UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM S-8 REGISTRATION STATEMENT UNDER

THE SECURITIES ACT OF 1933

MERCURY COMPUTER SYSTEMS, INC.

(Exact Name of Registrant as Specified in its Charter)

Massachusetts (State of Incorporation)

□ (Do not check if a smaller reporting company)

04-2741391 (I.R.S. Employer Identification Number)

201 Riverneck Road Chelmsford, Massachusetts 01824 (978) 256-1300 (Address of Principal Executive Offices)

MERCURY COMPUTER SYSTEMS, INC. Amended and Restated 2005 Stock Incentive Plan (Full Title of the Plan)

Alex A. Van Adzin Vice President, General Counsel, and Corporation Secretary Mercury Computer Systems, Inc. 201 Riverneck Road Chelmsford, Massachusetts 01824 (978) 256-1300

(Name, Address and Telephone Number, Including Area Code, of Agent for Service)

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer \Box

Non-accelerated filer

Accelerated filer

Smaller reporting company \Box

CALCULATION OF REGISTRATION FEE

		Proposed	Proposed	
	Amount	Maximum	Maximum	
	to be	Offering Price	Aggregate	Amount of
Title of Securities to be Registered	Registered (1)(2)(3)	Per Share (4)	Offering Price (4)	Registration Fee
Common Stock	2,097,775	\$10.92	\$22,907,703	\$1,278.25

(1) 597,775 shares of the registrant's common stock listed were part of the shares previously registered by the registrant on Form S-8 (File No. 333-101993 filed on December 19, 2002) in connection with the registrant's 1997 Stock Option Plan, as amended. Includes an additional 1,500,000 shares of the registrant's common stock that were not previously registered.

(2) This registration statement also covers preferred stock purchase rights (the "Rights") which are presently attached to and trade with the registrant's common stock. Any value attributable to the Rights is reflected in the market price of the common stock.

(3) In addition, pursuant to Rule 416(a) under the Securities Act of 1933, as amended (the "Securities Act"), this registration statement also covers an indeterminate number of additional shares of common stock to be offered or sold as a result of the anti-dilution provisions of the employee benefit plan described herein, including to prevent dilution resulting from any reorganization, recapitalization, reclassification, stock dividend, stock split, or other similar change.

(4) Calculated in accordance with Rule 457(c) and (h) under the Securities Act solely for the purpose of determining the amount of the registration fee, based on the average of the high and low prices on the NASDAQ Global Select Market on December 8, 2009.

EXPLANATORY NOTE

This registration statement is being filed solely for the purpose of registering 2,097,775 additional shares of common stock, par value \$0.01 per share ("Common Stock"), of Mercury Computer Systems, Inc. (the "Company") to be offered to participants under the Company's Amended and Restated 2005 Stock Incentive Plan (the "2005 Plan"), originally adopted in 2005. The number of shares of Common Stock reserved and available for issuance under the 2005 Plan includes 5,714,270 shares which were previously registered with the Securities and Exchange Commission (the "Commission") on Form S-8 (File Nos. 333-129929 filed on November 23, 2005, 333-139019 filed on November 30, 2006, 333-149046 filed on February 4, 2008, and 333-156364 filed on December 19, 2008) (collectively, the "Prior Registration Statement"), plus the number of shares underlying any grants previously made under the Company's 1997 Stock Option Plan, as amended (the "1997 Plan") that are forfeited, canceled, or are terminated (other than by exercise) from and after the effective date of the 2005 Plan. An aggregate of 597,775 additional shares have been included in the shares reserved for issuance under the 2005 Plan as a result of the forfeiture, cancellation, or termination (other than by exercise) of grants previously made under the 1997 Plan. This registration statement also covers the registration of 1,500,000 shares of Common Stock added to the 2005 Plan in connection with its amendment and restatement, which was approved by the Company's shareholders on October 21, 2009.

Pursuant to General Instruction E of Form S-8, the contents of the Prior Registration Statement are incorporated herein by reference, except as otherwise noted below.

PART II

INFORMATION REQUIRED IN THE REGISTRATION STATEMENT

ITEM 3. INCORPORATION OF DOCUMENTS BY REFERENCE.

The following documents are incorporated herein by reference:

- (a) The Company's annual report on Form 10-K for the fiscal year ended June 30, 2009, as filed with the Commission on September 4, 2009;
- (b) The Company's quarterly report on Form 10-Q for the fiscal quarter ended September 30, 2009, as filed with the Commission on November 9, 2009;
- (c) The Company's current reports on Form 8-K filed with the Commission on July 7, 2009, August 3, 2009, September 8, 2009, September 14, 2009, October 2, 2009, and October 26, 2009;
- (d) The description of the Company's common stock contained in the Company's registration statement on Form 8-A dated January 7, 1998, as filed with the Commission pursuant to Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), including any amendment thereto or report filed for the purpose of updating such description; and
- (e) The description of the Company's preferred stock purchase rights contained in the Company's registration statement on Form 8-A dated December 15, 2005, as filed with the Commission pursuant to Section 12 of the Exchange Act, including any amendment thereto or report filed for the purpose of updating such description.

All documents subsequently filed by the Company pursuant to Sections 13(a), 13(c), 14, and 15(d) of the Exchange Act, prior to the filing of a posteffective amendment which indicates that all securities offered hereby have been sold or that deregisters all securities then remaining unsold, shall be deemed to be incorporated by reference herein and to be a part hereof from the date of the filing of such documents.

ITEM 5. INTERESTS OF NAMED EXPERTS AND COUNSEL.

The validity of the Common Stock offered under this registration statement will be passed upon for the Company by Goodwin Procter LLP, Boston, Massachusetts. Anthony J. Medaglia, Jr., who is Of Counsel at Goodwin Procter LLP, owns 28,950 shares of Common Stock and options to purchase an additional 1,010 shares of Common Stock.

ITEM 8. EXHIBITS.

Exhibit

Description

- 4.1 Articles of Organization (incorporated herein by reference to Exhibit 3.1 of the Company's annual report on Form 10-K for the fiscal year ended June 30, 2009, as filed with the Commission on September 4, 2009).
- 4.2 Articles of Amendment (incorporated herein by reference to Exhibit 3.2 of the Company's quarterly report on Form 10-Q for the fiscal quarter ended December 31, 2004, as filed with the Commission on February 8, 2005).
- 4.3 Articles of Amendment (incorporated herein by reference to Exhibit 1 of the Company's registration statement on Form 8-A, as filed with the Commission on December 15, 2005).
- 4.4+ By-laws, as amended through September 22, 2004.
- 4.5 Amendment to By-laws dated December 17, 2007 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on December 20, 2007).
- 4.6 Amendment to By-laws dated January 21, 2008 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on January 24, 2008).
- 4.7 Amendment to By-laws dated September 14, 2009 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on September 14, 2009).
- 4.8 Shareholder Rights Agreement, dated as of December 14, 2005, between the Company and Computershare Trust Company, N.A. (formerly known as EquiServe Trust Company, N.A.) (incorporated herein by reference to Exhibit 2 of the Company's registration statement on Form 8-A, as filed with the Commission on December 15, 2005).
- 4.9 Mercury Computer Systems, Inc. Amended and Restated 2005 Stock Incentive Plan (incorporated herein by reference to Appendix A of the Company's Definitive Proxy Statement filed with the Commission on September 21, 2009).
- 5.1* Opinion of Goodwin Procter LLP.
- 23.1* Consent of KPMG LLP.
- 23.2 Consent of Goodwin Procter LLP (contained in the opinion filed as Exhibit 5.1 to this registration statement).
- 24.1 Power of Attorney (included in signature page to this registration statement).
- 99.1 Form of Stock Option Agreement under the 2005 Stock Incentive Plan (incorporated herein by reference to Exhibit 10.1 of the Company's current report on Form 8-K, as filed with the Commission on August 21, 2006).
- 99.2 Form of Restricted Stock Award Agreement under the 2005 Stock Incentive Plan (incorporated herein by reference to Exhibit 10.3 of the Company's current report on Form 8-K, as filed with the Commission on November 16, 2005).
- 99.3 Form of Stock Option Agreement for performance stock options under the 2005 Stock Incentive Plan (incorporated herein by reference to Exhibit 10.1 of the Company's current report on Form 8-K, as filed with the Commission on September 28, 2007).
- 99.4 Form of Deferred Stock Award Agreement under the 2005 Stock Incentive Plan (incorporated herein by reference to Exhibit 10.1 of the Company's quarterly report on Form 10-Q for the fiscal quarter ended March 31, 2006, as filed with the Commission on May 9, 2006).
- + Indicates an exhibit the Company is refiling with this registration statement on Form S-8 since the Company cannot incorporate by reference to Exchange Act reports that are more than five years old.

* Filed herewith.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, 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 the town of Chelmsford, the Commonwealth of Massachusetts on this 14th day of December, 2009.

MERCURY COMPUTER SYSTEMS, INC.

By:

Alex A. Van Adzin Vice President, General Counsel, and Corporation Secretary

/S/ ALEX A. VAN ADZIN

Power of Attorney

KNOW ALL MEN BY THESE PRESENTS that each person whose signature appears below constitutes and appoints Mark Aslett, Robert E. Hult, and Alex A. Van Adzin his true and lawful attorneys-in-fact and agents, each acting alone, with full powers of substitution and resubstitution, for him or in his name, place and stead, in any and all capacities to sign any and all amendments or post-effective amendments to this registration statement (or any registration statement for the same offering that is to be effective upon filing pursuant to Rule 462(b) under the Securities Act of 1933), and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, each acting alone, full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, each acting alone, or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

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.

Signature	Title	Date
/S/ MARK A SLETT Mark Aslett	President, Chief Executive Officer, and Director (Principal Executive Officer)	December 14, 2009
/S/ ROBERT E. HULT Robert E. Hult	Senior Vice President, Chief Financial Officer, and Treasurer (Principal Financial Officer and Principal Accounting Officer)	December 14, 2009
/S/ RUSSELL K. JOHNSEN Russell K. Johnsen	Chairman of the Board of Directors	December 14 2009
/S/ ALBERT P. BELLE ISLE Albert P. Belle Isle	Director	December 14, 2009
/S/ GEORGE W. CHAMILLARD George W. Chamillard	Director	December 14, 2009
/S/ WILLIAM K. O'BRIEN William K. O'Brien	Director	December 14, 2009
/S/ LEE C. STEELE Lee C. Steele	Director	December 14, 2009
/S/ VINCENT VIITO Vincent Vitto	Director	December 14, 2009
/S/ RICHARD P. WISHNER Richard P. Wishner	Director	December 14, 2009

EXHIBIT INDEX

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- * Filed herewith.

BY-LAWS

<u>of</u>

MERCURY COMPUTER SYSTEMS, INC.

TABLE OF CONTENTS

		Page
ARTICLE 1 Articles	of Organization	3
ARTICLE 2 Fiscal Y	/ear	3
ARTICLE 3 Meeting	gs of Stockholders	3
Section 3.1	Annual Meeting	3
Section 3.2	Special Meetings	5
Section 3.3	Place of Meetings	5
Section 3.4	Notice of Meetings	6
Section 3.5	Quorum and Adjournment	6
Section 3.6	Action without Meeting	8
Section 3.7	Proxies and Voting	8
ARTICLE 4 Director	-	9
Section 4.1	Enumeration, Election and Term of Office	9
Section 4.2	Powers	10
Section 4.3	Meetings of Directors	11
Section 4.4	Quorum of Directors	12
Section 4.5	Consent in Lieu of Meeting and Participation in Meetings by Communications Equipment	12
Section 4.6	Committees	12
ARTICLE 5 Officers		13
Section 5.1	Enumeration, Election and Term of Office	13
Section 5.2	President and Chairman of the Board	14
Section 5.3	Treasurer and Assistant Treasurer	14
Section 5.4	Clerk and Assistant Clerk	14
Section 5.5	Secretary of the Board and Assistant Secretary	15
Section 5.6	Temporary Clerk and Temporary Secretary	15
Section 5.7	Other Powers and Duties	16
ARTICLE 6 Resigna	tions, Removals and Vacancies	16
Section 6.1	Resignations	16
Section 6.2	Removals	16
Section 6.3	Vacancies	17
	ification of Directors and Others	18
Section 7.1	Definitions	18

Section 7.2	Right to Indemnification	19
Section 7.3	Indemnification not Available	19
Section 7.4	Compromise or Settlement	19
Section 7.5	Advances	19
Section 7.6	Not Exclusive	20
Section 7.7	Insurance	20
ARTICLE 8 Stock		20
Section 8.1	Stock Authorized	20
Section 8.2	Issue of Authorized Unissued Capital Stock	20
Section 8.3	Certificates of Stock	20
Section 8.4	Replacement Certificate	21
Section 8.5	Transfers	22
Section 8.6	Record Date	22
ARTICLE 9 Miscella	neous Provisions	23
Section 9.1	Execution of Papers	23
Section 9.2	Voting of Securities	23
Section 9.3	Corporate Seal	24
Section 9.4	Corporate Records	24
ARTICLE 10 Amend	ments	24

BY-LAWS

<u>of</u> <u>MERCURY COMPUTER SYSTEMS, INC.</u> ARTICLE 1

Articles of Organization

The name and purposes of the Corporation shall be as set forth in the Articles of Organization. These By-Laws, the powers of the Corporation and its Directors and stockholders, and all matters concerning the conduct and regulation of the business of the Corporation, shall be subject to such provisions in regard thereto, if any, as are set forth in the Articles of Organization. All references in these By-Laws to the Articles of Organization shall be construed to mean the Articles of Organization of the Corporation as from time to time amended or restated.

ARTICLE 2

Fiscal Year

Except as from time to time otherwise determined by the Directors, the fiscal year of the Corporation shall be the twelve months ending on June 30.

ARTICLE 3

Meetings of Stockholders

Section 3.1 Annual Meeting

The annual meeting of the stockholders shall be held at 10:00 o'clock A.M. on the first Wednesday of October in each year. Purposes for which an annual meeting is to be held, additional to those prescribed by law and by these By-Laws, may be specified by the President or by the Directors.

If such annual meeting has not been held on the day herein provided therefor, a special meeting of the stockholders in lieu of the annual meeting may be held, and any business transacted or elections held at such special meeting shall have the same effect as if transacted or held at the annual meeting, and in such case all references in these By-Laws, except in this Section 3.1, to the annual meeting of the stockholders shall be deemed to refer to such special meeting. Any such special meeting shall be called, and the purposes thereof shall be specified in the call, as provided in Section 3.2 of this Article 3.

To be properly brought before the meeting, business must be of a nature that is appropriate for consideration at an annual meeting and must be (i) specified in the notice of meeting (or any supplement thereto) given by or at the direction of the Board of Directors, (ii) otherwise properly brought before the meeting by or at the direction of the Board of Directors, or (iii) otherwise properly brought before the meeting by a stockholder. In addition to any other applicable requirements, for business to be properly brought before the annual meeting by a stockholder, the stockholder must have given timely notice thereof in writing to the Clerk of the Corporation. To be timely, each such notice must be given either by personal delivery or by United States mail, postage prepaid, to the Clerk of the Corporation not later than (1) with respect to a matter to be brought before an annual meeting and (2) with respect to a matter to be brought before a special meeting of the stockholders not in lieu of an annual meeting, the close of business on the tenth (10th) day following the date on which notice of such meeting is first given to stockholders. The notice shall set forth (i) information concerning the stockholder, including his or her name and address; (ii) a representation that the stockholder is entitled to vote at such meeting and intends to appear

in person or by proxy at the meeting to present the matter specified in the notice, and (iii) such other information as would be required to be included in a proxy statement soliciting proxies for the presentation of such matter to the meeting.

Notwithstanding anything in these By-Laws to the contrary, no business shall be transacted at the annual meeting except in accordance with the procedures set forth in this Section; provided, however, that nothing in this Section shall be deemed to preclude discussion by any stockholder of any business properly brought before the annual meeting in accordance with these By-Laws.

Section 3.2 Special Meetings

A special meeting of the stockholders may be called at any time by the President, or by a majority of the Directors acting by vote or by written instrument or instruments signed by them. A special meeting of the stockholders shall be called by the Clerk, or in the case of death, absence, incapacity or refusal of the Clerk, by any other officer, upon written application of one or more stockholders who hold at least forty (40) percent in interest of the capital stock entitled to vote thereat. Such call shall state the time, place and purposes of the meeting. In the event that none of the officers is able or willing to call a special meeting, the supreme judicial or superior court, upon application of one or more stockholders who hold at least forty (40) percent in interest of the capital stock entitled to vote thereat, shall have jurisdiction in equity to authorize one or more of such stockholders to call a meeting by giving notice as is required by law.

Section 3.3 Place of Meetings

All meetings of the stockholders shall be held at the principal office of the Corporation in Massachusetts, unless a different place within Massachusetts or, if permitted by the Articles of Organization, elsewhere within the United States is designated by the President, or by a majority

of the Directors acting by vote or by written instrument or instruments signed by them. Any adjourned session of any meeting of the stockholders shall be held at such place within Massachusetts or, if permitted by the Articles of Organization, elsewhere within the United States as is designated in the vote of adjournment.

Section 3.4 Notice of Meetings

A written notice of the place, date and hour of a meetings of stockholders stating the purposes of the meeting shall be given at least seven (7) days before the meeting to each stockholder entitled to vote thereat, by leaving such notice with him or at his residence or usual place of business or by mailing it, postage prepaid, and addressed to such stockholder at his address as it appears in the records of the Corporation. Such notice shall be given by the Clerk, or in the case of the death, absence, incapacity or refusal of the Clerk, by any other officer or by a person designated either by the Clerk, by the person or persons calling the meeting, by any stockholder or group of stockholders applying for such meeting pursuant to Section 3.2 of Article 3 of these By-Laws or by the Board of Directors. Whenever notice of a meeting is required to be given a stockholder under any provision of law, of the Articles of Organization, or of these By-Laws, a written waiver thereof, executed before or after the meeting by such stockholder or his attorney thereunto authorized, and filed with the records of the meeting, shall be deemed equivalent to such notice.

Section 3.5 Quorum and Adjournment

At any meeting of the stockholders, a quorum for the election of any Director or for the consideration of any question shall consist of a majority in interest of all stock issued, outstanding and entitled to vote at such election or upon such question, respectively, except that if two or more classes of stock are entitled to vote as separate classes for the election of

any Director or upon any question, then in the case of each such class a quorum for the election of any Director or for the consideration of such question shall consist of a majority in interest of all stock of that class issued, outstanding and entitled to vote thereon. Stock owned by the Corporation, if any, shall be disregarded in determining any quorum. Both abstentions and broker non-votes are to be counted for the purpose of determining the existence of a quorum for the transaction of business at any meeting. Whether or not a quorum is present, any meeting may be adjourned from time to time by a majority of the votes properly cast upon the question, and the meeting may be held as adjourned without further notice. In addition, the presiding officer at any Shareholders Meeting shall have the authority to reschedule or adjourn any such meeting if (a) no quorum is present for the transaction of business; (b) the board of directors determines that an adjournment is necessary or appropriate to enable the shareholders to consider fully information which the board of directors determines has not been made sufficiently or timely available to shareholders; or (c) the board of directors determines that adjournment is otherwise in the best interests of the company.

When a quorum for an election is present at any meeting, a plurality of the votes properly cast for any office shall elect such office. When a quorum for the consideration of a question is present at any meeting, a majority of the votes properly cast upon the question shall decide the question; except that if two or more classes of stock are entitled to vote as separate classes upon such question, then in the case of each such class a majority of the votes of such class properly cast upon the question shall decide the vote of that class upon the question; and except in any case where a larger vote is required by law or by the Articles of Organization. For purposes of determining the number of shares voting on a particular proposal, abstentions and broker nonvotes are not to be counted as votes cast or shares voting.

Section 3.6 Action without Meeting

Any action required or permitted to be taken at any meeting of the stockholders may be taken without a meeting if all stockholders entitled to vote on the matter consent to the action in writing and the written consents are filed with the records of the meetings of stockholders. Such consents shall be treated for all purposes as a vote at a meeting.

Section 3.7 Proxies and Voting

Except as may otherwise be provided in the Articles of Organization, stockholders entitled to vote shall have one vote for each share of stock entitled to vote owned by them. Stockholders entitled to vote may vote in person or by proxy. No proxy dated more than six (6) months before the meeting named therein shall be valid and no proxy shall be valid after the final adjournment of such meeting; provided, however, that a proxy coupled with an interest sufficient in law to support an irrevocable power, including, without limitation, an interest in the shares or in the Corporation generally, may be irrevocable if it so provides, need not specify the meeting to which it relates, and shall be valid and enforceable until the interest terminates, or for such shorter period as may be specified in the proxy. A proxy with respect to stock held in the name of two or more persons shall be valid if executed by any one of them unless at or prior to the exercise of the proxy the Corporation receives specific written notice to the contrary from any one of them. A proxy purporting to be executed by or on behalf of a stockholder shall be deemed valid unless challenged at or prior to its exercise and the burden of proving invalidity shall rest on the challenger. Proxies shall be filed with the Clerk, or person performing the duties of clerk, at the meeting, or any adjournment thereof, before being voted.

The Corporation shall not, directly or indirectly, vote upon any share of its own stock. Both abstentions and broker non-votes are to be counted as present for the purpose of determining the existence of a quorum for the transaction of business at any meeting. However,

for purposes of determining the number of shares voting a Particular proposal, abstentions and broker non-votes are not to be counted as votes cast or shares voting.

ARTICLE 4

Directors

Section 4.1 Enumeration, Election and Term of Office

The business and affairs of this corporation shall be managed under the direction of a Board of Directors consisting of not fewer than three (3) nor more than fifteen (15) Directors, the exact number to be determined from time to time by resolution adopted by the affirmative vote of a majority of the entire Board of Directors, such Board of Directors to be divided into such classes and elected by such stockholders as have the right to vote thereon, for such terms as are provided in the Articles of Organization. Each Director shall hold office until his successor shall have been elected and qualified, subject to Article 6 of these By-Laws. Whenever used in these By-Laws, the phrase "entire Board of Directors" shall mean that number of Directors fixed by the most recent resolution adopted pursuant to the preceding sentence prior to the date as of which a determination of the number of Directors then constituting the entire Board of Directors may be enlarged by the stockholders at any meeting or by the affirmative vote of a majority of the entire Board of Directors may be enlarged by the stockholders at any meeting or by the affirmative vote of a majority of the entire Board of Directors then in office.

Nominations for the election of Directors may be made by the Board of Directors or a committee appointed by the Board of Directors or by any stockholder entitled to vote generally in the election of Directors. However, any stockholder entitled to vote generally in the election of Directors may nominate one or more persons for election as Directors at a meeting only if written notice of such stockholder's intent to make such nomination or nominations has been

given, either by personal delivery or by United States mail, postage prepaid, to the Clerk of the Corporation not later than (1) with respect to an election to be held at an annual meeting of stockholders or special meeting in lieu of an annual meeting, sixty (60) days prior to the date for the annual meeting set forth in the By-Laws and (2) with respect to an election to be held at a special meeting of stockholders not in lieu of an annual meeting, the close of business on the tenth (10th) day following the date on which notice of such meeting is first given to stockholders. Each such notice to the Clerk shall set forth (i) the name and address of the stockholder and each of his or her nominees; (ii) a representation that the stockholder is entitled to vote at such meeting and intends to appear in person or by proxy at the meeting to nominate the person or persons specified in the notice; (iii) a description of all arrangements or understandings between the stockholder and each such nominee; (iv) such other information as would be required to be included in a proxy statement soliciting proxies or the election of the nominees of such stockholder; and (v) the consent of each nominee to serve as a Director of the Corporation if so elected. The Corporation may require any proposed nominee to furnish such other information as may reasonably be required by the Corporation to determine the eligibility of such proposed nominee to serve as a Director of the Corporation. The presiding officer of the meeting may, if the facts warrant, determine that a nomination was not made in accordance with the foregoing procedure, and if such officer should so determine, he or she shall so declare to the meeting and the defective nomination shall be disregarded.

No Director need be a stockholder. Any election of Directors by the stockholders shall be by ballot if so requested by any stockholder entitled to vote thereon.

Section 4.2 Powers

The business of the Corporation shall be managed by the Board of Directors, which shall exercise all the powers of the Corporation except as otherwise required by law, by the Articles of

Organization or by these By-Laws. In the event of one or more vacancies in the Board of Directors the remaining Directors, if at least two (2) Directors still remain in office, may exercise the powers of the full Board until such vacancy or vacancies are filled.

Section 4.3 Meetings of Directors

Regular meetings of the Directors may be held without notice at such places and at such times as may be fixed from time to time by the Directors. A regular meeting of the Directors may be held without notice immediately following an annual meeting of stockholders or any special meeting held in lieu thereof.

Special meetings of Directors may be called by the Chairman of the Board, the President, the Treasurer or any two (2) or more Directors, or if there shall be less than three (3) Directors, by any one (1) Director, and shall be held at such time and place as specified in the call. Reasonable notice of each special meeting of the Directors shall be given to each Director. Such notice may be given by the Secretary or Assistant Secretary of the Board, the Clerk or any Assistant Clerk or by the officer or one of the Directors calling the meeting. Notice to a Director shall in any case be sufficient if sent by telegram or telecopier at least forty-eight (48) hours or, by mail at least ninety-six (96) hours before the meeting addressed to the Director at his or her usual or last known business or residence address, or if given to him or her at least forty-eight (48) hours before the meeting in person or by telephone or by handing him or her a written notice. Notice of a meeting need not be given to any Director if a written waiver of notice, executed by him or her before or after the meeting, is filed with the records of the meeting, or to any Director who attends the meeting without protesting prior thereto or at its commencement the lack of notice to him or her. A notice or waiver of notice need not specify the purposes of the meeting.

Section 4.4 Quorum of Directors

At any meeting of the Directors, a quorum for any election or for the consideration of any question shall consist of a majority of the Directors then in office. Whether or not a quorum is present any meeting may be, adjourned from time to time by a majority of the votes properly cast upon the question, and the meeting may be held as adjourned without further notice. When a quorum is present at any meeting, the votes of a majority of the Directors present shall be requisite and sufficient for election to any office and shall decide any question brought before such meeting, except in any case where a larger vote is required by law, by the Articles of Organization or by these By-Laws.

Section 4.5 Consent in Lieu of Meeting and Participation in Meetings by Communications Equipment

Any action required or permitted to be taken at any meeting of the Directors may be taken without a meeting if all the Directors consent to the action in writing, and the written consents are filed with the records of the meetings of the Directors. Such consents shall be treated for all purposes as a vote of the Directors at a meeting.

Members of the Board of Directors or any Committee designated thereby may participate in a meeting of such Board or Committee by means of a conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear each other at the same time and participation by such means shall constitute presence in person at a meeting.

Section 4.6 Committees

By vote of a majority of the Directors then in office, the Directors may elect from their own number an Executive Committee or other Committees and may by like vote delegate to any such Committee some or all of their powers except those which by law may not be delegated.

ARTICLE 5

Officers

Section 5.1 Enumeration, Election and Term of Office

The officers of the Corporation shall include a President, a Treasurer and a Clerk, who shall be chosen by the Directors at their first meeting following an annual meeting of the stockholders. Each of the officers shall hold office until the next annual election to the office which he or she holds and until his or her successor is chosen and qualified or until he or she sooner dies, resigns, is removed or becomes disqualified. The Directors may choose one of their number to be Chairman of the Board and determine his or her powers, duties and term of office. The Directors may at any time appoint such other officers, including one or more Vice Presidents, Assistant Treasurers, Assistant Clerks, a Secretary of the Board and an Assistant Secretary of the Board as they deem wise, and may determine their respective powers, duties and terms of office.

The Corporation may also designate individuals as divisional, group, or segment vice presidents or vice presidents of a particular function, which individual shall carry such title on a non-executive basis and not as an executive officer of the Corporation. Said non-executive vice presidents may be designated by the Board of Directors or by the President pursuant to Board resolutions so-authorizing the President to appoint non-executive vice presidents on a particular occasion or from time to time in his or her discretion, said honorary vice presidents to be titled "Vice President (specific area of function)."

No officer need be a stockholder or a Director except that the Chairman of the Board shall be a Director. The same person may hold more than one office, except that no person shall be both President and Clerk.

Section 5.2 President and Chairman of the Board

The President shall be the Chief Executive Officer of the Corporation and, subject to the control and direction of the Directors, shall have general supervision and control of the business of the Corporation. The President shall preside at all meetings of the stockholders at which he or she is present, and, if the President is a Director, at all meetings of the Directors, if there shall be no Chairman of the Board or in the absence of the Chairman of the Board.

If there shall be a Chairman of the Board, such person shall make his or her counsel available to the other officers of the Corporation, and shall have such other duties and powers as may from time to time be conferred on him or her by the Directors. The Chairman of the Board shall preside at all meetings of the Directors at which he or she is present, and, in the absence of the President, at all meetings of stockholders.

Section 5.3 Treasurer and Assistant Treasurer

The Treasurer shall have the custody of the funds and valuable books and papers of the Corporation, except such as are directed by these By-Laws to be kept by the Clerk or by the Secretary of the Board. The Treasurer shall perform all other duties usually incident to such office, and shall be at all times subject to the control and direction of the Directors. If required by the Directors, the Treasurer shall give bond in such form and amount and with such sureties as shall be determined by the Directors.

If the Treasurer is absent or unavailable, any Assistant Treasurer shall have the duties and powers of Treasurer and shall have such further duties and powers as the Directors shall from time to time determine.

Section 5.4 Clerk and Assistant Clerk

If the Corporation shall not have a resident agent appointed pursuant to law, the Clerk shall be a resident of the Commonwealth of Massachusetts. The Clerk shall record all

proceedings of the stockholders in a book to be kept therefor. In case a Secretary of the Board is not elected, the Clerk shall also record all proceedings of the Directors in a book to be kept therefor.

If the Corporation shall not have transfer agent, the Clerk shall also keep or cause to be kept the stock and transfer records of the Corporation, which shall contain the names of all stockholders and the record address and the amount of stock held by each.

If the Clerk is absent or unavailable, any Assistant Clerk shall have the duties and powers of the Clerk and shall have such further duties and powers as the Directors shall from time to time determine.

Section 5.5 Secretary of the Board and Assistant Secretary

If a Secretary of the Board is elected, such person shall record all proceedings of the Directors in a book to be kept therefor. If the Secretary of the Board is absent or unavailable, any Assistant Secretary shall have the duties and powers, of the Secretary and shall have such further duties and powers as the Directors shall from time to time determine.

If no Secretary or Assistant Secretary has been elected, or if, having been elected, no Secretary or Assistant Secretary is present at a meeting of the Directors, the Clerk or an Assistant Clerk shall record the proceedings of the Directors.

Section 5.6 Temporary Clerk and Temporary Secretary

If no Clerk or Assistant Clerk shall be present at any meeting of the stockholders, or if no Secretary, Assistant Secretary, Clerk or Assistant Clerk shall be present at any meeting of the Directors, the person presiding at the meeting shall designate a Temporary Clerk or Secretary to perform the duties of Clerk or Secretary.

Section 5.7 Other Powers and Duties

Each officer shall, subject to these By-Laws and to the control and direction of the Directors, have in addition to the duties and powers specifically set forth in these By-Laws, such duties and powers as are customarily incident to such office and such additional duties and powers as the Directors may from time to time determine.

ARTICLE 6

Resignations, Removals and Vacancies

Section 6.1 Resignations

Any Director or officer may resign at any time by delivering his or her resignation in writing to the President or the Clerk or to a meeting of the Directors. Such resignations shall take effect at such time as is specified therein, or if no such time is so specified, then upon delivery thereof to the President or the Clerk or to a meeting of the Directors.

Section 6.2 Removals

Directors, including Directors elected by the Directors to fill vacancies in the Board, may be removed from office (a) with cause by vote of the holders of a majority of the shares issued and outstanding and entitled to vote generally in the election of Directors; (b) with or without cause by vote of the holders of at least 80% of the votes entitled to be cast by the holders of all shares of the Corporation entitled to vote generally in the election of Directors, voting together as a single class; (c) with cause by vote of a majority of the Directors then in office; or (d) without cause by vote of at least 80% of the Directors then in office; or (d) without cause by vote of at least 80% of the Directors then in office (including the Director to be removed in calculating said percentage); provided that the Directors, of a class elected by a particular class of shareholders may be removed only by vote of the holders of a majority of the shares of such class.

The Directors may terminate or modify the authority of any agent or employee. The Directors may remove any officer from office with or without assignment of cause by vote of a majority of the Directors then in office.

If cause is assigned for removal of any Director or officer, such Director or officer may be removed only after reasonable notice and opportunity to be heard before the body proposing to remove him.

No Director or officer who resigns or is removed shall have any right to any compensation as such Director or officer for any period following his resignation or removal, or any right to damages on account of such removal, whether his compensation be by the month or by the year or otherwise; provided, however, that the foregoing provision shall not prevent such Director or officer from obtaining damages for breach of any contract of employment legally binding upon the Corporation.

Section 6.3 Vacancies

Any vacancy in the Board of Directors, including a vacancy resulting from an enlargement of the Board, may be filled by the Directors by vote of a majority of the Remaining Directors then in office, though less than a quorum, or by the stockholders at a meeting called for the purpose, provided that any vacancy created by the stockholders may be filled by the stockholders at the same meeting. Any Director elected in accordance with the preceding sentence shall hold office for the remainder of the full term of the class of Directors in which the new Directorship was created or the vacancy occurred and until such Directors' successor shall have been elected and qualified or until he or she sooner dies, resigns, is removed or becomes disqualified.

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If the office of any officer becomes vacant, the Directors may choose or appoint a successor by vote of a majority of the Directors present at the meeting at which such choice or appointment is made.

Each such successor shall hold office for the unexpired term of the Director's predecessor and until a successor shall be chosen or appointed and qualified, or until he or she sooner dies, resigns, is removed or becomes disqualified.

ARTICLE 7

Indemnification of Directors and Others

Section 7.1 Definitions

For purposes of this Article 7:

(a) "Director/officer" means any person who is serving or has served as a Director, officer or employee of the Corporation appointed or elected by the Board of Directors 'or the stockholders of the Corporation, or any Director, officer or employee of the Corporation who is serving or has served at the request of the Corporation as a Director, officer, trustee, principal, partner, employee or other agent of any other organization.

(b) "Proceeding" means any action, suit or proceeding, civil or criminal, brought or threatened in or before any court, tribunal, administrative or legislative body or agency.

(c) "Expense" means any fine or penalty, and any liability fixed by a judgment, order, decree or award in a Proceeding, any amount reasonably paid in settlement of a Proceeding and any professional fees and other disbursements reasonably incurred in connection with a Proceeding.

Section 7.2 Right to Indemnification

Except as limited by law or as provided in Sections 7.3 and 7.4 of this Article 7, each Director/officer (and his heirs and personal representatives) shall be indemnified by the Corporation against any Expense incurred by such Director/officer in connection with each Proceeding in which he or she is involved as a result of his or her serving or having served as a Director/officer.

Section 7.3 Indemnification not Available

No indemnification shall be provided to a Director/officer with respect to a Proceeding as to which it shall have been adjudicated that he or she did not act in good faith in the reasonable belief that his or her action was in the best interests of the Corporation.

Section 7.4 Compromise or Settlement

In the event that a Proceeding is compromised or settled so as to impose any liability or obligation on a Director/officer or upon the Corporation, no indemnification shall be provided as to said Director officer with respect to such Proceeding if such Director/officer shall have been adjudicated not to have acted in good faith in the reasonable belief that his or her action was in the best interests of the Corporation.

Section 7.5 Advances

The Corporation shall pay sums on account of indemnification in advance of a final disposition of a Proceeding upon receipt of an undertaking by the Director/officer to repay such sums if it is subsequently established that he or she is not entitled to indemnification pursuant to Sections 7.3 and 7.4 hereof, which undertaking may be accepted without reference to the financial ability of such person to make repayment.

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Section 7.6 Not Exclusive

Nothing in this Article 7 shall limit any lawful rights to indemnification existing independently of this Article 7.

Section 7.7 Insurance

The provisions of this Article 7 shall not limit the power of the Board of Directors to authorize the purchase and maintenance of insurance on behalf of any Director/officer against any Expense, whether or not the Corporation would have the power to indemnify such Director/officer against such Expense under this Article 7.

ARTICLE 8

<u>Stock</u>

Section 8.1 Stock Authorized

The total number of shares and the par value, if any, of each class of stock which the Corporation is authorized to issue, and if more than one class is authorized, the descriptions, preferences, voting powers, qualifications and special and relative rights and privileges as to each class and any series thereof, shall be as stated in the Articles of Organization.

Section 8.2 Issue of Authorized Unissued Capital Stock

Any unissued capital stock from time to time authorized under the Articles of Organization and amendments thereto may be issued by vote of the Directors. No stock shall be issued unless the cash, so far as due, or the property, services or expenses for which it was authorized to be issued, has been actually received or incurred by, or conveyed or rendered to, the Corporation, or is in its possession as surplus.

Section 8.3 Certificates of Stock

Each stockholder shall be entitled to a certificate in such form as may be prescribed from time to time by the Directors, stating the number and the class and the designation of the series,

if any, of the shares held by such stockholder. Such certificates shall be signed by the President or a Vice President and by the Treasurer or an Assistant Treasurer. Such signatures may be facsimiles if the certificate is signed by a transfer agent, or by a registrar, other than a Director, officer or employee of the Corporation. In case any officer has signed or whose facsimile signature has been placed on such certificate shall have ceased to be such officer before such certificate is issued, it may be issued by the Corporation with the same effect as if he or she were such officer at the time of its issue. Every certificate issued by the Corporation for shares of stock at a time when such shares are subject to any restriction on transfer pursuant to the Articles of Organization, the By-Laws or any agreement to which the Corporation is a party, shall have the restriction noted conspicuously on the certificate and shall also set forth on the face or back of the certificate either the full text of the restriction, or a statement of the existence of such restriction and a statement that the Corporation will furnish a copy thereof to issue more than one class or series of stock shall set forth upon the face or back of the certificate either the full text of the preferences, voting powers, qualifications and special and relative rights of the shares of each class and series if any, authorized to be issued, as set forth in the Articles of Organization, or a statement of the existence of such restriction either the full text of the preferences, voting powers, qualifications and special and relative rights of the shares of each class and series if any, authorized to be issued, as set forth in the Articles of Organization, or a statement of the existence of such preferences, powers, qualifications and rights and a statement that the Corporation at a time when it is authorized to issue more than one class or series of stock shall set forth upon the face or back of the certificate either the full text of the preference

Section 8.4 Replacement Certificate

In case of the alleged loss or destruction or the mutilation of a certificate of stock, a new certificate may be issued in place thereof, upon such conditions as the Directors may determine.

Section 8.5 Transfers

Subject to the restrictions, if any, imposed by the Articles of Organization, the By-Laws or any agreement to which the Corporation is a party, shares of stock shall be transferred on the books of the Corporation only by the surrender to the Corporation or its transfer agent of the certificate representing such shares properly endorsed or accompanied by a written assignment of such shares or by a written power of attorney to sell, assign or transfer such shares, properly executed, with necessary transfer stamps affixed, and with such proof that the endorsement, assignment or power of attorney is genuine and effective as the Corporation or its transfer agent may reasonably require. Except as may otherwise be required by law, the Corporation shall be entitled to treat the record holder of stock as shown on its books as the owner of such stock for all purposes, including the payment of dividends and the right to vote with respect thereto, regardless of any transfer, pledge or other disposition of such stock, until the shares have been transferred on the books of the Corporation in accordance with the requirements of these By-Laws. It shall be the duty of each stockholder to notify the Corporation of his or her post office address.

Section 8.6 Record Date

The Directors may fix in advance a time, which shall be not more than sixty (60) days before the date of any meeting of stockholders or the date for the payment of any dividend or the making of any distribution to stockholders or the last day on which the consent or dissent of stockholders may be effectively expressed for any purpose, as the record date for determining the stockholders having the right to notice of and to vote at such meeting and any adjournment thereof or the right to receive such dividend or distribution or the right to give such consent or dissent, and in such case only stockholders of record on such date shall have such right, notwithstanding any transfer of stock on the books of the Corporation after the record date; or

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without fixing such record date the Directors may for any such purposes close the transfer books for all or any part of such period.

If no record date is fixed and the transfer books are not closed:

(1) The record date for determining stockholders having the right to notice of or to vote at a meeting of stockholders shall be at the close of business on the day next preceding the day on which notice is given.

(2) The record date for determining stockholders for any other purpose shall be at the close of business on the day on which the Board of Directors acts with respect thereto.

ARTICLE 9

Miscellaneous Provisions

Section 9.1 Execution of Papers

All deeds, leases, transfers, contracts, bonds, notes, releases, checks, drafts and other obligations authorized to be executed on behalf of the Corporation shall be signed by the President or the Treasurer except as the Directors may generally or in particular cases otherwise determine.

Section 9.2 Voting of Securities

Except as the Directors may generally or in particular cases otherwise determine the President or the Treasurer may, on behalf of the Corporation (i) waive notice of any meeting of stockholders or shareholders of any other corporation, or of any association, trust or firm, of which any securities are held by this Corporation; (ii) appoint any person or persons to act as proxy or attorney-in-fact for the Corporation, with or without substitution, at any such meeting; and (iii) execute instruments of consent to stockholder or shareholder action taken without a meeting.

Section 9.3 Corporate Seal

The seal of the Corporation shall be a circular die with the name of the Corporation, the word "Massachusetts" and the year of its incorporation cut or engraved thereon, or shall be in such other form as the Board of Directors or the stockholders may from time to time determine.

Section 9.4 Corporate Records

The original, or attested copies, of the Articles of Organization, By-Laws, and the records of all meetings of incorporators and stockholders, and the stock and transfer records, which shall contain the names of all stockholders and the record address and the amount of stock held by each, shall be kept in Massachusetts for inspection by the stockholders at the principal office of the Corporation or at an office of the Clerk, or if the Corporation shall have a transfer agent or a resident agent, at an office of either of them. Said copies and records need not all be kept in the same office.

ARTICLE 10

Amendments

These By-Laws may be altered, amended or repealed or new By-Laws enacted by the affirmative vote of a majority of the entire Board of Directors (if notice of the proposed alteration or amendment is contained in the notice of the meeting at which such vote is taken or if all Directors are present) or at any regular meeting of the stockholders (or at any special meeting thereof duly called for that purpose) by the affirmative vote of a majority of the shares represented and entitled to vote at such meeting (if notice of the proposed alteration or amendment is contained in the notice of such meeting).

Notwithstanding anything contained in the preceding paragraph of this Article 10 to the contrary until January 1, 1999, either (i) the affirmative vote of the holders of at least eighty (80%) percent of the votes entitled to be cast by the holders of all shares of the Corporation

entitled to vote generally in the election of Directors, voting together as a single class, or (ii) the affirmative vote of a majority of the entire Board of Directors with the concurring vote of a majority of the Continuing Directors voting separately and as a subclass of Directors, shall be required to alter, amend or repeal or adopt any provision inconsistent with, Section 3.1 of Article 3, Section 4.1 of Article 4, Section 6.2 and Section 6.3 of Article 6 amid this paragraph of this Article 10. For purposes of this Article 10, the term "Continuing Director" shall have the meaning ascribed to it in Article 6 of the Articles of Organization of the Corporation. Subsequent to January 1, 1999, the foregoing sections may be altered, amended or repealed in accordance with the first paragraph of this Article 10.2. The purposes for which the corporation is formed are as follows: To manufacture, sell, invent, design, develop, distribute, lease and to engage in all aspects of the production of micro-computer based product; to invent, design, discover, or acquire formulae, processes, improvements, inventions, designs, patents, licenses, copyrights, trademarks, trade names and trade secrets applicable to the foregoing and to hold, use, sell, license and otherwise deal in or dispose of the same; to acquire by purchase, deed, mortgage, lease or by any other method and to hold, maintain, operate, improve, develop, sell, exchange, lease, mortgage, pledge, hypothecate, loan money upon and otherwise deal in real and personal property of every kind, character and description and wheresoever situated, including without limitation the stock and securities of the corporation or of any other corporation; to lend money upon credit or security to, to guarantee or assume obligations of, and to aid in any other manner other concerns wherever and however organized, any obligations of which or any interest in which shall be held by the corporation or in the affairs or prosperity of which the corporation has a lawful interest and to do a

As amended September 22, 2004.

December 14, 2009

Mercury Computer Systems, Inc. 201 Riverneck Road Chelmsford, Massachusetts 01824-2820

Re: <u>Registration Statement on Form S-8 for Additional Shares</u>

Ladies and Gentlemen:

This opinion letter is furnished to you in connection with your filing of a Registration Statement on Form S-8 (the "Registration Statement") pursuant to the Securities Act of 1933, as amended (the "Securities Act"), on the date hereof relating to an aggregate of 2,097,775 shares (the "Shares") of Common Stock, \$0.01 par value per share ("Common Stock"), of Mercury Computer Systems, Inc., a Massachusetts corporation (the "Company"), that may be issued pursuant to the Company's Amended and Restated 2005 Stock Incentive Plan (the "Plan").

We have reviewed such documents and made such examination of law as we have deemed appropriate to give the opinion expressed below. We have relied, without independent verification, on certificates of public officials and, as to matters of fact material to the opinion set forth below, on certificates of officers of the Company.

The opinion expressed below is limited to Massachusetts law.

For purposes of the opinion expressed below, we have assumed that a sufficient number of authorized but unissued shares of the Company's Common Stock will be available for issuance when the Shares are issued.

Based on the foregoing, we are of the opinion that the Shares have been duly authorized and, upon issuance and delivery against payment therefor in accordance with the terms of the Plan, will be validly issued, fully paid and nonassessable.

We hereby consent to the inclusion of this opinion as Exhibit 5.1 to the Registration Statement. In giving our consent, we do not 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 thereunder.

Very truly yours,

/s/ GOODWIN PROCTER LLP

GOODWIN PROCTER LLP

The Board of Directors Mercury Computer Systems, Inc.:

We consent to the use of our report dated September 4, 2009, with respect to the consolidated balance sheets of Mercury Computer Systems, Inc. and subsidiaries as of June 30, 2009 and 2008, and the related consolidated statements of operations, shareholders' equity and comprehensive loss, and cash flows for each of the years in the three-year period ended June 30, 2009, the related consolidated financial statement schedule, and the effectiveness of internal control over financial reporting as of June 30, 2009, incorporated by reference in this Registration Statement on Form S-8.

/s/ KPMG LLP

Boston, Massachusetts December 14, 2009