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**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**  
Washington, D.C. 20549

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**POST-EFFECTIVE AMENDMENT NO. 7  
TO  
FORM S-8  
REGISTRATION STATEMENT  
UNDER  
THE SECURITIES ACT OF 1933**

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**MERCURY COMPUTER SYSTEMS, INC.**

(Exact Name of Registrant as Specified in its Charter)

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**Massachusetts**  
(State of Incorporation)

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

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

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**MERCURY COMPUTER SYSTEMS, INC.  
1997 STOCK OPTION PLAN**  
(Full Title of the Plan)

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**Gerald M. Haines II  
Senior Vice President, Corporate Development,  
Chief Legal Officer, and 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)

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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

Accelerated filer

Non-accelerated filer  (Do not check if a smaller reporting company)

Smaller reporting company

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## EXPLANATORY NOTE

Mercury Computer Systems, Inc. (the “Company”) is filing this post-effective amendment to deregister certain of the securities originally registered pursuant to the registration statement on Form S-8 (File No. 333-101993), filed with the Securities and Exchange Commission on December 19, 2002 (the “Registration Statement”) with respect to shares of the Company’s common stock, par value \$0.01 per share (“Common Stock”), thereby registered for issuance under the Company’s 1997 Stock Option Plan, as amended (the “1997 Plan”). An aggregate of 4,000,000 shares of Common Stock were registered for issuance under the 1997 Plan pursuant to the Registration Statement.

On November 14, 2005, the Company’s shareholders approved the Company’s 2005 Stock Incentive Plan (as amended from time to time, the “2005 Plan”), which replaced the 1997 Plan as of the date of approval. Following the approval of the 2005 Plan, no future awards may be made under the 1997 Plan. The maximum number of shares of Common Stock reserved and available for issuance under the 2005 Plan includes the shares underlying any grants previously made under the 1997 Plan that are forfeited, canceled, or terminated (other than by exercise) from and after the effective date of the 2005 Plan. The total number of shares available for grant under the 1997 Plan as of the effective date of the 2005 Plan was 1,942,264 shares. Additional shares (the “Additional Carried Forward 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 previously-made grants under the 1997 Plan. The Additional Carried Forward Shares included 2,421,305 shares registered under the Registration Statement, which were deregistered pursuant to Post-Effective Amendment No. 1 to the Registration Statement filed on November 30, 2006, 229,978 shares registered under the Registration Statement, which were deregistered pursuant to Post-Effective Amendment No. 2 to the Registration Statement filed on February 4, 2008, 442,047 shares registered under the Registration Statement, which were deregistered pursuant to Post-Effective Amendment No. 3 to the Registration Statement filed on December 19, 2008, 597,775 shares registered under the Registration Statement, which were deregistered pursuant to Post-Effective Amendment No. 4 to the Registration Statement filed on December 14, 2009, 77,680 shares registered under the Registration Statement, which were deregistered pursuant to Post-Effective Amendment No. 5 to the Registration Statement filed on March 11, 2011, and 29,060 shares registered under the Registration Statement, which were deregistered pursuant to Post-Effective Amendment No. 6 to the Registration Statement filed on November 4, 2011. The Additional Carried Forward Shares also include an additional 171,811 shares registered under the Registration Statement, which are hereby deregistered.

Contemporaneously with the filing of this Post-Effective Amendment No. 7 to the Registration Statement, the Company is filing a registration statement on Form S-8 to register, among other shares, an additional 171,811 shares of Common Stock for issuance pursuant to the 2005 Plan.

## 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 Post-Effective Amendment No. 7 to the 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 5th day of November, 2012.

MERCURY COMPUTER SYSTEMS, INC.

By: /s/ Gerald M. Haines II

Gerald M. Haines II  
Senior Vice President, Corporate Development, Chief  
Legal Officer, and Secretary

Pursuant to the requirements of the Securities Act of 1933, this Post-Effective Amendment No. 7 to the Registration Statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
<u>/s/ Mark Aslett</u> Mark Aslett	President, Chief Executive Officer, and Director (Principal Executive Officer)	November 5, 2012
<u>/s/ Kevin M. Bisson</u> Kevin M. Bisson	Senior Vice President, Chief Financial Officer, and Treasurer (Principal Financial Officer)	November 5, 2012
<u>/s/ Charles A. Speicher</u> Charles A. Speicher	Vice President, Controller, and Chief Accounting Officer (Principal Accounting Officer)	November 5, 2012
<u>/s/ Vincent Vitto</u> Vincent Vitto	Chairman of the Board of Directors	November 5, 2012
<u>/s/ James K. Bass</u> James K. Bass	Director	November 5, 2012
<u>/s/ George W. Chamillard</u> George W. Chamillard	Director	November 5, 2012
<u>/s/ Michael A. Daniels</u> Michael A. Daniels	Director	November 5, 2012
<u>/s/ George K. Muellner</u> George K. Muellner	Director	November 5, 2012
<u>/s/ William K. O'Brien</u> William K. O'Brien	Director	November 5, 2012
<u>/s/ Lee C. Steele</u> Lee C. Steele	Director	November 5, 2012