO THE MANUFACTURE OF, AMONG OTHER THINGS, HARD COATINGS TO MINIMIZE WEAR ON CUTTING TOOLS, A MARKET IN WHICH WE HAVE LIMITED EXPERIENCE AND IF WE FAIL TO SUCCESSFULLY PENETRATE SUCH MARKETS, OUR NET SALES WILL CONTINUE TO BE VULNERABLE TO THE DOWNTURNS IN THE SEMICONDUCTOR INDUSTRY

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

We have limited experience selling our products in certain markets outside the semiconductor industry. We cannot be certain that we will be successful in the expansion of our business outside the semiconductor industry. Our future success will depend in part on our ability to:

- identify new applications for our products
- adapt our products for such applications
- market and sell such products to customers

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

During 1999, we plan to add manufacturing capacity to our Austin, Texas operations and further equip our cleanroom facilities in Andover and Methuen, Massachusetts. Our ability to increase sales of certain products depends in part upon our ability to expand our manufacturing capacity for such products in a timely manner. If we are unable to expand our manufacturing capacity on a timely basis or to manage such expansion effectively, our customers could seek such products from others and our market share could be reduced. Because the semiconductor industry is subject to rapid demand shifts which are difficult to foresee, we 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 our fixed operating expenses and if sales levels do not increase to offset the additional expense levels associated with any such expansion, our business, financial condition and results of operations could be materially adversely affected.

SALES TO FOREIGN MARKETS CONSTITUTE APPROXIMATELY 30% OF OUR NET SALES AND, THEREFORE, OUR 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 our foreign subsidiaries, but exclude direct export sales which were less than 10% of our total net sales, accounted for approximately 30% of net sales in 1996, 27% of net sales in 1997 and 32% of net sales in 1998. We anticipate that international sales will continue to account for a significant portion of our net sales. In addition, certain of our key domestic customers derive a significant portion of their revenues from sales in international markets. Therefore, our sales and results of operations could be adversely affected by economic slowdowns and other risks associated with international sales.

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

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

COMPETITION FOR PERSONNEL IN THE SEMICONDUCTOR AND INDUSTRIAL MANUFACTURING INDUSTRIES IS INTENSE AND BECAUSE WE DO NOT TYPICALLY HAVE EMPLOYMENT AGREEMENTS WITH OUR EMPLOYEES, WE CANNOT BE SURE THAT WE WILL BE ABLE TO RETAIN THEM WHICH IS AN IMPORTANT FACTOR IN ACHIEVING FUTURE SUCCESS

Our 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 our business, financial condition and results of operations. We believe that our future success will depend in part on our ability to attract and retain highly skilled technical, financial, managerial and marketing personnel. Competition for such personnel is intense, and we cannot be certain that we will be successful in attracting and retaining such personnel. We are the beneficiary of key-man life insurance policies on John R. Bertucci, Chairman, Chief Executive Officer and President, in the amount of \$7.2 million.

OUR PROPRIETARY TECHNOLOGY, WHICH INCLUDES 49 PATENTS AND 8 PENDING PATENT APPLICATIONS, IS IMPORTANT TO THE CONTINUED SUCCESS OF OUR BUSINESS AND THE FAILURE TO PROTECT THIS PROPRIETARY TECHNOLOGY MAY SIGNIFICANTLY IMPAIR OUR COMPETITIVE POSITION

Although we seek to protect our intellectual property rights through patents, copyrights, trade secrets and other measures, we cannot be certain that:

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

PROTECTION OF OUR INTELLECTUAL PROPERTY RIGHTS MAY RESULT IN COSTLY LITIGATION

Litigation may be necessary in order to enforce our patents, copyrights or other intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others or to defend against claims of infringement. Such litigation could result in substantial costs and diversion of resources and could have a material adverse effect on our business, financial condition and results of operations.

TRADING IN OUR SHARES COULD BE SUBJECT TO EXTREME PRICE FLUCTUATIONS AND YOU COULD HAVE DIFFICULTY TRADING YOUR SHARES

The market for shares in newly public technology companies is subject to extreme price and volume fluctuations. These broad market fluctuations may materially and adversely affect the market price of our common stock. In addition, although our common stock will be quoted on the Nasdaq National Market, an active trading market may not develop and be sustained after this offering.

YOU WILL EXPERIENCE AN IMMEDIATE AND SUBSTANTIAL DILUTION IN THE BOOK VALUE OF YOUR INVESTMENT

Purchasers of common stock in this offering will incur immediate and substantial dilution of \$11.53 in the pro forma net tangible book value per share of common stock from the assumed initial public offering price of \$16.00 per share.

AFTER THIS OFFERING ONE STOCKHOLDER, ALONG WITH MEMBERS OF HIS FAMILY, WILL HAVE CONTROLLING INTEREST IN MKS AND WILL BE ABLE TO EFFECT IMPORTANT CORPORATE ACTIONS WITHOUT THE APPROVAL OF OTHER STOCKHOLDERS

Upon consummation of this offering, John R. Bertucci, Chairman, Chief Executive Officer and President of MKS, and members of his family will, in the aggregate, beneficially own approximately 70% of our outstanding common stock. As a result, these stockholders, acting together, will be able to take any of the following actions without the approval of our public stockholders:

- amend our Articles of Organization in certain respects or approve a merger, sale of assets or other major corporate transaction
- defeat any non-negotiated takeover attempt that may be beneficial to our public stockholders
- determine the amount and timing of dividends paid to themselves and to our public stockholders
- otherwise control our management and operations and the outcome of all matters submitted for a stockholder vote, including the election of directors

CERTAIN PROVISIONS OF OUR ARTICLES OF ORGANIZATION, OUR 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 we have no present plans to issue any preferred stock, the Board of Directors, without further stockholder approval, may issue preferred stock that could have the effect of delaying, deterring or preventing a change in control of MKS. The issuance of preferred stock could adversely affect the voting power of the holders of common stock including the loss of voting control to others. In addition, our By-Laws will provide for a classified Board of Directors consisting of three classes. This classified board could also have the effect of delaying, deterring or preventing a change in control of MKS.

FUTURE SALES BY OUR EXISTING STOCKHOLDERS COULD ADVERSELY AFFECT THE MARKET PRICE OF OUR COMMON STOCK

Sales of our common stock in the public market following this offering could adversely affect the market price of the common stock. All of the shares offered under this prospectus will be freely tradable in the open market, and

- 17,553,165 additional shares may be sold after the expiration of 180-day lock-up agreements
- approximately 1,100,000 additional shares may be sold upon the exercise of stock options after the expiration of 180-day lock-up agreements

## S CORPORATION AND TERMINATION OF S CORPORATION STATUS

MKS has been treated as an S corporation for federal income tax purposes since July 1, 1987. As a result, MKS currently pays no federal, and certain state, income tax, and all of the earnings of MKS are subject to federal, and certain state, income taxation directly at the stockholder level. MKS's S corporation status will terminate upon the closing of this offering, at which time MKS will become subject to corporate income taxation under Subchapter C of the Internal Revenue Code and applicable state income taxation law. Pro forma statement of income data set forth in this prospectus has been adjusted to include pro forma income tax provisions as if MKS had been a C corporation during the relevant periods.

As soon as practicable following the closing of this offering, MKS intends to make a distribution to the stockholders of record on the day prior to the effective date of the registration statement of \$40.0 million, which is the estimated amount of the "accumulated adjustments account," as of the day prior to the closing of this offering as defined in Section 1368(a)(1) of the Internal Revenue Code. The accumulated adjustments account is equal to the cumulative income of MKS, as determined for federal income tax purposes, for the period MKS was an S corporation (from July 1, 1987 through the date of the closing of this offering) minus any distributions made to stockholders during this period. The accumulated adjustments account for the period January 1, 1999 through the date of the closing of this offering will equal a portion of the federal taxable income of MKS for the entire calendar year 1999, excluding any earnings from its international subsidiaries, determined by allocating all of the calendar year 1999 taxable income equally to each day in the year and multiplying the daily taxable income by the number of days from January 1, 1999 through the date of the closing of this offering. Investors purchasing shares in this offering will not receive any portion of the distribution.

MKS expects to enter into a Tax Indemnification and S Corporation Distribution Agreement with its existing stockholders providing for, among other things, the indemnification of MKS by such stockholders for any federal and state income taxes, including interest and penalties, incurred by MKS if for any reason MKS is deemed to be treated as a C corporation during any period in which it reported its taxable income as an S corporation. The tax indemnification obligation of each existing stockholder is limited to the aggregate amount of all distributions made to such stockholders by MKS since July 1, 1987, minus any taxes paid by such stockholders on such distributions plus the amount of any refund of taxes to such stockholders as a result of such a deemed change in tax status and is limited to each such stockholders' pro rata receipt of the accumulated adjustments account distributions. The agreement also provides for the payment, with interest, by the existing stockholders or MKS, as the case may be, for the difference between the amount to be distributed and the actual amount of accumulated adjustments account on the day immediately preceding the closing of this offering. The actual amount of the accumulated adjustments account on the day prior to the closing of this offering cannot be determined until MKS calculates the amount of its taxable income for the year ending December 31, 1999. Furthermore, the amount of the accumulated adjustments account can be affected by income tax audits of MKS. If any audit increases or decreases the accumulated adjustments account, MKS or the existing stockholders, as the case may be, will also be required to make a payment with interest, of such difference to the other party. MKS's tax returns for 1995, 1996 and 1997 are currently being audited by the Internal Revenue Service and although the estimated accumulated adjustments account has been adjusted to reflect all changes that MKS expects to make as a result of the audit, there can be no assurance that additional adjustments will not be required prior to the conclusion of the audit. Purchasers of common stock in this offering will not be parties to the Tax Indemnification and S Corporation Distribution Agreement.

## USE OF PROCEEDS

The net proceeds we will receive from the sale of the 6,000,000 shares of common stock offered by us are estimated to be \$88,680,000 (\$103,188,000 if the underwriters' over-allotment option is exercised in full), after deducting the estimated underwriting discount and offering expenses payable by us and assuming an initial public offering price of \$16.00 per share. We will not receive any of the proceeds from the sale of shares by the selling stockholders.

We will use \$40.0 million of the net proceeds from this offering to pay the stockholders of record on the day prior to the effective date of the registration statement the estimated amount, subject to adjustment, of their undistributed S corporation earnings as of the day prior to the closing of this offering. See "S Corporation and Termination of S Corporation Status." We expect to use the remainder of the net proceeds for general corporate purposes, including working capital, product development and capital expenditures.

A portion of the net proceeds after the S corporation distribution may also be used for the acquisition of businesses, products and technologies that are complementary to those of MKS. There are currently no active negotiations, commitments or agreements with respect to any acquisition. Pending such uses, we intend to invest the net proceeds from this offering in short-term, investment-grade, interest-bearing securities.

## DIVIDEND POLICY

We currently intend, subject to our contractual obligations under the Tax Indemnification and S Corporation Distribution Agreement, to retain earnings for the continued development of our business. Restrictions or limitations on the payment of dividends may be imposed in the future under the terms of credit agreements or under other contractual provisions. In the absence of such restrictions or limitations, the payment of any dividends will be at the discretion of our Board of Directors.

## CAPITALIZATION

The following table sets forth the capitalization of MKS (1) as of December 31, 1998, (2) on a pro forma basis to reflect distributions and adjustments in connection with MKS's S corporation status and (3) as adjusted to reflect the sale of 6,000,000 shares of common stock by MKS at an assumed initial public offering price of \$16.00 per share and the application of the net proceeds therefrom. See "Use of Proceeds."

The pro forma data reflects the liability for distribution of an estimated \$35.9 million, calculated as of December 31, 1998, of cumulative undistributed S corporation taxable income for which stockholders of record on the day prior to the effective date of the registration statement have been or will be taxed. The actual amount to be distributed after the closing of this offering will be \$40.0 million, which is the estimated amount of our cumulative undistributed S corporation taxable income as of the day prior to the closing of this offering, subject to adjustment. See "S Corporation and Termination of S Corporation Status" and Notes 2 and 9 of Notes to Consolidated Financial Statements. The pro forma as adjusted data have been adjusted to reflect the issuance of 6,000,000 shares of common stock at an assumed initial public offering price of \$16.00 per share, after deducting the estimated underwriting discount and offering expenses payable by MKS. The remaining balance in retained earnings represents accumulated earnings prior to MKS's conversion from a C corporation to an S corporation in 1987, accumulated income in overseas subsidiaries and differences between book and tax accumulated income.

	DECEMBER 31, 1998		
	ACTUAL	PRO FORMA	PRO FORMA AS ADJUSTED
	(IN THOUSANDS, EXCEPT SHARE DATA)		
Long-term obligations, less current portion.....	\$13,786	\$13,786	\$ 13,786
Stockholders' equity:			
Common stock, no par value; 30,000,000 shares authorized, 18,053,167 shares issued and outstanding (actual and pro forma); 24,053,167 shares issued and outstanding (pro forma as adjusted).....	113	113	113
Additional paid-in capital.....	48	48	88,728
Retained earnings.....	52,479	16,553	16,553
Accumulated other comprehensive income.....	2,186	2,186	2,186
Total stockholders' equity.....	54,826	18,900	107,580
Total capitalization.....	\$68,612	\$32,686	\$121,366

The common stock to be outstanding after this offering is based on shares outstanding as of December 31, 1998 and excludes 2,132,575 shares of common stock issuable upon the exercise of options outstanding as of such date at a weighted average exercise price of \$5.19 per share. See Note 8 of Notes to Consolidated Financial Statements.

## DILUTION

As of December 31, 1998, MKS had a net tangible book value of \$54,826,000, or \$3.04 per share of common stock. After taking into account the sale of the shares offered hereby by MKS, the pro forma net tangible book value as of December 31, 1998 would have been \$107,580,000, or \$4.47 per share. The pro forma net tangible book value assumes that the proceeds to MKS, net of offering expenses and commissions, will be approximately \$52,754,000. This number has also been adjusted to take into account the distribution to stockholders of record on the day prior to the effective date of the registration statement of the accumulated undistributed S corporation taxable income for which such taxpayers have been or will be taxed as of December 31, 1998. That amount is estimated to be \$35.9 million as of December 31, 1998. No other changes occurring after December 31, 1998 have been taken into account. Based on the foregoing, there would be an immediate increase in net tangible book value to existing stockholders attributable to new investors of \$2.92 per share and the immediate dilution of \$11.53 per share to new investors. The following table illustrates this per share dilution:

Assumed initial public offering price per share.....		\$16.00
Net tangible book value per share at December 31, 1998....	\$ 3.04	
Decrease per share attributable to the S corporation distribution.....	(1.49)	
Increase per share attributable to new investors.....	2.92	
	-----	
Pro forma net tangible book value per share after this offering.....		4.47
		-----
Dilution per share to new investors.....		\$11.53
		=====

The following table sets forth, on a pro forma basis as of December 31, 1998, (1) the number of shares of common stock purchased from MKS, (2) the total consideration paid to MKS and (3) the average price paid per share by existing stockholders and by the new investors purchasing shares of common stock in this offering, at an assumed initial public offering price of \$16.00 per share. Underwriting discounts, commissions and other estimated offering expenses have not been deducted. Shares owned by existing stockholders will be reduced by the number of shares sold by them in this offering.

	SHARES PURCHASED		TOTAL CONSIDERATION		AVERAGE PRICE PER SHARE
	NUMBER	PERCENT	AMOUNT	PERCENT	
Existing stockholders.....	18,053,167	75.1%	\$ 161,000	0.2%	\$0.009
New investors.....	6,000,000	24.9	96,000,000	99.8	\$16.00
	-----	-----	-----	-----	-----
Total.....	24,053,167	100.0%	96,161,000	100.0%	
	=====	=====	=====	=====	=====

As of December 31, 1998, there were options outstanding to purchase a total of 2,132,575 shares of common stock, at a weighted average exercise price of \$5.19 per share and 2,401,793 additional shares reserved for future grants of issuances under MKS's stock option and stock purchase plans. To the extent that any of these options are exercised, there will be further dilution to new investors.

## SELECTED CONSOLIDATED FINANCIAL DATA

The following selected financial data as of December 31, 1997 and 1998 and for the years ended December 31, 1996, 1997 and 1998 have been derived from MKS's financial statements, included elsewhere in this prospectus, which have been audited by PricewaterhouseCoopers LLP, independent accountants, as indicated in their report. The selected financial data as of December 31, 1994, 1995 and 1996 and for the years ended December 31, 1994 and 1995 are derived from financial statements, which were also audited by PricewaterhouseCoopers LLP, not included herein. The data should be read in conjunction with the Consolidated Financial Statements, including the Notes thereto, and with "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere in this prospectus.

MKS has been treated as an S corporation under the applicable provisions of the Internal Revenue Code since July 1, 1987. As an S corporation, MKS has not been subject to federal, and certain state, income taxes. The pro forma net income set forth below reflects the provision for income taxes that would have been recorded had MKS been a C corporation, assuming an effective tax rate of 39.0% for 1994 and 1995, and 38.0% for 1996, 1997, and 1998. As a result of terminating its S corporation status upon the closing of this offering, MKS will record a one-time non-cash credit to historical earnings for additional deferred taxes. If this credit to earnings had occurred at December 31, 1998, the amount would have been approximately \$3.9 million. This amount is expected to change through the closing of this offering and is excluded from pro forma net income. See Notes 2 and 9 of Notes to Consolidated Financial Statements. Pro forma balance sheet data reflects the liability for the distribution of an estimated \$35.9 million, calculated as of December 31, 1998, of cumulative undistributed S corporation taxable income for which stockholders of record on the day prior to effective date of the registration statement have been or will be taxed. The actual amount to be distributed after the closing of this offering will be \$40.0 million, the estimated amount of our cumulative undistributed S corporation taxable income as of the day prior to the closing of this offering, subject to adjustment. Pro forma net income per share for 1998 reflects the effect of an assumed issuance of sufficient shares to fund the distribution, as of January 1, 1998. See "S Corporation and Termination of S Corporation Status" and Note 2 of Notes to Consolidated Financial Statements.

	YEAR ENDED DECEMBER 31,				
	1994	1995	1996	1997	1998
	(IN THOUSANDS)				
STATEMENT OF INCOME DATA:					
Net sales.....	\$106,829	\$157,164	\$170,862	\$188,080	\$139,763
Cost of sales.....	59,813	87,703	102,008	107,606	83,784
Gross profit.....	47,016	69,461	68,854	80,474	55,979
Research and development.....	8,036	10,935	14,195	14,673	12,137
Selling, general and administrative.....	26,893	34,420	37,191	41,838	34,707
Restructuring.....	--	--	1,400	--	--
Income from operations.....	12,087	24,106	16,068	23,963	9,135
Interest expense, net.....	1,284	1,448	2,286	1,861	1,187
Other income (expense), net.....	--	--	(479)	166	187
Income before income taxes.....	10,803	22,658	13,303	22,268	8,135
Provision for income taxes.....	800	1,000	800	1,978	949
Net income.....	\$ 10,003	\$ 21,658	\$ 12,503	\$ 20,290	\$ 7,186

THE HISTORICAL NET INCOME PER SHARE DATA SET FORTH BELOW DOES NOT INCLUDE PROVISIONS FOR FEDERAL INCOME TAXES BECAUSE PRIOR TO THE CLOSING OF THIS OFFERING, MKS WAS TREATED AS AN S CORPORATION FOR FEDERAL INCOME TAX PURPOSES. THE PRO FORMA STATEMENT OF INCOME DATA SET FORTH BELOW PRESENTS NET INCOME PER SHARE DATA AS IF MKS HAD BEEN SUBJECT TO FEDERAL INCOME TAXES AS A C CORPORATION DURING THE PERIODS PRESENTED.

	YEAR ENDED DECEMBER 31,				
	1994	1995	1996	1997	1998
HISTORICAL NET INCOME PER SHARE:					
Basic.....	\$0.55	\$1.20	\$0.69	\$1.12	\$0.40
Diluted.....	\$0.55	\$1.20	\$0.69	\$1.10	\$0.38

	YEAR ENDED DECEMBER 31,				
	1994	1995	1996	1997	1998
	(IN THOUSANDS, EXCEPT PER SHARE DATA)				
PRO FORMA STATEMENT OF INCOME DATA (UNAUDITED):					
Historical income before income taxes.....	\$10,803	\$22,658	\$13,303	\$22,268	\$8,135
Pro forma provision for income taxes assuming C corporation tax.....	4,213	8,837	5,055	8,462	3,091
Pro forma net income.....	\$ 6,590	\$13,821	\$ 8,248	\$13,806	\$5,044
PRO FORMA NET INCOME PER COMMON SHARE:					
Basic.....	\$ 0.37	\$ 0.77	\$ 0.46	\$ 0.76	\$ 0.25
Diluted.....	\$ 0.37	\$ 0.77	\$ 0.46	\$ 0.76	\$ 0.24

	DECEMBER 31,				DECEMBER 31, 1998	
	1994	1995	1996	1997	ACTUAL	PRO FORMA
	(IN THOUSANDS)					
BALANCE SHEET DATA:						
Cash and cash equivalents.....	\$ 4,059	\$ 3,650	\$ 3,815	\$ 2,511	\$ 11,188	\$ 11,188
Working capital (deficit).....	25,078	32,202	22,404	30,321	31,493	(4,433)
Total assets.....	72,320	104,511	95,000	106,536	96,232	96,232
Short-term obligations.....	9,246	15,192	16,124	13,852	12,819	12,819
Long-term obligations, less current portion.....	14,948	20,462	18,899	15,624	13,786	13,786
Stockholders' equity.....	37,272	48,392	45,498	52,848	54,826	18,900

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

The following discussion contains forward-looking statements that involve risks and uncertainties. MKS's actual results could differ materially from those discussed in the forward-looking statements as a result of certain factors including those set forth under "Risk Factors" and elsewhere in this prospectus. The following discussion and analysis should be read in conjunction with "Selected Consolidated Financial Data" and the Consolidated Financial Statements and Notes thereto appearing elsewhere in this prospectus.

## OVERVIEW

MKS was founded in 1961. MKS develops, manufactures and supplies instruments and components used to measure, control and analyze gases in semiconductor manufacturing and similar industrial manufacturing processes. During 1997 and 1998, MKS estimates that approximately 60% of its net sales were to semiconductor capital equipment manufacturers and semiconductor device manufacturers. MKS expects that sales to such customers will continue to account for a substantial majority of its sales. MKS's customers include semiconductor capital equipment manufacturers, semiconductor device manufacturers, industrial manufacturing companies and university, government and industrial research laboratories. In 1996, 1997, and 1998, sales to MKS's top five customers accounted for approximately 26%, 32% and 24%, respectively, of MKS's net sales. During 1998, Applied Materials, Inc. accounted for approximately 16% of MKS's net sales. MKS typically enters into contracts with its semiconductor equipment manufacturer customers that provide for quantity discounts. MKS recognizes revenue, and accrues for anticipated returns and warranty costs, upon shipment.

In the third quarter of 1996, as a result of the downturn in the semiconductor industry, MKS recorded a restructuring charge of \$1.4 million. The charge was primarily related to a reduction of personnel and the closure of certain facilities and included the cost of severance, lease commitments and the write-off of leasehold improvements. During 1998, as a result of the downturn in the semiconductor industry, MKS reduced its staffing levels by approximately 30% from its year-end 1997 levels.

A significant portion of MKS's sales are to operations in international markets. International sales by MKS's foreign subsidiaries, located in Japan, Korea, Europe, and Canada, were 27.3% and 32.4% of net sales for 1997 and 1998, respectively. Sales by MKS's Japan subsidiary comprised 15.0% and 15.1% of net sales in 1997 and 1998, respectively. MKS does not classify export sales made directly by MKS as international sales. Such export sales have generally been less than 10% of net sales. MKS currently uses, and plans to continue to use, forward exchange contracts and local currency purchased options to reduce currency exposure arising from foreign denominated sales associated with the intercompany purchases of inventory. Gains and losses on derivative financial instruments that qualify for hedge accounting are classified in cost of sales. Gains and losses on derivative financial instruments that do not qualify for hedge accounting are marked-to-market and recognized immediately in other income. See Note 3 to Notes to Consolidated Financial Statements.

MKS has been treated as an S corporation for federal income tax purposes since July 1, 1987. MKS's S corporation status will terminate upon the closing of this offering, at which time MKS will become subject to federal, and certain state, income taxation as a C corporation. The pro forma net income reflects a pro forma effective tax rate of 38.0% to reflect federal and state income taxes which would have been payable for 1998 had MKS been taxed as a C corporation. See "S Corporation and Termination of S Corporation Status."

## RESULTS OF OPERATIONS

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

	YEAR ENDED DECEMBER 31,		
	1996	1997	1998
Net sales.....	100.0%	100.0%	100.0%
Cost of sales.....	59.7	57.2	59.9
Gross profit.....	40.3	42.8	40.1
Research and development.....	8.3	7.8	8.7
Selling, general and administrative.....	21.8	22.3	24.9
Restructuring.....	0.8	--	--
Income from operations.....	9.4	12.7	6.5
Interest expense, net.....	1.3	1.0	0.8
Other income (expense), net.....	(0.3)	0.1	0.1
Income before income taxes.....	7.8	11.8	5.8
Provision for income taxes.....	0.5	1.0	0.7
Net income.....	7.3%	10.8%	5.1%
Pro forma data:			
Historical income before income taxes.....	7.8%	11.8%	5.8%
Pro forma provision for income taxes.....	3.0	4.5	2.2
Pro forma net income.....	4.8%	7.3%	3.6%

## Year Ended 1998 Compared to 1997

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

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

**Research and Development.** Research and development expenses decreased 17.3% to \$12.1 million or 8.7% of net sales for 1998 from \$14.7 million or 7.8% of net sales for 1997. The decrease was due to reduced spending for development materials primarily related to certain projects that were completed during 1998.

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

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

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

Pro Forma Provision for Income Taxes. The pro forma provision for income taxes for 1998 reflects the estimated tax expense MKS would have incurred had it been subject to federal and state income taxes as a C corporation under the Internal Revenue Code. The pro forma provision reflects a pro forma tax rate of 38.0%, which differs from the federal statutory rate due primarily to the effects of state and foreign taxes and certain tax credits.

Year Ended 1997 Compared to 1996

Net Sales. Net sales increased 10.1% to \$188.1 million for 1997 from \$170.9 million for 1996. International net sales were approximately \$51.4 million in both 1997 and 1996 and were 27.3% of net sales in 1997 and 30.1% of net sales in 1996. The increase in net sales was primarily due to increased sales volume of MKS's existing products in the United States.

Gross Profit. Gross profit as a percentage of net sales increased to 42.8% for 1997 from 40.3% for 1996. The change was due primarily to the reduction in fixed costs resulting from the restructuring effected in the third quarter of 1996 and the resulting increase in operational efficiencies.

Research and Development. Research and development expenses increased 3.4% to \$14.7 million or 7.8% of net sales for 1997 from \$14.2 million or 8.3% of net sales for 1996. The increase was primarily due to an increase in staffing throughout 1997 for certain development projects.

Selling, General and Administrative. Selling, general and administrative expenses increased 12.5% to \$41.8 million or 22.3% of net sales for 1997 from \$37.2 million or 21.8% of net sales for 1996. The increase was due to increased compensation expense resulting from increased salaries and wages and incentive compensation.

Restructuring. In the third quarter of 1996, as a result of the downturn in the semiconductor industry, MKS recorded a restructuring charge of \$1.4 million. The charge included \$0.4 million of severance pay, \$0.7 million of lease commitments, and \$0.3 million for the write-off of leasehold improvements.

Interest Expense, Net. Net interest expense decreased to \$1.9 million for 1997 from \$2.3 million for 1996 primarily due to lower debt outstanding during 1997.

Other Income (Expense), Net. Other expense for 1996 and other income for 1997 reflect losses and gains of \$0.5 million and \$1.2 million, respectively, from foreign exchange contracts that did not qualify for hedge accounting, and a foreign exchange translation loss on an intercompany payable from MKS's Korean subsidiary of \$1.0 million related to the devaluation of the Korean won in the fourth quarter of 1997.

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

## Selected Quarterly Operating Results

The following tables present unaudited consolidated financial information for the eight quarters ended December 31, 1998. In the opinion of management, this information has been presented on the same basis as the audited Consolidated Financial Statements appearing elsewhere in this prospectus. All adjustments which management considers necessary for a fair presentation of the results of such periods have been included to present fairly the unaudited quarterly results when read in conjunction with MKS's Consolidated Financial Statements and Notes thereto. The results for any quarter are not necessarily indicative of future quarterly results of operations.

	QUARTER ENDED							
	MARCH 31, 1997	JUNE 30, 1997	SEPT. 30, 1997	DEC. 31, 1997	MARCH 31, 1998	JUNE 30, 1998	SEPT. 30, 1998	DEC. 31, 1998
	(IN THOUSANDS)							
STATEMENT OF INCOME DATA:								
Net sales.....	\$40,520	\$45,749	\$48,360	\$53,451	\$46,163	\$34,026	\$28,834	\$30,740
Cost of sales.....	24,277	26,413	27,766	29,150	26,757	20,265	18,140	18,622
Gross profit.....	16,243	19,336	20,594	24,301	19,406	13,761	10,694	12,118
Research and development.....	2,994	3,563	3,779	4,337	3,794	3,107	2,568	2,668
Selling, general and administrative.....	9,612	10,321	10,816	11,089	10,112	9,045	7,808	7,742
Income from operations.....	3,637	5,452	5,999	8,875	5,500	1,609	318	1,708
Interest expense, net.....	494	527	445	395	375	337	234	241
Other income (expense), net.....	275	(447)	632	(294)	(281)	123	77	268
Income before income taxes.....	3,418	4,478	6,186	8,186	4,844	1,395	161	1,735
Provision for income taxes.....	289	378	523	788	565	163	19	202
Net income.....	\$ 3,129	\$ 4,100	\$ 5,663	\$ 7,398	\$ 4,279	\$ 1,232	\$ 142	\$ 1,533

	QUARTER ENDED							
	MARCH 31, 1997	JUNE 30, 1997	SEPT. 30, 1997	DEC. 31, 1997	MARCH 31, 1998	JUNE 30, 1998	SEPT. 30, 1998	DEC. 31, 1998
PERCENTAGE OF NET SALES:								
Net sales.....	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cost of sales.....	59.9	57.7	57.4	54.5	58.0	59.6	62.9	60.6
Gross profit.....	40.1	42.3	42.6	45.5	42.0	40.4	37.1	39.4
Research and development.....	7.4	7.8	7.8	8.1	8.2	9.1	8.9	8.6
Selling, general and administrative.....	23.7	22.6	22.4	20.8	21.9	26.6	27.1	25.2
Income from operations.....	9.0	11.9	12.4	16.6	11.9	4.7	1.1	5.6
Interest expense, net.....	1.2	1.1	0.9	0.7	0.8	1.0	0.8	0.8
Other income (expense), net.....	0.6	(1.0)	1.3	(0.6)	(0.6)	0.4	0.3	0.8
Income before income taxes.....	8.4	9.8	12.8	15.3	10.5	4.1	0.6	5.6
Provision for income taxes.....	0.7	0.8	1.1	1.5	1.2	0.5	0.1	0.6
Net income.....	7.7%	9.0%	11.7%	13.8%	9.3%	3.6%	0.5%	5.0%

MKS's quarterly operating results have varied significantly and are likely to continue to vary significantly due to a number of factors including:

- specific economic conditions in the industries in which MKS's customers operate, particularly the semiconductor industry
- the timing of the receipt of orders from major customers
- customer cancellations or shipment delays
- price competition
- disruption in sources of supply
- seasonal variations of capital spending by customers
- production capacity constraints
- specific features requested by customers



- exchange rate fluctuations
- the introduction or announcement of new products by MKS or its competitors
- other factors, many of which are beyond MKS's control

MKS's net sales have fluctuated over the past eight quarters primarily due to the decline in the semiconductor capital equipment market and the semiconductor device market in 1998 that adversely affected sales of MKS's products in each of the quarters of 1998. MKS expects that the decline in worldwide semiconductor capital equipment orders in the second half of 1998 and the instability of the Asian markets will continue to adversely affect sales of semiconductor capital equipment manufacturers for at least the first quarter of 1999. As a result, for at least the first quarter we currently expect that our 1999 quarterly net sales and net income will be less than net sales and net income for the comparable quarter of 1998.

Gross profit as a percentage of net sales increased in each quarter of 1997 primarily as a result of fuller utilization of existing manufacturing capacity as a result of increased net sales. Gross profit as a percentage of net sales decreased in each of the first three quarters of 1998 as a result of manufacturing overhead costs becoming a higher percentage of net sales due to lower sales volume.

The increase in research and development expenses for the second, third and fourth quarters of 1997 was primarily due to increased staffing levels. The decrease in research and development expenses for the first, second, and third quarters of 1998 was due to reduced spending for development materials primarily related to certain projects that were completed during 1998.

Selling, general and administrative expenses increased in the second, third and fourth quarters of 1997 primarily due to increased compensation expense and the write-off of certain abandoned assets. The decrease in selling, general and administrative expenses in the first, second, and third quarters of 1998 was primarily due to a decrease in compensation expense along with other selling related expenses.

Other income primarily represents gains and losses on foreign exchange contracts and a foreign exchange translation loss on an intercompany payable from MKS's Korean subsidiary of \$1.0 million in the fourth quarter of 1997 related to the devaluation of the Korean won. Other expenses in the first quarter of 1998 include \$0.7 million for costs associated with MKS's planned initial public offering in early 1998 which was postponed.

#### LIQUIDITY AND CAPITAL RESOURCES

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

Operations provided cash of \$26.3 million, \$16.8 million and \$23.0 million for 1996, 1997 and 1998, respectively, primarily impacted in each period by net income, depreciation and changes in the levels of inventory and accounts receivable. Investing activities utilized cash of \$10.2 million, \$3.3 million and \$2.1 million in 1996, 1997 and 1998, respectively, primarily for the purchase of property and equipment in each period. Financing activities utilized cash of \$15.6 million, \$16.2 million and \$11.8 million in 1996, 1997 and 1998, respectively, primarily for stockholder distributions in each period. Cash flows from financing activities for each period were primarily from short-term and long-term borrowings.

Working capital was \$31.5 million as of December 31, 1998. MKS has a combined \$30.0 million line of credit with two banks, expiring December 31, 1999, all of which is available. Interest on future borrowings under the line of credit would be payable monthly at a rate based on LIBOR, which was 7.131% at December 31, 1998. MKS also has lines of credit through its foreign subsidiaries with several financial institutions totaling \$15.0 million at December 31, 1998. The total unused balance under these lines of credit was \$5.3 million at December 31, 1998. The interest rates on borrowings outstanding as of December 31, 1998 on these lines of credit ranged from 1.3% to 1.7%. Interest on future borrowings under the unused balance of these lines of credit would be at rates ranging from 1.5% to 7.85%. These lines generally expire and are renewed at six month intervals. In addition, MKS has outstanding term loans and

mortgage loans from banks totaling \$12.0 million (net of the current portion) at December 31, 1998. See Notes 6 and 13 of Notes to Consolidated Financial Statements.

In 1997 and 1998, MKS distributed \$12.4 million and \$6.2 million, respectively, of undistributed S corporation earnings to its stockholders. As soon as practicable following the closing of this offering, MKS intends to make a distribution to the stockholders of record on the day prior to the effective date of the registration statement in the amount of \$40.0 million, which is the estimated balance of the accumulated adjustments account as of the day prior to the closing of the offering, subject to adjustment. The accumulated adjustments account is cumulatively equal to financial reporting income, adjusted for differences between the methods of accounting used for financial accounting and for federal income tax purposes from July 1, 1987 through the date of termination of MKS's S corporation status, that has not been previously distributed. Investors purchasing shares in this offering will not receive any portion of the distribution. See "S Corporation and Termination of S Corporation Status."

MKS believes that the net proceeds from this offering, together with the cash anticipated to be generated from operations and funds available from existing credit facilities, will be sufficient to satisfy its estimated working capital and planned capital expenditure requirements through at least the next 24 months.

#### EFFECT OF CURRENCY EXCHANGE RATES AND EXCHANGE RATE RISK MANAGEMENT

A significant portion of MKS's business is conducted outside of the United States through its foreign subsidiaries. The foreign subsidiaries maintain their accounting records in their local currencies. Consequently, period to period comparability of results of operations is affected by fluctuations in exchange rates. MKS derives a significant portion of its cash flows from foreign denominated revenue. To the extent the dollar value of foreign denominated revenue is diminished as a result of a strengthening U.S. dollar, MKS's results of operations and cash flows could be adversely affected.

The primary currencies to which MKS has exposure are the Japanese yen and the German mark. The nature of this exposure is from MKS selling inventory to its overseas subsidiaries for resale in local currency. Consequently, the cash flows from the overseas subsidiaries are affected by exchange rate fluctuations. To reduce the risks associated with foreign currency rate fluctuations, MKS has entered into forward exchange contracts and local currency purchased options on a continuing basis in amounts and timing consistent with the underlying currency exposures.

The factors MKS considers in determining whether forward exchange contracts or purchased options qualify for hedge accounting include:

- whether the notional amounts of the derivatives offset the underlying currency exposures in terms of timing and amounts
- for forward exchange contracts, whether the underlying transactions being hedged are pursuant to firm commitments
- for local currency purchased options, whether it is probable that the underlying hedging transaction will occur

Gains on forward exchange contracts and local currency purchased options, qualifying for hedge accounting, amounted to \$2.5 million, \$1.2 million and \$0.3 million for the years ended December 31, 1996, 1997 and 1998, respectively, and are classified in cost of sales. Losses of \$0.5 million, gains of \$1.2 million and losses of \$0.2 million on forward exchange contracts that did not qualify for hedge accounting were recognized in earnings for 1996, 1997 and 1998, respectively, and are classified in other income (expense), net. These amounts are net of a foreign exchange translation loss of \$1.0 million and a gain of \$1.0 million on intercompany payables from its subsidiaries in 1997 and 1998 respectively. Foreign exchange translation gains and losses from unhedged intercompany balances were not material in 1996.

While MKS does not issue or hold derivative financial instruments for trading purposes, there can be no assurance that any losses realized on such instruments will be fully offset by gains on the underlying exposure. Prospectively, MKS plans to continue to use forward exchange contracts and local currency purchased options to seek to mitigate the impact of exchange rate fluctuations. See Notes 2 and 3 of Notes to Consolidated Financial Statements.

#### MARKET RISK AND SENSITIVITY ANALYSIS

##### Foreign Exchange Rate Risk

The potential fair value loss for a hypothetical 10% adverse change in forward currency exchange rates on MKS's forward exchange contracts at December 31, 1998 would be \$949,000. The potential loss was estimated by calculating the fair value of the forward exchange contracts at December 31, 1998 and comparing that with those calculated using the hypothetical forward currency exchange rates.

The value of the local currency purchased options at December 31, 1998 was immaterial. Any loss related to the local currency purchased options is limited to the unamortized premium of \$155,000 at December 31, 1998.

At December 31, 1998, MKS had \$9,687,000 related to short-term borrowings denominated in Japanese yen. The carrying value of these short-term borrowings approximates fair value due to their short period to maturity. Assuming a hypothetical 10% adverse change in the Japanese yen to U.S. dollar year end exchange rate, the fair value of these short-term borrowings would increase by \$1,077,000. The potential increase in fair value was estimated by calculating the fair value of the short-term borrowings at December 31, 1998 and comparing that with the fair value using the hypothetical year end exchange rate.

##### Interest Rate Risk

MKS is exposed to fluctuations in interest rates in connection with its variable rate term loans. In order to minimize the effect of changes in interest rates on earnings, MKS entered into an interest rate swap that fixed the interest rate on its variable rate term loans. Under the swap agreement, MKS pays a fixed rate of 5.85% on the notional amount and receives LIBOR. At December 31, 1998, the notional amount of the interest rate swap was equal to the principal amount of the variable rate term loans. The potential increase in the fair value of term loans when adjusting for the interest rate swap paying at a fixed rate resulting from a hypothetical 10% decrease in interest rates was not material.

#### RECENTLY ISSUED ACCOUNTING PRONOUNCEMENTS

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

#### YEAR 2000 COMPLIANCE

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

##### State of Readiness

MKS designed and began implementation of a multi-phase Year 2000 project which consists of:

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

- testing of systems and components following remediation

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

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

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

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

One of MKS's international subsidiaries is currently undergoing conversion of its business systems in order to become Year 2000 compliant. Management believes that these systems will be operational by June 1999. This phase of the Year 2000 project is currently on schedule.

MKS's personal computer based systems were assessed in early 1998. MKS believes that all non-compliant hardware and software was identified by March 1998, at which time it made a list prioritizing databases to be remedied. Critical databases were identified and were scheduled for remediation prior to other databases. Remediation plans to convert the databases were initiated in November 1998. MKS anticipates that it will complete its critical and non-critical conversions by June 1999. This phase of the Year 2000 project is currently on schedule.

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

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

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

conducted through December 1998, and a remediation plan was developed in January 1999. MKS anticipates completion of all corrective actions by June 1999 with testing and review of corrected items to occur in the summer of 1999. This phase of the Year 2000 project is currently on schedule.

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

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

MKS assessed which of these third-party goods, services and interfaces were critical to its operations and developed and mailed a standard survey to each third-party deemed critical in January 1998. By March 1998, MKS had reviewed most responses received. To date, the responses received indicate that the third-parties are either in the process of developing remediation plans, or are compliant. MKS anticipates further assessment to continue through March 1999 and plans to conduct reviews at that time. A remediation plan is expected to be in place by June 1999 with all critical third-parties achieving satisfactory compliance by August 1999. This phase of the Year 2000 project is currently on schedule.

#### Costs

MKS's costs to date associated with assessment, remediation and testing activities concerning the Year 2000 problem have been approximately \$1,500,000. MKS estimates that an additional \$1,500,000, the major portion of which will be capitalized and expensed over the life of the assets, will be required to complete the replacement or modification of its facilities, manufacturing equipment, computer software and products and to address the noncompliance of key third-parties. MKS has funded and will continue to fund these activities principally through cash provided by operations and existing leasing lines of credit. It is not possible for MKS to completely estimate the costs incurred in its remediation effort as many of its employees have focused and will continue to focus significant efforts in evaluating MKS's Year 2000 state of readiness and in remediating problems that have arisen, and will continue to arise, from such evaluation.

#### Contingency Plan

To date, MKS has not formulated contingency plans related to the failure of its or a third-party's Year 2000 remediation efforts. Contingency plans for the failure to implement compliance procedures have not been completed because it is the intent of MKS to complete all required modifications and to test modifications thoroughly prior to December 31, 1999. However, as discussed above, MKS is engaged in ongoing assessment, remediation and testing activities and the internal results as well as the responses received from third-parties will be taken into account in determining the nature and extent of any contingency plans if necessary.

## BUSINESS

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

- - semiconductors
- - flat panel displays
- - magnetic and optical storage devices and media, including:
  - compact disks
  - hard disk storage devices
  - magnetic devices for reading disk data
  - digital video disks
  - optical storage disks or laser readable disks
- - solar cells which convert light into electrical current
- - fiber optic cables for telecommunications
- - optical coatings, such as eyeglass coatings
- - coatings for architectural glass
- - hard coatings to minimize wear on cutting tools
- - diamond thin films

Our products include:

- - instruments used to measure, control and analyze:
  - gas pressure
  - gas flow
  - gas composition
- - vacuum technology products:
  - vacuum gauges
  - vacuum valves and components

For over 25 years, MKS has focused on satisfying the needs of semiconductor capital equipment manufacturers and semiconductor device manufacturers and has established long-term relationships with many of its customers. Over 4,000 customers worldwide purchased products from MKS during 1998 including:

- semiconductor capital equipment manufacturers
- semiconductor device manufacturers
- industrial manufacturing companies
- university, government and industrial research laboratories

MKS's customers include Applied Materials, Inc., Lam Research Corporation, Novellus Systems, Inc., Tokyo Electron Limited, Inc., Air Products and Chemicals, Inc. and Motorola, Inc. MKS sells its products primarily through its sales force which consists of 118 employees, as of December 31, 1998, in 22 offices in France, Germany, Japan, Korea, The Netherlands, Singapore, Taiwan, the United Kingdom and the United States.

## INDUSTRY BACKGROUND

In the past 40 years, significant advances in materials science and processing technologies have made possible the manufacture of products ranging from highly complex microprocessor chips to simple but effective airtight coatings for food packagings. In many materials processing applications, specific gas mixtures at precisely controlled pressures are used:

- to create and maintain the required process atmosphere
- as a source of materials to be deposited on a surface, such as a silicon wafer
- to remove or etch materials from a surface to form a circuit pattern

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

#### Semiconductor Manufacturing Process

The manufacturing of semiconductors requires hundreds of process steps. Many steps involve the controlled application or removal of layers of materials to or from a surface referred to as a substrate. These process steps take place within a process chamber, which provides a controlled environment for the fabrication of semiconductor devices. Most of the key processes used in the production of semiconductors require precise automatic control of gas pressure, flow and composition in the process chamber.

To ensure the integrity and performance of the manufacturing process, semiconductor device manufacturers require sophisticated instruments that can provide precise automated control of all major process variables within the process chamber. The process steps required to produce circuit patterns involve the control of multiple gases flowing into the process chamber at specified intervals, and at controlled pressure and vacuum levels. In a typical process step, the process chamber is evacuated to a base pressure established by a vacuum pumping system and measured with vacuum gauges. Automatic shut-off valves are sequenced to protect pumps and process instruments from exposure to atmospheric pressure. Chamber leak integrity may be checked by gas analyzers scanning for the presence of undesirable atmospheric gases or water vapor. Mass flow controllers automatically control the flow rates of multiple gases into the process chamber. Simultaneously, the automatic pressure control system for the process chamber measures the pressure in the chamber and controls it at the desired level by electronically adjusting the position of a control valve located between the process chamber and the vacuum pump. Downstream of the process chamber, heated lines, particle traps, and vacuum valves and switches are used to prevent contamination of the process chamber as a result of the backstream of particles and exhaust gases back into the process chamber. This improves circuit quality, reduces maintenance and prolongs vacuum pump life.

The pressures used in semiconductor manufacturing processes range from as low as one trillionth of atmospheric pressure to as high as two hundred times atmospheric pressure. The following table shows the wide range of pressures required for typical semiconductor manufacturing processes:

[PRESSURE RANGES OF TYPICAL SEMICONDUCTOR MANUFACTURING PROCESSES CHART]

[This table graphically depicts, using graybars, the gas pressure ranges, from one trillionth of atmospheric pressure to two hundred times atmospheric pressure used in various typical semiconductor manufacturing process steps (introduction of gases into process chamber, deposition of materials and thin films on to substrates, introduction of gases to etch circuit patterns, deposition of conductive metal layers onto substrates and implantation of positively charged atoms into substrates).

The fabrication of a semiconductor circuit requires varying flow rates, pressures and gases. A typical process step uses from three to five different gases.

Uptime, yield and throughput are critical semiconductor manufacturing concepts. Uptime is the amount of time that the semiconductor processing tool is available for processing. Yield is the ratio of acceptable circuits to total circuits processed. Throughput is the number of wafers that can be processed per hour. Uptime, yield, and throughput depend in major part upon:

- precise repeatable measurement and control of the specific gas pressure, flow rates and composition
- the maintenance of the vacuum integrity of the process chamber
- the prevention of wafer contamination from particles entering the chamber

Pressure variations of as little as one one-hundred-thousandth of atmospheric pressure can change process yields significantly and errors in gas flow rates and composition may impair circuit performance. Atmospheric contamination and particle contamination can produce defects that significantly reduce wafer yields and the time required to remove contaminants reduces uptime and throughput. The speed of response and precision of the automatic control systems directly affects uptime, throughput of wafers and process yields.

#### Other Similar Industrial Manufacturing Processes

Many of the same processes used to manufacture semiconductors are also used to manufacture: flat panel displays; magnetic and optical storage devices and media; solar cells; fiber optic cables for telecommunications; optical coatings; coatings for architectural glass; hard coatings to minimize wear on cutting tools; and diamond thin films.

## Trends in Semiconductor Manufacturing

The ability of semiconductor device manufacturers to offer integrated circuits with smaller geometries and greater functionality at higher speeds requires continuous improvements in semiconductor process equipment and process controls. The transition to smaller circuit patterns, such as 0.18 micron and smaller line-widths, requires more process steps. It is also leading to the introduction of new materials such as copper for conductors and a whole new class of organic and inorganic materials for insulators. These in turn require new technologies for delivery of gases and vapors to the process chamber. In addition, the introduction of advanced processes such as high density plasma is leading to a need for lower pressures, which are more difficult to measure and control than higher pressures. These trends, along with increased wafer sizes, which result in higher circuit value per wafer, are leading to the need for increased sophistication of semiconductor processing equipment, a heightened emphasis on uptime, yield and throughput and the need for more precise process controls. As a result, the design and performance of instruments that control pressure or the flow of gases, or analyze the composition of gases, are becoming even more critical to the semiconductor manufacturing process.

To address the increasing complexity of semiconductor devices, semiconductor device manufacturers typically develop processes to create particular device features using specific manufacturing equipment. The process for each feature is then documented and may be subsequently replicated for use in multiple fabrication facilities around the world. The precision, repeatability and reliability of the measurement and control instrumentation used for each process is critical to providing uptime, high yield and throughput on manufacturing equipment at all facilities employing such processes. Semiconductor device manufacturers are placing increasing importance on uptime, yield, throughput and process consistency throughout their facilities to minimize:

- capital equipment expenditures
- facility construction costs
- overall ongoing operating costs

The increasing sophistication of semiconductor devices requires an increase in the number of components and subsystems used in the design of semiconductor manufacturing process tools. To reduce manufacturing complexity, improve quality and reliability and ensure long-term service and support, semiconductor capital equipment manufacturers and semiconductor device manufacturers are increasingly seeking to establish relationships with a smaller group of broad-based suppliers that meet their needs on a worldwide basis and provide:

- advanced technological capabilities to address the increasing complexities of the semiconductor manufacturing process
- instrument and component designs that ensure repeatable processes around the world
- value-added, integrated instruments and components
- a worldwide sales, service and support infrastructure

## MKS SOLUTION AND STRATEGY

MKS's objective is to be the leading worldwide supplier of instruments and components used to measure, control and analyze gases in semiconductor and other advanced thin-film materials processing applications and to help semiconductor device manufacturers achieve improvements in their return on invested capital. The principal elements of MKS's solution and strategy to achieve this objective are set forth below:

**Technology Leadership.** MKS's products incorporate leading-edge technologies to control and monitor increasingly complex gas-related semiconductor manufacturing processes, thereby enhancing

uptime, yield and throughput which can improve the investment return on capital equipment and facilities. The instruments and components in MKS's product offering provides the required capabilities through:

- high precision operation over the extreme and variable pressure ranges required for semiconductor processes
- precise, consistent and repeatable measurement and control performance that allows processes to be replicated in manufacturing facilities around the world
- advanced control technologies which enhance uptime, yield and throughput
- multiple, diverse and alternative technologies for controlling the flow rate and composition of gases and vapors needed for new classes of advanced materials for next generation semiconductor devices
- innovative vacuum technology subsystems that reduce atmospheric and particle contamination, thereby enhancing uptime, yield and throughput

MKS's products have continuously advanced as its customers' needs have evolved. MKS seeks to extend its technological leadership by applying its expertise in vacuum, pressure, flow and gas composition measurement control and analysis technologies to develop advanced products that meet the critical gas-related process requirements of semiconductor and advanced thin-film materials manufacturers.

MKS has introduced technological innovations including:

- corrosion-resistant pressure and vacuum sensors
- automatic pressure and vacuum control systems
- compact single unit gas composition analyzers to replace bulky multi-component systems

MKS has developed, and continues to develop, new products to address emerging industry trends such as the transition from the use of 200mm wafers to 300mm wafers and the shrinking of integrated circuit line-widths from 0.25 micron to 0.18 micron and smaller. MKS has supplied pre-production equipment to be incorporated into semiconductor capital equipment manufacturers' 300mm pre-production semiconductor wafer process equipment, which is expected to be included in pilot production lines of device manufacturers.

MKS has also developed equipment that is being used by research laboratories for semiconductor devices using less than 0.18 micron line-widths. In addition, MKS has developed, and continues to develop, materials delivery systems for new classes of materials, such as copper for conductors, titanium nitride for barriers and a class of organic and inorganic dielectric materials that are beginning to be used in small geometry manufacturing.

MKS has been a leader in making its products compatible with emerging digital network standards, such as DeviceNet. DeviceNet enables components used in semiconductor manufacturing processes to transmit self-diagnostic and other information on a digital host network. This reduces system complexity and space requirements.

To ensure that MKS maintains its leading-edge position, MKS aligns its research and development program to the Semiconductor Industry Association Technology Roadmap. The Semiconductor Industry Association Technology Roadmap identifies technological developments, as well as obstacles, required to produce future generations of semiconductor devices. MKS also maintains associations with leading universities to anticipate future semiconductor production needs three to seven years in advance.

Comprehensive Product Offering. MKS currently offers, and intends to continue to offer, the widest range of pressure and vacuum measurement and control products serving the semiconductor manufacturing and similar industrial manufacturing industries. MKS offers a full line of products including a wide range of gas pressure, flow and composition analysis measurement and control instruments and vacuum gauges, valves and components.

Since the development of its original Baratron laboratory-based pressure measurement instrument in 1961, MKS has continuously enhanced and expanded its product offerings in response to the evolving needs of its customers. For example, MKS recently introduced the Micro Baratron instrument, a significantly smaller version of its pressure measurement product, and a new low vapor pressure material

delivery system. MKS plans to introduce new products throughout 1999, including a line of mass flow calibrators and process monitoring hardware and software for gas analysis.

MKS's products are designed to meet the increasingly complex needs of its customers. With the increasing sophistication of semiconductor capital equipment leading to an increasing number of components and subsystems in semiconductor manufacturing process tools, MKS delivers products that reduce equipment size and improve process performance. MKS's subsystem products combine several components into single integrated solutions. MKS's integrated solutions deliver higher performance at a lower cost than similar subsystems built from discrete components. Additionally, MKS's integrated solutions are easier to install and configure, further reducing the overall cost to the customer.

MKS plans to continue to expand its product lines through both internal development and acquisitions of complementary businesses, products and technologies. MKS's comprehensive product offering enables MKS to meet a broad range of customer needs and provide a single source of solutions for semiconductor device and semiconductor capital equipment manufacturers as they seek to consolidate their supplier relationships to a smaller select group.

**Close Working Relationships with Customers.** MKS has focused on satisfying the needs of semiconductor device manufacturers and semiconductor capital equipment manufacturers for over 25 years and has established long-term relationships with many of its customers. MKS works with its customers at the pre-design and design stage to identify and respond to their requests for current and future generations of products. These close working relationships allow MKS to understand and address the cost and performance expectations of its customers. MKS plans to enhance its relationships with its major customers and identify opportunities to develop similar relationships with additional semiconductor capital equipment manufacturers and semiconductor device manufacturers.

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

**Global Infrastructure and World Class Manufacturing Capabilities.** As semiconductor device manufacturers have become increasingly global, they have required that suppliers offer comprehensive local repair service and close customer support. Manufacturers require close support to enable them to calibrate, repair, modify, upgrade and retrofit their equipment to improve process consistency, uptime, yield and throughput. To meet these market requirements, MKS maintains a global sales and support organization with 22 offices worldwide. MKS currently manufactures its products at nine facilities in the United States and abroad. MKS continues to devote significant resources to expand and maintain its worldwide production and service capabilities to meet the global demand for gas measurement, control and analysis instruments and vacuum technology components. MKS opened a sales and support facility in Singapore in 1998 and during 1999 plans to add manufacturing capabilities to its Austin, Texas facility and further equip its cleanroom facilities in Andover and Methuen, Massachusetts.

MKS believes that the ability to manufacture reliable instruments and components in a cost-effective manner is critical to meet the demanding just-in-time delivery requirements of semiconductor capital equipment manufacturers and semiconductor device manufacturers. MKS's worldwide production and manufacturing facilities provide MKS with the ability to manufacture reliable gas measurement, control and analysis instruments and components in a timely and cost-effective manner. With a total of approximately 250,000 square feet of manufacturing capacity in five locations in the United States and four others in Germany, Japan, the United Kingdom and Korea, MKS has implemented world class practices in quality and delivery techniques. MKS's manufacturing facilities in the United States, the United Kingdom and Germany are ISO 9001 certified.

## PRODUCTS

MKS offers a full line of instruments and components that are used to measure, control and analyze gases in semiconductor manufacturing and other advanced thin-film manufacturing processes. MKS supplies products in two principal areas:

- measurement and control instrumentation products
- vacuum technology products

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

[CHART]

[Schematic showing where MKS products are used in a typical semiconductor manufacturing process.]

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

Baratron Pressure Measurement Products. MKS's Baratron pressure measurement products are high precision, pressure measurement instruments. MKS has five Baratron product families that range from high accuracy digital output instruments to simple electronic switches. These products are typically used to measure the pressure of the gases being distributed upstream of the process chambers, to measure process chamber pressures and to measure pressures between process chambers, vacuum pumps and exhaust lines. Baratron instruments measure pressures at ranges from two hundred times atmospheric pressure to one billionth of atmospheric pressure. MKS believes it offers the widest range of gas pressure measurement instruments in the semiconductor and advanced thin-film materials processing industries.

A key feature of Baratron instruments is the ability to measure pressure independent of gas composition, which is critical for precise pressure control of semiconductor processes that involve gas mixtures. In these processes, there is a need to control both pressure and gas mixture, but the pressure measurement instrument must measure only the pressure of the sum of the gases in the chamber, independent of gas composition. The Baratron instruments enable users to achieve a highly precise, accurate and repeatable measurement of gas pressure. Pressure measurement, independent of gas composition, is also useful during process steps used to remove atmospheric gases as well as those used to introduce specific amounts of various types of gases. Such processes are used to manufacture fluorescent bulbs and to fabricate gas lasers.

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

BARATRON PRESSURE MEASUREMENT PRODUCTS

PRODUCT LINES	DESCRIPTION	RANGES OF LIST PRICES
High precision, high accuracy pressure and vacuum measurement instruments	Instruments with built-in temperature stabilization features, for high precision, high accuracy and high temperature operation	\$2,900-\$6,400
General purpose pressure and vacuum measurement instruments	Rugged instruments with and without built-in temperature stabilization features, for reliable, precise and accurate process measurement	\$450-\$4,200
Ultra-clean high pressure and vacuum measurement instruments	Instruments with ultra- clean surfaces exposed to gas, for precise, high purity applications	\$550-\$1,050
General purpose "MINI" pressure and vacuum measurement instruments	Small footprint instruments for precise, accurate, general purpose process measurement	\$650-\$1,400
Electronic pressure and vacuum switches	Economical, stable instrument providing "go/no-go" output for precise pressure trip-points and alarms	\$350-\$750

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

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

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

AUTOMATIC PRESSURE AND VACUUM CONTROL PRODUCTS

PRODUCT LINES	DESCRIPTION	RANGES OF LIST PRICES
Automatic throttle control valve controllers	Analog controllers, self-tuning digital controllers and displayless self-tuning controllers	\$800-\$2,650
Throttle control valves	Non-sealing and sealing valves; high speed sealing throttle control valves; automatic, microprocessor-based smart throttle control valves	\$1,400-\$8,800
Automatic solenoid control valve controllers	Stand-alone control electronics packages or integrated sensor, valve and control electronics packages	\$1,850-\$2,900
Solenoid control valves	Elastomer and all-metal-sealed solenoid control valves	\$450-\$1,500

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

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

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

## FLOW MEASUREMENT AND CONTROL PRODUCTS

PRODUCT LINES	DESCRIPTION	RANGES OF LIST PRICES
Direct liquid injection subsystem	Pumps and vaporizes liquid precursors for metals and dielectrics into process chamber	\$8,500-\$24,900
Gas box rate of rise calibrator	Measures pressure increase with time in a known volume	\$8,100-\$11,800
Pressure-based vapor delivery systems	Measures and controls flow of low pressure vapors into chamber	\$4,900-\$12,400
Pressure-based mass flow controllers	Gas flow controller consisting of Baratron sensor, control valve, orifice and electronics	\$2,700
Ultra-clean, all-metal-sealed thermal mass flow controllers	Gas flow controller consisting of sensor, control valve and electronics	\$1,400-\$9,500
General purpose elastomer-sealed mass flow controllers	Gas flow controller consisting of sensor, control valve and electronics	\$1,050-\$2,450

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

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

Gas Composition Analysis Instruments. MKS's gas analysis instruments are sold primarily to the semiconductor industry. The residual gas analysis product lines include a quadrapole mass spectrometer sensor, which is a device that separates gases based on molecular weight. MKS's quadrapole mass spectrometer sensors include built-in electronics to analyze the composition of background and process gases in the process chamber. MKS's ORION process monitoring system is a sophisticated quadrapole mass spectrometer process analyzer for statistical process monitoring of manufacturing processes operating from very low pressures to atmospheric pressure. These instruments are provided both as portable laboratory systems and as process gas monitoring systems used in the diagnosis of semiconductor manufacturing process systems and are sold at prices ranging up to \$80,000. The gas monitoring systems can indicate out-of-bounds conditions, such as the presence of undesirable atmospheric gases, water vapor or out-of-tolerance amounts of specific gases in the process chamber, enabling operators to diagnose and repair faulty equipment. MKS's gas sampling systems provide a turn-key solution for withdrawing gases from chambers at relatively high pressures for introduction into the low pressure gas analyzers. Next generation semiconductor manufacturing processes, with smaller circuit patterns and larger wafer sizes, are expected to require sophisticated gas analysis instruments and/or monitoring equipment to ensure tighter process control and earlier diagnosis of equipment malfunction.

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

Vacuum Gauging Products. MKS offers a wide range of vacuum instruments consisting of vacuum measurement sensors and associated power supply and readout units. These vacuum gauges measure phenomena that are related to the level of pressure in the process chamber and downstream of the process chamber between the chamber and the pump. Unlike Baratron pressure measurement instruments, vacuum gauges do not measure pressure directly. These gauges are used to measure vacuum at pressures lower than those measurable with a Baratron pressure measurement instrument or to measure vacuum in the Baratron pressure measurement instrument range where less accuracy is required. MKS's indirect pressure gauges use thermal conductivity and ionization gauge technologies to measure pressure from atmospheric pressure to one trillionth of atmospheric pressure. MKS's Baratron pressure measurement instruments, together with its vacuum gauges, are capable of measuring the full range of pressures used in semiconductor and other thin-film manufacturing processes from two hundred times atmospheric pressure to one trillionth of atmospheric pressure.

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

Vacuum Valves and Components. MKS's vacuum valves are used on the gas lines between the process chamber and the pump downstream of the process chamber. MKS's vacuum components consist of flanges, fittings, traps and heated lines that are used downstream from the process chamber to provide leak free connections and to prevent condensable materials from depositing particles near or back into the chamber. The manufacture of small circuit patterns cannot tolerate contamination from atmospheric leaks or particles. MKS's vacuum components are designed to minimize such contamination and thus increase yields and uptimes.

#### VACUUM TECHNOLOGY PRODUCTS

PRODUCT LINES	DESCRIPTION	RANGES OF LIST PRICES
Cold cathode and hot filament vacuum gauges	Electronic gauges to measure pressure down to one trillionth of atmospheric pressure	\$600-\$6,200
Convection gauges	Electronic gauges to measure from one atmosphere down to one millionth of atmospheric pressure	\$200-\$700
Right-angle and in-line shut-off valves	High vacuum rapid action poppet valves	\$250-\$4,500
Vapor sublimation traps	Contaminant particle trap	\$1,800-\$4,600
Other vacuum components	Flanges, fittings, valves and heated lines	\$50-\$3,050

## MARKETS AND APPLICATIONS

MKS estimates that approximately 60% of its sales in 1998 were made to the semiconductor industry. MKS's products are also used in other markets and applications including the manufacture of, among other things:

- flat panel displays
- magnetic and optical storage devices and media
- solar cells which convert light into electrical current
- fiber optic cables for telecommunications
- optical coatings, such as eyeglass coatings
- coatings for architectural glass
- hard coatings to minimize wear on cutting tools
- diamond thin films

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

## Semiconductor Manufacturing

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

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

MKS's products are also used for process facility applications such as gas distribution, pressure control and vacuum distribution in clean rooms where semiconductor manufacturing takes place. MKS anticipates that the semiconductor manufacturing market will continue to account for a substantial portion of its sales. While the semiconductor device manufacturing market is global, the major semiconductor capital equipment manufacturers are concentrated in the United States, Japan and Europe.

## Flat Panel Display Manufacturing

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

#### Magnetic and Optical Storage Devices and Media

MKS's products are used in the manufacture of:

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

The transition to higher density storage capacity requires manufacturing processes incorporating tighter process controls. While storage media manufacturing is global, the major manufacturers are concentrated in Japan and the Asia-Pacific region and storage media capital equipment manufacturers are concentrated in the United States, Japan and Europe.

#### Optical Fiber and Optical Coating

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

#### Other Coating Markets

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

MKS estimates that the flat panel display, magnetic and optical storage media, optical fiber, optical coating markets and other coating markets combined, accounted for approximately 12% and 14% of net sales for 1997 and 1998, respectively.

#### Other Markets

MKS's pressure measurement and control instruments and vacuum components are used in plasma processes used to sterilize medical instruments, in vacuum freeze drying of pharmaceuticals, foods and beverages, and in vacuum processes involved in light bulb and gas laser manufacturing. MKS's products are also sold to government, university and industrial laboratories for vacuum applications involving research and development in materials science, physical chemistry and electronics materials. The major equipment and process providers and research laboratories are concentrated in the United States, Japan and Europe.

## CUSTOMERS

MKS's largest customers are leading semiconductor capital equipment manufacturers such as Applied Materials, Lam Research, Novellus and Tokyo Electron, semiconductor device manufacturers such as Motorola, and specialty gas providers such as Air Products and Chemicals. In 1996, 1997, and 1998, sales to MKS's top five customers accounted for approximately 26%, 32% and 24%, respectively, of MKS's net sales. During the same periods, international sales represented approximately 30%, 27% and 32% of total net sales, respectively. During 1998, Applied Materials accounted for approximately 16% of MKS's net sales. Applied Materials purchases products from MKS under the terms of an agreement, with no minimum purchase requirements, that expires in 2000.

## SALES, MARKETING AND SUPPORT

MKS's worldwide sales, marketing and support organization is critical to its strategy of maintaining close relationships with semiconductor capital equipment manufacturers and semiconductor device manufacturers. MKS sells its products primarily through its direct sales force. As of December 31, 1998, MKS had 118 sales employees in 22 offices in France, Germany, Japan, Korea, The Netherlands, Singapore, Taiwan, the United Kingdom and the United States. This direct sales force is supplemented by sales representatives and agents in Canada, China, India, Israel, and Italy and in selected U.S. cities. MKS maintains a marketing staff, which as of December 31, 1998, consisted of 14 employees, to identify customer requirements, assist in product planning and specifications and to focus on future trends in the semiconductor and other markets.

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

## MANUFACTURING

MKS believes that the ability to manufacture reliable gas management instruments and components in a cost-effective manner is critical to meeting the demanding requirements of semiconductor capital equipment manufacturers and semiconductor device manufacturers. MKS monitors and analyzes product lead times, warranty data, process yields, supplier performance, field data on mean time between failures, inventory turns, repair response time and other indicators so that it may continuously improve its manufacturing processes. MKS has adopted a total quality management process. MKS's manufacturing facilities in the United States, the United Kingdom and Germany are ISO 9001 certified.

MKS is devoting significant financial and management resources to maintain and expand its worldwide production and service capabilities to meet the global demand for gas management instruments and components. MKS believes that the ability to manufacture reliable instruments and components in a cost-effective manner is critical to meet the demanding just-in-time delivery requirements of semiconductor capital equipment manufacturers and semiconductor device manufacturers. Due to the short time between the receipt of orders and shipments, MKS normally operates with a level of backlog that is not significant. MKS currently manufactures its products at nine facilities in the United States and abroad. MKS plans to add manufacturing capabilities in 1999 to its Austin, Texas facilities and further equip its cleanroom facilities in Andover and Methuen, Massachusetts.

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

## RESEARCH AND DEVELOPMENT

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

As of December 31, 1998, MKS employed a research and development staff of 89 employees. In 1996, 1997 and 1998, MKS's research and development expenditures were approximately \$14.2 million, \$14.7 million and \$12.1 million, respectively, representing approximately 8.3%, 7.8% and 8.7% of net sales, respectively.

## COMPETITION

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

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

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

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

In some cases, particularly with respect to mass flow controllers, semiconductor device manufacturers may direct semiconductor capital equipment manufacturers to use a specified supplier's product in their equipment. Accordingly, MKS's success depends in part on its ability to have semiconductor device manufacturers specify that its products be used at their fabrication facilities and MKS may encounter difficulties in changing established relationships of competitors with a large installed base of products at such customers' fabrication facilities. In addition, MKS's competitors can be expected to continue to improve the design and performance of their products. There can be no assurance that competitors will not develop products that offer price or performance features superior to those of MKS's products.

## PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

MKS relies on a combination of patent, copyright, trademark and trade secret laws and license agreements to establish and protect its proprietary rights. MKS has 49 U.S. patents and 8 pending U.S. patent applications. Foreign counterparts of certain of these applications have been filed or may be filed at the appropriate time. While MKS believes that certain patents may be important for certain aspects of its business, MKS believes that its success depends more upon close customer contact, innovation, technological expertise, responsiveness and worldwide distribution.

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

## EMPLOYEES

As of December 31, 1998, MKS employed 821 persons, including 486 in manufacturing, 89 in research and development, 246 in marketing, sales, support and general and administrative activities. Management believes that MKS's ongoing success depends upon its continued ability to attract and retain highly skilled employees. None of MKS's employees is represented by a labor union or party to a collective bargaining agreement. MKS believes that its employee relations are good.

## FACILITIES

MKS sells its products primarily through its direct sales force in 22 offices in France, Germany, Japan, Korea, The Netherlands, Singapore, Taiwan, the United Kingdom and the United States. The direct sales force is supplemented by sales representatives and agents in Canada, China, India, Israel, and Italy and in selected U.S. cities. MKS's corporate headquarters are located in Andover, Massachusetts. Manufacturing and other operations are conducted in a number of locations worldwide. MKS's minimum payments for leased real estate for the year ending December 31, 1999 are expected to be \$1,484,000. MKS believes that the current facilities along with the planned addition for 1999 will be adequate and suitable to meet its needs for the foreseeable future. The following table provides information concerning MKS's principal and certain other owned and leased facilities:

LOCATION	SQ. FT.	ACTIVITY	PRODUCTS MANUFACTURED	LEASE EXPIRES
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Andover, Massachusetts	82,000	Headquarters, Manufacturing, Customer Support and Research & Development	Baratron pressure measurement products	(1)
Boulder, Colorado	86,000	Manufacturing, Customer Support, Service and Research & Development	Vacuum gauges, valves and components	(2)
Methuen, Massachusetts	85,000	Manufacturing, Customer Support, Service and Research & Development	Pressure control and flow measurement and control products	(1)
Lawrence, Massachusetts	40,000	Manufacturing	Baratron pressure measurement products	(1)
Tokyo, Japan	20,700	Manufacturing, Sales, Customer Support, Service and Research & Development	Mass flow measurement and control products	(3)
Santa Clara, California	15,600	Sales, Customer Support and Service	Not applicable	(4)*

LOCATION	SQ. FT.	ACTIVITY	PRODUCTS MANUFACTURED	LEASE EXPIRES
Richardson, Texas	14,600	Manufacturing, Sales, Customer Support and Service	Subassemblies	8/31/01
Munich, Germany	14,100	Manufacturing, Sales, Customer Support, Service and Research & Development	Mass flow measurement and control products	(1)
Le Bourget, France	13,700	Sales, Customer Support and Service	Not applicable	(1)
Austin, Texas	8,200	Sales, Customer Support and Service	Not applicable	1/30/03
Seoul, Korea	4,760	Manufacturing, Sales, Customer Support and Service	Mass flow measurement and control products	5/30/00**
Manchester, U.K.	2,200	Manufacturing, Sales, Customer Support and Service	Mass flow measurement and control products	10/5/09
Singapore	2,050	Sales, Customer Support and Service	Not applicable	3/25/01
Taiwan	2,050	Sales, Customer Support and Service	Not applicable	12/31/01

(1) This facility is owned by MKS.

(2) MKS leases one facility which has 39,000 square feet of space and a lease term which expires 10/31/01 and owns a second and third facility with 28,000 and 19,000 square feet of space, respectively.

(3) MKS leases a facility which has 14,000 square feet of space and a lease term which expires 4/30/99 and owns another facility with 6,700 square feet of space.

(4) MKS leases one facility with 4,000 square feet of space on a month-to-month basis, a second facility of 4,000 square feet with a lease term which expires on 1/30/00 and a third facility of 2,600 square feet with a lease term which expires 6/30/99. MKS owns a fourth facility of 5,000 square feet.

\* MKS has an option to extend its leases at this location for a period of 18 months.

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

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

#### LEGAL PROCEEDINGS

MKS is not a party to any material legal proceedings.

## MANAGEMENT

## EXECUTIVE OFFICERS AND DIRECTORS

The executive officers and directors of MKS as of December 31, 1998 are as follows:

NAME - - - - -	AGE ---	POSITION -----
John R. Bertucci.....	57	Chairman, Chief Executive Officer and President
Ronald C. Weigner.....	53	Vice President and Chief Financial Officer
John J. Sullivan.....	63	Executive Vice President of Technology
William D. Stewart.....	54	Corporate Vice President and General Manager, Vacuum Products
Joseph A. Maher, Jr.....	51	Corporate Vice President and General Manager, Measurement and Control Products
Leo Berlinghieri.....	45	Corporate Vice President, Customer Support Operations
Richard S. Chute(1).....	60	Director
Owen W. Robbins(2).....	69	Director
Robert J. Therrien.....	64	Director
Louis P. Valente(1)(2).....	68	Director

(1) Member of Compensation Committee.

(2) Member of Audit Committee.

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

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

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

Mr. Stewart has served as Corporate Vice President of MKS and General Manager of Vacuum Products since November 1997. From October 1986 to November 1997, he was President of HPS Vacuum Products group, which MKS acquired in October 1986. Mr. Stewart co-founded HPS in 1976. Mr. Stewart has an M.B.A. from Northwestern University and a B.S. in Business Administration from the University of Colorado. Mr. Stewart also serves on the board of directors of the Janus Fund.

Mr. Maher has served as Corporate Vice President of MKS and General Manager of Measurement and Control Products since November 1997. From March 1997 through November 1997, he served as Vice President of the Process Control Instrumentation Group. Mr. Maher was a Vice President of Lam Research Corporation from 1993 through 1996, and from 1980 through 1993, he was Executive Vice President of Drytek Corporation, which was purchased by Lam Research Corporation in 1993. Mr. Maher has a B.S. in Electrical Engineering from Northeastern University.

Mr. Berlinghieri has served as Corporate Vice President, Customer Support Operations of MKS since November 1995. From 1980 to November 1995, he served in various management positions at MKS, including Manufacturing Manager, Production & Inventory Control Manager, and Director of Customer

Support Operations. Mr. Berlinghieri is also Treasurer of the TQM-BASE Council, Inc., a non-profit quality management consortium comprised of Boston-area semiconductor capital equipment manufacturers.

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

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

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

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

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

#### COMMITTEES OF THE BOARD OF DIRECTORS

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

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

#### DIRECTOR COMPENSATION

Directors of MKS are reimbursed for expenses incurred in connection with their attendance at Board of Directors and committee meetings. Directors who are not employees of MKS are paid an annual fee of \$10,000 and \$1,000 for each Board of Directors meeting they attend and \$500 for each committee meeting they attend which is not held on the same day as a Board of Directors meeting. Messrs. Chute, Robbins, Therrien and Valente, MKS's four non-employee directors, have each been granted options, under MKS's 1996 Director Stock Option Plan (under which no further grants will be made), to purchase 8,592 shares of common stock at a weighted average exercise price of \$4.81 per share. Each has also been granted options to purchase 6,000 shares of common stock at an exercise price of \$14.40 per share under the 1997 Director Stock Option Plan.

## COMPENSATION COMMITTEE INTERLOCKS AND INSIDER PARTICIPATION

The Compensation Committee is currently comprised of Messrs. Chute and Valente. No member of the Compensation Committee was at any time an employee of MKS. No executive officer of MKS serves as a member of the Board of Directors or Compensation Committee of any other entity which has one or more executive officers serving as a member of MKS's Board of Directors or Compensation Committee.

## EXECUTIVE COMPENSATION

The following table sets forth information with respect to the compensation of MKS's Chief Executive Officer and each of the four other most highly compensated executive officers for the year ended December 31, 1998 (the "Named Executive Officers").

SUMMARY COMPENSATION TABLE FOR 1998

NAME AND PRINCIPAL POSITION	ANNUAL COMPENSATION			LONG-TERM COMPENSATION AWARDS	ALL OTHER COMPENSATION (1)
	SALARY	BONUS	OTHER ANNUAL COMPENSATION	SECURITIES UNDERLYING OPTIONS (#)	
John R. Bertucci..... Chief Executive Officer and President	\$337,440	--	--	--	\$12,264
Ronald C. Weigner..... Vice President and Chief Financial Officer	164,257	--	--	60,000	8,000
Joseph A. Maher, Jr..... Corporate Vice President and General Manager, Measurement and Control Products	161,307	--	--	60,000	8,000
William D. Stewart..... Corporate Vice President and General Manager, Vacuum Products	173,893	--	--	60,000	8,000
Leo Berlinghieri..... Corporate Vice President, Customer Support Operations	152,559	--	--	60,000	3,200

(1) Includes a premium of \$4,264 paid on a life insurance policy and estimated payments of \$8,000 paid into a 401(k) plan for Mr. Bertucci, and estimated payments paid into a 401(k) plan for Messrs. Weigner, Maher, Stewart and Berlinghieri.

## STOCK OPTION GRANTS

The following table contains information concerning the grants of options to purchase MKS's common stock made to each of the Named Executive Officers for the year ended December 31, 1998. Stock options are generally granted at 100% of the fair value of MKS's common stock as determined by the Board of Directors on the date of grant. In reaching the determination of fair value at the time of each grant, the Board of Directors considers a range of factors, including MKS's current financial position, its recent revenues, results of operations and cash flows, its assessment of MKS's competitive position in its markets and prospects for the future, the status of MKS's product development and marketing efforts, current valuations for comparable companies and the illiquidity of an investment in MKS's common stock.

## OPTION GRANTS IN 1998

NAME	INDIVIDUAL GRANTS				POTENTIAL REALIZABLE VALUE AT ASSUMED ANNUAL RATES OF STOCK PRICE APPRECIATION FOR OPTION TERM (2)	
	NUMBER OF SECURITIES UNDERLYING OPTIONS GRANTED (1)	PERCENT OF TOTAL OPTIONS GRANTED TO EMPLOYEES IN FISCAL YEAR	EXERCISE OR BASE PRICE PER SHARE	EXPIRATION DATE	5%	10%
	-----	-----	-----	-----	-----	-----
John R. Bertucci.....	--	--	--	--	--	--
Ronald C. Weigner.....	60,000	9.47%	\$6.67	7/9/08	\$251,684	\$637,816
Joseph A. Maher, Jr. ....	60,000	9.47	6.67	7/9/08	251,684	637,816
William D. Stewart.....	60,000	9.47	6.67	7/9/08	251,684	637,816
Leo Berlinghieri.....	60,000	9.47	6.67	7/9/08	251,684	637,816

(1) These options become exercisable with respect to 20% of the shares granted on July 9, 1999 and with respect to the remainder of the shares on a quarterly basis during the following four years.

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

## OPTION EXERCISES AND HOLDINGS

The following table sets forth information concerning option exercises and option holdings for the fiscal year ended December 31, 1998 with respect to each of the Named Executive Officers.

AGGREGATED OPTION EXERCISES IN 1998  
AND YEAR-END OPTION VALUES

NAME	NUMBER OF SHARES UNDERLYING UNEXERCISED OPTIONS AT YEAR-END		VALUE OF UNEXERCISED IN-THE-MONEY OPTIONS AT YEAR-END (1)	
	EXERCISABLE	UNEXERCISABLE	EXERCISABLE	UNEXERCISABLE
John R. Bertucci.....	--	--	--	--
Ronald C. Weigner.....	75,961	110,639	\$757,331	\$ 968,671
Joseph A. Maher, Jr. ....	44,310	142,290	441,771	1,284,231
William D. Stewart.....	75,961	110,639	757,331	968,671
Leo Berlinghieri.....	75,961	110,639	757,331	968,671

(1) Values are based on the difference between the fair market value of the underlying shares at December 31, 1998 (\$14.40 per share) and the exercise price of each option listed (between \$4.43 and \$6.67 per share).

## STOCK PLANS

## 1995 Stock Incentive Plan

MKS's Amended and Restated 1995 Stock Incentive Plan (the "1995 Stock Plan") provides for the grant of incentive stock options, nonstatutory stock options, stock appreciation rights, performance shares and awards of restricted stock and unrestricted stock. An aggregate of 3,750,000 shares of common stock may be issued pursuant to the 1995 Stock Plan (subject to adjustment for certain changes in MKS's capitalization). No award may be made under the 1995 Stock Plan after November 30, 2005.

The 1995 Stock Plan is administered by the Board of Directors and the Compensation Committee. The Board of Directors has the authority to grant awards under the 1995 Stock Plan and to accelerate, waive or amend certain provisions of outstanding awards. The Board of Directors has authorized the Compensation Committee to administer certain aspects of the 1995 Stock Plan and has authorized the Chief Executive Officer of MKS to grant awards to non-executive officer employees. The maximum number of shares represented by such awards may not exceed 450,000 shares in the aggregate or 30,000 shares to any one employee.

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

**Stock Appreciation Rights and Performance Shares.** A stock appreciation right is based on the value of common stock and entitles the holder to receive consideration to the extent that the fair market value on the date of exercise of the shares of common stock underlying the right exceeds the fair market value of the underlying shares on the date the right was granted. A performance share award entitles the recipient to acquire shares of common stock upon the attainment of specified performance goals.

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

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

Section 162(m) of the Internal Revenue Code disallows a tax deduction to public companies for certain compensation in excess of \$1.0 million paid to a company's chief executive officer or to any of the four other most highly compensated executive officers. Certain compensation, including "performance-based compensation," is not included in compensation subject to the \$1.0 million limitation. The 1995 Stock Plan limits to 1,350,000 the maximum number of shares of common stock with respect to which awards may be granted to any employee in any calendar year. This limitation is intended to preserve the tax deductions to MKS that might otherwise be unavailable under Section 162(m) with respect to certain awards.

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

## 1999 Employee Stock Purchase Plan

MKS's 1999 Employee Stock Purchase Plan (the "Purchase Plan") authorizes the issuance of up to an aggregate of 450,000 shares of common stock to participating employees. MKS will make one or more offerings to employees to purchase common stock under the Purchase Plan. Offerings under the Purchase Plan commence on June 1 and December 1 and terminate, respectively on November 30 and May 31. During each offering, the maximum number of shares which may be purchased by a participating employee is determined on the first day of this offering period under a formula whereby 85% of the market value of a share of common stock on the first day of this offering period is divided into an amount equal to 10% of the employee's annualized compensation (or such lower percentage as may be established by the Compensation Committee) for the immediately preceding six-month period. An employee may elect to have up to 10% deducted from his or her regular salary (or such lower percentage as may be established by the Compensation Committee) for this purpose. The price at which an employee's option is exercised is the lower of (1) 85% of the closing price of the common stock on the Nasdaq National Market on the day that this offering commences or (2) 85% of the closing price on the day that this offering terminates.

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

## 1997 Director Stock Option Plan

MKS's 1997 Director Stock Option Plan (the "1997 Director Plan") authorizes the issuance of up to an aggregate of 300,000 shares of common stock. The 1997 Director Plan is administered by MKS's Board of Directors. Options are granted under the 1997 Director Plan only to directors of MKS who are not employees of MKS. Under the 1997 Director Plan, prior to the date of this prospectus each existing eligible director will receive an option to purchase 10,500 shares of common stock at an exercise price equal to the initial public offering price and future non-employee directors will receive an option to purchase 11,250 shares of common stock upon their initial election to the Board of Directors. Each initial option will vest over a three-year period in 12 equal quarterly installments following the date of grant. On the date of each annual meeting of the stockholders, options will be automatically granted to each eligible director who has been in office for at least six months prior to the date of the annual meeting of the stockholders. Each annual option will entitle the holder to purchase 6,000 shares of common stock. Each annual option will become exercisable on the day prior to the first annual meeting of stockholders following the date of grant, or if no such meeting is held within 13 months after the date of grant, on the 13-month anniversary of the date of grant. The exercise price of all options granted under the 1997 Director Plan is equal to the fair market value of the common stock on the date of grant. Options granted under the 1997 Director Plan terminate upon the earlier of three months after the optionee ceases to be a director of MKS or ten years after the grant date. In the event of a change in control of MKS, the vesting of all options then outstanding would be accelerated in full and any restrictions on exercising outstanding options would terminate.

The Company's 1996 Director Stock Option Plan, under which options have been granted to, and may still be exercised by, four non-employee directors of MKS, has been terminated. See "-- Director Compensation."

## Employment Agreements

MKS entered into an employment agreement with each of Messrs. Stewart, Maher, Berlinghieri and Weigner.

Each agreement sets a base salary for each employee which is reviewed annually. In addition to a base salary, each employee is entitled, under MKS's Management Incentive Program, to a bonus equal to a percentage of his base salary if MKS attains specified financial goals during the year. Each employee is also entitled to standard benefits including:

- participation in a profit sharing and retirement savings plan
- vacation days
- life insurance
- medical/dental insurance

The remaining provisions of each agreement are also substantially the same.

The term of employment for each is from month to month with termination:

- upon the death of the employee
- at the election of MKS if the employee fails or refuses to perform
- at the election of MKS if the employee commits any acts not in MKS's best interest

Payment by MKS upon termination depends on how employment is terminated:

- if employment is terminated after the expiration of a 30 day notice period, MKS has no further obligation for compensation
- if employment is terminated by death, MKS must pay the employee's estate the compensation owed to him at the end of the month of his death
- if employment is terminated at the election of MKS, MKS must pay the employee through the last day of actual employment

Each of the agreements contains non-competition provisions during the term of employment and for the period one year after termination of employment. Under these provisions, Messrs. Stewart, Maher, Berlinghieri and Weigner may not:

- engage in any competitive business or activity
- for the 12 months subsequent to termination, work for, employ, become a partner with, or cause to be employed any employee, officer or agent of MKS
- for the 12 months subsequent to termination, give, sell or lease any competitive services or goods to any customer of MKS
- have any financial interest in or be a director, officer, stockholder, partner, employee or consultant to any competitor of MKS

## CERTAIN TRANSACTIONS

Mr. Chute, a director of MKS, MKS's clerk, and a co-trustee of certain of the Bertucci Family Trusts (see "Principal Stockholders") and Mr. Thomas H. Belknap, a co-trustee of certain of the Bertucci Family trusts, are attorneys at the law firm of Hill & Barlow, a professional corporation. Hill & Barlow has provided legal services to MKS during the calendar year ended December 31, 1998 for which it was compensated by MKS in the aggregate amount of \$183,000.

Mr. Stewart, Corporate Vice President and General Manager of Vacuum Products, is the general partner of Aspen Industrial Park Partnership. On October 12, 1989, MKS entered into a lease with Aspen, which has been periodically extended, for certain facilities occupied by MKS's Vacuum Products group in Boulder, Colorado. MKS currently pays Aspen approximately \$350,000 annually to lease such facilities.

MKS has been treated as an S corporation for federal income tax purposes since July 1, 1987. As a result, MKS currently pays no federal, and certain state, income tax and all of the earnings of MKS are subject to federal, and certain state, income taxation directly at the stockholder level. MKS's S corporation status will terminate upon the closing of this offering, at which time MKS will become subject to corporate income taxation under Subchapter C of the Internal Revenue Code. In 1997 and 1998, MKS distributed \$12.4 million and \$6.2 million, respectively, of undistributed S corporation earnings to its stockholders. As soon as practicable following the closing of this offering, MKS intends to make a distribution to the stockholders of record on the day prior to the effective date of the registration statement in the amount of \$40.0 million, which is the estimated balance of the accumulated adjustments account as of the day prior to the closing of this offering, subject to adjustment. See "S Corporation and Termination of S Corporation Status."

MKS believes that the transactions listed above were made on terms no less favorable to the Company than could have been obtained from unaffiliated third parties. Commencing on the effective date of this offering, all future transactions between MKS and its officers, directors or other affiliates must (1) be approved by a majority of the members of the Board of Directors and a majority of the disinterested members of the Board; and (2) be on terms no less favorable to MKS than could be obtained from unaffiliated third parties.

## PRINCIPAL AND SELLING STOCKHOLDERS

The following table sets forth certain information regarding beneficial ownership of MKS's common stock as of December 31, 1998, and as adjusted to reflect the sale of shares offered hereby, by (1) each of the directors of MKS, (2) each of the Named Executive Officers, (3) each person known to MKS to own beneficially more than 5% of MKS's common stock and (4) all directors and executive officers as a group.

Unless otherwise indicated, each person named in the table has sole voting power and investment power or shares such power with his or her spouse with respect to all shares of capital stock listed as owned by such person. Beneficial ownership is determined in accordance with the rules of the Securities and Exchange Commission and includes voting or investment power with respect to the securities. The number of shares of common stock outstanding used in calculating the percentage for each listed person includes any shares the individual has the right to acquire within 60 days of December 31, 1998.

All of the shares being offered by the selling stockholders are owned by trusts for the benefit of Mr. Bertucci and members of his family.

NAME OF BENEFICIAL OWNER	SHARES BENEFICIALLY OWNED PRIOR TO OFFERING		NUMBER OF SHARES OFFERED	SHARES BENEFICIALLY OWNED AFTER OFFERING	
	NUMBER	PERCENT		NUMBER	PERCENT
John R. Bertucci.....	17,261,915 (1)	95.6%	500,000	16,761,915	69.7%
Ronald C. Weigner.....	82,291 (2)	*	--	82,291	*
John J. Sullivan.....	614,010 (3)	3.4	--	614,010	2.6
Joseph A. Maher, Jr.....	44,310 (2)	*	--	44,310	*
William D. Stewart.....	82,291 (2)	*	--	82,291	*
Leo Berlinghieri.....	82,291 (2)	*	--	82,291	*
Richard S. Chute.....	2,766,852 (4)	15.3	300,000	2,466,852	10.3
Owen W. Robbins.....	8,027 (2)	*	--	8,027	*
Robert J. Therrien.....	8,027 (2)	*	--	8,027	*
Louis P. Valente.....	8,027 (2)	*	--	8,027	*
Thomas H. Belknap.....	2,331,902 (5)	12.9	200,000	2,131,902	8.9
All executive officers and directors as a group.....	18,199,216	99.0%	500,000	17,699,216	72.6%

\* Less than 1% of outstanding common stock.

- (1) Includes 6,046,208 shares held directly by Mr. Bertucci, 6,124,980 shares held directly by Mr. Bertucci's wife, and 5,090,727 shares held by Bertucci family trusts for which either Mr. or Mrs. Bertucci serves as a co-trustee.
- (2) Comprised solely of options exercisable within 60 days of December 31, 1998.
- (3) Includes 316,500 shares held in a grantor retained annuity trust.
- (4) Includes 2,758,825 shares held by certain of the Bertucci family trusts for which Mr. Chute serves as a co-trustee and 8,027 shares subject to options held by Mr. Chute exercisable within 60 days of December 31, 1998.
- (5) Represents shares held by certain of the Bertucci family trusts for which Mr. Belknap serves as a co-trustee.

## DESCRIPTION OF CAPITAL STOCK

The authorized capital stock of MKS will consist of 50,000,000 shares of common stock, no par value per share, and 2,000,000 shares of preferred stock, \$.01 par value per share, after giving effect to the amendment and restatement of MKS's Restated Articles of Organization which will be filed with the Secretary of State of The Commonwealth of Massachusetts prior to the closing of this offering.

## COMMON STOCK

As of December 31, 1998, there were 18,053,167 shares of common stock outstanding and held of record by twenty-three stockholders.

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

## PREFERRED STOCK

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

## MASSACHUSETTS LAW AND CERTAIN PROVISIONS OF MKS'S RESTATED ARTICLES OF ORGANIZATION AND BY-LAWS

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

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

The By-Laws will require that nominations for the Board of Directors made by a stockholder of a planned nomination must be given not less than 30 and not more than 90 days prior to a scheduled meeting, provided that if less than 40 days' notice is given of the date of the meeting, a stockholder will

have ten days within which to give such notice. The stockholder's notice of nomination must include particular information about the stockholder, the nominee and any beneficial owner on whose behalf the nomination is made. MKS may require any proposed nominee to provide such additional information as is reasonably required to determine the eligibility of the proposed nominee.

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

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

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

The Articles of Organization will contain a provision excluding MKS from the applicability of Massachusetts General Laws Chapter 110F, entitled "Business Combinations with Interested Shareholders." In general, Chapter 110F places limitations on a Massachusetts corporation's ability to engage in business combinations with certain stockholders for a period of three years, unless the corporation elects to opt out of the statute's coverage by including such a provision in its Articles of Organization.

#### TRANSFER AGENT AND REGISTRAR

The Transfer Agent and Registrar for the common stock is BankBoston, N.A.

## SHARES ELIGIBLE FOR FUTURE SALE

Prior to this offering, there has been no public market for the securities of MKS. Upon completion of this offering, based upon the number of shares outstanding at December 31, 1998, there will be \_\_\_\_\_ shares of common stock of MKS outstanding assuming the underwriters do not exercise their over-allotment option, and no options are exercised. Of these shares, the 6,500,000 shares sold in this offering will be freely tradable without restriction or further registration under the Securities Act, except that any shares purchased by "affiliates" of MKS, as that term is defined in Rule 144 under the Securities Act, may generally only be sold in compliance with the limitations of Rule 144 described below.

## SALES OF RESTRICTED SHARES

The outstanding shares of common stock not sold in this offering will be deemed "restricted securities" under Rule 144 under the Securities Act. Of these shares, 17,553,165 are subject to 180-day lock-up agreements with the representatives. Upon expiration of the lock-up agreements 180 days after the date of this prospectus, all such shares will be available for sale in the public market, subject to the provisions of Rule 144.

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

In general, under Rule 144, beginning 90 days after the effective date of this prospectus, a stockholder who has beneficially owned his or her restricted securities for at least one year will be entitled to sell, within any three-month period, a limited number of such shares. The number of shares may not exceed the greater of 1% of the then outstanding shares of common stock or the average weekly trading volume in the common stock during the four preceding calendar weeks. In addition, under Rule 144(k), if a period of at least two years has elapsed since the date restricted securities were acquired from MKS, a stockholder who is not an affiliate of MKS at the time of sale and has not been an affiliate of MKS for at least three months prior to the sale will be entitled to sell the shares immediately without restriction.

Securities issued in reliance on Rule 701, such as shares of common stock acquired upon exercise of certain options granted under MKS's stock plans, are also restricted and, beginning 90 days after the effective date of this prospectus, may be sold by stockholders other than affiliates of MKS subject only to the manner of sale provisions of Rule 144 and by affiliates under Rule 144 without compliance with its one-year holding period requirement.

## OPTIONS

As of December 31, 1998 there were options outstanding to purchase an aggregate of 2,132,575 shares of MKS's common stock, of which options to purchase an aggregate of 804,701 shares were exercisable. Of these, 802,009 shares were subject to lock-up agreements. The option to purchase the remaining 2,692 shares has since expired. MKS intends to file registration statements on Form S-8 under the Securities Act to register all shares of common stock issuable under each of the 1995 Stock Plan, Purchase Plan, the 1997 Director Plan and the 1996 Director Stock Option Plan promptly following the consummation of this offering. Shares issued pursuant to such plans shall be, after the effective date of the Form S-8 registration statements, eligible for resale in the public market without restriction, subject to Rule 144 limitations applicable to affiliates and the lock-up agreements noted above, if applicable.

## UNDERWRITING

MKS is offering the shares of common stock described in this prospectus through a number of underwriters. NationsBanc Montgomery Securities LLC, Donaldson, Lufkin & Jenrette Securities Corporation and Lehman Brothers Inc. are the representatives of the underwriters. MKS and the selling stockholders have entered into an underwriting agreement with the representatives. Subject to the terms and conditions of the underwriting agreement, MKS and the selling stockholders have agreed to sell to the underwriters, and the underwriters have each agreed to purchase, the number of shares of common stock listed next to its name in the following table.

UNDERWRITER -----	NUMBER OF SHARES -----
NationsBanc Montgomery Securities LLC.....	
Donaldson, Lufkin & Jenrette Securities Corporation.....	
Lehman Brothers Inc. ....	
	-----
Total.....	6,500,000 =====

The underwriters initially will offer shares to the public at the price specified on the cover page of this prospectus. The underwriters may allow to some dealers a concession of not more than \$            per share. The underwriters also may allow, and any other dealers may realow, a concession of not more than \$            per share to some other dealers. If all the shares are not sold at the initial public offering price, the underwriters may change the offering price and the other selling terms. The common stock is offered subject to a number of conditions, including:

- receipt and acceptance of our common stock by the underwriters
- the right to reject orders in whole or in part

MKS has granted an option to the underwriters to buy up to 975,000 additional shares of common stock. These additional shares would cover sales of shares by the underwriters which exceed the number of shares specified in the table above. The underwriters have 30 days to exercise this option. If the underwriters exercise this option, they will each purchase additional shares approximately in proportion to the amounts specified in the table above.

MKS and all holders of its stock prior to this offering, as well as most holders of stock options, have entered into lock-up agreements with the underwriters. Under those agreements, MKS and those holders of stock and options may not dispose of or hedge any MKS common stock or securities convertible into or exchangeable for shares of MKS common stock. These restrictions will be in effect for a period of 180 days after the date of this prospectus. At any time and without notice, NationsBanc Montgomery Securities LLC may, in its sole discretion, release all or some of the securities from these lock-up agreements.

MKS and the selling stockholders will indemnify the underwriters against some liabilities, including some liabilities under the Securities Act. If MKS is unable to provide this indemnification, MKS and the selling stockholders will contribute to payments the underwriters may be required to make in respect of those liabilities.

In connection with this offering, the underwriters may purchase and sell shares of common stock in the open market. These transactions may include:

- short sales
- stabilizing transactions
- purchases to cover positions created by short sales

Short sales involve the sale by the underwriters of a greater number of shares than they are required to purchase in this offering. Stabilizing transactions consist of bids or purchases made for the purpose of

preventing or retarding a decline in the market price of the common stock while this offering is in progress.

The underwriters also may impose a penalty bid. This means that if the representatives purchase shares in the open market in stabilizing transactions or to cover short sales, the representatives can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them.

The underwriters may engage in activities that stabilize, maintain or otherwise affect the price of the common stock, including:

- over-allotment
- stabilization
- syndicate covering transactions
- imposition of penalty bids

As a result of these activities, the price of the common stock may be higher than the price that otherwise might exist in the open market. If the underwriters commence these activities, they may discontinue them at any time. The underwriters may carry out these transactions on the Nasdaq National Market, in the over-the-counter market or otherwise.

The underwriters do not expect sales to discretionary accounts to exceed 5% of the total number of shares of common stock offered by this prospectus.

Prior to this offering, there has been no public market for the common stock of MKS. The initial public offering price will be negotiated among MKS, the selling stockholders and the underwriters. Among the factors to be considered in such negotiations are:

- the history of, and prospects for, MKS and the industry in which it competes
- the past and present financial performance of MKS
- an assessment of MKS's management
- the present state of MKS's development
- the prospects for future earnings of MKS
- the prevailing market conditions of the applicable U.S. securities market at the time of this offering
- market valuations of publicly traded companies that MKS and the representatives believe to be comparable to MKS
- other factors deemed relevant

#### LEGAL MATTERS

The validity of the common stock offered hereby will be passed upon for MKS by Hale and Dorr LLP, Boston, Massachusetts. Certain legal matters in connection with this offering will be passed upon for the underwriters by Ropes & Gray, Boston, Massachusetts.

#### EXPERTS

The consolidated balance sheets of MKS Instruments, Inc. at December 31, 1997 and 1998 and the consolidated statements of income, stockholders' equity and cash flows for each of the three years in the period ended December 31, 1998 included in this prospectus have been included herein in reliance on the report of PricewaterhouseCoopers LLP, independent accountants, given upon the authority of that firm as experts in accounting and auditing.

## ADDITIONAL INFORMATION

MKS has filed with the Securities and Exchange Commission, a registration statement on Form S-1 under the Securities Act with respect to the common stock offered hereby. This prospectus, which constitutes part of the registration statement, does not contain all of the information set forth in the registration statement, certain parts of which are omitted in accordance with the rules and regulations of the Securities and Exchange Commission. For further information with respect to MKS and the common stock offered hereby, reference is made to the registration statement. Statements contained in this prospectus as to the contents of any contract or other document filed as an exhibit to the registration statement are not necessarily complete, and in each instance reference is made to the copy of such document filed as an exhibit to the registration statement, each such statement being qualified in all respects by such reference. The registration statement (and all amendments, exhibits and schedules thereto) may be inspected without charge at the principal office of the Securities and Exchange Commission in Washington, D.C. and copies of all or any part of which may be inspected and copied at the public reference facilities maintained by the Securities and Exchange Commission at 450 Fifth Street, N.W., Judiciary Plaza, Room 1024, Washington, D.C. 20549, and at the Securities and Exchange Commission's regional offices located at Citicorp Center, 500 West Madison Street, Suite 1400, Chicago, Illinois 60661-2511 and 7 World Trade Center, Suite 1300, New York, New York 10048. Copies of such material can also be obtained at prescribed rates by mail from the Public Reference Section of the Securities and Exchange Commission at 450 Fifth Street, N.W., Washington, D.C. 20549. In addition, the Securities and Exchange Commission maintains a website (<http://www.sec.gov>) that contains reports, proxy and information statements and other information regarding registrants that file electronically with the Securities and Exchange Commission.

MKS intends to distribute to its stockholders annual reports containing audited consolidated financial statements.

## MKS INSTRUMENTS, INC.

## INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

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## REPORT OF INDEPENDENT ACCOUNTANTS

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

In our opinion, the accompanying consolidated balance sheets and related consolidated statements of income, stockholders' equity and cash flows present fairly, in all material respects, the financial position of MKS Instruments, Inc. and its subsidiaries at December 31, 1997 and 1998 and the results of their operations and their cash flows for each of the three years in the period ended December 31, 1998, in conformity with generally accepted accounting principles. These financial statements are the responsibility of the Company's management; our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with generally accepted auditing standards which require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for the opinion expressed above.

PRICEWATERHOUSECOOPERS LLP

Boston, Massachusetts  
January 22, 1999, except for the  
information in the first and second  
paragraph of Note 13 as to which the date  
is January 28, 1999 and February 24, 1999,  
respectively

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MKS INSTRUMENTS, INC.  
 CONSOLIDATED BALANCE SHEETS  
 (IN THOUSANDS, EXCEPT SHARE DATA)

	DECEMBER 31,	DECEMBER 31, 1998	
	1997	ACTUAL	PRO FORMA
	-----	-----	-----
			(NOTE 2)
			(UNAUDITED)
ASSETS			
Current assets:			
Cash and cash equivalents.....	\$ 2,511	\$11,188	\$11,188
Marketable equity securities.....	614	538	538
Trade accounts receivable, net of allowance for doubtful accounts of \$610 and \$656 at December 31, 1997 and 1998, respectively.....	32,439	20,674	20,674
Inventories.....	29,963	24,464	24,464
Deferred tax asset.....	682	698	698
Other current assets.....	1,670	971	971
	-----	-----	-----
Total current assets.....	67,879	58,533	58,533
Property, plant and equipment, net.....	33,976	32,725	32,725
Other assets.....	4,681	4,974	4,974
	-----	-----	-----
Total assets.....	\$106,536	\$96,232	\$96,232
	=====	=====	=====
LIABILITIES AND STOCKHOLDERS' EQUITY			
Current liabilities:			
Short-term borrowings.....	\$ 10,721	\$ 9,687	\$ 9,687
Current portion of long-term debt.....	2,070	2,058	2,058
Current portion of capital lease obligations.....	1,061	1,074	1,074
Accounts payable.....	7,433	3,677	3,677
Accrued compensation.....	7,501	3,985	3,985
Other accrued expenses.....	6,883	5,280	5,280
Income taxes payable.....	1,889	1,279	1,279
Distribution payable.....	--	--	35,926
	-----	-----	-----
Total current liabilities.....	37,558	27,040	62,966
Long-term debt.....	13,748	12,042	12,042
Long-term portion of capital lease obligations.....	1,876	1,744	1,744
Deferred tax liability.....	133	117	117
Other liabilities.....	373	463	463
Commitments and contingencies (Note 7)			
Stockholders' equity:			
Common Stock, Class A, no par value; 11,250,000 shares authorized, 7,766,910 issued and outstanding.....	40	40	40
Common Stock, Class B (non voting) no par value; 18,750,000 shares authorized; 10,286,255 and 10,286,257 shares issued and outstanding at December 31, 1997 and 1998, respectively.....	73	73	73
Additional paid-in capital.....	48	48	48
Retained earnings.....	51,443	52,479	16,553
Accumulated other comprehensive income.....	1,244	2,186	2,186
	-----	-----	-----
Total stockholders' equity.....	52,848	54,826	18,900
	-----	-----	-----
Total liabilities and stockholders' equity.....	\$106,536	\$96,232	\$96,232
	=====	=====	=====

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

## MKS INSTRUMENTS, INC.

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

	YEAR ENDED DECEMBER 31,		
	1996	1997	1998
Net sales.....	\$170,862	\$188,080	\$139,763
Cost of sales.....	102,008	107,606	83,784
Gross profit.....	68,854	80,474	55,979
Research and development.....	14,195	14,673	12,137
Selling, general and administrative.....	37,191	41,838	34,707
Restructuring.....	1,400	--	--
Income from operations.....	16,068	23,963	9,135
Interest expense.....	2,378	2,132	1,483
Interest income.....	92	271	296
Other income (expense), net.....	(479)	166	187
Income before income taxes.....	13,303	22,268	8,135
Provision for income taxes.....	800	1,978	949
Net income.....	\$ 12,503	\$ 20,290	\$ 7,186
Historical net income per share:			
Basic.....	\$ 0.69	\$ 1.12	\$ 0.40
Diluted.....	\$ 0.69	\$ 1.10	\$ 0.38
Historical weighted average common shares outstanding:			
Basic.....	18,053	18,053	18,053
Diluted.....	18,053	18,388	18,720
Pro forma data (unaudited):			
Historical income before income taxes.....	\$ 13,303	\$ 22,268	\$ 8,135
Pro forma provision for income taxes assuming C corporation tax.....	5,055	8,462	3,091
Pro forma net income.....	\$ 8,248	\$ 13,806	\$ 5,044
Pro forma net income per share:			
Basic.....	\$ 0.46	\$ 0.76	\$ 0.25
Diluted.....	\$ 0.46	\$ 0.76	\$ 0.24
Pro forma weighted average common shares outstanding:			
Basic.....	18,053	18,053	20,295
Diluted.....	18,053	18,262	20,780

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



statements.

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## MKS INSTRUMENTS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS  
(IN THOUSANDS)

	YEAR ENDED DECEMBER 31,		
	1996	1997	1998
Cash flows from operating activities:			
Net income.....	\$ 12,503	\$ 20,290	\$ 7,186
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization of property, plant, and equipment.....	5,920	5,712	6,242
Loss on disposal of property, plant and equipment....	--	552	48
Deferred taxes.....	(277)	(145)	(32)
Provision for doubtful accounts.....	(20)	258	253
Forward exchange contract loss (gain) realized.....	302	132	(1,211)
Stock option compensation.....	--	95	--
Changes in operating assets and liabilities:			
(Increase) decrease in trade accounts receivable.....	6,119	(12,509)	12,908
(Increase) decrease in inventories.....	4,145	(5,930)	6,479
(Increase) decrease in other current assets.....	3,239	(1,261)	554
Increase (decrease) in accrued compensation.....	(220)	2,386	(3,516)
Increase (decrease) in other accrued expenses....	(1,520)	3,312	(1,602)
Increase (decrease) in accounts payable.....	(4,221)	2,638	(3,682)
Increase (decrease) in income taxes payable.....	331	1,283	(647)
Net cash provided by operating activities.....	26,301	16,813	22,980
Cash flows from investing activities:			
Purchases of property, plant and equipment.....	(9,417)	(3,269)	(3,137)
Proceeds from sale of property, plant and equipment.....	--	203	60
Increase in other assets.....	(443)	(123)	(270)
Cash received (used) to settle forward exchange contracts.....	(302)	(132)	1,211
Net cash used in investing activities.....	(10,162)	(3,321)	(2,136)
Cash flows from financing activities:			
Net (payments) borrowings on demand notes payable....	224	(1,875)	--
Proceeds from short-term borrowings.....	11,025	24,110	15,242
Payments on short-term borrowings.....	(9,628)	(22,938)	(17,569)
Proceeds from long-term debt.....	400	--	--
Principal payments on long-term debt.....	(2,093)	(2,217)	(2,057)
Cash distributions to stockholders.....	(14,500)	(12,400)	(6,150)
Principal payments under capital lease obligations....	(982)	(870)	(1,257)
Net cash used in financing activities.....	(15,554)	(16,190)	(11,791)
Effect of exchange rate changes on cash and cash equivalents.....	(420)	1,394	(376)
Increase (decrease) in cash and cash equivalents.....	165	(1,304)	8,677
Cash and cash equivalents at beginning of period.....	3,650	3,815	2,511
Cash and cash equivalents at end of period.....	\$ 3,815	\$ 2,511	\$ 11,188
Supplemental disclosure of cash flow information:			
Cash paid during the period for:			
Interest.....	\$ 2,363	\$ 2,030	\$ 1,526
Income taxes.....	\$ 770	\$ 1,078	\$ 1,608
Noncash transactions during the period:			
Equipment acquired under capital leases.....	\$ 2,074	\$ 145	\$ 1,138

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. DESCRIPTION OF BUSINESS:

MKS Instruments, Inc. (the "Company") is a worldwide developer, manufacturer, and supplier of instruments and components that are used to measure, control and analyze gases in semiconductor manufacturing and similar industrial manufacturing processes. The Company's products include pressure and flow measurement and control instruments; vacuum gauges, valves and components; and gas analysis instruments. The Company is subject to risks common to companies in the semiconductor industry including, but not limited to, the highly cyclical nature of the semiconductor industry leading to recurring periods of over supply, development by the Company or its competitors of new technological innovations, dependence on key personnel and the protection of proprietary technology.

## 2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES:

## BASIS OF PRESENTATION

The consolidated financial statements include the accounts of the Company and its subsidiaries. All significant intercompany accounts and transactions have been eliminated in consolidation. The Company has reflected the approximately 77.5% owned foreign subsidiaries as wholly-owned subsidiaries pursuant to common control accounting. Upon the closing of this offering for which these financial statements are being prepared, the shares of the foreign subsidiaries owned directly by the ultimate stockholders will be contributed to the Company.

## PRO FORMA BALANCE SHEET PRESENTATION (UNAUDITED)

The Company intends to distribute the balance of its accumulated and undistributed S corporation earnings from the proceeds of this offering for which this registration statement is being prepared. The unaudited pro forma balance sheet has been prepared assuming an estimated \$35,926,000 distribution was payable as of December 31, 1998. The remaining balance in retained earnings represents accumulated earnings prior to the Company converting from a C corporation to an S corporation in 1987, accumulated income in overseas subsidiaries and differences between book and tax accumulated income.

## HISTORICAL AND PRO FORMA (UNAUDITED) NET INCOME PER SHARE

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

Historical net income per share is not meaningful based upon the Company's planned conversion from an S corporation to a C corporation upon the closing of this offering for which these financial statements have been prepared. Historical net income has been adjusted for the pro forma provision for income taxes calculated assuming the Company was subject to income taxation as a C corporation, at a pro forma tax rate of 38.0%. In accordance with a regulation of the Securities and Exchange Commission, pro forma net income per share has been presented for the year ended December 31, 1998 to reflect the effect of the assumed issuance of 2,242,272 shares of common stock of the Company necessary to be sold at the mid-point of the estimated initial public offering price in order to fund the intended distribution of the accumulated and undistributed S corporation earnings as of January 1, 1998.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
(TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

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

	FOR THE YEAR ENDED DECEMBER 31,					
	1996		1997		1998	
	PRO FORMA	HISTORICAL	PRO FORMA	HISTORICAL	PRO FORMA	HISTORICAL
Net income.....	\$ 8,248	\$12,503	\$13,806	\$20,290	\$ 5,044	\$ 7,186
Shares used in net income per common share -- basic.....	18,053	18,053	18,053	18,053	20,295	18,053
Effect of dilutive securities:						
Employee and director stock options.....	--	--	209	335	485	667
Shares used in net income per common share -- diluted.....	18,053	18,053	18,262	18,388	20,780	18,720
Net income per common share -- basic.....	\$ 0.46	\$ 0.69	\$ 0.76	\$ 1.12	\$ 0.25	\$ 0.40
Net income per common share -- diluted.....	\$ 0.46	\$ 0.69	\$ 0.76	\$ 1.10	\$ 0.24	\$ 0.38

#### FOREIGN EXCHANGE

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

#### REVENUE RECOGNITION

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

#### CASH AND CASH EQUIVALENTS

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

#### INVESTMENTS

The appropriate classification of investments in debt and equity securities is determined at the time of purchase. Debt securities that the Company has both the intent and ability to hold to maturity are carried at amortized cost. Debt securities that the Company does not have the intent and ability to hold to maturity or equity securities are classified either as "available-for-sale" or as "trading" and are carried at fair value. Marketable equity securities are carried at fair value and classified either as available-for-sale or trading. Unrealized gains and losses on securities classified as available-for-sale are included in accumulated other comprehensive income in consolidated stockholders' equity. Unrealized gains and losses on securities classified as trading are reported in earnings.

#### INVENTORIES

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

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
(TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

PROPERTY, PLANT AND EQUIPMENT

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

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

RESEARCH AND DEVELOPMENT

Research and development costs are expensed as incurred.

NEW ACCOUNTING PRONOUNCEMENTS

In March 1998, the American Institute of Certified Public Accountants issued Statement of Position (SOP) 98-1, "Accounting for the Costs of Software Developed or Obtained for Internal Use" which provides guidance on the accounting for the costs of software developed or obtained for internal use. SOP 98-1 is effective for fiscal years beginning after December 15, 1998. The Company does not expect the SOP 98-1 to have a material impact on its financial position or results of operations.

In June 1998, the Financial Accounting Standards Board issued Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivative Instruments and Hedging Activities." SFAS No. 133 requires that all derivative instruments be recorded on the balance sheet at their fair value. Changes in the fair value of derivatives are recorded each period in current earnings or other comprehensive income, depending on whether a derivative is designated as part of a hedge transaction and, if it is, the type of hedge transaction. The statement is effective for all fiscal quarters of all fiscal years beginning after June 15, 1999. The Company has not yet determined the impact that the adoption SFAS No. 133 will have on its financial position or results of operations.

USE OF ESTIMATES

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the dates of the financial statements and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates.

RECLASSIFICATION OF PRIOR YEAR BALANCES

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

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
(TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

## 3. FINANCIAL INSTRUMENTS AND RISK MANAGEMENT:

## FOREIGN EXCHANGE RISK MANAGEMENT

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

Realized and unrealized gains and losses on forward exchange contracts and local currency purchased options that qualify for hedge accounting are recognized in earnings in the same period as the underlying hedged item. Realized and unrealized gains and losses on forward exchange contracts and local currency purchased option contracts that do not qualify for hedge accounting are recognized immediately in earnings. Forward exchange contracts receive hedge accounting on firmly committed transactions when they are designated as a hedge of the designated currency exposure and are effective in minimizing such exposure. Options receive hedge accounting on probable anticipated transactions when they are designated as a hedge of the currency exposure and are effective in minimizing such exposure. The cash flows resulting from forward exchange contracts and local currency purchased options that qualify for hedge accounting are classified in the statement of cash flows as part of cash flows from operating activities. Cash flows resulting from forward exchange contracts and local currency purchased options that do not qualify for hedge accounting are classified in the statement of cash flows as investing activities.

Forward exchange contracts with notional amounts totaling none, \$9,800,000, and \$8,000,000 to exchange foreign currencies for U.S. dollars, were outstanding at December 31, 1996, 1997, and 1998, respectively. Of such forward exchange contracts \$6,900,000 and \$7,800,000 to exchange Japanese yen for U.S. dollars, were outstanding at December 31, 1997 and 1998, respectively. The forward exchange contracts with notional amounts outstanding at December 31, 1998 totaling \$8,000,000 do not qualify for hedge accounting and accordingly are marked to market and recognized immediately in earnings. Local currency purchased options with notional amounts totaling \$3,722,000, \$12,738,000, and \$10,221,000 to exchange foreign currencies for U.S. dollars were outstanding at December 31, 1996, 1997, and 1998, respectively.

Foreign exchange losses of \$479,000, foreign exchange gains of \$1,166,000 and foreign exchange losses of \$168,000 on forward exchange contracts that did not qualify for hedge accounting were recognized in earnings during 1996, 1997 and 1998, respectively, and are classified in Other income (expense), net. Gains on forward exchange contracts that qualify for hedge accounting of \$978,000 were deferred and classified in other accrued expenses at December 31, 1996. Gains on local currency purchased options deferred at December 31, 1996 that qualify for hedge accounting of \$200,000 were deferred in other accrued expenses. Gains on forward exchange contracts and local currency purchased options that qualify

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
(TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

for hedge accounting are classified in cost of goods sold and totaled \$2,476,000, \$1,178,000, and \$310,000 for the years ended December 31, 1996, 1997, and 1998, respectively.

The fair value of forward exchange contracts at December 31, 1998, determined by applying period end currency exchange rates to the notional contract amounts, amounted to a loss of \$349,000. The fair values of local currency purchased options at December 31, 1997 and 1998 which were obtained through dealer quotes were immaterial.

The Company recorded a foreign exchange translation loss on intercompany payables of \$1,000,000 and a foreign exchange translation gain on intercompany payables of \$1,000,000 in Other income (expense), net in 1997 and 1998, respectively. Foreign exchange translation gains and losses from unhedged intercompany balances were not material in 1996.

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

## INTEREST RATE RISK MANAGEMENT

The Company utilizes an interest rate swap to fix the interest rate on certain variable rate term loans in order to minimize the effect of changes in interest rates on earnings. In 1998, the Company entered into a four-year interest rate swap agreement on a declining notional amount basis which coincides with the scheduled principal payments with a major financial institution for the notional amount of \$10,528,000 equal to the term loans described in Note 6. Under the agreement, the Company pays a fixed rate of 5.85% on the notional amount and receives LIBOR. The interest differential payable or accruable on the swap agreement is recognized on an accrual basis as an adjustment to interest expense. The criteria used to apply hedge accounting for this interest rate swap is based upon management designating the swap as a hedge against the variable rate debt combined with the terms of the swap matching the underlying debt including the notional amount, the timing of the interest reset dates, the indices used and the paydates. At December 31, 1998, the fair value of this interest rate swap, which represents the amount the Company would receive or pay to terminate the agreement, is a net payable of \$151,000, based on dealer quotes. The variable rate received on the swap at December 31, 1998 was 5.5%.

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

## CONCENTRATIONS OF CREDIT RISK

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

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
 (TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

## FAIR VALUE OF FINANCIAL INSTRUMENTS

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

## 4. INVENTORIES:

Inventories consist of the following:

	DECEMBER 31,	
	1997	1998
Raw material.....	\$ 9,981	\$ 7,544
Work in process.....	7,241	5,718
Finished goods.....	12,741	11,202
	-----	-----
	\$29,963	\$24,464
	=====	=====

## 5. PROPERTY, PLANT AND EQUIPMENT:

Property, plant and equipment consist of the following:

	DECEMBER 31,	
	1997	1998
Land.....	\$ 8,350	\$ 8,834
Buildings.....	26,241	26,020
Machinery and equipment.....	24,861	27,394
Furniture and fixtures.....	9,697	10,578
Leasehold improvements.....	882	1,814
	-----	-----
	70,031	74,640
Less: accumulated depreciation and amortization.....	36,055	41,915
	-----	-----
	\$33,976	\$32,725
	=====	=====

## 6. DEBT:

## CREDIT AGREEMENTS AND SHORT-TERM BORROWINGS

In February 1996, the Company entered into loan agreements with two banks, which provide access to a revolving credit facility. These agreements have since been amended. The revolving credit facility, as amended, provides for uncollateralized borrowings up to \$30,000,000, which expires on December 31, 1999. Interest on borrowings is payable quarterly at either the banks' base rate or the LIBOR Rate, as defined in the agreement, at the Company's option. At December 31, 1997 and 1998, the Company had no borrowings under this revolving credit facility.

Additionally, certain of the Company's foreign subsidiaries have lines of credit and short-term borrowing arrangements with various financial institutions which provide for aggregate borrowings as of December 31, 1998 of up to \$15,003,000, which generally expire and are renewed at six month intervals. At December 31, 1997 and 1998, total borrowings outstanding under these arrangements were \$10,721,000, and \$9,687,000, respectively, at interest rates ranging from 1.3% to 1.6%, and 1.3% to 1.7%, respectively. Foreign short-term borrowings are generally collateralized by certain trade accounts receivable and are guaranteed by a domestic bank.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
 (TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

## LONG-TERM DEBT

Long-term debt consists of the following:

	DECEMBER 31,	
	1997	1998
Term loans.....	\$12,194	\$10,528
Mortgage notes.....	3,624	3,572
Total long-term debt.....	15,818	14,100
Less: current portion.....	2,070	2,058
Long-term debt less current portion.....	\$13,748	\$12,042

On November 1, 1993, the Company entered into a term loan agreement with a bank, which provided for borrowings of \$10,000,000. Principal payments are payable in equal monthly installments of \$56,000 through October 1, 2000, with the remaining principal payment due on November 1, 2000. The loan is collateralized by certain land, buildings, and equipment. Interest is payable monthly at either the bank's base rate, at a rate based on the long-term funds rate, or at the LIBOR Rate, as defined in the agreement, at the Company's option.

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

At December 31, 1997 and 1998, the interest rates in effect for the term loan borrowings were 6.975% and 7.131%, respectively.

The terms of the revolving credit facility and term loan agreements, as amended, contain, among other provisions, requirements for maintaining certain levels of tangible net worth and other financial ratios. The agreement also contains restrictions with respect to acquisitions. Under the most restrictive covenant, the operating cash flow to debt service ratio for a fiscal quarter shall not be less than 1.25 to 1.0. In the event of default of these covenants or restrictions, any obligation then outstanding under the loan agreement shall become payable upon demand by the bank. See Note 13 for subsequent event.

The Company has loans outstanding from various foreign banks in the form of mortgage notes at interest rates ranging from 2.0% to 6.2%. Principal and interest are payable in monthly installments through 2010. The loans are collateralized by mortgages on certain of the Company's foreign properties.

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

YEAR ENDING DECEMBER 31,	AGGREGATE MATURITIES
1999.....	\$ 2,058
2000.....	7,343
2001.....	1,405
2002.....	1,329
2003.....	422
Thereafter.....	1,543
	-----
	\$14,100
	=====

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
(TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

## 7. LEASE COMMITMENTS:

The Company leases certain of its facilities and machinery and equipment under capital and operating leases expiring in various years through 2002 and thereafter. Generally, the facility leases require the Company to pay maintenance, insurance and real estate taxes. Rental expense under operating leases totaled \$2,487,000, \$2,478,000, and \$2,388,000 for the years ended December 31, 1996, 1997, and 1998, respectively.

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

YEAR ENDING DECEMBER 31, -----	OPERATING LEASES -----		CAPITAL LEASES -----
	REAL ESTATE	EQUIPMENT	EQUIPMENT
1999.....	\$1,484	\$437	\$1,202
2000.....	882	251	974
2001.....	660	130	537
2002.....	153	36	333
2003.....	84	13	116
Thereafter.....	51	42	--
	-----	-----	-----
Total minimum lease payments.....	\$3,314	\$909	\$3,162
	=====	=====	=====
Less: amounts representing interest.....			344
			-----
Present value of minimum lease payments.....			2,818
Less: current portion.....			1,074
			-----
Long-term portion.....			\$1,744
			=====

## 8. STOCKHOLDERS' EQUITY:

## COMMON STOCK

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

Upon the closing of this offering for which this Registration Statement is being prepared each outstanding share of Class A and Class B common stock of the Company will be converted into an aggregate of 18,053,167 shares of common stock.

## STOCK OPTION PLANS

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

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

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
 (TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

At December 31, 1998 options to purchase 1,651,793 shares of the Company's common stock were reserved for issuance under the Plan. At December 31, 1998, under the Director Plan, options to purchase 28,932 shares of common stock were reserved for issuance. Stock options are granted at 100% of the fair value of the Company's common stock as determined by the Board of Directors on the date of grant. In reaching the determination of fair value at the time of each grant, the Board of Directors considered a range of factors, including the Company's current financial position, its recent revenues, results of operations and cash flows, its assessment of the Company's competitive position in its markets and prospects for the future, the status of the Company's product development and marketing efforts, current valuations for comparable companies and the illiquidity of an investment in the Company's common stock. Generally, stock options under the Plan vest 20% after one year and 5% per quarter thereafter, and expire 10 years after the grant date. Under the Director Plan, the options granted in 1996 vest over three years and options granted in 1997 and later vest at the earlier of (1) the next annual meeting, (2) 13 months from date of grant or (3) the effective date of an acquisition as defined in the Director Plan.

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

	YEAR ENDED DECEMBER 31, 1996		YEAR ENDED DECEMBER 31, 1997		YEAR ENDED DECEMBER 31, 1998	
	OPTIONS	WEIGHTED AVERAGE EXERCISE PRICE	OPTIONS	WEIGHTED AVERAGE EXERCISE PRICE	OPTIONS	WEIGHTED AVERAGE EXERCISE PRICE
Outstanding -- beginning of period...	608,270	\$11.06	810,442	\$4.43	1,564,449	\$4.50
Granted.....	810,442	4.43	785,657	4.57	629,969	6.80
Exercised.....	--	--	--	--	(2)	4.43
Forfeited or Expired.....	(608,270)	11.06	(31,650)	4.43	(96,209)	4.43
Outstanding -- end of period.....	810,442	\$ 4.43	1,564,449	\$4.50	2,098,207	\$5.20
Exercisable at end of period.....	114,782	\$ 4.43	476,451	\$4.43	778,473	\$4.46

At December 31, 1998, Plan options included 1,436,588, 566,669, and 94,950 shares outstanding at exercise prices of \$4.43, \$6.67, and \$8.00 per share. The weighted average remaining contractual life of these options was 8.2 years.

During 1996, 27,128 options were granted at an exercise price of \$4.43 per share under the Director Plan and were outstanding at December 31, 1996. Of these options, 4,524 were exercisable at December 31, 1996. During 1997, options for 3,620 shares were granted under the Director Plan at an exercise price of \$4.43 per share. Of these options, 30,748 were outstanding with 13,564 exercisable at the \$4.43 per share price at December 31, 1997. During 1998, options for 3,620 shares were granted under the Director Plan at an exercise price of \$8.00 per share. Of these options, 34,368 were outstanding with 26,228 exercisable at the \$4.43 per share price at December 31, 1998.

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

The disclosures required under SFAS No. 123 have been omitted as they are not meaningful based upon the Company's planned conversion from an S corporation to a C corporation upon the closing of this offering for which these financial statements are being prepared. Had the fair value based method prescribed in SFAS No. 123 been used to account for stock-based compensation cost, there would have

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
 (TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

been no change in pro forma net income and pro forma earnings per share from that reported based on the following assumptions: dividend yield of 8%, risk free interest rate of 5.44% and an expected life of 8 years.

9. INCOME TAXES:

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

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

	YEAR ENDED DECEMBER 31,		
	1996	1997	1998
Income before income taxes:			
United States.....	\$11,953	\$21,858	\$6,169
Foreign.....	1,350	410	1,966
	-----	-----	-----
	13,303	22,268	8,135
Current taxes:			
State.....	285	1,331	197
Foreign.....	792	792	784
	-----	-----	-----
	1,077	2,123	981
Deferred taxes:			
State.....	(156)	(72)	(39)
Foreign.....	(121)	(73)	7
	-----	-----	-----
	(277)	(145)	(32)
Provision for income taxes.....	\$ 800	\$ 1,978	\$ 949
	=====	=====	=====

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

At December 31, 1996, 1997, and 1998 the components of the deferred tax asset and deferred tax liability were as follows:

	DECEMBER 31,		
	1996	1997	1998
Deferred tax assets (liabilities):			
Inventories.....	\$234	\$344	\$265
Intercompany profits.....	160	214	152
Compensation.....	72	77	127
Investment booked under the equity method.....	(28)	(41)	(59)
Other.....	(34)	(45)	96
	-----	-----	-----
Total.....	\$404	\$549	\$581
	=====	=====	=====

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
(TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

## 10. EMPLOYEE BENEFIT PLANS:

The Company has a 401(k) profit-sharing plan for U.S. employees meeting certain requirements in which eligible employees may contribute from 1% up to 12% of their compensation. The Company, at its discretion, may provide a matching contribution which will generally match up to the first 2% of each participant's compensation, plus 25% of the next 4% of compensation. At the discretion of the Board of Directors, the Company may also make additional contributions for the benefit of all eligible employees. The Company's contributions are generally paid annually, and were \$2,170,000 and \$2,500,000 for the years ended December 31, 1996 and 1997. Approximately \$1,400,000 has been accrued as the estimated Company contribution for the year ended December 31, 1998 and is included in accrued compensation.

The Company maintains a bonus plan which provides cash awards to key employees, at the discretion of the Compensation Committee of the Board of Directors, based upon operating results and employee performance. Bonus expense to key employees was none, \$1,425,000, and none for the years ended December 31, 1996, 1997, and 1998, respectively.

## 11. RESTRUCTURING:

In 1996, the Company recorded a restructuring charge of \$1,400,000, primarily related to reduction of personnel and the closure of facilities in Phoenix, AZ and San Jose, CA. These charges include \$425,000 of severance pay, \$710,000 of lease commitments, and \$265,000 for the write-off of leasehold improvements. The facilities closure concluded during 1997. The remaining balance of approximately \$126,000 for lease commitments is included in Other accrued expenses in the accompanying balance sheet at December 31, 1998.

## 12. GEOGRAPHIC FINANCIAL INFORMATION AND SIGNIFICANT CUSTOMER:

See Note 1 for a brief description of the Company's business. The Company is organized around two similar product lines domestically and by geographic locations internationally and has three reportable segments: North America, Far East, and Europe. Net sales to unaffiliated customers are based on the location in which the sale originated. Transfers between geographic areas are at negotiated transfer prices and have been eliminated from consolidated net sales. Income from operations consists of total net sales less operating expenses and does not include either interest income, interest expense or income taxes. The Company had one customer comprising 15%, 22% and 16% of net sales for the years ended December 31, 1996, 1997, and 1998, respectively. This data is presented in accordance with SFAS 131, "Disclosures About Segments of an Enterprise and Related Information," which the Company has retroactively adopted for all periods presented.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS -- (CONTINUED)  
 (TABLES IN THOUSANDS, EXCEPT PER SHARE DATA)

	YEAR ENDED DECEMBER 31, 1998			
	NORTH AMERICA	FAR EAST	EUROPE	TOTAL
Net sales to unaffiliated customers...	\$ 95,607	\$23,902	\$20,254	\$139,763
Intersegment net sales.....	26,657	290	1,015	27,962
Depreciation and amortization.....	5,627	210	405	6,242
Income from operations.....	6,319	1,298	1,518	9,135
Segment assets.....	65,560	20,768	9,904	96,232
Long-lived assets.....	28,960	5,655	3,084	37,699
Capital expenditures.....	2,635	179	323	3,137
	YEAR ENDED DECEMBER 31, 1997			
Net sales to unaffiliated customers...	\$138,186	\$31,559	\$18,335	\$188,080
Intersegment net sales.....	35,429	225	749	36,403
Depreciation and amortization.....	5,096	259	357	5,712
Income from operations.....	22,847	886	230	23,963
Segment assets.....	77,302	19,906	9,328	106,536
Long-lived assets.....	30,738	4,904	3,015	38,657
Capital expenditures.....	2,899	128	242	3,269
	YEAR ENDED DECEMBER 31, 1996			
Net sales to unaffiliated customers...	\$121,061	\$31,066	\$18,735	\$170,862
Intersegment net sales.....	34,100	199	1,426	35,725
Depreciation and amortization.....	5,145	388	387	5,920
Income from operations.....	14,534	653	881	16,068
Segment assets.....	66,593	18,524	9,883	95,000
Long-lived assets.....	33,402	5,554	3,551	42,507
Capital expenditures.....	8,332	208	877	9,417

Included in North America are the United States and Canada. Net sales to unaffiliated customers from the United States were \$119,423,000, \$136,653,000 and \$94,449,000 for the years ended December 31, 1996, 1997 and 1998, respectively. Long-lived assets within the United States amounted to \$33,315,000, \$30,667,000 and \$28,902,000 at December 31, 1996, 1997, and 1998, respectively.

Included in the Far East are Japan, Korea and Singapore. Included in Europe are Germany, France and the United Kingdom. Net sales to unaffiliated customers from Japan were \$28,242,000, \$28,184,000 and \$21,153,000 for the years ended December 31, 1996, 1997 and 1998, respectively. Long-lived assets within Japan amounted to \$5,141,000, \$4,792,000 and \$5,431,000 at December 31, 1996, 1997 and 1998, respectively.

### 13. SUBSEQUENT EVENTS:

On January 28, 1999, the Company amended its revolving credit facility and its term loan agreements described in Note 6. The amendments include revised quarterly cash flow to debt service ratios. The most restrictive covenant is the cash flow to debt service ratio of 1.25 to 1.0 in the fourth quarter of 1999 and thereafter.

On February 24, 1999 the Company effected a 3-for-2 stock split, in the form of a stock dividend of its common stock and increased the number of authorized shares of common stock to 30,000,000. Accordingly, all share data has been restated to reflect the common stock split.

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## INSIDE BACK COVER (PG.5):

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

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6,500,000 SHARES

LOGO

COMMON STOCK

-----  
Prospectus  
    , 1999  
-----

NationsBanc Montgomery Securities LLC

Donaldson, Lufkin & Jenrette

Lehman Brothers

Until                   , 1999 (25 days after the date of this prospectus), all dealers effecting transactions in the common stock, whether or not participating in this distribution, may be required to deliver a prospectus. This is in addition to the obligation of dealers to deliver a prospectus when acting as underwriters and with respect to their unsold allotments or subscriptions.

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## PART II

## INFORMATION NOT REQUIRED IN PROSPECTUS

## ITEM 13. OTHER EXPENSES OF ISSUANCE AND DISTRIBUTION.

Estimated expenses payable in connection with the sale of the common stock offered hereby are as follows:

SEC Registration Fee.....	\$ 35,327
NASD Filing Fee.....	\$ 12,708
Printing, Engraving and Mailing Expenses.....	\$120,000
Nasdaq Listing Fee.....	\$ 95,000
Legal Fees and Expenses.....	\$150,000
Accounting Fees and Expenses.....	\$150,000
Blue Sky Fees and Expenses.....	\$ 7,500
Transfer Agent and Registrar Fees.....	\$ 10,000
Miscellaneous.....	\$ 19,465
	-----
Total.....	\$600,000
	=====

-----  
The Company will bear all expenses shown above.

## ITEM 14. INDEMNIFICATION OF DIRECTORS AND OFFICERS.

Section 67 of Chapter 156B of the Massachusetts General Laws provides that a corporation may indemnify its directors and officers to the extent specified in or authorized by (1) the articles of organization; (2) a by-law adopted by the stockholders; or (3) a vote adopted by the holders of a majority of the shares of stock entitled to vote on the election of directors. In all instances, the extent to which a corporation provides indemnification to its directors and officers under Section 67 is optional. In its Amended and Restated Articles of Organization (the "Articles of Organization"), the Registrant has elected to commit to provide indemnification to its directors and officers in specified circumstances. Generally, Article 6 of the Registrant's Articles of Organization provides that the Registrant shall indemnify directors and officers of the Registrant against liabilities and expenses arising out of legal proceedings brought against them by reason of their status as directors or officers or by reason of their agreeing to serve, at the request of the Registrant, as a director or officer with another organization. Under this provision, a director or officer of the Registrant shall be indemnified by the Registrant for all costs and expenses (including attorneys' fees), judgments, liabilities and amounts paid in settlement of such proceedings, even if he is not successful on the merits, if he acted in good faith in the reasonable belief that his action was in the best interests of the Registrant. The Board of Directors may authorize advancing litigation expenses to a director or officer at his request upon receipt of an undertaking by any such director or officer to repay such expenses if it is ultimately determined that he is not entitled to indemnification for such expenses.

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

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

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

ITEM 15. RECENT SALES OF UNREGISTERED SECURITIES.

In the three years preceding the filing of this Registration Statement, the Registrant sold 2 shares of its common stock for total proceeds of \$6.64 to an employee. The registrant awarded options to purchase 837,570 shares of common stock at a weighted average exercise price of \$4.43 per share and 789,277 shares of common stock at a weighted average exercise price of \$4.57 per share, in 1996 and 1997, respectively, to employees and directors of the Company.

In 1998, the registrant awarded options to purchase shares of common stock to employees and directors of the Company on the dates, in the amounts, and at the exercise price set forth below:

DATE - - - - -	NUMBER OF OPTIONS -----	EXERCISE PRICE PER SHARE -----
January 9, 1998.....	3,620	\$8.00
January 26, 1998.....	31,650	\$8.00
March 31, 1998.....	31,650	\$8.00
July 9, 1998.....	450,000	\$6.67
November 10, 1998.....	116,669	\$6.67

The grant of options were exempt from registration under the Securities Act by virtue of the provisions of Section 4(2) of the Securities Act or Rule 701 thereunder.

ITEM 16. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES.

(a) Exhibits:

EX. NO. -----	DESCRIPTION -----
1.1	Form of Underwriting Agreement
+3.1	Restated Articles of Organization, as amended
3.2	Form of Amended and Restated Articles of Organization
+3.3	By-Laws, as amended
+3.4	Form of Amended and Restated By-Laws
+4.1	Specimen certificate representing the common stock
+5.1	Opinion of Hale and Dorr LLP
+10.1	Amended and Restated 1995 Stock Incentive Plan
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+10.9	Loan Agreement dated as of October 31, 1995, as last amended January 28, 1999, by and between the First National Bank of Boston and the Registrant
+10.10	Lease Agreement dated as of October 12, 1989, as extended November 1, 1998, by and between Aspen Industrial Park Partnership and the Registrant
+10.11	Loan Agreement dated as of November 1, 1993, as last amended January 28, 1999, between the First National Bank of Boston and the Registrant

EX. NO.	DESCRIPTION
-----	-----
+10.12	Lease dated as of September 21, 1995 by and between General American Life Insurance Company and the Registrant
+10.13	Loan Agreement dated as of February 23, 1996, as last amended January 28, 1999, between BankBoston, N.A., Chemical Bank and the Registrant
+10.14	Revolving Credit Note (\$8,000,000) dated February 23, 1996 between Chemical Bank, The First National Bank of Boston and the Registrant
+10.15	Revolving Credit Note (\$12,000,000) dated February 23, 1996 between Chemical Bank, The First National Bank of Boston and the Registrant
+10.16	Promissory Note dated as of August 1990 between Jefferson National Life Insurance Company and the Registrant
+**10.17	Comprehensive Supplier Agreement #982812 dated October 23, 1998 by and between Applied Materials, Inc. and the Registrant
+**10.18	Management Incentive Program
+10.19	Lease dated as of December 21, 1989, as last amended December 1996, between Walpole Park South II Trust and the Registrant
+10.20	Lease dated as of January 1, 1996 between MiFuji Kanzai Co. Ltd. and the Registrant (covering Floor 5)
+10.21	Lease dated as of April 21, 1997 between MiFuji Kanzai Co. Ltd. and the Registrant (covering Floors 1 and 2)
+10.22	Split-Dollar Agreement dated as of September 12, 1991 between the Registrant, John R. Bertucci and Claire R. Bertucci and Richard S. Chute, Trustees of the John R. Bertucci Insurance Trust of January 10, 1986
+10.23	Split-Dollar Agreement dated as of September 12, 1991 between the Registrant, John R. Bertucci and John R. Bertucci and Thomas H. Belknap, Trustees of the Claire R. Bertucci Insurance Trust of January 10, 1986
10.24	Form of Tax Indemnification and S Corporation Distribution Agreement
+10.25	Employment Agreement dated March 7, 1997 between Joseph Maher and the Registrant
10.26	Form of Contribution Agreement
+21.1	Subsidiaries of the Registrant
+23.1	Consent of Hale and Dorr LLP (contained in Exhibit 5.1)
23.2	Consent of PricewaterhouseCoopers LLP
+24	Power of Attorney (included on Page II-5)
+27	Financial Data Schedule

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

+ Previously filed.

(b) FINANCIAL STATEMENTS SCHEDULES

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

Schedule II -- Valuation and Qualifying Accounts

ITEM 17. UNDERTAKINGS.

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

The undersigned registrant hereby undertakes that:

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

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

The undersigned registrant hereby further undertakes to provide to the underwriters at the closing specified in the underwriting agreements, certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

## SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the Registrant has duly caused this amendment to the Registration Statement (File No. 333-71363) to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Andover, Commonwealth of Massachusetts, on this 23rd day of March, 1999.

MKS INSTRUMENTS, INC.

By: /s/ JOHN R. BERTUCCI

-----  
JOHN R. BERTUCCI

CHAIRMAN OF THE BOARD, PRESIDENT  
AND CHIEF EXECUTIVE OFFICER

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

SIGNATURES -----	TITLE -----	DATE -----
/s/ JOHN R. BERTUCCI* ----- JOHN R. BERTUCCI	Chairman of the Board of Directors, President and Chief Executive Officer (Principal Executive Officer)	March 23, 1999
/s/ RONALD C. WEIGNER* ----- RONALD C. WEIGNER	Vice President and Chief Financial Officer (Principal Financial and Accounting Officer)	March 23, 1999
/s/ RICHARD S. CHUTE* ----- RICHARD S. CHUTE	Director	March 23, 1999
/s/ OWEN W. ROBBINS* ----- OWEN W. ROBBINS	Director	March 23, 1999
/s/ ROBERT J. THERRIEN* ----- ROBERT J. THERRIEN	Director	March 23, 1999
/s/ LOUIS P. VALENTE* ----- LOUIS P. VALENTE	Director	March 23, 1999

\*By: /s/ JOHN R. BERTUCCI

-----  
JOHN R. BERTUCCI  
ATTORNEY-IN-FACT

## REPORT OF INDEPENDENT ACCOUNTANTS

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

Our audits of the consolidated financial statements referred to in our report dated January 22, 1999, except for the information in the first and second paragraph of Note 13 as to which the date is January 28, 1999 and February 24, 1999, respectively, of MKS Instruments, Inc. also included an audit of the consolidated financial statement schedule listed in Item 16(b) herein. In our opinion, this consolidated financial statement schedule presents fairly, in all material respects, the information set forth therein when read in conjunction with the related consolidated financial statements.

PRICEWATERHOUSECOOPERS LLP

Boston, Massachusetts  
January 22, 1999

S-1

## SCHEDULE II

## MKS INSTRUMENTS, INC.

VALUATION AND QUALIFYING ACCOUNTS  
(IN THOUSANDS)

	BALANCE AT BEGINNING OF PERIOD -----	PROVISION CHARGED TO EXPENSE -----	ACCOUNTS WRITTEN OFF -----	BALANCE AT END OF PERIOD -----
YEAR ENDED DECEMBER 31, 1996				
Allowance for Doubtful Accounts.....	\$542	(20)	40	\$482
YEAR ENDED DECEMBER 31, 1997				
Allowance for Doubtful Accounts.....	\$482	258	130	\$610
YEAR ENDED DECEMBER 31, 1998				
Allowance for Doubtful Accounts.....	\$610	253	207	\$656

## EXHIBIT INDEX

EX. NO.	DESCRIPTION	SEQUENTIALLY NUMBERED PAGE
-----	-----	-----
1.1	Form of Underwriting Agreement	
+3.1	Restated Articles of Organization, as amended	
3.2	Form of Amended and Restated Articles of Organization	
+3.3	By-Laws, as amended	
+3.4	Form of Amended and Restated By-Laws	
+4.1	Specimen certificate representing the common stock	
+5.1	Opinion of Hale and Dorr LLP	
+10.1	Amended and Restated 1995 Stock Incentive Plan	
+10.2	1996 Amended and Restated 1996 Director Stock Option Plan	
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\*\* Confidential materials omitted and filed separately with the Securities and Exchange Commission.

+ Previously filed.

NATIONSBANC MONTGOMERY SECURITIES LLC  
FORM UNDERWRITING AGREEMENT  
Execution Copy

6,500,000 Shares

MKS Instruments, Inc.

Common Stock

Underwriting Agreement

dated March \_\_, 1999

6,500,000 Shares  
MKS INSTRUMENTS, INC.  
Common Stock  
UNDERWRITING AGREEMENT

March \_\_\_\_, 1999

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

Ladies and Gentlemen:

Introductory. MKS Instruments, Inc., a Massachusetts corporation (the "Company"), proposes to issue and sell to the several underwriters named in Schedule A (the "Underwriters") an aggregate of 6,000,000 shares of its Common Stock, no par value per share (the "Common Stock") and the stockholders of the Company named in Schedule B hereto (the "Selling Stockholders") severally propose to sell to the Underwriters an aggregate of 500,000 shares of Common Stock, each Selling Stockholder selling the amount set forth opposite such Selling Stockholder's name in Schedule B (the aggregate of 6,500,000 shares to be sold by the Company and the Selling Stockholders is herein called the "Firm Common Shares"). In addition, the Company has granted to the Underwriters an option to purchase up to an additional 975,000 shares of Common Stock (the aggregate of additional shares to be sold by the Company is herein called the "Optional Common Shares"), as provided in Section 2. The Firm Common Shares and, if and to the extent such option is exercised, the Optional Common Shares are collectively called the "Common Shares". NationsBanc Montgomery Securities LLC ("NMS"), Donaldson, Lufkin & Jenrette Securities Corporation and Lehman Brothers, Inc. have agreed to act as representatives of the several Underwriters (in such capacity, the "Representatives") in connection with the offering and sale of the Common Shares.

The Company has prepared and filed with the Securities and Exchange Commission (the "Commission") a registration statement on Form S-1 (File No. 333-71363), which contains a form of prospectus to be used in connection with the public offering and sale of the Common Shares. Such registration statement, as amended, including the financial statements, exhibits and schedules thereto, in the form in which it was declared effective by the Commission under the Securities Act of 1933 and the rules and regulations promulgated thereunder (collectively, the "Securities Act"), including any information deemed to be a part thereof at the time of effectiveness pursuant to Rule 430A or Rule 434 under the Securities Act, is called the "Registration Statement". Any registration statement filed by the Company pursuant to Rule 462(b) under the Securities Act is called the "Rule 462(b) Registration

Statement", and from and after the date and time of filing of the Rule 462(b) Registration Statement the term "Registration Statement" shall include the Rule 462(b) Registration Statement. Such prospectus, in the form first used by the Underwriters to confirm sales of the Common Shares, is called the "Prospectus"; provided, however, if the Company has, with the consent of NMS, elected to rely upon Rule 434 under the Securities Act, the term "Prospectus" shall mean the Company's prospectus subject to completion (each, a "preliminary prospectus") dated March 2, 1999 (such preliminary prospectus is called the "Rule 434 preliminary prospectus"), together with the applicable term sheet (the "Term Sheet") prepared and filed by the Company with the Commission under Rules 434 and 424(b) under the Securities Act and all references in this Agreement to the date of the Prospectus shall mean the date of the Term Sheet. All references in this Agreement to the Registration Statement, the Rule 462(b) Registration Statement, a preliminary prospectus, the Prospectus or the Term Sheet, or any amendments or supplements to any of the foregoing, shall include any copy thereof filed with the Commission pursuant to its Electronic Data Gathering, Analysis and Retrieval System ("EDGAR").

Each of the Company and the Selling Stockholders hereby confirms its agreements with the Underwriters as follows:

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

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

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

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

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

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

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

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

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

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

(i) Preparation of the Financial Statements. The financial statements filed with the Commission as a part of the Registration Statement and included in the Prospectus present fairly the consolidated financial position of the Company and its subsidiaries as of and at the dates indicated and the results of their operations and cash flows for the periods specified. Such financial statements and supporting schedules have been prepared in conformity with generally accepted accounting principles applied on a consistent basis throughout the periods involved, except as may be expressly stated in the related notes thereto. No other financial statements or supporting schedules are required to be included in the Registration Statement. The financial data set forth in the Prospectus under the captions "Prospectus Summary--Summary Consolidated Financial Data", "Selected Consolidated Financial Data" and "Capitalization" fairly present the information set forth therein on a basis consistent with that of the audited financial statements contained in the Registration Statement.

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

(k) Capitalization and Other Capital Stock Matters. After giving effect to the assumptions set forth in the Prospectus, (i) the authorized, issued and outstanding capital stock of the Company as of December 31, 1998, was as set forth in the Prospectus under the caption "Capitalization" (other than for subsequent issuances, if any, pursuant to employee benefit plans described in the Prospectus or upon exercise of outstanding options described in the Prospectus), (ii) the Common Stock (including the Common Shares) conforms in all material respects to the description thereof contained in the Prospectus. All of the issued and outstanding shares of Common Stock (including the shares of Common Stock owned by Selling Stockholders) have been duly authorized and validly issued, are fully paid and nonassessable and have been issued in compliance with federal and state securities laws. None of the outstanding shares of Common Stock were issued in violation of any preemptive rights, rights of first refusal or other similar rights to subscribe for or purchase securities of the Company. There are no authorized or outstanding options, warrants, preemptive rights, rights of first refusal or other rights to purchase, or equity or debt securities convertible into or exchangeable or exercisable for, any capital stock of the Company or any of its subsidiaries other than those accurately described in the Prospectus. The description of the Company's stock option, stock bonus and other stock plans or arrangements, and the options or other rights granted thereunder, set forth in the Prospectus accurately and fairly presents the information required to be shown with respect to such plans, arrangements, options and rights.

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

(m) Non-Contravention of Existing Instruments; No Further Authorizations or Approvals Required. Neither the Company nor any of its subsidiaries is in violation of its charter or by-laws or is in default (or, with the giving of notice or lapse of time, would be in default) ("Default") under any indenture, mortgage, loan or credit agreement, note, contract, franchise, lease or other instrument to which the Company or any of its subsidiaries is a party or by which it or any of them may be bound, or to which any of the property or assets of the Company or any of its subsidiaries is subject (each, an "Existing Instrument"), except for such Defaults as would not, individually or in the aggregate, result in a Material Adverse Change. The Company's execution, delivery and performance of this Agreement and consummation of the transactions contemplated hereby and by the Prospectus (i) have been duly authorized by all necessary corporate action and will not result in any violation of the provisions of the charter or by-laws of the Company or any subsidiary, (ii) will not conflict with or constitute a breach of, or Default under, or result in the creation or imposition of any lien, charge or encumbrance upon any property or assets of the Company or any of its subsidiaries pursuant to, or require the consent of any other part to, any Existing Instrument, except for such conflicts, breaches, Defaults, liens, charges or encumbrances as would not, individually or in the aggregate, result in a Material Adverse Change and (iii) will not result in any violation of any law, administrative regulation or administrative or court decree applicable to the Company or any subsidiary. No consent, approval, authorization or other order of, or registration or filing with, any court or other governmental or regulatory authority or agency, is required for the Company's execution, delivery and performance of this Agreement and consummation of the transactions contemplated hereby and by the Prospectus, except such as have been obtained or made by the Company and are in full force and effect under the Securities Act, applicable state securities or blue sky laws and from the National Association of Securities Dealers, Inc. (the "NASD").

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

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

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

the aggregate, if the subject of an unfavorable decision, ruling or finding, could result in a Material Adverse Change.

(q) Title to Properties. The Company and each of its subsidiaries has good and marketable title to all the properties and assets reflected as owned in the financial statements referred to in Section (i) above (or elsewhere in the Prospectus), in each case, except as disclosed in the Prospectus, free and clear of any security interests, mortgages, liens, encumbrances, equities, claims and other defects, except such as do not materially and adversely affect the value of such property and do not materially interfere with the use made or proposed to be made of such property by the Company or such subsidiary. The real property, improvements, equipment and personal property held under lease by the Company or any subsidiary are held under valid and enforceable leases, with such exceptions as are not material and do not materially interfere with the use made or proposed to be made of such real property, improvements, equipment or personal property by the Company or such subsidiary.

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

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

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

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

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

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

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

Section 1B. Representations and Warranties of the Selling Stockholders. Each Selling Stockholder represents, warrants and covenants to each Underwriter as follows:

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

(b) The Custody Agreement and Power of Attorney. Each of the (i) Custody Agreement signed by such Selling Stockholder and BankBoston, N.A., as custodian (the "Custodian"), relating to the deposit of the Common Shares to be sold by such Selling Stockholder (the "Custody Agreement") and (ii) Power of Attorney appointing certain individuals named therein as such Selling Stockholder's attorneys-in-fact (each, an "Attorney-in-Fact") to the extent set forth therein relating to the transactions contemplated hereby and by the Prospectus (the "Power of Attorney"), of such Selling Stockholder has been duly executed and delivered by such Selling Stockholder and is a valid and binding agreement of such Selling Stockholder, enforceable in accordance with its terms, except as rights to indemnification thereunder may be limited by applicable law and except as the enforcement thereof may be limited by bankruptcy, insolvency, reorganization, moratorium or other similar laws relating to or affecting the rights and remedies of creditors or by general equitable principles.

(c) Title to Common Shares to be Sold; All Authorizations Obtained. Such Selling Stockholder has, and on the First Closing Date and the Second Closing Date (as defined below) will have, good and valid title to all of the Common Shares which may be sold by such Selling Stockholder pursuant to this Agreement on such date and the legal right and power, and all authorizations and approvals required by law and under its trust agreement or other organizational documents to enter into this Agreement and its Custody Agreement and Power of Attorney, to sell, transfer and deliver all of the Common Shares which may be sold by such Selling Stockholder pursuant to this Agreement and to comply with its other obligations hereunder and thereunder.

(d) Delivery of the Common Shares to be Sold. Delivery of the Common Shares which are sold by such Selling Stockholder pursuant to this Agreement will pass good and valid title to such Common Shares, free and clear of any security interest, mortgage, pledge, lien, encumbrance or other claim.

(e) Non-Contravention; No Further Authorizations or Approvals Required. The execution and delivery by such Selling Stockholder of, and the performance by such Selling Stockholder of its obligations under, this Agreement, the Custody Agreement and the Power of Attorney will not contravene or conflict with, result in a breach of, or constitute a Default under, or require the consent of any other party to, the trust agreement of such Selling Stockholder or any other agreement or instrument to which such Selling Stockholder is a party or by which it is bound or under which it is entitled to any right or benefit, any provision of applicable law or any judgment, order, decree or regulation applicable to such Selling Stockholder of any court, regulatory body, administrative agency, governmental body or arbitrator having jurisdiction over such Selling Stockholder. No consent, approval, authorization or other order of, or registration or filing with, any court or other governmental authority or agency, is required for the consummation by such Selling Stockholder of the transactions contemplated in this Agreement, except such as have been obtained or made and are in full force and effect under the Securities Act, applicable state securities or blue sky laws and from the NASD.

(f) No Registration or Other Similar Rights. Such Selling Stockholder does not have any registration or other similar rights to have any equity or debt securities registered for sale by the Company under the Registration Statement or included in the offering contemplated by this Agreement, except for such rights as are described in the Prospectus under "Shares Eligible for Future Sale."

(g) No Further Consents, etc. No consent, approval or waiver is required under any instrument or agreement to which such Selling Stockholder is a party or by which it is bound or under which it is entitled to any right or benefit, in connection with the offering, sale or purchase by the Underwriters of any of the Common Shares which may be sold by such Selling Stockholder under this Agreement or the consummation by such Selling Stockholder of any of the other transactions contemplated hereby.

(h) Disclosure Made by Such Selling Stockholder in the Prospectus. All information furnished by or on behalf of such Selling Stockholder in writing expressly for use in the Registration Statement and Prospectus is, and on the First Closing Date and the Second Closing Date will be, true, correct, and complete in all material respects, and does not, and on the First Closing Date and the Second Closing Date will not, contain any untrue statement of a material fact or omit to state any material fact necessary to make such information not misleading. Such Selling Stockholder confirms as accurate the number of shares of Common Stock set forth opposite such Selling Stockholder's name in Schedule B to this Agreement (prior to giving effect to the sale of the Common Shares).

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

(j) Confirmation of Company Representations and Warranties. Such Selling Stockholder has no reason to believe that the representations and warranties of the Company contained in Section 1A hereof are not true and correct, is familiar with the Registration Statement and the Prospectus and has no knowledge of any material fact, condition or information not disclosed in the Registration Statement or the Prospectus which has had or may have a Material Adverse Effect and is not prompted to sell shares of Common Stock by any information concerning the Company which is not set forth in the Registration Statement and the Prospectus.

Any certificate signed by or on behalf of any Selling Stockholder and delivered to the Representatives or to counsel for the Underwriters shall be deemed to be a representation and warranty by such Selling Stockholder to each Underwriter as to the matters covered thereby.

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

The Firm Common Shares. Upon the terms set forth herein, (i) the Company agrees to issue and sell to the several Underwriters an aggregate of 6,000,000 Firm Common Shares and (ii) the Selling Stockholders agree to sell to the several Underwriters an aggregate of 500,000 Firm Common Shares, each Selling Stockholder selling the number of Firm Common Shares set forth opposite such Selling Stockholder's name on Schedule B. On the basis of the representations, warranties and agreements herein contained, and upon the terms but subject to the conditions herein set forth, the Underwriters agree, severally and not jointly, to purchase from the Company and the Selling Stockholders the respective number of Firm Common Shares set forth opposite their names on Schedule A. The purchase price per Firm Common Share to be paid by the several Underwriters to the Company and the Selling Stockholders shall be \$[ ] per share.

The First Closing Date. Delivery of certificates for the Firm Common Shares to be purchased by the Underwriters and payment therefor shall be made at the offices of NMS, 600 Montgomery Street, San Francisco, California (or such other place as may be agreed to by the Company and the Representatives) at 6:00 a.m. San Francisco time, on [ ], or such other time and date not later than 10:30 a.m. San Francisco time, on [ ] as the Representatives shall designate by notice to the Company (the time and date of such closing are called the "First Closing Date"). The Company and the Selling Stockholders hereby acknowledge that circumstances under which the Representatives may provide notice to postpone the First Closing Date as originally scheduled include, but are in no way limited to, any determination by the Company, the Selling Stockholders or the Representatives to recirculate to the public copies of an amended or supplemented Prospectus or a delay as contemplated by the provisions of Section 10.

The Optional Common Shares; the Second Closing Date. In addition, on the basis of the representations, warranties and agreements herein contained, and upon the terms but subject to the conditions herein set forth, the Company hereby grants an option to the several Underwriters to purchase, severally and not jointly, up to an aggregate of 975,000 Optional Common Shares from the Company at the purchase price per share to be paid by the Underwriters for the Firm Common Shares. The option granted hereunder is for use by the Underwriters solely in covering any over-allotments in connection with the sale and distribution of the Firm Common Shares. The option granted hereunder may be exercised at any time (but not more than once) upon notice by the Representatives to the Company, which notice may be given at any time within 30 days from the date of this Agreement. Such notice shall set forth (i) the aggregate number of Optional Common Shares as to which the Underwriters are exercising the option, (ii) the names and denominations in which the certificates for the Optional Common Shares are to be registered and (iii) the time, date and place at which such certificates will be delivered (which time and date may be simultaneous with, but not earlier than, the First Closing Date; and in such case the term "First Closing Date" shall refer to the time and date of delivery of certificates for the Firm Common Shares and the Optional Common Shares). Such time and date of delivery, if subsequent to the First Closing Date, is called the "Second Closing Date" and shall be determined by the Representatives and shall not be earlier than three nor later than five full business days after delivery of such notice of exercise. If any Optional Common Shares are to be purchased, (a) each Underwriter

agrees, severally and not jointly, to purchase the number of Optional Common Shares (subject to such adjustments to eliminate fractional shares as the Representatives may determine) that bears the same proportion to the total number of Optional Common Shares to be purchased as the number of Firm Common Shares set forth on Schedule A opposite the name of such Underwriter bears to the total number of Firm Common Shares and (b) the Company agrees to sell the number of Optional Common Shares (subject to such adjustments to eliminate fractional shares as the Representatives may determine) that bears the same proportion to the total number of Optional Common Shares to be sold as the number of Optional Common Shares to be sold by the Company as set forth in the paragraph "Introductory" of this Agreement bears to the total number of Optional Common Shares. The Representatives may cancel the option at any time prior to its expiration by giving written notice of such cancellation to the Company.

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

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

It is understood that the Representatives have been authorized, for their own account and the accounts of the several Underwriters, to accept delivery of and receipt for, and make payment of the purchase price for, the Firm Common Shares and any Optional Common Shares the Underwriters have agreed to purchase. NMS, individually and not as the Representatives of the Underwriters, may (but shall not be obligated to) make payment for any Common Shares to be purchased by any Underwriter whose funds shall not have been received by the Representatives by the First Closing Date or the Second Closing Date, as the case may be, for the account of such Underwriter, but any such payment shall not relieve such Underwriter from any of its obligations under this Agreement.

Each Selling Stockholder hereby agrees that (i) it will pay all stock transfer taxes, stamp duties and other similar taxes, if any, payable upon the sale or delivery of the Common Shares to be sold by such Selling Stockholder to the several Underwriters, or otherwise in connection with the performance of such Selling Stockholder's obligations hereunder and (ii) the Custodian is authorized to deduct for such payment any such amounts from the proceeds to such Selling Stockholder hereunder and to hold such amounts for the account of such Selling Stockholder with the Custodian under the Custody Agreement.

Delivery of the Common Shares. The Company and the Selling Stockholders shall deliver, or cause to be delivered, to the Representatives for the accounts of the several Underwriters certificates for the Firm Common Shares to be sold by them at the First Closing Date, against the irrevocable release of a wire transfer of immediately available funds for the amount of the purchase price therefor. The Company shall also deliver, or cause to be delivered, to the Representatives for the accounts of the several Underwriters, certificates for the Optional Common Shares the Underwriters have agreed to purchase from it on the First Closing Date or the Second Closing Date, as the case may be,

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

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

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

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

(b) Securities Act Compliance. After the date of this Agreement, the Company shall promptly advise the Representatives in writing (i) of the receipt of any comments of, or requests for additional or supplemental information from, the Commission, (ii) of the time and date of any filing of any post-effective amendment to the Registration Statement or any amendment or supplement to any preliminary prospectus or the Prospectus, (iii) of the time and date that any post-effective amendment to the Registration Statement becomes effective and (iv) of the issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement or any post-effective amendment thereto or of any order preventing or suspending the use of any preliminary prospectus or the Prospectus, or of any proceedings to remove, suspend or terminate from listing or quotation the Common Stock from any securities exchange upon which it is listed for trading or included or designated for quotation, or of the threatening or initiation of any proceedings for any of such purposes. If the Commission shall enter any such stop order at any time, the Company will use its best efforts to obtain the lifting of such order at the earliest possible moment. Additionally, the Company agrees that it shall comply with the provisions of Rules 424(b), 430A and 434, as applicable, under the Securities Act and will use its reasonable efforts to confirm that any filings made by the Company under such Rule 424(b) were received in a timely manner by the Commission.

(c) Amendments and Supplements to the Prospectus and Other Securities Act Matters. If, during the Prospectus Delivery Period, any event shall occur or condition exist as a result of which it is necessary to amend or supplement the Prospectus in order to make the statements therein, in the light of the circumstances when the Prospectus is delivered to a purchaser, not misleading, or if in the opinion of

the Representatives or counsel for the Underwriters it is otherwise necessary to amend or supplement the Prospectus to comply with law, the Company agrees to promptly prepare (subject to Section 3A(a) hereof), file with the Commission and furnish at its own expense to the Underwriters and to dealers, amendments or supplements to the Prospectus so that the statements in the Prospectus as so amended or supplemented will not, in the light of the circumstances when the Prospectus is delivered to a purchaser, be misleading or so that the Prospectus, as amended or supplemented, will comply with law.

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

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

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

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

(h) Earnings Statement. As soon as practicable, the Company will make generally available to its security holders and to the Representatives an earnings statement (which need not be audited) covering the twelve-month period ending March 31, 2000 that satisfies the provisions of Section 11(a) of the Securities Act.

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

(j) Agreement Not To Offer or Sell Additional Securities. During the period of 180 days following the date of the Prospectus, the Company will not, without the prior written consent of NMS (which consent may be withheld at the sole discretion of NMS), directly or indirectly, sell, offer, contract or grant any option to sell, pledge, transfer or establish an open "put equivalent position" within the meaning of Rule 16a-1(h) under the Exchange Act, or otherwise dispose of or transfer, or announce the offering of, or file any registration statement under the Securities Act in respect of, any shares of Common Stock, options or warrants to acquire shares of the Common Stock or securities exchangeable

or exercisable for or convertible into shares of Common Stock (other than as contemplated by this Agreement with respect to the Common Shares); provided, however, that the Company may issue shares of its Common Stock or options to purchase its Common Stock, or Common Stock upon exercise of options, pursuant to any stock option, stock bonus or other stock plan or arrangement described in the Prospectus, (ii) file one or more Registration Statements on Form S-8, and (iii) issue shares in connection with any acquisition if recipients agree in writing not to sell, offer, dispose of or otherwise transfer any such shares during such 180 day period without the prior written consent of NMS (which consent may be withheld at the sole discretion of the NMS).

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

Section 3B. Covenants of the Selling Stockholders. Each Selling Stockholder further covenants and agrees with each Underwriter:

(a) Agreement Not to Offer or Sell Additional Securities. Such Selling Stockholder will not, without the prior written consent of NMS (which consent may be withheld in its sole discretion), directly or indirectly, sell, offer, contract or grant any option to sell (including without limitation any short sale), pledge, transfer, establish an open "put equivalent position" within the meaning of Rule 16a-1(h) under the Exchange Act, or otherwise dispose of any shares of Common Stock, options or warrants to acquire shares of Common Stock, or securities exchangeable or exercisable for or convertible into shares of Common Stock currently or hereafter owned either of record or beneficially (as defined in Rule 13d-3 under Securities Exchange Act of 1934, as amended) by the undersigned, or publicly announce the undersigned's intention to do any of the foregoing, for a period commencing on the date hereof and continuing through the close of trading on the date 180 days after the date of the Prospectus.

(b) Delivery of Forms W-8 and W-9 . To deliver to the Representative prior to the First Closing Date a properly completed and executed United States Treasury Department Form W-8 (if the Selling Stockholder is a non-United States person) or Form W-9 (if the Selling Stockholder is a United States Person).

Section 4. Payment of Expenses. The Company agrees to pay all costs, fees and expenses incurred in connection with the performance of its obligations hereunder and in connection with the transactions contemplated hereby, including without limitation (i) all expenses incident to the issuance and delivery of the Common Shares (including all printing and engraving costs), (ii) all fees and expenses of the registrar and transfer agent of the Common Stock, (iii) all necessary issue, transfer and other stamp taxes in connection with the issuance and sale of the Common Shares to the Underwriters, (iv) all fees and

expenses of the Company's counsel, independent public or certified public accountants and other advisors, (v) all costs and expenses incurred in connection with the preparation, printing, filing, shipping and distribution of the Registration Statement (including financial statements, exhibits, schedules, consents and certificates of experts), each preliminary prospectus and the Prospectus, and all amendments and supplements thereto, and this Agreement, (vi) all filing fees, attorneys' fees and expenses incurred by the Company or the Underwriters in connection with qualifying or registering (or obtaining exemptions from the qualification or registration of) all or any part of the Common Shares for offer and sale under the state securities or blue sky laws or the provincial securities laws of Canada, and, if requested by the Representatives, preparing and printing a "Blue Sky Survey" or memorandum, and any supplements thereto, advising the Underwriters of such qualifications, registrations and exemptions, subject to a maximum fee of \$7,500 (vii) the filing fees incident to, and the reasonable fees and expenses of counsel for the Underwriters in connection with, the NASD's review and approval of the Underwriters' participation in the offering and distribution of the Common Shares, (viii) the fees and expenses associated with listing the Common Shares on the Nasdaq National Market, and (ix) all other fees, costs and expenses referred to in Item 13 of Part II of the Registration Statement. Except as provided in this Section 4, Section 6, Section 8 and Section 9 hereof, the Underwriters shall pay their own expenses, including the fees and disbursements of their counsel.

The Selling Stockholders further agree with each Underwriter to pay (directly or by reimbursement) all fees and expenses incident to the performance of their obligations under this Agreement which are not otherwise specifically provided for herein, including but not limited to (i) fees and expenses of counsel and other advisors for such Selling Stockholders, (ii) fees and expenses of the Custodian and (iii) expenses and taxes incident to the sale and delivery of the Common Shares to be sold by such Selling Stockholders to the Underwriters hereunder (which taxes, if any, may be deducted by the Custodian under the provisions of Section 2 of this Agreement).

This Section 4 shall not affect or modify any separate, valid agreement relating to the allocation of payment of expenses between the Company, on the one hand, and the Selling Stockholders, on the other hand.

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

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

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

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

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

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

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

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

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

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

(e) Opinion of Counsel for the Underwriters. On each of the First Closing Date and the Second Closing Date the Representatives shall have received the favorable opinion of Ropes & Gray, counsel for the Underwriters, dated as of such Closing Date, with respect to the matters set forth in

paragraphs (i), (viii), (ix) and the next-to-last paragraph of Exhibit A-1 (and the Representatives shall have received an additional five conformed copies of such counsel's legal opinion for each of the several Underwriters).

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

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

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

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

(g) Bring-down Comfort Letter. On each of the First Closing Date and the Second Closing Date the Representatives shall have received from PricewaterhouseCoopers LLP, independent public or certified public accountants for the Company, a letter dated such date, in form and substance satisfactory to the Representatives, to the effect that they reaffirm the statements made in the letter furnished by them pursuant to subsection (a) of this Section 5, except that the specified date referred to therein for the carrying out of procedures shall be no more than three business days prior to the First Closing Date or Second Closing Date, as the case may be (and the Representatives shall have received an additional five conformed copies of such accountants' letter for each of the several Underwriters).

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

(i) Opinion of Counsel for the Selling Stockholders. On the First Closing Date the Representatives shall have received the favorable opinion of Hill & Barlow, counsel for the Selling Stockholders, dated as of such Closing Date, the form of which is attached as Exhibit A-3 (and the Representatives shall have received an additional five conformed copies of such counsel's legal opinion for each of the several Underwriters).

(j) Selling Stockholders' Certificate. On the First Closing Date the Representatives shall have received a written certificate executed by each Selling Stockholder, dated as of such Closing Date, to the effect that:

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

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

(k) Selling Stockholders' Documents. On the date hereof, the Company and the Selling Stockholders shall have furnished for review by the Representatives copies of the Powers of Attorney and Custody Agreements executed by each of the Selling Stockholders and such further information, certificates and documents as the Representatives may reasonably request.

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

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

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

Section 7. Effectiveness of this Agreement.

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

Prior to such effectiveness, this Agreement may be terminated by any party by notice to each of the other parties hereto, and any such termination shall be without liability on the part of (a) the Company or the Selling Stockholders to any Underwriter, except that the Company and the Selling Stockholders shall be obligated to reimburse the expenses of the Representatives and the Underwriters pursuant to Sections 4 and 6 hereof, (b) of any Underwriter to the Company or the Selling Stockholders, or (c) of any party hereto to any other party except that the provisions of Section 8 and Section 9 shall at all times be effective and shall survive such termination.

## Section 8. Indemnification.

(a) Indemnification of the Underwriters. (1) The Company agrees to indemnify and hold harmless each Underwriter, its officers and employees, and each person, if any, who controls any Underwriter within the meaning of the Securities Act and the Exchange Act against any loss, claim, damage, liability or expense, as incurred, to which such Underwriter or such controlling person may become subject, under the Securities Act, the Exchange Act or other federal or state statutory law or regulation, or at common law or otherwise (including in settlement of any litigation, if such settlement is effected with the written consent of the Company), insofar as such loss, claim, damage, liability or expense (or actions in respect thereof as contemplated below) arises out of or is based (i) upon any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, or any amendment thereto, including any information deemed to be a part thereof pursuant to Rule 430A or Rule 434 under the Securities Act, or the omission or alleged omission therefrom of a material fact required to be stated therein or necessary to make the statements therein not misleading; or (ii) upon any untrue statement or alleged untrue statement of a material fact contained in any preliminary prospectus or the Prospectus (or any amendment or supplement thereto), or the omission or alleged omission therefrom of a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; or (iii) in whole or in part upon any inaccuracy in the representations and warranties of the Company contained herein; or (iv) in whole or in part upon any failure of the Company to perform its obligations hereunder or under law; or (v) any act or failure to act or any alleged act or failure to act by any Underwriter in connection with, or relating in any manner to, the Common Stock or the offering contemplated hereby, and which is included as part of or referred to in any loss, claim, damage, liability or action arising out of or based upon any matter covered by clause (i) or (ii) above, provided that the Company shall not be liable under this clause (v) to the extent that a court of competent jurisdiction shall have determined by a final judgment that such loss, claim, damage, liability or action resulted directly from any such acts or failures to act undertaken or omitted to be taken by such Underwriter through its bad faith or willful misconduct; and to reimburse each Underwriter and each such controlling person for any and all expenses (including the fees and disbursements of counsel chosen by NMS) as such expenses are reasonably incurred by such Underwriter or such controlling person in connection with investigating, defending, settling, compromising or paying any such loss, claim, damage, liability, expense or action; provided, however, that the foregoing indemnity agreement shall not apply to any loss, claim, damage, liability or expense to the extent, but only to the extent, arising out of or based upon any untrue statement or alleged untrue statement or omission or alleged omission made in reliance upon and in conformity with written information furnished to the Company by the Representatives expressly for use in the Registration Statement, any preliminary prospectus or the Prospectus (or any amendment or supplement thereto); and provided, further, that with respect to any preliminary prospectus, the foregoing indemnity agreement shall not inure to the benefit of any Underwriter from whom the person asserting any loss, claim, damage, liability or expense purchased Common Shares, or any person controlling such Underwriter, if copies of the Prospectus were timely delivered to the Underwriter pursuant to Section 2 and a copy of the Prospectus (as then amended or supplemented if the Company shall have furnished any amendments or supplements thereto) was not sent or given by or on behalf of such Underwriter to such person, if required by law so to have been delivered, at or prior to the written confirmation of the sale of the Common Shares to such person, and if the Prospectus (as so amended or supplemented) would have cured the defect giving rise to such loss, claim, damage, liability or expense. The indemnity agreement set forth in this Section 8(a) shall be in addition to any liabilities that the Company and the Selling Stockholders may otherwise have.

(2) Subject to Section 8(e), each of the Selling Stockholders, severally and not jointly, agrees to indemnify and hold harmless each Underwriter, its officers and employees, and each person, if any, who controls any Underwriter within the meaning of the Securities Act and the Exchange Act against any loss, claim, damage, liability or expense, as incurred, to which such Underwriter or such controlling person may become subject, under the Securities Act, the Exchange Act or other federal or state statutory law or regulation, or at common law or otherwise (including in settlement of any litigation, if such settlement is effected with the written consent of the Company), insofar as such loss, claim, damage, liability or expense (or actions in respect thereof as contemplated below) arises out of or is based (i) upon any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, or any amendment thereto, including any information deemed to be a part thereof pursuant to Rule 430A or Rule 434 under the Securities Act, or the omission or alleged omission therefrom of a material fact required to be stated therein or necessary to make the statements therein not misleading but only to the extent that such untrue statement or alleged untrue statement or omission or alleged omission was made in reliance upon and in conformity with information furnished to the Company or the Underwriters by such Selling Stockholder, directly or indirectly through such Selling Stockholder's representatives, for use in the preparation of the Registration Statement or such amendment or supplement; or (ii) upon any untrue statement or alleged untrue statement of a material fact contained in any preliminary prospectus or the Prospectus (or any amendment or supplement thereto), or the omission or alleged omission therefrom

of a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading but only to the extent that such untrue statement or alleged untrue statement or omission or alleged omission was made in reliance upon and in conformity with information furnished to the Company or the Underwriters by such Selling Stockholder, directly or through such Selling Stockholders representatives for use in the preparation of such Prospectus or such amendment or supplement; or (iii) in whole or in part upon any inaccuracy in the representations and warranties of such Selling Stockholder contained herein; or (iv) in whole or in part upon any failure of such Selling Stockholder to perform its obligations hereunder or under law; or (v) any act or failure to act or any alleged act or failure to act by any Underwriter in connection with, or relating in any manner to, the Common Stock or the offering contemplated hereby, and which is included as part of or referred to in any loss, claim, damage, liability or action arising out of or based upon any matter covered by clause (i) or (ii) above, provided that such Selling Stockholder shall not be liable under this clause (v) to the extent that a court of competent jurisdiction shall have determined by a final judgment that such loss, claim, damage, liability or action resulted directly from any such acts or failures to act undertaken or omitted to be taken by such Underwriter through its bad faith or willful misconduct; and to reimburse each Underwriter and each such controlling person for any and all expenses (including the fees and disbursements of counsel chosen by NMS) as such expenses are reasonably incurred by such Underwriter or such controlling person in connection with investigating, defending, settling, compromising or paying any such loss, claim, damage, liability, expense or action; provided, however, that the foregoing indemnity agreement shall not apply to any loss, claim, damage, liability or expense to the extent, but only to the extent, arising out of or based upon any untrue statement or alleged untrue statement or omission or alleged omission made in reliance upon and in conformity with written information furnished to the Company by the Representatives expressly for use in the Registration Statement, any preliminary prospectus or the Prospectus (or any amendment or supplement thereto); and provided, further, that with respect to any preliminary prospectus, the foregoing indemnity agreement shall not inure to the benefit of any Underwriter from whom the person asserting any loss, claim, damage, liability or expense purchased Common Shares, or any person controlling such Underwriter, if copies of the Prospectus were timely delivered to the Underwriter pursuant to Section 2 and a copy of the Prospectus (as then amended or supplemented if the Company shall have furnished any amendments or supplements thereto) was not sent or given by or on behalf of such Underwriter to such person, if required by law so to have been delivered, at or prior to the written confirmation of the sale of the Common Shares to such person, and if the Prospectus (as so amended or supplemented) would have cured the defect giving rise to such loss, claim, damage, liability or expense. The indemnity agreement set forth in this Section 8(a) shall be in addition to any liabilities that the Selling Stockholders may otherwise have.

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

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

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

(d) Settlements. The indemnifying party under this Section 8 shall not be liable for any settlement of any proceeding effected without its written consent, but if settled with such consent or if there be a final judgment for the plaintiff, the indemnifying party agrees to indemnify the indemnified party against any loss, claim, damage, liability or expense by reason of such settlement or judgment. No indemnifying party shall, without the prior written consent of the indemnified party, effect any settlement, compromise or consent to the entry of judgment in any pending or threatened action, suit or proceeding in respect of which any indemnified party is or could have been a party and indemnity was or could have been sought hereunder by such indemnified party, unless such settlement, compromise or consent includes an unconditional release of such indemnified party from all liability on claims that are the subject matter of such action, suit or proceeding.

(e) Limitation on Liability of Selling Stockholders. The liability of each Selling Stockholder under the representations, warranties and agreements contained herein and under the indemnity and contribution agreements contained in the provisions of this Section 8 and Section 9 shall be limited to an amount equal to the aggregate initial public offering price of all Shares sold by such Selling Stockholder to the Underwriters minus the amount of the underwriting discount paid thereon to the Underwriters by such Selling Stockholder. The Company and such Selling Stockholders may agree, as among themselves and without limiting the rights of the Underwriters under this Agreement, as to the respective amount of such liability for which they each shall be responsible.

#### Section 9. Contribution.

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

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

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

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

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

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

Underwriters, or in such other proportions as may be specified by the Representatives with the consent of the non-defaulting Underwriters, to purchase the Common Shares which such defaulting Underwriter or Underwriters agreed but failed or refused to purchase on such date. If, on the First Closing Date or the Second Closing Date, as the case may be, any one or more of the Underwriters shall fail or refuse to purchase Common Shares and the aggregate number of Common Shares with respect to which such default occurs exceeds 10% of the aggregate number of Common Shares to be purchased on such date, and arrangements satisfactory to the Representatives and the Company for the purchase of such Common Shares are not made within 48 hours after such default, this Agreement shall terminate without liability of any party to any other party except that the provisions of Section 4, Section 8 and Section 9 shall at all times be effective and shall survive such termination. In any such case either the Representatives or the Company shall have the right to postpone the First Closing Date or the Second Closing Date, as the case may be, but in no event for longer than seven days in order that the required changes, if any, to the Registration Statement and the Prospectus or any other documents or arrangements may be effected.

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

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

Section 12. Representations and Indemnities to Survive Delivery. The respective indemnities, agreements, representations, warranties and other statements of the Company, of its officers, of the Selling Stockholders and of the several Underwriters set forth in or made pursuant to this Agreement will remain in full force and effect, regardless of any investigation made by or on behalf of any Underwriter or the Company or any of its or their partners, officers or directors or any controlling person, or the

Selling Stockholders, as the case may be, and will survive delivery of and payment for the Common Shares sold hereunder and any termination of this Agreement.

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

If to the Representatives:

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

with copies to:

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

and

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

If to the Company:

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

with a copy to:

Hale and Dorr  
60 State Street  
Boston, MA 02109

Facsimile: (617) 526-5000  
Attention: Mark G. Borden

If to the Selling Stockholders:

BankBoston, N.A.  
150 Royall Street  
Mall Shop 45-02-62  
Canton, MA 02021  
Attention: Carole McHugh

Section 14. Successors. This Agreement will inure to the benefit of and be binding upon the parties hereto, including any substitute Underwriters pursuant to Section 10 hereof, and to the benefit of the employees, officers and directors and controlling persons referred to in Section 8 and Section 9, and in each case their respective successors, and no other person will have any right or obligation hereunder. The term "successors" shall not include any purchaser of the Common Shares as such from any of the Underwriters merely by reason of such purchase.

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

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

Section 17. Failure of One or More of the Selling Stockholders to Sell and Deliver Common Shares. If one or more of the Selling Stockholders shall fail to sell and deliver to the Underwriters the Common Shares to be sold and delivered by such Selling Stockholders at the First Closing Date pursuant to this Agreement, then the Underwriters may at their option, by written notice from the Representatives to the Company and the Selling Stockholders, either (i) terminate this Agreement without any liability on the part of any Underwriter or, except as provided in Sections 4, 6, 8 and 9 hereof, the Company or the Selling Stockholders, or (ii) purchase the shares which the Company and other Selling Stockholders have agreed to sell and deliver in accordance with the terms hereof. If one or more of the Selling Stockholders shall fail to sell and deliver to the Underwriters the Common Shares to be sold and delivered by such Selling Stockholders pursuant to this Agreement at the First Closing Date, then the Underwriters shall have the right, by written notice from the Representatives to the Company and the Selling Stockholders, to postpone the First Closing Date, but in no event for longer than seven days in order that the required changes, if any, to the Registration Statement and the Prospectus or any other documents or arrangements may be effected.

Section 18. General Provisions. This Agreement constitutes the entire agreement of the parties to this Agreement and supersedes all prior written or oral and all contemporaneous oral agreements, understandings and negotiations with respect to the subject matter hereof. This Agreement may be executed in two or more counterparts, each one of which shall be an original, with the same effect as if the signatures thereto and hereto were upon the same instrument. This Agreement may not be amended or modified unless in writing by all of the parties hereto, and no condition herein (express or implied) may be waived unless waived in writing by each party whom the condition is meant to benefit. The Table of Contents and the Section headings herein are for the convenience of the parties only and shall not affect the construction or interpretation of this Agreement.

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

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

Very truly yours,

MKS INSTRUMENTS, INC.

By: -----

John R. Bertucci  
President

Selling Stockholders as Listed on the  
Attached Schedule B

By: -----

Ronald C. Weigner  
Attorney-in Fact

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

NATIONSBANC MONTGOMERY SECURITIES LLC  
DONALDSON, LUFKIN & JENRETTE SECURITIES CORPORATION  
LEHMAN BROTHERS INC.

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

By NATIONSBANC MONTGOMERY SECURITIES LLC

By: \_\_\_\_\_  
Title

SCHEDULE A

Underwriters  
-----

Number of Firm Common Shares to be Purchased  
-----

NationsBanc Montgomery Securities LLC  
Donaldson, Lufkin & Jenrette Securities Corporation  
Lehman Brothers Inc.

## SCHEDULE B

	Number of Firm Common Shares to be Sold -----	Number of Optional Common Shares to be Sold (if Maximum Option is Exercised) -----
The Company	6,000,000	975,000
Claire R. Bertucci CBS Retained Annuity Trust of 1998	50,000	0
Claire R. Bertucci JCB Retained Annuity Trust of 1998	50,000	0
John R. Bertucci CBS Retained Annuity Trust of 1998	50,000	0
John R. Bertucci Family Retained Annuity Trust of 1998	50,000	0
John R. Bertucci JCB Retained Annuity Trust of 1998	50,000	0
Claire R. Bertucci CBS Retained Annuity Trust of 1997	50,000	0
Claire R. Bertucci JCB Retained Annuity Trust of 1997	50,000	0
John R. Bertucci CBS Retained Annuity Trust of 1997	50,000	0
John R. Bertucci Family Retained Annuity Trust of 1997	50,000	0
John R. Bertucci JCB Retained Annuity Trust of 1997	50,000	0

## EXHIBIT A-1

The final opinion in draft form should be attached as Exhibit A-1 at the time this Agreement is executed.

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

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

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

(ii) The authorized, issued and outstanding capital stock of the Company (including the Common Stock) conform as to legal matters in all material respects to the descriptions thereof set forth in the Prospectus. All of the outstanding shares of Common Stock have been duly authorized and validly issued, are fully paid and nonassessable. The form of certificate used to evidence the Common Stock is in due and proper form and complies with all applicable requirements of the charter and by-laws of the Company and The Commonwealth of Massachusetts.

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

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

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

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

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

(viii) The statements (A) in the Prospectus under the caption "Shares Eligible for Future Sale" and (B) in Item 14 and Item 15 of the Registration Statement, insofar as such statements constitute matters of law or legal conclusions, have been reviewed by such counsel and are correct, in all material respects.

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

(x) To the knowledge of such counsel, there are no agreements other than as listed in Exhibit A thereto, required by the Securities Act to be described to in the Registration Statement or to be filed as exhibits thereto other than those described to therein or filed or incorporated by reference as exhibits thereto as is required.

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

(xii) The execution and delivery of the Underwriting Agreement by the Company and the performance by the Company of its obligations thereunder (other than performance by the Company of its obligations under the indemnification and contribution sections of the Underwriting Agreement, as to which no opinion need be rendered) (A) have been duly authorized by all necessary corporate action on the part of the Company; (B) will not result in any violation of the provisions of the charter or by-laws of the Company or any subsidiary; (C) will not constitute a breach of, or default under, or result in the creation or imposition of any lien, charge or encumbrance upon any property or assets of the Company pursuant to any of the agreements listed on Exhibit A thereto filed as an exhibit to the Registration Statement; or (D) to the knowledge of such counsel, will not result in any violation of any United States, Federal or Massachusetts state law, administrative regulation or administrative or court decree applicable to the Company (other than state securities laws).

(xiii) The Company is not, and after receipt of payment for the Common Shares as herein contemplated and the application of the net proceeds therefrom as described in the Prospectus will not be, an "investment company" within the meaning of Investment Company Act.

In addition, such counsel shall state that they have participated in conferences with officers and other representatives of the Company, representatives of the independent public or certified public accountants for the Company and with representatives of the Underwriters at which the contents of the Registration Statement and the Prospectus, and any supplements or amendments thereto, and related matters were discussed and, while the limitations inherent in the independent verification of factual matters and the character of determinations involved in the registration process are such that such counsel is not passing upon and does not assume any responsibility for the accuracy, completeness or fairness of the statements contained in the Registration Statement or the Prospectus (other than as specified above), and any supplements or amendments thereto, subject to and on the basis of the foregoing, no facts have come to their attention which has caused them to believe that either the Registration Statement or any amendments thereto, at the time the Registration Statement or such amendments became effective, contained an untrue statement of a material fact or omitted to state a

material fact required to be stated therein or necessary to make the statements therein not misleading or that the Prospectus, as of its date or at the First Closing Date or the Second Closing Date, as the case may be, contained an untrue statement of a material fact or omitted to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading (it being understood that such counsel need express no belief as to the financial statements or schedules or notes thereto or other financial or statistical information, or information regarding the Underwriters or the method of distribution of Common Shares included in the Registration Statement or the Prospectus or any amendments or supplements thereto).

In rendering such opinion, such counsel may (A) state that they render no opinion as to matters involving the application of laws of any jurisdiction other than laws of the Commonwealth of Massachusetts or the federal law of the United States, and (B) rely as to matters of fact, to the extent they deem reasonable, on certificates of responsible officers of the Company and public officials.

## EXHIBIT A-2

The final opinion in draft form should be attached as Exhibit A-2 at the time this Agreement is executed.

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

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

(xiv) The Company has been duly incorporated.

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

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

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

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

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

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

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

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

## EXHIBIT A-3

The final opinion in draft form should be attached as Exhibit A-3 at the time this Agreement is executed.

The opinion of such counsel pursuant to Section 5(i) shall be rendered to the Representatives at the request of the Company and shall so state therein. References to the Prospectus in this Exhibit A-3 include any supplements thereto at the Closing Date.

(i) The Underwriting Agreement has been duly executed and delivered by or on behalf of, and is a valid and binding agreement of, such Selling Stockholder, enforceable in accordance with its terms.

(ii) The execution and delivery by such Selling Stockholder of, and the performance by such Selling Stockholder of its obligations under, the Underwriting Agreement and its Custody Agreement and its Power of Attorney will not contravene or conflict with, result in a breach of, or constitute a default under the trust agreement of such Selling Stockholder, or, to the best of such counsel's knowledge, violate or contravene any provision of applicable law or regulation, or violate, result in a breach of or constitute a default under the terms of any other agreement or instrument to which such Selling Stockholder is a party or by which it is bound, or any judgment, order or decree applicable to such Selling Stockholder of any court, regulatory body, administrative agency, governmental body or arbitrator having jurisdiction over such Selling Stockholder.

(iii) To the knowledge of such counsel, immediately prior to the date hereof, such Selling Stockholder is the sole registered owner of all of the Common Shares which may be sold by such Selling Stockholder under the Underwriting Agreement and has the legal right and power, and all authorizations and approvals required under its trust agreement to enter into the Underwriting Agreement and its Custody Agreement and its Power of Attorney, to sell, transfer and deliver all of the Common Shares which may sold by such Selling Stockholder under the Underwriting Agreement and to comply with its other obligations under the Underwriting Agreement, its Custody Agreement and its Power of Attorney.

(iv) Each of the Custody Agreement and Power of Attorney of such Selling Stockholder has been duly executed and delivered by such Selling Stockholder and is a valid and binding agreement of such Selling Stockholder, enforceable in accordance with its terms.

(v) Assuming that the Underwriters purchase the Common Shares which are sold by such Selling Stockholder pursuant to the Underwriting Agreement for value, in good faith and without notice of any adverse claim within the meaning of Section 8-302 of the Massachusetts Uniform Commercial Code, the delivery of such Common Shares pursuant to the Underwriting Agreement will, to the knowledge of such counsel, pass good and valid title to such Common Shares, free and clear of any security interest, mortgage, pledge, lieu encumbrance or other claim.

(vi) To the best of such counsel's knowledge, no consent, approval, authorization or other order of, or registration or filing with, any court or governmental authority or agency, is required for the consummation by such Selling Stockholder of the transactions contemplated in the Underwriting Agreement, except as required under the Securities Act, applicable state securities or blue sky laws, and from the NASD.

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

## EXHIBIT B

\_\_\_\_\_, 1999

NationsBanc Montgomery Securities LLC  
Donaldson, Lufkin & Jenrette Securities Corporation  
Paine Webber

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

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

Ladies & Gentlemen:

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

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

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

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

Printed Name of Holder

By:

Signature

Printed Name of Person Signing

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

THE COMMONWEALTH OF MASSACHUSETTS

William Francis Galvin  
Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
RESTATED ARTICLES OF ORGANIZATION  
(GENERAL LAWS, CHAPTER 156B, SECTION 74)

-----

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

of MKS Instruments, Inc.  
-----  
(Exact name of corporation)

located at SIX SHATTUCK ROAD, ANDOVER, MASSACHUSETTS 01810 do hereby certify  
that the following Restatement of the Articles of Organization was duly adopted  
at a meeting held on February 17, 1999, by vote of the directors/or:

\_\_\_\_\_  
5,177,940 shares of CLASS A COMMON out of 5,177,940 shares outstanding,  
\_\_\_\_\_  
(type, class &  
series, if any)

\_\_\_\_\_  
6,857,500 shares of CLASS B COMMON out of 6,857,501 shares outstanding, and  
\_\_\_\_\_  
(type, class &  
series, if any)

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

being at least two-thirds of each type, class or series of stock outstanding and  
entitled to vote thereon and of each type class or series of stock whose rights  
are adversely affected thereby:

ARTICLE I

The name of the corporation is:

MKS Instruments, Inc.

ARTICLE II

The purpose of the corporation is to engage in the following  
business activities :

- C [ ] See Continuation Sheets 2A and 2B.
- P [ ]
- M [ ]
- RA [ ]

Note: If the space provided under any article or item on this form is  
insufficient, additions shall be set forth on separate 8 1/2 x 11  
sheets of paper with a left hand 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 such addition is clearly indicated.

## CONTINUATION SHEET 2A

## 2. THE PURPOSES FOR WHICH THE CORPORATION IS FORMED ARE AS FOLLOWS:

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

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

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

## CONTINUATION SHEET 2B

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

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

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

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

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

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

## ARTICLE III

State the total number of shares and par value, if any, of each class of stock which the corporation is authorized to issue:

WITHOUT PAR VALUE		WITH PAR VALUE		
TYPE	NUMBER OF SHARES	TYPE	NUMBER OF SHARES	PAR VALUE
Common	50,000,000	Common		
Preferred		Preferred	2,000,000	\$0.01

## ARTICLE IV

If more than one class of stock is authorized, state a distinguishing designation for each class. Prior to the issuance of any shares of a class, if shares of another class are outstanding, the corporation must provide a description of the preferences, voting powers, qualifications, and special and relative rights or privileges of that class and of each other class of which shares are outstanding and of each series then established within any class.

See Continuation Sheets 4A, 4B and 4C

## ARTICLE V

The restrictions, if any, imposed by the Articles of Organization upon the transfer of shares of stock of any class are:

None

## ARTICLE VI

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

See Continuation Sheets 6A, 6B, 6C, 6D, 6E, 6F and 6G

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

Note: the preceding six (6) articles are considered to be permanent and may ONLY be changed by filing appropriate Articles of Amendment.

## CONTINUATION SHEET 4A

The total number of shares of all classes of stock which the corporation shall have authority to issue is 52,000,000 shares, consisting of (i) 50,000,000 shares of Common Stock, no par value per share ("Common Stock"), and (ii) 2,000,000 shares of Preferred Stock, \$0.01 par value per share ("Preferred Stock"). Upon the filing of the corporation's Restated Articles of Organization on March \_\_, 1999 (the "Mandatory Conversion Date") each share of Class A Common Stock, no par value per share, and each share of Class B Common Stock, no par value per share (together with the Class A Common Stock, the "Class Common Stock"), shall be converted into one share of Common Stock, no par value per share. All holders of record of shares of Class Common Stock shall be given written notice of the Mandatory Conversion Date and the place designated for mandatory conversion of all such shares of Class Common Stock pursuant to this provision. Such notice need not be given in advance of the occurrence of the Mandatory Conversion Date. Such notice shall be sent by first class or registered mail, postage prepaid, to each record holder of Class Common Stock at such holder's address last shown on the records of the transfer agent for the Class Common Stock (or the records of the corporation, if it serves as its own transfer agent). Upon receipt of such notice, each holder of shares of Class Common Stock shall surrender his or its certificate or certificates for all such shares to the corporation at the place designated in such notice, and shall thereafter receive certificates for the number of shares of Common Stock equal to the number of shares of Class Common Stock represented by such certificates. On the Mandatory Conversion Date, all rights with respect to the Class Common Stock so converted, including the rights, if any, to receive notices and vote (other than as a holder of Common Stock) will terminate, except only the rights of the holders thereof, upon surrender of their certificate or certificates thereafter, to receive certificates for the number of shares of Common Stock into which such Class Common Stock has been converted, and payment of any declared but unpaid dividends thereon. If so required by the corporation, certificates surrendered for conversion shall be endorsed or accompanied by written instrument or instruments of transfer, in form satisfactory to the corporation, duly executed by the registered holder or by his or its attorney duly authorized in writing. As soon as practicable after the Mandatory Conversion Date and the surrender of the certificate or certificates for Class Common Stock, the corporation shall cause to be issued and delivered to such holder, or on his or its written order, a certificate or certificates for the number of full shares of Common Stock issuable on such conversion in accordance with the provisions hereof.

All certificates evidencing shares of Class Common Stock which are required to be surrendered for conversion in accordance with the provisions hereof shall, from and after the Mandatory Conversion Date, be deemed to have been retired and cancelled and the shares of Class Common Stock represented thereby converted into Common Stock for all purposes, notwithstanding the failure of the holder or holders thereof to surrender such certificates on or prior to such date.

## CONTINUATION SHEET 4B

The following is a statement of the designation and the powers, privileges and rights, and the qualifications, limitations or restrictions thereof in respect of each class of capital stock of the corporation.

## A. COMMON STOCK.

1. GENERAL. The voting, dividend and liquidation rights of the holders of the Common Stock are subject to and qualified by the rights of the holders of the Preferred Stock of any series as may be designated by the Board of Directors upon any issuance of the Preferred Stock of any series.

2. VOTING. The holders of the Common Stock are entitled to one vote for each share held at all meetings of stockholders (and written actions in lieu of meetings). There shall be no cumulative voting.

3. DIVIDENDS. Dividends may be declared and paid on the Common Stock from funds lawfully available therefor as and when determined by the Board of Directors and subject to any preferential dividend rights of any then outstanding Preferred Stock.

4. LIQUIDATION. Upon the dissolution or liquidation of the corporation, whether voluntary or involuntary, holders of Common Stock will be entitled to receive all assets of the corporation available for distribution to its stockholders, subject to any preferential rights of any then outstanding Preferred Stock.

## B. PREFERRED STOCK.

Preferred Stock may be issued from time to time in one or more series, each of such series to have such terms as stated or expressed herein and in the resolution or resolutions providing for the issue of such series adopted by the Board of Directors of the corporation as hereinafter provided. Any shares of Preferred Stock which may be redeemed, purchased or acquired by the corporation may be reissued except as otherwise provided by law. Different series of Preferred Stock shall not be construed to constitute different classes of shares for the purposes of voting by classes unless expressly provided.

## CONTINUATION SHEET 4C

Authority is hereby expressly granted to the Board of Directors from time to time to issue the Preferred Stock in one or more series, and in connection with the creation of any such series, by resolution or resolutions providing for the issue of the shares thereof, to determine and fix such voting powers, full or limited, or no voting powers, and such designations, preferences and relative participating, optional or other special rights, and qualifications, limitations or restrictions thereof, including without limitation thereof, dividend rights, conversion rights, redemption privileges and liquidation preferences, as shall be stated and expressed in such resolutions, all to the full extent now or hereafter permitted by Chapter 156B of the Massachusetts General Laws. Without limiting the generality of the foregoing, the resolutions providing for issuance of any series of Preferred Stock may provide that such series shall be superior or rank equally or be junior to the Preferred Stock of any other series to the extent permitted by law. No vote of the holders of the Preferred Stock or Common Stock shall be a prerequisite to the issuance of any shares of any series of the Preferred Stock authorized by and complying with the conditions of the Articles of Organization, the right to have such vote being expressly waived by all present and future holders of the capital stock of the corporation.

## CONTINUATION SHEET 6A

## 6A. LIMITATION OF DIRECTOR LIABILITY

Except to the extent that Chapter 156B of the Massachusetts General Laws prohibits the elimination or limitation of liability of directors for breaches of fiduciary duty, no director of the corporation shall be personally liable to the corporation or its stockholders for monetary damages for any breach of fiduciary duty as a director, notwithstanding any provision of law imposing such liability. No amendment to or repeal of this provision shall apply to or have any effect on the liability or alleged liability of any director of the corporation for or with respect to any acts or omissions of such director occurring prior to such amendment.

## 6B. INDEMNIFICATION

1. ACTIONS, SUITS AND PROCEEDINGS. The corporation shall indemnify each person who was or is a party or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative, by reason of the fact that he is or was, or has agreed to become, a director or officer of the corporation, or is or was serving, or has agreed to serve, at the request of the corporation, as a director or officer of, or in a similar capacity with, another organization or in any capacity with respect to any employee benefit plan of the corporation (all such persons being referred to hereafter as an "Indemnitee"), or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees), judgments and fines incurred by him or on his behalf in connection with such action, suit or proceeding and any appeal therefrom, unless the Indemnitee shall be finally adjudicated in such action, suit or proceeding not to have acted in good faith in the reasonable belief that his action was in the best interests of the corporation or, to the extent such matter relates to service with respect to an employee benefit plan, in the best interests of the participants or beneficiaries of such employee benefit plan. Notwithstanding anything to the contrary in this Article, except as set forth in Section 6 below, the corporation shall not indemnify an Indemnitee seeking indemnification in connection with a proceeding (or part thereof) initiated by the Indemnitee unless the initiation thereof was approved by the Board of Directors of the

## CONTINUATION SHEET 6B

corporation. Notwithstanding anything to the contrary in this Article, the corporation shall not indemnify an Indemnitee to the extent such Indemnitee is reimbursed from the proceeds of insurance, and in the event the corporation makes any indemnification payments to an Indemnitee and the Indemnitee is subsequently reimbursed from the proceeds of insurance, such Indemnitee shall promptly refund such indemnification payments to the corporation to the extent of such insurance reimbursement.

2. SETTLEMENTS AND COMPROMISE. The right to indemnification conferred in this Article shall include the right to be paid by the corporation for amounts paid in settlement or compromise of any such action, suit or proceeding and any appeal therefrom, and all expenses (including attorneys' fees) incurred in connection with such settlement or compromise, pursuant to a consent decree or otherwise, unless and to the extent it is determined pursuant to Section 5 below that the Indemnitee did not act in good faith in the reasonable belief that his action was in the best interests of the corporation or, to the extent such matter relates to service with respect to an employee benefit plan, in the best interests of the participants or beneficiaries of such employee benefit plan.

3. NOTIFICATION AND DEFENSE OF CLAIM. As a condition precedent to his right to be indemnified, the Indemnitee must notify the corporation in writing as soon as practicable of any action, suit, proceeding or investigation involving him for which indemnity will or could be sought. With respect to any action, suit, proceeding or investigation of which the corporation is so notified, the corporation will be entitled to participate therein at its own expense and/or to assume the defense thereof at its own expense, with legal counsel reasonably acceptable to the Indemnitee. After notice from the corporation to the Indemnitee of its election so to assume such defense, the corporation shall not be liable to the Indemnitee for any legal or other expenses subsequently incurred by the Indemnitee in connection with such claim, other than as provided below in this Section 3. The Indemnitee shall have the right to employ his own counsel in connection with such claim, but the fees and expenses of such counsel incurred after notice from the corporation of its assumption of the defense thereof shall be at the expense of the Indemnitee unless (i) the employment of counsel by the Indemnitee has been authorized by the corporation, (ii) counsel to the Indemnitee shall have reasonably concluded that there may be a conflict of interest or position on any significant issue

## CONTINUATION SHEET 6C

between the corporation and the Indemnitee in the conduct of the defense of such action or (iii) the corporation shall not in fact have employed counsel to assume the defense of such action, in each of which cases the fees and expenses of counsel for the Indemnitee shall be at the expense of the corporation, except as otherwise expressly provided by this Article. The corporation shall not be entitled, without the consent of the Indemnitee, to assume the defense of any claim brought by or in the right of the corporation or as to which counsel for the Indemnitee shall have reasonably made the conclusion provided for in clause (ii) above.

4. ADVANCE OF EXPENSES. Subject to the provisions of Section 5 below, in the event that the corporation does not assume the defense pursuant to Section 3 of this Article of any action, suit, proceeding or investigation of which the corporation receives notice under this Article, any expenses (including attorneys' fees) incurred by an Indemnitee in defending a civil or criminal action, suit, proceeding or investigation or any appeal therefrom shall be paid by the corporation in advance of the final disposition of such matter; PROVIDED, HOWEVER, that the payment of such expenses incurred by an Indemnitee in advance of the final disposition of such matter shall be made only upon receipt of an undertaking by or on behalf of the Indemnitee to repay all amounts so advanced in the event that it shall ultimately be determined that the Indemnitee is not entitled to be indemnified by the corporation as authorized in this Article. Such undertaking shall be accepted without reference to the financial ability of the Indemnitee to make such repayment.

5. PROCEDURE FOR INDEMNIFICATION. In order to obtain indemnification or advancement of expenses pursuant to Section 1, 2 or 4 of this Article, the Indemnitee shall submit to the corporation a written request, including in such request such documentation and information as is reasonably available to the Indemnitee and is reasonably necessary to determine whether and to what extent the Indemnitee is entitled to indemnification or advancement of expenses. Any such indemnification or advancement of expenses shall be made promptly, and in any event within 60 days after receipt by the corporation of the written request of the Indemnitee, unless the corporation determines within such 60-day period that the Indemnitee did not meet the applicable standard of conduct set forth in Section 1 or 2, as the case may be. Such determination shall be made in each instance by (a) a majority vote of a quorum of the directors of the corporation, (b) a majority vote of a

## CONTINUATION SHEET 6D

quorum of the outstanding shares of stock of all classes entitled to vote for directors, voting as a single class, which quorum shall consist of stockholders who are not at that time parties to the action, suit or proceeding in question, (c) independent legal counsel (who may, to the extent permitted by law, be regular legal counsel to the corporation), or (d) a court of competent jurisdiction.

6. REMEDIES. The right to indemnification or advances as granted by this Article shall be enforceable by the Indemnitee in any court of competent jurisdiction if the corporation denies such request, in whole or in part, or if no disposition thereof is made within the 60-day period referred to above in Section 5. Unless otherwise required by law, the burden of proving that the Indemnitee is not entitled to indemnification or advancement of expenses under this Article shall be on the corporation. Neither the failure of the corporation to have made a determination prior to the commencement of such action that indemnification is proper in the circumstances because the Indemnitee has met the applicable standard of conduct, nor an actual determination by the corporation pursuant to Section 5 that the Indemnitee has not met such applicable standard of conduct, shall be a defense to the action or create a presumption that the Indemnitee has not met the applicable standard of conduct. The Indemnitee's expenses (including attorneys' fees) incurred in connection with successfully establishing his right to indemnification, in whole or in part, in any such proceeding shall also be indemnified by the corporation.

7. SUBSEQUENT AMENDMENT. No amendment, termination or repeal of this Article or of the relevant provisions of Chapter 156B of the Massachusetts General Laws or any other applicable laws shall affect or diminish in any way the rights of any Indemnitee to indemnification under the provisions hereof with respect to any action, suit, proceeding or investigation arising out of or relating to any actions, transactions or facts occurring prior to the final adoption of such amendment, termination or repeal.

8. OTHER RIGHTS. The indemnification and advancement of expenses provided by this Article shall not be deemed exclusive of any other rights to which an Indemnitee seeking indemnification or advancement of expenses may be entitled under any law (common or statutory), agreement or vote of stockholders or directors or otherwise, both

## CONTINUATION SHEET 6E

as to action in his official capacity and as to action in any other capacity while holding office for the corporation, and shall continue as to an Indemnitee who has ceased to be a director or officer, and shall inure to the benefit of the estate, heirs, executors and administrators of the Indemnitee. Nothing contained in this Article shall be deemed to prohibit, and the corporation is specifically authorized to enter into, agreement with officers and directors providing indemnification rights and procedures different from those set forth in this Article. In addition, the corporation may, to the extent authorized from time to time by its Board of Directors, grant indemnification rights to other employees or agents of the corporation or other persons serving the corporation and such rights may be equivalent to, or greater or less than, those set forth in this Article.

9. PARTIAL INDEMNIFICATION. If an Indemnitee is entitled under any provision of this Article to indemnification by the corporation for some or a portion of the expenses (including attorneys' fees), judgments, fines or amounts paid in settlement or compromise actually and reasonably incurred by him or on his behalf in connection with any action, suit, proceeding or investigation and any appeal therefrom but not, however, for the total amount thereof, the corporation shall nevertheless indemnify the Indemnitee for the portion of such expenses (including attorneys' fees), judgments, fines or amounts paid in settlement or compromise to which the Indemnitee is entitled.

10. INSURANCE. The corporation may purchase and maintain insurance, at its expense, to protect itself and any director, officer, employee or agent of the corporation or another organization or employee benefit plan against any expense, liability or loss incurred by him in any such capacity, or arising out of his status as such, whether or not the corporation would have the power to indemnify such person against such expense, liability or loss under Chapter 156B of the Massachusetts General Laws.

11. MERGER OR CONSOLIDATION. If the corporation is merged into or consolidated with another corporation and the corporation is not the surviving corporation, the surviving corporation shall assume the obligations of the corporation under this Article with respect to any action, suit, proceeding or investigation arising out of or relating to any actions, transactions or facts occurring prior to the date of such merger or consolidation.

## CONTINUATION SHEET 6F

12. SAVINGS CLAUSE. If this Article or any portion hereof shall be invalidated on any ground by any court of competent jurisdiction, then the corporation shall nevertheless indemnify each Indemnitee as to any expenses (including attorneys' fees), judgments, fines and amounts paid in settlement or compromise in connection with any action, suit, proceeding or investigation, whether civil, criminal or administrative, including an action by or in the right of the corporation, to the fullest extent permitted by any applicable portion of this Article that shall not have been invalidated and to the fullest extent permitted by applicable law.

13. SUBSEQUENT LEGISLATION. If the Massachusetts General Laws are amended after adoption of this Article to expand further the indemnification permitted to Indemnitees, then the corporation shall indemnify such persons to the fullest extent permitted by the Massachusetts General Laws, as so amended.

## 6C. OTHER PROVISIONS

(a) The directors may make, amend, or repeal the By-Laws in whole or in part, except with respect to any provision of such By-Laws which by law or these Articles of Organization or the By-Laws requires action by the stockholders.

(b) Meetings of the stockholders of the corporation may be held anywhere in the United States.

(c) The corporation shall have the power to be a partner in any business enterprise which this corporation would have the power to conduct by itself.

(d) The corporation, by vote of at least sixty-six and two-thirds percent (66 2/3%) of the stock outstanding and entitled to vote thereon (or if there are two or more classes of stock entitled to vote as separate classes, then by vote of at least sixty-six and two-thirds percent (66 2/3%) of each such class of stock outstanding), may (i) authorize any amendment to its Articles of Organization pursuant to Section 71 of Chapter 156B of the Massachusetts General Laws, as amended from time to time, (ii) authorize the sale, lease or exchange of all or substantially all of its property and assets, including its goodwill, pursuant to Section 75 of Chapter 156B of the Massachusetts

## CONTINUATION SHEET 6G

General Laws, as amended from time to time, and (iii) approve an agreement of merger or consolidation pursuant to Section 78 of Chapter 156B of the Massachusetts General Laws, as amended from time to time; PROVIDED, however, that if any such (i) amendment to its Articles of Organization, (ii) sale, lease, or exchange or (iii) merger or consolidation (each as more fully described above) has been approved by a majority of the Board of Directors of the corporation, then the corporation may authorize or approve such action by vote of a majority of the stock outstanding and entitled to vote thereon (or if there are two or more classes of stock entitled to vote as separate classes, then by vote of a majority of each such class outstanding).

(e) Chapter 110F of the Massachusetts General Laws, as it may be amended from time to time, shall not apply to the corporation.

## ARTICLE VII

The effective date of the restated Articles of Organization of the corporation shall be the date approved and filed by the Secretary of the Commonwealth. If a later effective date is desired, specify such date which shall not be more than thirty days after the date of filing.

## ARTICLE VIII

The information contained in Article VIII is not a permanent part of the Articles of Organization.

a. The street address (post office box are not acceptable) of the principle office of the corporation in Massachusetts is:

6 Shattuck Road, Andover, MA 01810

b. The name, residential address and post office address of each director and officer of the corporation is as follows.

	NAME	RESIDENTIAL ADDRESS	POST OFFICE ADDRESS
President:	John R. Bertucci		c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810
Treasurer:	William Donlan		c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810
Clerk:	Richard S. Chute		c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810
Directors:	John R. Bertucci		c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810
	Richard S. Chute		c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810
	Owen W. Robbins		c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810
	Robert J. Therrien		c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810
	Louis P. Valente		c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810

c. The fiscal year (i.e., tax year) of the corporation shall end on the last day of the month of:

December

d. The name and business address of the resident agent, if any, of the corporation is:

\*\*We further certify that the foregoing Restated Articles of Organization affect no amendments to the Articles of Organization of the corporation as heretofore amended, except amendments to the following articles. Briefly describe amendments below:

SIGNED UNDER THE PENALTIES OF PERJURY, this \_\_\_\_\_ day of \_\_\_\_\_, 1999.

\_\_\_\_\_, President

\_\_\_\_\_, Clerk

\*Delete the inapplicable words

\*\*If there are no amendments, state "None."

## Continuation Sheet 8

- Article 3. Is amended to: (i) eliminate authorized shares of Class A Common Stock, no par value per share ("Class A Common Stock"), and Class B Common Stock, no par value per share ("Class B Common Stock"); (ii) increase the authorized number of shares of Common Stock, no par value per share ("Common Stock") to 50,000,000 shares and; (iii) authorize issuance of up to 2,000,000 shares of Preferred Stock.
- Article 4. Is amended to: (i) delete any and all provisions describing or relating to rights and preferences of Class A Common Stock and Class B Common Stock; (ii) provide that each outstanding share of Class A Common Stock and Class B Common Stock has been converted into one share of Common Stock; (iii) provide a statement of the designation and the powers, privileges and rights, and the qualification, limitations or restrictions thereof in respect of each class of capital stock of the corporation; and (iv) authorize the Board of Directors to issue Preferred Stock in one or more series and create any such series of Preferred Stock without requiring a vote of the holders of Preferred Stock or Common Stock as a prerequisite to the issuance of any shares of any such Preferred Stock and restate Article 4 in its entirety.
- Article 6. Is amended to (i) delete the provision relating to limitation of director liability and replace it with Section 6A, "Limitation of Director Liability;" (ii) add Section 6B "Indemnification;" and (iii) add Section 6C "Other Provisions."

THE COMMONWEALTH OF MASSACHUSETTS  
RESTATED ARTICLES OF ORGANIZATION  
(General Laws, Chapter 156B, Section 74)

\_\_\_\_\_  
I hereby approve the within Restated Articles of Organization and, the filing fee in the amount of \$\_\_\_\_\_ having been paid, said articles are deemed to have been filed with me this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_.

Effective date:\_\_\_\_\_

WILLIAM FRANCIS GALVIN  
Secretary of the Commonwealth

TO BE FILLED IN BY CORPORATION  
Photocopy of document to be sent to:

Emma R. Petty, Corporate Paralegal

-----  
Hale and Dorr LLP  
60 State Street

-----  
Boston, MA 02109  
-----

Telephone: 617-526-6000  
-----

## TAX INDEMNIFICATION AND S CORPORATION DISTRIBUTION AGREEMENT

This TAX INDEMNIFICATION AND S CORPORATION DISTRIBUTION AGREEMENT (the "Agreement") is entered into as of March \_\_\_\_, 1999 between MKS INSTRUMENTS, INC., a Massachusetts corporation (the "Company"), and the persons listed on Schedule A attached hereto (individually a "Stockholder" and collectively the "Stockholders"). Capitalized terms not otherwise defined have the meanings ascribed to them in Section 1.1.

WHEREAS, the Company and the Stockholders have entered into this Agreement as a condition to the Public Offering;

WHEREAS, the Company has been an "S corporation" (as defined in Section 1361(a)(1) of the Code) for federal tax purposes since July 1, 1987;

WHEREAS, the Company and the Stockholders understand that the Company's S corporation status will terminate upon the date of the Public Offering (the "Termination Date"), and, as a result, the Company will be a "C corporation" (as defined in Section 1361(a)(2) of the Code) beginning on the Termination Date;

WHEREAS, the Company will declare the AAA Dividend which will be payable as soon as possible on or after the Closing Date;

WHEREAS, the Company and the Stockholders wish to terminate this Agreement such that it has no effect should the Public Offering not occur;

NOW, THEREFORE, the parties agree as follows:

## ARTICLE I

## DEFINITIONS

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1.1 DEFINITIONS. The following terms, as used herein, have the following meanings:

"AA Account" means the Company's "accumulated adjustments account," as defined in Section 1368(e)(1) of the Code, as of the close of business on the day before the Termination Date.

"AAA Dividend" means the dividend to be declared by the Company of all of the undistributed AA Account.

"AAA Settlement Date" means the last day of the "post-termination transition period," as defined in Section 1377(b) of the Code, of the Company, except shall not include any extension of the post-termination transition period pursuant to Section 1377(b)(1)(C) as the result of a determination that the Company's election under Section 1362(a) had terminated earlier than the Closing Date.

"Closing Date" means the date on which the Public Offering closes.

"Code" means the Internal Revenue Code of 1986, as amended.

"C Short Year" means that portion of the S Termination Year of the Company beginning on the Termination Date and ending on the last day of the S Termination Year.

"C Taxable Year" means any taxable year (or portion thereof) of the Company, including the C Short Year, during which it is subject to taxation as a C corporation as defined in Section 1361(a)(2) of the Code.

"Final Determination" means the first to occur of

- (i) the expiration of 30 days after IRS acceptance of a Waiver of Restrictions on Assessment and Collection of Deficiency of Tax and Acceptance of Overassessment on IRS Form 870 or 870-AD (or any successor comparable form or the expiration of a comparable period with respect to any comparable agreement or form under the laws of other jurisdictions);
- (ii) a decision, judgment, decree, or other order by a court of competent jurisdiction that is not subject to further judicial review and has become final;
- (iii) the execution of a closing agreement under Section 7121 of the Code or the acceptance by the IRS of an offer in compromise under Section 7122 of the Code, or comparable agreements under the laws of other jurisdictions;
- (iv) the expiration of the time for filing a claim for refund or for instituting suit in respect for a claim for refund disallowed in whole or in part by the IRS or other relevant tax authority;
- (v) any other final disposition of the tax liability for such period by reason of the expiration of the applicable statute of limitations; or
- (vi) any other event that the parties agree is final and irrevocable determination of the liability at issue.

"Public Offering" means the public offering of the Company's Common Stock pursuant to the Registration Statement on Form S-1 originally filed by the Company with the Securities and Exchange Commission on January 28, 1999.

"Record Date" means the day prior to the date upon which the Company's Registration Statement on Form S-1, as amended, which was initially filed with the Securities and Exchange Commission on January 28, 1999, is declared effective by the Securities and Exchange Commission.

"S Short Year" means that portion of the S Termination Year beginning on the first day of such taxable year and ending on the day immediately preceding the Termination Date.

"S Taxable Year" means any taxable year (or portion thereof) of the Company, including the S Short Year, during which it is subject to taxation as an S corporation as defined in Section 1361(a)(1) of the Code.

"S Termination Year" shall mean the fiscal year of the Company that includes the Termination Date.

"Taxing Authority" means the United States Internal Revenue Service and any comparable state or foreign taxing authority.

"Termination Date" means the date on which the S corporation status of the Company will terminate pursuant to Section 1362(d) of the Code, which is expected to be the Closing Date.

ARTICLE II

TERMINATION OF S CORPORATION STATUS, ALLOCATION OF INCOME,  
-----  
DECLARATION OF AAA DIVIDEND AND ADJUSTMENT OF AAA DIVIDEND  
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2.1 TERMINATION OF S CORPORATION STATUS. The Company and the Stockholders understand that the Company's S corporation status will terminate upon the consummation of the Public Offering.

2.2 PRO RATA ALLOCATION OF TAX ITEMS. The Company shall be required to allocate the tax items described in Section 1362(e)(2)(A) of the Code between the S Short Year and the C Short Year pursuant to the pro rata allocation rules set forth in Section 1362(e)(2)(B) of the Code.

2.3 DECLARATION OF AAA DIVIDEND. Prior to the Closing Date, the Company shall declare the AAA Dividend, subject to the closing of the Public Offering, to the

stockholders of record on the Record Date payable as soon as possible on or after the Closing Date.

2.4 ADJUSTMENT TO AAA DIVIDEND.

(a) The parties acknowledge that the amount of the AAA Dividend will be based on good faith determinations by the Company of the amount of AA Account as of the Termination Date.

(b) The parties agree that if the Company determines after the Termination Date and on or before the AAA Settlement Date that the amount of the AA Account as of the Termination Date does not equal the amount of the AAA Dividend, then:

(i) if the amount of the AAA Dividend exceeds the amount of AA Account as of the Termination Date, the Stockholders who received the AAA Dividend shall thereafter remit to the Company their pro-rata share of such excess no later than thirty (30) days after receiving notice from the Company that such amount is payable; and

(ii) if the amount of the AA Account as of Termination Date exceeds the amount of the AAA Dividend, the Company shall thereafter distribute to the Stockholders their pro-rata shares of such excess within thirty (30) days following the date the Company determines an amount is payable pursuant to this Section 2.4(b) (ii).

(c) Any payment due under this section shall be increased by interest on the amount of such payment computed from the date of the payment of the AAA Dividend until the date of payment pursuant to this section. The interest rate shall be the Prime Rate of BankBoston (or its successors) as adjusted from time to time.

ARTICLE III

TAX PAYMENTS AND INDEMNIFICATION OBLIGATIONS

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3.1 LIABILITY FOR TAXES INCURRED DURING S SHORT YEAR. Each Stockholder covenants and agrees that: (i) the Stockholder will duly include, in his own federal and state income tax returns, all items of income, gain, loss, deduction, or credit attributable to the S Short Year in a manner consistent with the Form 1120S and the schedules thereto (and the corresponding state income tax forms and schedules) to be filed by the Company with respect to such period; (ii) such returns shall be filed no later than the due date (including extensions, if any) for filing such returns; and (iii)

each Stockholder shall pay any and all taxes required to be paid for its taxable year that includes the S Short Year.

3.2 LIABILITY FOR TAXES INCURRED DURING S SHORT YEAR AND C SHORT YEAR. The Company covenants and agrees that: (i) the Company shall be responsible for and shall effect the filing of all federal and state income tax returns for the Company with respect to the S Short year and the C Short Year; (ii) such Company returns shall be accurately prepared and timely filed; and (iii) the Company shall pay any and all taxes required to be paid by the Company for the periods covered by such returns as required by applicable law.

3.3 STOCKHOLDERS INDEMNIFICATION OF COMPANY FOR TAX LIABILITIES.

(a) ADJUSTMENTS ATTRIBUTABLE TO COMPANY'S S STATUS. If, based on a Final Determination, the Company is deemed to have been a C corporation for federal, state or local income tax purposes during any period in which it reported (or intends to report) its taxable income as an S corporation, each Stockholder agrees to contribute to the capital of the Company, subject to the limitations contained in the last sentence of this Section 3.3(a) and in Section 3.3(b), an amount necessary to hold the Company harmless from any taxes (net of any refunds), penalties and interest arising from such Final Determination. Each Stockholder's obligation under this Section 3.3(a) shall be several and not joint and shall be limited to that percentage of the tax (net of any refunds), penalties and interest due and payable by the Company equal to the fraction, expressed as a percentage, the numerator of which is the total distributions to such Stockholder made by the Company from July 1, 1987 through and including the Termination Date, plus the AAA Dividend and any adjustment thereto pursuant to this Agreement, and the denominator of which is the total distributions made by the Company to all Stockholders from July 1, 1987 through and including the Termination Date, plus the AAA Dividend and any adjustment thereto pursuant to this Agreement.

(b) LIMIT ON INDEMNIFICATION AMOUNT. Any payment by a Stockholder to the Company pursuant to this Section 3.3 shall not exceed the amount of the total distributions made to such Stockholder by the Company from July 1, 1987 through and including the Termination Date, plus the AAA Dividend and any adjustment thereto pursuant to this Agreement, reduced by any taxes paid or payable by the Stockholders on the distributions and increased by any refund of taxes and interest received by the Stockholders with respect to the Company's S corporation earnings.

(c) TIME OF INDEMNIFICATION PAYMENT. The Stockholders shall contribute to the capital of the Company amounts set forth in this Section 3.3 within thirty (30) days after notice from the Company that a payment is due by the Company to the appropriate Taxing Authority.

## 3.4 CONTESTS/COOPERATION.

(a) CONTESTS. Each of the Company and the Stockholders agree that (i) in the event that any of them receives notice, whether orally or in writing, of any federal, state, local or foreign tax examinations, claims, settlements, proposed adjustments or related matters that may affect in any way the liability of any of such persons whether under this Agreement or otherwise, it shall within ten days notify the other parties in writing thereof (provided that any failure to give such notice shall not reduce a party's right to indemnification under this Agreement except to the extent of actual damage incurred by the other parties as a result of such failure), and (ii) the Company shall be entitled at its reasonable discretion and sole expense to handle, control and compromise or settle the defense of any matter of the Company or any Stockholder which may give rise to a liability under this Agreement or a limitation of liability under this Agreement, provided that the Stockholders may participate in all conferences, meetings or proceedings with respect to the issue.

(b) COOPERATION. The parties will make available to one another, as reasonably requested, and to any Taxing Authority, all information, records or documents relating to the liability for taxes covered by this Agreement and will preserve such information, records or documents until the expiration of any applicable statute of limitations or extensions thereof. The party requesting such information shall reimburse the other party for all reasonable out-of-pocket costs incurred in producing such information.

(c) CLAIMS FOR REFUND. Each party hereto agrees to file a properly completed claim with the appropriate Taxing Authority for a refund or an abatement of taxes paid with respect to any matter which may give rise to a liability under Section 3.4 of this Agreement.

3.5 COSTS. Except to the extent otherwise provided herein, each party shall bear its own costs in administering this Agreement.

3.6 CORRECTION OF A FINAL DETERMINATION. In the event a party makes a payment pursuant to this Agreement based on the expected outcome of a Final Determination which subsequently is determined to have been incorrect, the parties shall adjust the payments hereunder in order to reflect the subsequent determination as if it was the Final Determination upon which the original payment was based.

## ARTICLE IV

## MISCELLANEOUS

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4.1 DISPUTES. If the parties are, after negotiation in good faith, unable to agree upon the appropriate application of this Agreement, the controversy shall be settled by the accounting firm remaining on the list of firms set forth on Schedule B hereto after the Company and the representative of the Stockholders, commencing with the Company, shall have objected seriatim to the other firms of the list (the "Accounting Firm"). The decision of the Accounting Firm shall be final, and each of the Company and the Stockholders agree immediately to pay to the other any amount due under this Agreement pursuant to such decision. The expenses of the Accounting firm shall be borne one-half by the Company and one-half by the Stockholders, in the same proportion that the Stockholders share liability under Section 3.3 hereof, unless the Accounting Firm specifies otherwise.

4.2 COUNTERPARTS. This Agreement may be executed in several counterparts, each of which shall be deemed an original, but all of which counterparts collectively shall constitute an instrument representing the Agreement between the parties hereto.

4.3 CONSTRUCTION OF TERMS. Nothing herein expressed or implied is intended, or shall be construed, to confer upon or give any person, firm or corporation, other than the parties hereto or their respective successors and assigns, any rights or remedies under or by reason of this Agreement.

4.4 GOVERNING LAW. This Agreement and the legal relations between the parties hereto shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts without regard to Massachusetts choice of law rules.

4.5 AMENDMENT AND MODIFICATION. This Agreement may be amended, modified or supplemented only by a written agreement executed by the parties.

4.6 ASSIGNMENT. This Agreement and all of the provisions hereof shall be binding upon and inure to the benefit of the parties hereto and their respective successors and permitted assigns, but neither this Agreement nor any of the rights, interests or obligations hereunder shall be assigned by any of the parties hereto without the prior written consent of the other parties, nor is this Agreement intended to confer upon any other person except the parties any rights or remedies hereunder.

4.7 INTERPRETATION. The title, article and section headings contained in this Agreement are solely for the purpose of reference, are not part of the agreement of

the parties and shall not in any way affect the meaning or interpretation of this Agreement.

4.8 SEVERABILITY. In the event that any one or more of the provisions of this Agreement shall be held to be illegal, invalid or unenforceable in any respect, the same shall not in any respect affect the validity, legality or enforceability of the remainder of this Agreement, and the parties shall use their best efforts to replace such illegal, invalid or unenforceable provisions with an enforceable provision approximating, to the extent possible, the original intent of the parties.

4.9 ENTIRE AGREEMENT. This Agreement embodies the entire agreement and understanding of the parties hereto in respect to the subject matter contained herein. There are no representations, promises, warranties, covenants, or undertakings, other than those expressly set forth or referred to herein. This Agreement supersedes all prior agreements and the understandings between the parties with respect to such subject matter.

4.10 INTEREST ON OVERDUE PAYMENTS. Any payment pursuant to this Agreement not made when due under this Agreement shall bear interest at the rate of the Prime Rate of BankBoston (or its successors), as published from time to time.

4.11 SETOFF. All payments to be made by any party under this Agreement shall be made without setoff, counterclaim or withholding, all of which are expressly waived.

4.12 NOTICES. All notices provided for in this Agreement shall be validly given if in writing and delivered personally or sent by registered mail, postage prepaid

if to the Company, to:

Chief Financial Officer  
MKS Instruments, Inc.  
6 Shattuck Road  
Andover, MA 01810

copy to:  
Richard S. Chute  
Hill & Barlow  
One International Place  
Boston, MA 02110

if to any Stockholder, to:

Name of Stockholder  
c/o John R. Bertucci  
President  
MKS Instruments, Inc.  
6 Shattuck Road  
Andover, MA 01810

4.13 TERMINATION OF AGREEMENT. This Agreement shall terminate and be void, as if it never had been executed, if the Closing Date shall occur after April 30, 1999.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

MKS INSTRUMENTS, INC.

By: \_\_\_\_\_  
Chief Financial Officer

STOCKHOLDERS

-----  
Michael F. Brunelli  
Claire R. Bertucci JCB Retained  
Annuity Trust 1998

By: \_\_\_\_\_  
Trustee  
Claire R. Bertucci CBS Retained  
Annuity Trust 1998

By: \_\_\_\_\_  
Trustee

John R. Bertucci JCB Retained Annuity Trust 1998

By: -----  
Trustee  
John R. Bertucci CBS Retained Annuity Trust 1998

By: -----  
Trustee  
John R. Bertucci Family Retained Annuity Trust 1998

By: -----  
Trustee

-----  
John J. Sullivan

-----  
Cheryl A. Sweeting

-----  
Thomas J. Sullivan

-----  
John F. Sullivan

-----  
Kathleen M. Davis

John J. Sullivan Retained Annuity Trust of 1997

By: -----  
Trustee

-----  
Claire R. Bertucci

Claire R. Bertucci JCB Retained  
Annuity Irrevocable Trust of 1997

By: -----  
Trustee

Claire R. Bertucci CBS Retained  
Annuity Irrevocable Trust of 1997

By: -----  
Trustee

-----  
John R. Bertucci

John R. Bertucci JCB Retained Annuity  
Irrevocable Trust of 1997

By: -----  
Trustee

John R. Bertucci CBS Retained  
Annuity Irrevocable Trust of 1997

By: -----  
Trustee

John R. Bertucci Family Retained  
Annuity Irrevocable Trust of 1997

By: -----  
Trustee

Claire R. Bertucci 2nd Family Trust of  
December 15, 1986 f/b/o Janet C.  
Bertucci

By: -----  
Trustee

Claire R. Bertucci 2nd Family Trust of  
December 15, 1986 f/b/o Carol B.  
Bertucci

By: -----  
Trustee

John R. Bertucci 2nd Family Trust of  
December 15, 1986 f/b/o Janet C.  
Bertucci

By: -----  
Trustee

John R. Bertucci 2nd Family Trust of  
December 15, 1986 f/b/o Carol B.  
Bertucci

By: -----  
Trustee

-----  
John S. Nelson

SCHEDULE A  
LIST OF STOCKHOLDERS

Michael F. Brunelli

Claire R. Bertucci JCB Retained Annuity Trust 1998

Claire R. Bertucci CBS Retained Annuity Trust 1998

John R. Bertucci JCB Retained Annuity Trust 1998

John R. Bertucci CBS Retained Annuity Trust 1998

John R. Bertucci Family Retained Annuity Trust 1998

John J. Sullivan

Cheryl A. Sweeting

Thomas J. Sullivan

John F. Sullivan

Kathleen M. Davis

John J. Sullivan Retained Annuity Trust of 1997

Claire R. Bertucci

Claire R. Bertucci JCB Retained Annuity Irrevocable Trust of 1997

Claire R. Bertucci CBS Retained Annuity Irrevocable Trust of 1997

John R. Bertucci

John R. Bertucci JCB Retained Annuity Irrevocable Trust of 1997

John R. Bertucci CBS Retained Annuity Irrevocable Trust of 1997

John R. Bertucci Family Retained Annuity Irrevocable Trust of 1997

Claire R. Bertucci 2nd Family Trust of December 15, 1986 f/b/o Janet C. Bertucci

Claire R. Bertucci 2nd Family Trust of December 15, 1986 f/b/o Carol B. Bertucci

John R. Bertucci 2nd Family Trust of December 15, 1986 f/b/o Janet C. Bertucci

John R. Bertucci 2nd Family Trust of December 15, 1986 f/b/o Carol B. Bertucci

John S. Nelson

SCHEDULE B

Arthur Anderson LLP

KPMG Peat Marwick LLP

Deloitte & Touche LLP

Ernst & Young LLP

PricewaterhouseCoopers LLP

## CONTRIBUTION AGREEMENT

This CONTRIBUTION AGREEMENT (the "Agreement") is entered into as of March 18, 1999 between MKS INSTRUMENTS, INC., a Massachusetts corporation (the "Parent"), and the persons listed on SCHEDULE A attached hereto (individually a "Stockholder" and collectively the "Stockholders"). Each of the Stockholders owns shares of capital stock of the Parent and MKS International, Inc., a Massachusetts corporation and a subsidiary of Parent (the "Subsidiary").

WHEREAS, the Parent has filed a Registration Statement on Form S-1 with the Securities and Exchange Commission in connection with a firm commitment underwritten public offering (the "IPO") of shares of its common stock, no par value ("Common Stock");

WHEREAS, in connection with the IPO, the Parent will list its Common Stock for quotation on the Nasdaq National Market System (the "Listing");

WHEREAS, the Listing is intended to facilitate a public trading market in the Common Stock of the Company;

WHEREAS, the Stockholders acknowledge that such a public trading market would add to the value of the shares of Common Stock owned by them; and

WHEREAS, the Stockholders and the Parent believe that, in order to facilitate the IPO, the Subsidiary, should be wholly owned by the Parent;

NOW, THEREFORE, for good and valuable consideration, the sufficiency of which is hereby acknowledged, the undersigned hereby agree as follows:

1. CONTRIBUTION OF SHARES OF SUBSIDIARIES. Subject to the terms and conditions of this Contribution Agreement, each of the Stockholders hereby agrees that, effective immediately prior to the closing of the IPO (the "Closing"), all of his, her or its interest in all shares of the Subsidiary owned by him, her or it (the "Shares") shall be contributed, transferred, conveyed, assigned and delivered to the Parent or its designee. At the Closing each Stockholder shall deliver to the Parent certificates evidencing the Shares owned by such Stockholder duly endorsed in blank or with stock powers duly executed by such Stockholder.

2. FURTHER ASSURANCES. At any time and from time to time after the Closing, at the Parent's request and without consideration, each of the Stockholders shall promptly execute and deliver such instruments of contribution, transfer, conveyance, assignment and confirmation, and take all such other action as the Parent

may reasonably request, more effectively to transfer, convey and assign to the Parent or its designee, and to confirm the Parent's or its designee's title to, all of the Shares owned by such Stockholder, and to assist the Parent in exercising all rights with respect thereto and to carry out the purpose and intent of this Agreement.

3. REPRESENTATIONS OF THE STOCKHOLDERS. Each Stockholder severally represents and warrants to the Parent as follows:

(a) Except as set forth on SCHEDULE B attached hereto, such Stockholder has good and marketable title to the Shares which are to be transferred to the Parent by such Stockholder pursuant hereto, free and clear of any and all covenants, conditions, restrictions, voting trust arrangements, liens, charges, encumbrances, options and adverse claims or rights whatsoever. SCHEDULE A attached hereto sets forth a true and correct description of all Shares owned by such Stockholder.

(b) Except as set forth on SCHEDULE B attached hereto, such Stockholder has the full right, power and authority to enter into this Agreement and to transfer, convey and assign to the Parent or its designee at the Closing the Shares to be contributed by such Stockholder hereunder and, upon consummation of the IPO, the Parent or its designee will acquire from such Stockholder good and marketable title to such Shares, free and clear of all covenants, conditions, restrictions, voting trust arrangements, liens, charges, encumbrances, options and adverse claims or rights whatsoever.

(c) Except as set forth on SCHEDULE B attached hereto, such Stockholder is not a party to, subject to or bound by any agreement or any judgment, order, writ, prohibition, injunction or decree of any court or other governmental body which would prevent the execution or delivery of this Agreement by such Stockholder or the transfer, conveyance and assignment of the Shares to be contributed by such Stockholder to the Parent or its designee pursuant to the terms hereof.

4. MISCELLANEOUS.

4.1 COUNTERPARTS. This Agreement may be executed in several counterparts, each of which shall be deemed an original, but all of which counterparts collectively shall constitute an instrument representing the Agreement between the parties hereto.

4.2 CONSTRUCTION OF TERMS. Nothing herein expressed or implied is intended, or shall be construed, to confer upon or give any person, firm or corporation, other than the parties hereto or their respective successors and assigns, any rights or remedies under or by reason of this Agreement.

4.3 GOVERNING LAW. This Agreement and the legal relations between the parties hereto shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts without regard to Massachusetts choice of law rules.

4.4 AMENDMENT AND MODIFICATION. This Agreement may be amended, modified or supplemented only by a written agreement executed by the parties.

4.5 ASSIGNMENT. This Agreement and all of the provisions hereof shall be binding upon and inure to the benefit of the parties hereto and their respective successors and permitted assigns, but neither this Agreement nor any of the rights, interests or obligations hereunder shall be assigned by any of the Stockholders without the prior written consent of the Parent.

4.6 INTERPRETATION. The section headings contained in this Agreement are solely for the purpose of reference, are not part of the agreement of the parties and shall not in any way affect the meaning or interpretation of this Agreement.

4.7 SEVERABILITY. In the event that any one or more of the provisions of this Agreement shall be held to be illegal, invalid or unenforceable in any respect, the same shall not in any respect affect the validity, legality or enforceability of the remainder of this Agreement, and the parties shall use their best efforts to replace such illegal, invalid or unenforceable provisions with an enforceable provision approximating, to the extent possible, the original intent of the parties.

4.8 ENTIRE AGREEMENT. This Agreement embodies the entire agreement and understanding of the parties hereto in respect to the subject matter contained herein. There are no representations, promises, warranties, covenants, or undertakings, other than those expressly set forth or referred to herein. This Agreement supersedes all prior agreements and the understandings between the parties with respect to such subject matter.

4.9 NOTICES. All notices provided for in this Agreement shall be validly given if in writing and delivered personally or sent by registered mail, postage prepaid

if to the Parent, to:

President  
MKS Instruments, Inc.  
6 Shattuck Road  
Andover, MA 01810

copy to:  
Richard S. Chute  
Hill & Barlow  
One International Place  
Boston, MA 02110

If to any Stockholder, to the address appearing under such Stockholder's name on SCHEDULE A attached hereto, or at such other address provided by such Stockholder in writing to the Parent.

4.10 TERMINATION OF AGREEMENT. This Agreement shall terminate and be void, as if it never had been executed, if the Closing shall not have occurred on or before July 31, 1999.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

MKS INSTRUMENTS, INC.:

By: \_\_\_\_\_  
Ronald C. Weigner, Vice President  
and Chief Financial Officer

STOCKHOLDERS:

\_\_\_\_\_  
John R. Bertucci

\_\_\_\_\_  
Claire R. Bertucci

-----  
John J. Sullivan

Claire R. Bertucci Second Family Trust of  
December 15, 1986 FBO Carol B. Bertucci

By: -----  
John R. Bertucci, Trustee

By: -----  
Thomas H. Belknap, Trustee

Claire R. Bertucci Second Family Trust of  
December 15, 1986 FBO Janet C. Bertucci

By: -----  
John R. Bertucci, Trustee

By: -----  
Thomas H. Belknap, Trustee

John R. Bertucci Second Family Trust of  
December 15, 1986 FBO Carol B. Bertucci

By: -----  
Claire R. Bertucci, Trustee

By: -----  
Richard S. Chute, Trustee

John R. Bertucci Second Family Trust of  
December 15, 1986 FEC Janet C. Bertucci

By: -----  
Claire R. Bertucci, Trustee

By: -----  
Richard S. Chute, Trustee

SCHEDULE A  
STOCKHOLDERS

	MKS International Shares Owned
John R. Bertucci c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810	2,315.0
Claire R. Bertucci c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810	2,205.0
Claire R. Bertucci Second Family Trust of December 15, 1986 FBO Carol B. Bertucci c/o Hill & Barlow One International Place Boston, MA 02110	233.5
Claire R. Bertucci Second Family Trust of December 15, 1986 FBO Janet C. Bertucci c/o Hill & Barlow One International Place Boston, MA 02110	233.5
John R. Bertucci Second Family Trust of December 15, 1986 FBO Carol B. Bertucci c/o Hill & Barlow One International Place Boston, MA 02110	233.5
John R. Bertucci Second Family Trust of December 15, 1986 FBO Janet C. Bertucci c/o Hill & Barlow One International Place Boston, MA 02110	233.5
John J. Sullivan c/o MKS Instruments, Inc. 6 Shattuck Road Andover, MA 01810	250.0

SCHEDULE B

## CONSENT OF INDEPENDENT ACCOUNTANTS

We consent to the inclusion in this Amendment No. 3 to the registration statement on Form S-1 (File No. 333-71363) of our report dated January 22, 1999, except for the information in the first and second paragraph of Note 13, as to which the date is January 28, 1999 and February 24, 1999, respectively, on our audit of the consolidated financial statements and our report dated January 22, 1999, on our audit of the financial statement schedule of MKS Instruments, Inc. We consent to the references to our firm under the captions "Experts" and "Selected Consolidated Financial Data."

PricewaterhouseCoopers LLP

Boston, Massachusetts  
March 22, 1999