

As filed with the Securities and Exchange Commission on January 29, 2001

Registration No. 333-\_\_\_\_\_

SECURITIES AND EXCHANGE COMMISSION  
Washington, D. C. 20549

## FORM S-8

## 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)04-2277512  
(I.R.S. Employer  
Identification Number)SIX SHATTUCK ROAD, ANDOVER, MASSACHUSETTS  
(Address of Principal Executive Offices)01810  
(Zip Code)1993 STOCK OPTION PLAN, AS AMENDED  
OF APPLIED SCIENCE AND TECHNOLOGY, INC.  
(Full Title of the Plan)JOHN R. BERTUCCI  
CHAIRMAN AND CHIEF EXECUTIVE OFFICER  
MKS INSTRUMENTS, INC.  
SIX SHATTUCK ROAD  
ANDOVER, MA 01810  
(Name and Address of Agent for Service)(978) 975-2350  
(Telephone Number, Including Area Code, of Agent for Service)

## CALCULATION OF REGISTRATION FEE

Title of Securities to be Registered	Amount to be Registered(1)	Proposed Maximum Offering Price Per Share	Proposed Maximum Aggregate Offering Price(2)	Amount of Registration Fee
Common Stock no par value	1,234,709	\$19.65	\$24,262,031	\$6,066

(1) Based on 1,610,000 shares of ASTeX common stock subject to outstanding options under the 1993 Stock Option Plan, as amended of ASTeX. Shares underlying ASTeX options have been converted to MKS shares based on an exchange ratio of .7669.

(2) Estimated solely for the purpose of calculating the registration fee, and based on the weighted average exercise price of the ASTeX options in accordance with Rule 457(h) under the Securities Act of 1933, as amended. The weighted average exercise price of the ASTeX options has been converted using the exchange ratio of .7669.

## PART I. INFORMATION REQUIRED IN THE SECTION 10(a) PROSPECTUS

The information required by Part I is included in documents sent or given to participants in the 1993 Stock Option Plan, as amended pursuant to Rule 428(b)(1) of the Securities Act of 1933, as amended (the "Securities Act").

## PART II. INFORMATION REQUIRED IN THE REGISTRATION STATEMENT

## Item 3. INCORPORATION OF DOCUMENTS BY REFERENCE

The Registrant is subject to the informational and reporting requirements of Sections 13(a), 14 and 15(d) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and in accordance therewith files reports, proxy statements and other information with the Securities and Exchange Commission (the "Commission"). The following documents, which are on file with the Commission, are incorporated in this Registration Statement by reference:

- (1) The Registrant's latest annual report filed pursuant to Section 13(a) or 15(d) of the Exchange Act, or the latest prospectus filed pursuant to Rule 424(b) under the Securities Act that contains audited financial statements for the Registrant's latest fiscal year for which such statements have been filed.
- (2) All other reports filed pursuant to Section 13(a) or 15(d) of the Exchange Act since the end of the fiscal year covered by the document referred to in (1) above.
- (3) The description of the common stock of the Registrant, no par value per share (the "Common Stock"), contained in a registration statement filed under the Exchange Act, including any amendment or report filed for the purpose of updating such description.

All documents subsequently filed by the Registrant pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Exchange Act, prior to the filing of a post-effective amendment which indicates that all shares of Common Stock offered hereby have been sold or which deregisters all shares of Common Stock then remaining unsold, shall be deemed to be incorporated by reference herein and to be part hereof from the date of the filing of such documents. Any statement contained in a document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded for purposes of this Registration Statement to the extent that a statement contained herein or in any other subsequently filed document which also is or is deemed to be incorporated by reference herein modifies or supersedes such statement. Any statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this Registration Statement.

## Item 4. DESCRIPTION OF SECURITIES

Not applicable.

## Item 5. INTERESTS OF NAMED EXPERTS AND COUNSEL

Not applicable.

## Item 6. INDEMNIFICATION OF DIRECTORS AND OFFICERS

The Registrant is a Massachusetts corporation. Reference is made to Chapter 156B, Section 13 of the Massachusetts Business Corporation Law (the "MBCL"), which enables a corporation in its original articles of organization or an amendment thereto to eliminate or limit the personal liability of a director for monetary damages for violations of the director's fiduciary duty, except (i) for any breach of the director's duty of loyalty to the corporation or its stockholders, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) pursuant to Sections 61 and 62 of the MBCL (providing for liability of directors for authorizing illegal distributions and for making loans to directors, officers and certain stockholders) or (iv) for any transaction from which a director derived an improper personal benefit.

Reference also is made to Chapter 156B, Section 67 of the MBCL, which provides that a corporation may indemnify directors, officers, employees and other agents and persons who serve at its request as directors, officers, employees or other agents of another organization or who serve at its request in any capacity with respect to any employee benefit plan, to the extent specified or authorized by the articles of organization, a by-law adopted by the stockholders or a vote adopted by the holders of a majority of the shares of stock entitled to vote on the election of directors. Such indemnification may include payment by the corporation of expenses incurred in defending a civil or criminal action or proceeding in advance of the final disposition of such action or proceeding, upon receipt of an undertaking by the person indemnified to repay such payment if he shall be adjudicated to be not entitled to indemnification under Section 67, which undertaking may be accepted without reference to the financial ability of such person to make repayment. Any such indemnification may be provided although the person to be indemnified is no longer an officer, director, employee or agent of the corporation or of such other organization or no longer serves with respect to any such employee benefit plan. No indemnification shall be provided, however, for any person with respect to any matter as to which he shall have been adjudicated in any proceeding not to have acted in good faith in the reasonable belief that his action was in the best interest of the corporation or to the extent that such matter relates to service with respect to any employee benefit plan, in the best interests of the participants or beneficiaries of such employee benefit plan.

In its 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 Registrant has obtained directors and officers liability insurance for the benefit of its directors an

Item 7. EXEMPTION FROM REGISTRATION CLAIMED

Not applicable.

Item 8. EXHIBITS

The Exhibit Index immediately preceding the exhibits is incorporated herein by reference.

Item 9. UNDERTAKINGS

1. The undersigned Registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this Registration Statement:

- (i) To include any prospectus required by Section 10(a)(3) of the Securities Act;
- (ii) To reflect in the prospectus any facts or events arising after the effective date of the Registration Statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the Registration Statement. Notwithstanding the foregoing, any increase or decrease in the volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20 percent change in the maximum offering price set forth in the "Calculation of Registration Fee" table in the effective Registration Statement;

(iii) To include any material information with respect to the plan of distribution not previously disclosed in the Registration Statement or any material change to such information in the Registration Statement.

(2) That, for the purpose of determining any liability under the Securities Act, each such post-effective amendment shall be deemed to be a new Registration Statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

2. The undersigned Registrant hereby undertakes that, for purposes of determining any liability under the Securities Act, each filing of the Registrant's annual report pursuant to Section 13(a) or 15(d) of the Exchange Act (and, where applicable, each filing of an employee benefit plan's annual report pursuant to Section 15(d) of the Exchange Act) that is incorporated by reference in the Registration Statement shall be deemed to be a new Registration Statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

3. Insofar as indemnification for liabilities arising under the Securities Act 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 Commission such indemnification is against public policy as expressed in the Securities 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 or 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 question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

## SIGNATURES

Pursuant to the requirements of the Securities Act, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in Andover, Massachusetts on January 25, 2001.

MKS INSTRUMENTS, INC.

By: /s/ John R. Bertucci

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

## POWER OF ATTORNEY AND SIGNATURES

We, the undersigned officers and directors of MKS Instruments, Inc. hereby severally constitute and appoint John R. Bertucci, Ronald C. Weigner and Mark G. Borden, and each of them singly, our true and lawful attorneys with full power to them, and each of them singly, to sign for us and in our names in the capacities indicated below, the Registration Statement on Form S-8 filed herewith and any and all subsequent amendments to said Registration Statement, and generally to do all such things in our names and behalf in our capacities as officers and directors to enable MKS Instruments, Inc. to comply with all requirements of the Securities and Exchange Commission, hereby ratifying and confirming our signatures as they may be signed by said attorneys, or any of them, to said Registration Statement and any and all amendments thereto.

PURSUANT TO THE REQUIREMENTS OF THE SECURITIES ACT, THIS REGISTRATION STATEMENT HAS BEEN SIGNED BY THE FOLLOWING PERSONS IN THE CAPACITIES AND ON THE DATES INDICATED.

SIGNATURE -----	TITLE -----	DATE ----
/s/ John R. Bertucci ----- John R. Bertucci	Chairman of the Board and Chief Executive Officer (Principal Executive Officer)	January 25, 2001
/s/ Ronald C. Weigner ----- Ronald C. Weigner	Vice President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	January 25, 2001
/s/ Richard S. Chute ----- Richard S. Chute	Director	January 25, 2001
/s/ Owen W. Robbins ----- Owen W. Robbins	Director	January 25, 2001
/s/ Robert J. Therrien ----- Robert J. Therrien	Director	January 25, 2001
/s/ Louis P. Valente ----- Louis P. Valente	Director	January 25, 2001

## EXHIBIT INDEX

EXHIBIT NUMBER -----	DESCRIPTION -----
4.1(1)	Restated Articles of Organization of the Registrant.
4.2(2)	Amended and Restated By-Laws of the Registrant.
4.3(2)	Specimen Certificate for Common Stock of the Registrant.
4.4	Applied Science and Technology, Inc. 1993 Stock Option Plan, as amended.
5	Opinion of Hale and Dorr LLP.
23.1	Consent of Hale and Dorr LLP (included in Exhibit 5).
23.2	Consent of PricewaterhouseCoopers LLP.
24	Power of Attorney (included in the signature pages of this Registration Statement).
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(1)	Incorporated herein by reference from the Registrant's Registration Statement on Form S-4 (File No. 333-49738) originally filed with the Securities and Exchange Commission on November 13, 2000, as amended.
(2)	Incorporated herein by reference from the Registrant's Registration Statement on Form S-1 (File No. 333-71363) originally filed with the Securities and Exchange Commission on January 28, 1999, as amended.

## 1993 STOCK OPTION PLAN (AS AMENDED)

ARTICLE I  
PURPOSE OF THE PLAN

The purpose of this Plan is to encourage and enable employees, consultants, directors and others who are in a position to make significant contributions to the success of APPLIED SCIENCE AND TECHNOLOGY, INC. and of its Affiliated Corporations upon whose judgment, initiative and efforts the Corporation depends for the successful conduct of its business, to acquire a closer identification of their interests with those of the Corporation by providing them with opportunities to purchase stock in the Corporation pursuant to options granted hereunder, thereby stimulating their efforts on behalf of the Corporation and strengthening their desire to remain involved with the Corporation. Any person designated to participate in the Plan is referred to as a "Participant."

ARTICLE II  
DEFINITIONS

2.1 "Affiliated Corporation" means any stock corporation of which a majority of the voting common or capital stock is owned directly or indirectly by the Corporation.

2.2 "Award" means an Option granted under Article V.

2.3 "Board" means the Board of Directors of the Corporation or, if one or more has been appointed, a Committee at the Board of Directors of the Corporation.

2.4 "Code" means the Internal Revenue Code of 1986, as amended from time to time.

2.5 "Committee" means a Committee composed solely of two or more Non-Employee Directors appointed by the Board to administer the Plan.

2.6 "Corporation" means APPLIED SCIENCE AND TECHNOLOGY, INC., a Delaware corporation, or its successor.

2.7 "Employee" means any person who is a regular full-time or part-time employee of the Corporation or an Affiliated Corporation on or after the effective date of the Plan.

2.8 "Incentive Stock Option" ("ISO") means an option that qualifies as an incentive stock option as defined in Section 422 of the Code, as amended.

2.9 "Non-Employee Director" means (unless otherwise provided under Rule 16b-3 of the Securities Exchange Act of 1934) a member of the Board who is not currently an officer or Employee of the Corporation.

2.10 "Non-Qualified Option" means any option not intended to qualify as an Incentive Stock Option.

2.11 "Option" means an Incentive Stock Option or Non-Qualified Option granted by the Board under Article V of this Plan in the form of a right to purchase Stock evidenced by an instrument containing such provisions as the Board may establish. Except as otherwise expressly provided with respect to an Option grant, no Option granted pursuant to the Plan shall be an Incentive Stock Option.

2.12 "Participant" means a person selected by the Board or by the Committee to receive an award under the Plan.

2.13 "Plan" means this 1993 Stock Option Plan, as amended.

2.14 "Restricted Period" means the period of time selected by the Committee during which an award may be forfeited by the Participant.

2.15 "Stock" means the Common Stock, \$.01 par value, of the Corporation or any successor, including any adjustments in the event of changes in capital structure of the type described in Article X.

### ARTICLE III ADMINISTRATION OF THE PLAN

3.1 ADMINISTRATION BY BOARD. This Plan shall be administered by the Board of Directors of the Corporation. The Board may, from time to time, in its discretion delegate any of its functions under this Plan to one or more Committees. All references in this Plan to the Board shall also include the Committee or Committees, if one or more have been appointed by the Board. From time to time the Board may increase the size of the Committee or committees and appoint additional Directors as members thereto, remove members (with or without cause) and appoint new members in substitution therefor, fill vacancies however caused, or remove all members of the Committee or committees and thereafter directly administer the Plan. No member of the Board or a Committee shall be liable for any action or determination made in good faith with respect to the Plan or any options granted under it.

If a Committee is appointed by the Board, a majority of the members of the Committee shall constitute a quorum, and all determinations of the Committee under the Plan shall be made by a majority of its members and may be made without notice or meeting of the Committee by a writing signed by a majority of Committee members.

3.2 POWERS. The Board of Directors and/or any Committee appointed by the Board shall have full and final authority to operate, manage and administer the Plan on behalf of the Corporation. This authority includes, but is not limited to:

- (a) The power to grant Awards conditionally or unconditionally,
- (b) The power to prescribe the form or forms of any instruments evidencing Awards granted under this Plan,
- (c) The power to interpret the Plan,
- (d) The power to provide regulations for the operation of the incentive features of the Plan, and otherwise to prescribe and rescind regulations for interpretation, management and administration of the Plan,
- (e) The power to delegate responsibility for Plan operation, management and administration on such terms, consistent with the Plan, as the Board may establish,
- (f) The power to delegate to other persons the responsibility of performing ministerial acts in furtherance of the Plan's purpose, and
- (g) The power to engage the services of persons, companies, or organizations in furtherance of the Plan's purpose, including but not limited to, banks, insurance companies, brokerage firms and consultants.

3.3 ADDITIONAL POWERS. In addition, as to each Option to buy Stock of the Corporation, the Board or any Committee appointed by it shall have full and final authority in its discretion: (a) to determine the number of shares of Stock subject to each Option; (b) to determine the time or times at which Options will be granted; (c) to determine the option price of the shares of Stock subject to each Option, which price shall be not less than the minimum price specified in Article V of this Plan; (d) to determine the time or times when each Option shall become exercisable and the duration of the exercise period (including the acceleration of any exercise period), which shall not exceed the maximum period specified in Article V; (e) to determine whether each Option granted shall be an Incentive Stock Option or a Non-Qualified Option; and (f) to waive, generally and in particular instances, compliance by a Participant with any obligation to be performed by him under an Option, to waive any condition or provision of an Option, and to amend or cancel any Option (and if an Option is canceled, to grant a new Option on such terms as the Board may specify), except that the Board may not take any action with respect to an outstanding option that would adversely affect the rights of the Participant under such Option without such Participant's consent. Nothing in the preceding sentence shall be construed as limiting the power of the Board to make adjustments required by Article X.

In no event may the Corporation grant an Employee any Incentive Stock Option that is first exercisable during any one calendar year to the extent the aggregate fair market value of the Stock (determined at the time the options are granted) exceeds \$100,000 (under all stock option plans of the Corporation and any Affiliated Corporation); provided, however, that this paragraph shall have no force and effect if its inclusion in the Plan is not necessary for Incentive Stock Options issued under the Plan to qualify as such pursuant to Section 422(d)(1) of the Code.

#### ARTICLE IV ELIGIBILITY

4.1 ELIGIBLE EMPLOYEES. All Employees (including Directors who are Employees) are eligible to be granted Incentive Stock Option and Non-Qualified Option Awards under this Plan. Incentive Stock Options shall be granted only to Employees.

4.2 CONSULTANTS, DIRECTORS AND OTHER NON-EMPLOYEES. Any consultant, Director (whether or not an Employee) and any other non-employee is eligible to be granted Non-Qualified Option Awards under the Plan, provided the person has not irrevocably elected to be ineligible to participate in the Plan.

4.3 RELEVANT FACTORS. In selecting individual Employees, consultants, Directors and other non-employees to whom Awards shall be granted, the Board shall weigh such factors as are relevant to accomplish the purpose of the Plan as stated in Article I. An individual who has been granted an Award may be granted one or more additional Awards, if the Board so determines. The granting of an Award to any individual shall neither entitle that individual to, nor disqualify him from, participation in any other grant of Awards.

#### ARTICLE V STOCK OPTION AWARDS

5.1 NUMBER OF SHARES. Subject to the provisions of Article X of this Plan, the aggregate number of shares of Stock for which Options may be granted under this Plan shall not exceed 3,750,000 shares. The shares to be delivered upon exercise of Options under this Plan shall be made available, at the discretion of the Board, either from authorized but unissued shares or from previously issued and reacquired shares of Stock held by the Corporation as treasury shares, including shares purchased in the open market.

Stock issuable upon exercise of an Option granted under the Plan may be subject to such restrictions on transfer, repurchase rights or other restrictions as shall be determined by the Board of Directors.

5.2 EFFECT OF EXPIRATION, TERMINATION OR SURRENDER. If an Option under this Plan shall expire or terminate unexercised as to any shares covered thereby, or shall cease for any reason to be exercisable in whole or in part, or if the Corporation shall reacquire any unvested shares issued pursuant to Options under the Plan, such shares shall thereafter be available for the granting of other Options under this Plan, subject to the limits set forth in Section 5.1 hereof.

5.3 TERM OF OPTIONS. The full term of each Option granted hereunder shall be for such period as the Board shall determine. In the case of Incentive Stock Options granted hereunder, the term shall not exceed ten (10) years from the date of granting thereof. Each Option shall be subject to earlier termination as provided in Sections 6.3 and 6.4. Notwithstanding the foregoing, the term of Options intended to qualify as Incentive Stock Options shall not exceed five (5) years from the date of granting thereof if such Option is granted to any Employee who at the time such Option is granted owns, directly or indirectly, or is deemed to own by reason of the attribution rules set forth in Section 425(d) of the Code, more than ten percent (10%) of the total combined voting power of all classes of stock of the Corporation and its Affiliated Corporations (a "Ten-Percent Shareholder").

5.4 OPTION PRICE. The Option price shall be determined by the Board at the time any Option is granted. In the case of Incentive Stock Options, the exercise price shall not be less than 100% of the fair market value of the shares covered thereby at the time the Incentive Stock Option is granted (but in no event less than par value), provided that no Incentive Stock Option

shall be granted hereunder to any Employee who is a Ten-Percent Shareholder unless the Incentive Stock Option price equals not less than 110% of the fair market value of the shares covered thereby at the time the Incentive Stock Option is granted. In the case of Non-Qualified Stock Options, the exercise price shall not be less than 85% of fair market value.

5.5 FAIR MARKET VALUE. If, at the time an Option is granted under the Plan, the Corporation's Stock is publicly traded, then "fair market value" shall be determined as of the last business day for which the prices or quotes discussed in this sentence are available prior to the date such Option is granted and shall mean (i) the average (on that date) of the high and low prices of the Stock on the principal national securities exchange on which the Stock is traded, if the Stock is then traded on a national securities exchange; or (ii) the last reported sale price (on that date) of the Stock on the NASDAQ National Market List, if the Stock is then traded on the NASDAQ National Market System; or (iii) the closing bid price (or average of bid prices) last quoted (on that date) by an established quotation service for over-the-counter securities, if the Stock is not reported on the NASDAQ National Market System. However, if the Stock is not publicly traded at the time an Option is granted under the Plan, "fair market value" shall be deemed to be the fair value of the Stock as determined in good faith by the Board after taking into consideration all factors that it deems appropriate, including without limitation, recent sale and offer prices of the Stock in private transactions negotiated at arm's length.

5.6 NON-TRANSFERABILITY OF OPTIONS. No Incentive Stock Option granted under this Plan shall be transferable by the grantee otherwise than by will or the laws of descent and distribution, and such Incentive Stock Option may be exercised during the grantee's lifetime only by the grantee.

5.7 FOREIGN NATIONALS. Awards may be granted to Participants who are foreign nationals or employed outside the United States on such terms and conditions different from those specified in the Plan as the Committee considers necessary or advisable to achieve the purposes of the Plan or comply with applicable laws.

#### ARTICLE VI EXERCISE OF OPTION

6.1 EXERCISE. Each Option granted under this Plan shall be exercisable on such date or dates and during such period and for such number of shares as shall be determined pursuant to the provisions of the instrument evidencing such Option. The Board shall have the right to accelerate the date of exercise of any option, provided that, the Board shall not accelerate the exercise date of any Incentive Stock Option without the optionee's prior written consent if such acceleration would violate the annual vesting limitation contained in Section 422(d)(1) of the Code.

6.2 NOTICE OF EXERCISE. A person electing to exercise an Option shall give written notice to the Corporation of such election and of the number of shares he or she has elected to purchase and shall at the time of exercise tender the full purchase price of the shares he or she has elected to purchase. The purchase price can be paid partly or completely in shares of the Corporation's stock valued at Fair Market Value as defined in Section 5.5 hereof, or by any such other lawful consideration as the Board may determine. Until such person has been issued a

certificate or certificates for the shares so purchased, he or she shall possess no rights of a record holder with respect to any of such shares.

6.3 OPTION UNAFFECTED BY CHANGE IN DUTIES. No Incentive Stock Option (and, unless otherwise determined by the Board of Directors, no Non-Qualified Option granted to a person who is, on the date of the grant, an Employee of the Corporation or an Affiliated Corporation) shall be affected by any change of duties or position of the optionee (including transfer to or from an Affiliated Corporation), so long as he or she continues to be an Employee. Employment shall be considered as continuing uninterrupted during any bona fide leave of absence (such as those attributable to illness, military obligations or governmental service) provided that the period of such leave does not exceed 90 days or, if longer, any period during which such optionee's right to reemployment is guaranteed by statute. A bona fide leave of absence with the written approval of the Board shall not be considered an interruption of employment under the Plan, provided that such written approval contractually obligates the Corporation or any Affiliated Corporation to continue the employment of the optionee after the approved period of absence.

If the optionee shall cease to be an Employee for any reason other than death, such Option shall thereafter be exercisable only to the extent of the purchase rights, if any, which have accrued as of the date of such cessation; provided that (i) the Board may provide in the instrument evidencing any Option that the Board may in its absolute discretion, upon any such cessation of employment, determine (but be under no obligation to determine) that such accrued purchase rights shall be deemed to include additional shares covered by such Option; and (ii) unless the Board shall otherwise provide in the instrument evidencing any Option, upon any such cessation of employment, such remaining rights to purchase shall in any event terminate upon the earlier of (A) the expiration of the original term of the Option; or (B) where such cessation of employment is on account of disability, the expiration of one year from the date of such cessation of employment and, otherwise, the expiration of three months from such date. For purposes of the Plan, the term "disability" shall mean "permanent and total disability" as defined in Section 22(e)(3) of the Code.

In the case of a Participant who is not an employee, provisions relating to the exercisability of an Option following termination of service shall be specified in the award. If not so specified, all Options held by such Participant shall terminate on termination of service to the Corporation.

6.4 DEATH OF OPTIONEE. Should an optionee die while in possession of the legal right to exercise an Option or Options under this Plan, such persons as shall have acquired, by will or by the laws of descent and distribution, the right to exercise any Options theretofore granted, may, unless otherwise provided by the Board in any instrument evidencing any Option, exercise such Options at any time prior to one year from the date of death; provided, that such Option or Options shall expire in all events no later than the last day of the original term of such Option; provided, further, that any such exercise shall be limited to the purchase rights which have accrued as of the date when the optionee ceased to be an Employee, whether by death or otherwise, unless the Board provides in the instrument evidencing such Option that, in the discretion of the Board, additional shares covered by such Option may become subject to purchase immediately upon the death of the optionee.

ARTICLE VII  
TERMS AND CONDITIONS OF OPTIONS

Options shall be evidenced by instruments (which need not be identical) in such forms as the Board may from time to time approve. Such instruments shall conform to the terms and conditions set forth in Articles V and VI hereof and may contain such other provisions as the Board deems advisable which are not inconsistent with the Plan, including restrictions applicable to shares of Stock issuable upon exercise of Options. In granting any Non-Qualified Option, the Board may specify that such Non-Qualified Option shall be subject to the restrictions set forth herein with respect to Incentive Stock Options, or to such other termination and cancellation provisions as the Board may determine. The Board may from time to time confer authority and responsibility on one or more of its own members and/or one or more officers of the Corporation to execute and deliver such instruments. The proper officers of the Corporation are authorized and directed to take any and all action necessary or advisable from time to time to carry out the terms of such instruments.

ARTICLE VIII  
BENEFIT PLANS

Awards under the Plan are discretionary and are not a part of regular salary. Awards may not be used in determining the amount of compensation for any purpose under the benefit plans of the Corporation, or an Affiliated Corporation, except as the Board may from time to time expressly provide. Neither the Plan, an Option or any instrument evidencing an Option confers upon any Participant any right to continue as an Employee of, or consultant or advisor to, the Corporation or an Affiliated Corporation or affect the right of the Corporation or any Affiliated Corporation to terminate them at any time. Except as specifically provided by the Board in any particular case, the loss of existing or potential profits granted under this Plan shall not constitute an element of damages in the event of termination of the relationship of a Participant even if the termination is in violation of an obligation of the Corporation to the Participant by contract or otherwise.

ARTICLE IX  
AMENDMENT, SUSPENSION OR TERMINATION OF THE PLAN

The Board may suspend the Plan or any part thereof at any time or may terminate the Plan in its entirety. Awards shall not be granted after Plan termination. The Board may also amend the Plan from time to time, except that amendments which affect the following subjects must be approved by stockholders of the Corporation:

- (a) Except as provided in Article X relative to capital changes, the number of shares as to which Options may be granted pursuant to Article V;
- (b) The requirements as to eligibility for participation in the Plan.

Awards granted prior to suspension or termination of the Plan may not be canceled solely because of such suspension or termination, except with the consent of the grantee of the Award.

ARTICLE X  
CHANGES IN CAPITAL STRUCTURE

The instruments evidencing Options granted hereunder shall be subject to adjustment in the event of changes in the outstanding Stock of the Corporation by reason of stock dividends, stock splits, recapitalizations, reorganizations, mergers, consolidations, combinations, exchanges or other relevant changes in capitalization occurring after the date of an Award to the same extent as would affect an actual share of Stock issued and outstanding on the effective date of such change. Such adjustment to outstanding Options shall be made without change in the total price applicable to the unexercised portion of such options, and a corresponding adjustment in the applicable option price per share shall be made. In the event of any such change, the aggregate number and classes of shares for which Options may thereafter be granted under Section 5.1 of this Plan may be appropriately adjusted as determined by the Board so as to reflect such change.

Notwithstanding the foregoing, any adjustments made pursuant to this Article X with respect to Incentive Stock Options shall be made only after the Board, after consulting with counsel for the Corporation, determines whether such adjustments would constitute a "modification" of such Incentive Stock Options (as that term is defined in Section 424 of the Code) or would cause any adverse tax consequences for the holders of such Incentive Stock Options. If the Board determines that such adjustments made with respect to Incentive Stock Options would constitute a modification of such Incentive Stock Options, it may refrain from making such adjustments.

In the event of the proposed dissolution or liquidation of the Corporation, each Option will terminate immediately prior to the consummation of such proposed action or at such other time and subject to such other conditions as shall be determined by the Board.

Except as expressly provided herein, no issuance by the Corporation of shares of stock of any class, or securities convertible into shares of stock of any class, shall affect, and no adjustment by reason thereof shall be made with respect to, the number or price of shares subject to Options. No adjustments shall be made for dividends paid in cash or in property other than securities of the Corporation.

No fractional shares shall be issued under the Plan and the optionee shall receive from the Corporation cash in lieu of such fractional shares.

ARTICLE XI  
EFFECTIVE DATE AND TERM OF THE PLAN

The Plan shall become effective on September 1, 1993. The Plan shall continue until such time as it may be terminated by action of the Board or the Committee; provided, however, that no Options may be granted under this Plan on or after the tenth anniversary of the date on which the Plan was adopted by the Board.

ARTICLE XII  
CONVERSION OF ISOS INTO NON-QUALIFIED  
OPTIONS; TERMINATION OF ISOS

The Board, at the written request of any optionee, may in its discretion take such actions as may be necessary to convert such optionee's Incentive Stock Options, that have not been exercised on the date of conversion, into Non-Qualified Options at any time prior to the expiration of such Incentive Stock Options, regardless of whether the optionee is an employee of the Corporation or an Affiliated Corporation at the time of such conversion. Such actions may include, but not be limited to, extending the exercise period or reducing the exercise price of such Options. At the time of such conversion, the Board or the Committee (with the consent of the optionee) may impose such conditions on the exercise of the resulting Non-Qualified Options as the Board or the Committee in its discretion may determine, provided that such conditions shall not be inconsistent with the Plan. Nothing in the Plan shall be deemed to give any optionee the right to have such optionee's Incentive Stock Options converted into Non-Qualified Options, and no such conversion shall occur until and unless the Board or the Committee takes appropriate action. The Board, with the consent of the optionee, may also terminate any portion of any Incentive Stock Option that has not been exercised at the time of such termination.

ARTICLE XIII  
APPLICATION OF FUNDS

The proceeds received by the Corporation from the sale of shares pursuant to Options granted under the Plan shall be used for general corporate purposes.

ARTICLE XIV  
GOVERNMENTAL REGULATION

The Corporation's obligation to sell and deliver shares of Stock under this Plan is subject to the approval of any governmental authority required in connection with the authorization, issuance or sale of such shares.

ARTICLE XV  
WITHHOLDING OF ADDITIONAL INCOME TAXES

Upon the exercise of a Non-Qualified Option or the making of a Disqualifying Disposition (as defined in Article XVI) the Corporation, in accordance with Section 3402(a) of the Code, may require the optionee to pay additional withholding taxes in respect of the amount that is considered compensation includible in such person's gross income. The Board in its discretion may condition the exercise of an Option on the payment of such additional withholding taxes.

ARTICLE XVI  
NOTICE TO CORPORATION OF DISQUALIFYING DISPOSITION

Each Employee who receives an Incentive Stock Option must agree to notify the Corporation in writing immediately after the employee makes a Disqualifying Disposition of any Stock acquired pursuant to the exercise of an Incentive Stock Option. A Disqualifying

Disposition is any disposition (including any sale) of such Stock before the later of (a) two years after the date the Employee was granted the Incentive Stock Option or (b) one year after the date the Employee acquired Stock by exercising the Incentive Stock Option. If the Employee has died before such Stock is sold, these holding period requirements do not apply and no Disqualifying Disposition can occur thereafter.

ARTICLE XVII  
CONDITIONS ON DELIVERY OF STOCK

The Corporation shall not be obligated to deliver any shares of Stock pursuant to Options granted under the Plan until, (a) in the opinion of the Corporation's counsel, all applicable federal and state laws and regulations have been complied with, and (b) all other legal matters in connection with the issuance and delivery of such shares have been approved by the Corporation's counsel. If the sale of Stock has not been registered under the Securities Act of 1933, as amended, the Corporation may require, as a condition to exercise of the option, such representations or agreements as counsel for the Corporation may consider appropriate to avoid violation of such Act and may require that the certificates evidencing such Stock bear an appropriate legend restricting transfer.

ARTICLE XVIII  
GOVERNING LAW; CONSTRUCTION

The validity and construction of the Plan and the instruments evidencing Options shall be governed by the laws of the State of Delaware (without regard to the conflict of law principles thereof). In construing this Plan, the singular shall include the plural and the masculine gender shall include the feminine and neuter, unless the context otherwise requires.

HALE AND DORR LLP  
COUNSELLORS AT LAW

60 STATE STREET, BOSTON, MASSACHUSETTS 02109

617-526-6000 - FAX 617-526-5000

January 29, 2001

MKS Instruments, Inc.  
Six Shattuck Road  
Andover, MA 01810

Re: Applied Science and Technology, Inc. 1993 Stock Option Plan, as amended  
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Ladies and Gentlemen:

We have assisted in the preparation of a Registration Statement on Form S-8 (the "Registration Statement") to be filed with the Securities and Exchange Commission under the Securities Act of 1933, as amended (the "Securities Act"), relating to an aggregate of 1,234,709 shares of Common Stock, no par value per share (the "Shares"), of MKS Instruments, Inc., a Massachusetts corporation (the "Company"), issuable under the Applied Science and Technology, Inc. 1993 Stock Option Plan, as amended (the "Plan"). The Plan was assumed pursuant to the Agreement and Plan of Merger, dated as of October 2, 2000, by and among the Company, Mango Subsidiary, a Delaware corporation and a wholly owned subsidiary of the Company, and Applied Science and Technology, Inc., a Delaware corporation.

We have examined the Articles of Organization and By-Laws of the Company, each as amended and restated to date and originals, or copies certified to our satisfaction, of all pertinent records of the meetings of the directors and stockholders of the Company, the Registration Statement and such other documents relating to the Company as we have deemed material for the purposes of this opinion.

In our examination of the foregoing documents, we have assumed the genuineness of all signatures, the authenticity of all documents submitted to us as originals, the conformity to original documents of all documents submitted to us as copies, the authenticity of the originals of such latter documents and the legal competence of all signatories to such documents.

We assume that the appropriate action will be taken, prior to the offer and sale of the Shares in accordance with the Plan, to register and qualify the Shares for sale under all applicable state securities or "blue sky" laws.

We express no opinion herein as to the laws of any state or jurisdiction other than the state laws of The Commonwealth of Massachusetts, the General Corporation Law of the state of Delaware and the federal laws of the United States of America.

Based upon and subject to the foregoing, we are of the opinion that the Shares have been duly authorized for issuance and, when the Shares are issued and paid for in accordance with the terms and conditions of the Plan, the Shares will be validly issued, fully paid and nonassessable.

It is understood that this opinion is to be used only in connection with the offer and sale of the Shares while the Registration Statement is in effect.

Please note that we are opining only as to the matters expressly set forth herein, and no opinion should be inferred as to any other matters.

We hereby consent to the filing of this opinion with the Commission as an exhibit to the Registration Statement in accordance with the requirements of Item 601(b)(5) of Regulation S-K under the Securities Act. In giving such consent, we do not hereby admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations of the Commission.

Very truly yours,

/s/ Hale and Dorr LLP

HALE AND DORR LLP

## CONSENT OF INDEPENDENT ACCOUNTANTS

We hereby consent to the incorporation by reference in this Registration Statement on Form S-8 of our report dated January 28, 2000 relating to the financial statements, which appears in the 1999 Annual Report to Shareholders of MKS Instruments, Inc., which is incorporated by reference in MKS Instruments, Inc.'s Annual Report on Form 10-K for the year ended December 31, 1999. We also consent to the incorporation by reference of our report dated January 28, 2000 relating to the financial statement schedule, which appears in such Annual Report on Form 10-K.

/s/ PricewaterhouseCoopers LLP

Boston, Massachusetts  
January 26, 2001