SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, DC 20549

SCHEDULE TO

(Rule 13e-4)

TENDER OFFER STATEMENT UNDER SECTION 14(d)(1) OR 13(e)(1)

OF THE SECURITIES EXCHANGE ACT OF 1934

(Amendment No. 2)

MERCURY COMPUTER SYSTEMS, INC.

(Name of Subject Company (Issuer) and Filing Person (Offeror))

Options to Purchase Common Stock, Par Value \$.01 Per Share, of Mercury Computer Systems, Inc.

(Title of Class of Securities)

589378 10 8

(CUSIP Number of Class of Securities (Underlying Common Stock))

Craig Barrows, Esq.

Vice President and General Counsel

Mercury Computer Systems, Inc.

199 Riverneck Road

Chelmsford, Massachusetts 01824

(978) 256-1300

(Name, Address and Telephone Number of Person Authorized to Receive Notices and Communications on Behalf of Filing Person)

Copies of all communications should be sent to:

Anthony J. Medaglia, Jr., P.C.

Goodwin Procter LLP

Exchange Place

Boston, Massachusetts 02109

(617) 570-1000

CALCULATION OF FILING FEE

Transaction Value*
\$15,311,708

Amount of Filing Fee**
\$1,638.36

- * Calculated solely for purposes of determining the filing fee. This amount assumes that options to purchase 2,188,434 shares of common stock of Mercury Computer Systems, Inc., which options have an approximate aggregate value of \$15,311,708, will be exchanged pursuant to this offer. The aggregate value of such options was calculated based on the Black-Scholes option pricing model, as of July 31, 2006.
- ** The amount of the filing fee, calculated in accordance with Rule 0-11 under the Securities Exchange Act of 1934, as amended, equals \$107.00 per million dollars of the value of the transaction. The filing fee was previously paid on August 11, 2006 in connection with the initial filing of this Schedule TO.
- Check the box if any part of the fee is offset as provided in Rule 0-11(a)(2) and identify the filing with which the offsetting fee was previously paid. Identify the previous filing by registration statement number, or the Form or Schedule and the date of its filing.

Amount Previously Paid: Not applicable
Form or Registration No.: Not applicable
Date Filed: Not applicable

- " Check the box if the filing relates solely to preliminary communications made before the commencement of a tender offer. Check the appropriate boxes below to designate any transactions to which the statement relates:
 - " third party tender offer subject to Rule 14d-1.
 - x issuer tender offer subject to Rule 13e-4.
 - " Going-private transaction subject to Rule 13e-3.
 - " amendment to Schedule 13D under Rule 13d-2.

Check the following box if the filing is a final amendment reporting the results of the tender offer: "

Introductory Statement

This Amendment No. 2 to Schedule TO amends and supplements the Tender Offer Statement on Schedule TO filed by Mercury Computer Systems, Inc., a Massachusetts corporation (Mercury), with the Securities and Exchange Commission on August 11, 2006 (as amended by Amendment No. 1 thereto on August 11, 2006) in connection with Mercury s offer to exchange certain outstanding eligible options to purchase shares of Mercury s common stock, par value \$.01 per share, that were originally granted under Mercury s 1997 Stock Option Plan for shares of restricted stock or phantom stock units that will be granted under Mercury s 2005 Stock Incentive Plan, upon the terms and subject to the conditions set forth in the Offer to Exchange that was filed as Exhibit (a)(1)(A) to the Schedule TO.

This Amendment No. 2 amends and supplements the Schedule TO and the Offer to Exchange in order to:

- clarify as appropriate throughout the Offer to Exchange that holders of eligible options who are domiciled in Canada are eligible to
 participate in the exchange program, and to add additional information in Appendix B addressing tax consequences of participation
 in the exchange program to eligible employees who are subject to taxation in Canada;
- (ii) clarify in Section 4 (Procedures for Tendering Options for Exchange) of the Offer to Exchange that Mercury s determinations of questions regarding the number of shares subject to eligible options, and the validity, form, eligibility (including time of receipt) of submitted elections (including any changes to elections) and acceptance of any tender of options will be subject to remedies that may be available under applicable law;
- (iii) clarify in Section 5 (Withdrawal Rights) of the Offer to Exchange that Mercury's determinations of questions as to the form and validity, including time of receipt, of notices of withdrawals will be subject to remedies that may be available under applicable law;
- (iv) revise the bullet points in Section 7 (Conditions of the Exchange Program) of the Offer to Exchange to:
 - (a) replace the phrase our business, condition (financial or other), results of operations, assets, liabilities or prospects with the phrase our business, financial condition, results of operations, assets or liabilities;
 - (b) replace the phrase our business, condition (financial or other), results of operations, assets, liabilities, prospects or stock ownership with the phrase our business, financial condition, results of operations, assets or liabilities; and
 - (c) clarify that Mercury s determinations or judgments concerning the events described in Section 7 will be subject to remedies that may be available under applicable law;
- (v) clarify in Section 19 (Forward-Looking Statements) that Mercury s disclaimer of any obligation to update any forward-looking statement to reflect events or circumstances after the date on which such statement is qualified to the extent any such obligation to update is required by applicable federal securities laws;
- (vi) file as Exhibit (a)(1)(A)(ii) an amended Offer to Exchange reflecting the above-described clarifications and revisions;
- (vii) file as Exhibit (a)(1)(P) an email notifying eligible employees of the availability of the amended Offer to Exchange on Mercury s intranet; and

(viii) file as Exhibit (d)(11) a form of Stock Option Agreement under Mercury s 2005 Stock Incentive Plan.

ITEM 12. EXHIBITS.

The Exhibit Index included in this Amendment No. 2 to Schedule TO is incorporated herein by reference.

SIGNATURE

After due inquiry and to the best of my knowledge and belief, I certify that the information set forth in this statement is true, complete and correct.

MERCURY COMPUTER SYSTEMS, INC.

(Registrant)

Date: September 1, 2006

By: /s/ Robert E. Hult

Robert E. Hult

Senior Vice President,

Chief Financial Officer

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EXHIBIT INDEX

Exhibit		Incorporated by Reference				Filed
Number	Exhibit Description	Form	File No.	Exhibit	Filing Date	Herewith
(a)(1)(A)(i)	Offer to Exchange, dated August 11, 2006, including Transmittal Letter, form of Election to Participate and form of Notice of Withdrawal.	TO-I	005-52823	(a)(1)(A)	August 11, 2006	
(a)(1)(A)(ii)	Amended Offer to Exchange, dated September 1, 2006, including form of Election to Participate and form of Notice of Withdrawal.					X
(a)(1)(B)	Form of Personnel Grant Status.	TO-I	005-52823	(a)(1)(B)	August 11, 2006	
(a)(1)(C)	Email dated August 11, 2006 announcing the commencement of the election period for the exchange program.	TO-I	005-52823	(a)(1)(C)	August 11, 2006	
(a)(1)(D)	Form of email reminder of option exchange program expiration date.	TO-I	005-52823	(a)(1)(D)	August 11, 2006	
(a)(1)(E)	Preliminary Proxy Statement.	14A	000-23599	N/A	June 27, 2006	
(a)(1)(F)	Definitive Proxy Statement.	14A	000-23599	N/A	July 10, 2006	
(a)(1)(G)	Mercury s 2005 Stock Incentive Plan, amended and restated through August 7, 2006.	8-K	000-23599	10.1	August 8, 2006	
(a)(1)(H)	Form of Restricted Stock Award Agreement under Mercury s 2005 Stock Incentive Plan.	8-K	000-23599	10.3	November 16, 2005	
(a)(1)(I)	Form of Deferred Stock Award Agreement under Mercury s 2005 Stock Incentive Plan.	10-Q	000-23599	10.1	May 9, 2006	
(a)(1)(J)	French Guidelines for Stock Free Awards to employees and corporate officers of Mercury s French subsidiaries.	TO-I	005-52823	(a)(1)(J)	August 11, 2006	
(a)(1)(K)	Mercury s Annual Report on Form 10-K for the fiscal year ended June 30, 2005.	10-K	000-23599	N/A	September 13, 2005	
(a)(1)(L)	Mercury s Quarterly Report on Form 10-Q for the quarter ended September 30, 2005.	10-Q	000-23599	N/A	November 9, 2005	
(a)(1)(M)	Mercury s Quarterly Report on Form 10-Q for the quarter ended December 31, 2005.	10-Q	000-23599	N/A	February 9, 2006	

E-Liki		Incorporated by Reference			*** 1	
Exhibit Number	Exhibit Description	Form	File No.	Exhibit	Filing Date	Filed Herewith
(a)(1)(N)	Mercury s Quarterly Report on Form 10-Q for the quarter ended March 31, 2006.	10-Q	000-23599	N/A	May 9, 2006	
(a)(1)(O)	PowerPoint Presentation Regarding the Exchange Program.	TO-I/A	005-52823	(a)(1)(O)	August 11, 2006	
(a)(1)(P)	Email notifying eligible employees of the availability of the amended Offer to Exchange on Mercury s intranet.					X
(b)	Not applicable.					
(d)(1)	Mercury s 1997 Stock Option Plan, as amended and restated.	8-K	000-23599	10.1	November 18, 2004	
(d)(2)	Form of Option Agreement under Mercury s 1997 Stock Option Plan.	10-Q	000-23599	10.1	November 1, 2004	
(d)(3)	Form of Restricted Stock Award Agreement under Mercury s 1997 Stock Option Plan.	8-K	000-23599	10.1	August 17, 2005	
(d)(4)	Form of Restricted Stock Award Agreement with James R. Bertelli under Mercury s 1997 Stock Option Plan.	10-K	000-23599	10.2.4	September 13, 2005	
(d)(5)	Form of Stock Option Agreement under Mercury s 2005 Stock Incentive Plan.	8-K	000-23599	10.2	November 16, 2005	
(d)(6)	Form of Restricted Stock Award Agreement under Mercury s 2005 Stock Incentive Plan.	8-K	000-23599	10.3	November 16, 2005	
(d)(7)	Form of Restricted Stock Award Agreement with James R. Bertelli under Mercury s 2005 Stock Incentive Plan.	8-K	000-23599	10.4	November 16, 2005	
(d)(8)	Form of Stock Option Agreement under Mercury s 2005 Stock Incentive Plan.	8-K	000-23599	10.1	June 2, 2006	
(d)(10)	Form of Change in Control Severance Agreement.	8-K	000-23599	10.1	February 23, 2006	
(d)(11)	Form of Stock Option Agreement under Mercury s 2005 Stock Incentive Plan.	8-K	000-23599	10.1	August 21, 2006	
(g)	Not applicable.					
(h)	Not applicable.					