

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)

1994 FORMULA STOCK OPTION PLAN  
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	138,042	\$21.25	\$2,933,393	\$734

(1) Based on 180,000 shares of ASTeX common stock subject to outstanding options under the 1994 Formula Stock Option Plan 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 1994 Formula Stock Option Plan 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 and

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  
-----  
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. 1994 Formula Stock Option Plan.
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.

## APPLIED SCIENCE AND TECHNOLOGY, INC.

## 1994 FORMULA STOCK OPTION PLAN

## ARTICLE I

## PURPOSE OF THE PLAN

The purpose of this Plan is to encourage and enable non-employee Directors 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 non-employee Director 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 of 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 of not less than two members of the Board appointed by the Board to administer the Plan.



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

2.7 "Non-Employee" means any person who is not a regular full-time or part-time employee of the Corporation or an Affiliated Corporation on or after November 17, 1994.

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

2.9 "Option" means a 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.

2.10 "Participant" means a person who is to receive an award under the Plan.

2.11 "Plan" means this 1994 Formula Stock Option Plan.

2.12 "Reporting Person" means a person subject to Section 16 of the Securities Exchange Act of 1934 or any successor provision.

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

2.14 "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 IX.

### ARTICLE III

#### ADMINISTRATION OF THE PLAN

3.1 ADMINISTRATION BY BOARD. This Plan may be administered by the Board of Directors or by a committee of the Board of Directors of the Corporation constituted to permit the Plan to comply with Rule 16b-3 promulgated under the Securities Exchange Act of 1934, as amended (the "Exchange Act"). If a committee administers this Plan, the Board may, from time

to time, increase the size of the Committee or committees and appoint additional 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 hereunder. Subject to Article X and to the extent such actions are consistent with the exemptions provided under Rule 16b-3 promulgated under the Exchange Act, any committee appointed by the Board hereunder also shall have the authority, both generally and in particular instances, to waive compliance by a director with any obligation to be performed by him or her under the Plan and to waive any condition, restriction or provision imposed under the Plan. Such determinations and actions of the committee, and all other determinations and actions of the committee made or taken under authority granted by any provision of the Plan, will be conclusive and binding on all parties.

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, and to adopt, amend and rescind rules and regulations for the administration of the Plan,

- (d) The power to delegate responsibility for Plan operation, management and administration on such terms, consistent with the Plan, as the Board may establish,
- (e) The power to delegate to other persons the responsibility of performing ministerial acts in furtherance of the Plan's purpose,
- (f) 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, and
- (g) To interpret the Plan and to decide any questions and settle all controversies and disputes that may arise in connection with the Plan.

#### ARTICLE IV

##### ELIGIBILITY

4.1 ELIGIBLE PERSONS. All non-employee Directors are eligible to be granted Non-Qualified Option Awards under this Plan provided the person has not irrevocably elected to be ineligible to participate in the Plan and provided the person is not a holder of more than 5% of the outstanding shares of stock of the Company or a person who is in control of such holder.

#### ARTICLE V

##### STOCK OPTION AWARDS

5.1 NUMBER OF SHARES. Subject to the provisions of Article IX of this Plan, the aggregate number of shares of Stock for which Options may be granted under this Plan shall not exceed One Hundred Thousand (100,000) shares. Options shall be granted under this Plan, without approval or discretion on the part of the Board, to non-employee Directors as follows: beginning on November 18, 1994, and annually thereafter on the business day immediately

following the Corporation's annual meeting of stockholders, options shall be granted under the Formula plan, without approval or discretion on the part of the Board, to non-employee Directors as follows: Each non-employee Director who is a Director on such date will receive options to purchase four thousand (4,000) shares of stock, per year at the Annual Meeting each year. One thousand (1,000) shares will vest immediately and one thousand (1,000) will vest per quarter thereafter, subject to continued service as a Director of the Corporation. The exercise price of such options will be the fair market value of the shares of stock on the date of the grant, said options will continue to vest and be exercisable subject to the Director's continued service as a Director of the Corporation on such dates.

The shares to be delivered upon exercise of Options under this Plan shall be made available, at the sole 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. No fractional shares of Stock will be delivered under the Plan.

Stock issuable upon exercise of an option granted under the Plan may be subject to such restrictions on transfer or repurchase rights 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 Company 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.

5.3 TERM OF OPTIONS. Each Option granted hereunder shall be for a term of 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.

5.4 FAIR MARKET VALUE. If, at the time an Option is granted under the Plan, the Corporation's Stock is publicly traded, "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-NMS, if the Stock is not then traded on a national securities exchange; 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-NMS. 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 by the Board after taking into consideration all factors which it deems appropriate, including, without limitation, recent sale and offer prices of the Stock in private transactions negotiated at arm's length.

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

5.6 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.

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 5.4 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 and has fully paid the purchase price for such shares, he or she shall possess no rights of a record holder with respect to any of such shares. If the Corporation elects to receive payment for such shares by means of a promissory note, such note, if issued to an officer, director or holder of 5% or more of the Company's outstanding Common Stock, shall provide for payment of interest at a rate no less than the interest rate then payable by the Company to its principal commercial lender, or if the Company has no loan outstanding to a commercial lender, then the interest rate payable shall equal the prevailing prime rate of interest then charged by commercial banks headquartered in Minnesota (as determined by the Board of Directors in its reasonable discretion) plus two percent. An

optionholder shall not have the rights of a stockholder with regard to awards under the Plan except as to Stock actually received by him or her under the Plan.

6.3 OPTION UNAFFECTED BY CERTAIN CHANGES. A Director's term 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 service under the Plan.

If the optionee shall cease to be a Director 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 upon any such cessation of service, such remaining rights to purchase shall in any event terminate upon the expiration of the original term of the Option.

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 until the expiration of the original term of the Options, provided, further, that any such exercise shall be limited to the purchase rights that have accrued as of the date when the optionee ceased to be a Director whether by death or otherwise.

## ARTICLE VII

### REPORTING PERSON LIMITATIONS

To the extent required to qualify for the exemption provided by Rule 16b-3 under the Securities Exchange Act of 1934, and any successor provision, at least six months must elapse

from the date of acquisition of an Option by a Reporting Person to the date of disposition of such Option (other than upon exercise) or its underlying Common Stock.

#### ARTICLE VIII

##### 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 that 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 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 IX

##### BENEFIT PLANS

Awards under the Plan are not discretionary. 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 a Director of, or consultant or advisor to, the Company or an Affiliated Corporation. 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 X

##### 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 Plan may not be amended more than once every six months, unless such changes are necessary to comport with changes in the Code, the Employee Retirement Income Security Act, or the Rules thereunder. Subject to the foregoing, the Board may also amend the Plan from time to time, except that amendments that affect the following subjects must be approved by stockholders of the Corporation:

- (a) Except as provided in Article XI relative to capital changes, the number of shares as to which Options may be granted pursuant to Article V;
- (b) The maximum term of Options granted;
- (c) The minimum price at which Options may be granted;
- (d) The term of the Plan; and
- (e) The requirements as to eligibility for participation in the Plan.

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

#### ARTICLE XI

##### 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.

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 the Board shall determine.

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 XII

##### EFFECTIVE DATE AND TERM OF THE PLAN

The Plan shall become effective on November 17, 1994. 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 effective date hereof.

#### 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 REGULATIONS

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 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

##### CONDITIONS ON DELIVERY OF STOCK

The Company shall not be obligated to deliver any shares of Stock pursuant to options granted under the Plan until, (a) in the opinion of the Company'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 Company's

counsel. If the sale of Stock has not been registered under the Securities Act of 1933, as amended, the Company may require, as a condition to exercise of the option, such representations or agreements as counsel for the Company 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 XVII

##### GOVERNING LAW; CONSTRUCTION

The validity and construction of the Plan and the instruments evidencing Options shall be governed by the internal 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. 1994 Formula Stock Option Plan  
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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 138,042 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. 1994 Formula Stock Option Plan (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

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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