

**PROSPECTUS SUPPLEMENT
(TO PROSPECTUS DATED AUGUST 19, 2004)**

\$125,000,000

Mercury Computer Systems, Inc.

**2.00% Convertible Senior Notes due 2024 and
the Common Stock Issuable upon Conversion of the Notes**

This document supplements the prospectus dated August 19, 2004 relating to the resale by selling securityholders, and their transferees, pledgees, donees and successors, of 2.00% Convertible Senior Notes due 2024 and the shares of common stock issuable upon conversion of the notes. This document supplements, and should be read in conjunction with, the prospectus.

The following table supplements information with respect to the selling securityholders and the respective principal amounts of notes and shares of common stock that may be offered by each selling securityholder under the prospectus. The information is based on information that has been provided to us by or on behalf of the selling securityholders. The table lists additional selling securityholders as well as updated information regarding certain selling securityholders listed in the table on pages 44-47 of the prospectus.

Name	Principal Amount of Notes Beneficially Owned that May Be Sold	Percentage of Notes Outstanding	Number of Shares of Common Stock Issuable Upon Conversion of the Notes that May Be Sold ⁽¹⁾⁽²⁾
Allstate Insurance Company ⁽³⁾	2,100,000	1.68%	69,467
BNP Paribas Equity Strategies, SNC ⁽⁴⁾⁽⁵⁾	2,585,000	2.07%	85,511
Boilermakers Blacksmith Pension Trust ⁽⁶⁾	1,375,000	1.10%	45,484
Chrysler Corporation Master Retirement Trust ⁽⁷⁾	1,765,000	1.41%	58,385
CooperNeff Convertible Strategies (Cayman) Master Fund, LP ⁽⁴⁾	2,545,000	2.04%	84,187
DBAG London ⁽⁸⁾	2,424,000	1.94%	80,185
Delta Airlines Master Trust ⁽⁶⁾	360,000	0.29%	11,908
Delta Airlines Master Trust – CV ⁽⁷⁾	425,000	0.34%	14,058
Duke Endowment ⁽⁶⁾	300,000	0.24%	9,923
F.M. Kirby Foundation, Inc.	655,000	0.52%	21,667
International Truck & Engine Corporation Non-Contributory Retirement Plan Trust ⁽⁷⁾	400,000	0.32%	13,231
International Truck & Engine Corporation Retiree Health Benefit Trust ⁽⁷⁾	155,000	0.12%	5,127
International Truck & Engine Corporation Retirement Plan for Salaried Employees Trust ⁽⁷⁾	230,000	0.18%	7,608
Lyxor/Convertible Arbitrage Fund Limited ⁽⁴⁾	459,000	0.37%	15,183
Microsoft Corporation ⁽⁷⁾	460,000	0.37%	15,216
Motion Picture Industry Health Plan – Active Member Fund ⁽⁷⁾	80,000	0.06%	2,646
Motion Picture Industry Health Plan – Retiree Member Fund ⁽⁷⁾	55,000	0.04%	1,819
OCM Convertible Trust ⁽⁷⁾	655,000	0.52%	21,667
OCM Global Convertible Securities Fund ⁽⁷⁾	60,000	0.05%	1,984
Qwest Occupational Health Trust ⁽⁷⁾	75,000	0.06%	2,480
Singlehedge US Convertible Arbitrage Fund ⁽⁴⁾	634,000	0.51%	20,972
State Employees Retirement Fund of the State of Delaware ⁽⁷⁾	380,000	0.30%	12,570
Sturgeon Limited ⁽⁴⁾	527,000	0.42%	17,433
UBS AG London Branch ⁽⁹⁾⁽¹⁰⁾	10,000,000	8.00%	330,797
UBS AG London – F/B/O HFS	2,000,000	1.60%	66,159
UnumProvident Corporation ⁽⁷⁾	165,000	0.13%	5,458
Vanguard Convertible Securities Fund, Inc. ⁽⁷⁾	8,495,000	6.80%	281,012

⁽¹⁾ Assumes conversion of all of the holder's notes at the initial conversion rate of 33.0797 shares per \$1,000 principal amount of the notes (representing an initial conversion price of approximately \$30.23 per share of common stock). However, this conversion price will be subject to adjustment as described in the section of the prospectus entitled "Description of Notes—Conversion of Notes." As a result, the amount of common stock issuable upon conversion of the notes may increase or decrease in the future.

⁽²⁾ Except as noted below, in the case of each selling securityholder, the percentage of our shares of common stock that will be beneficially owned by such selling securityholder after conversion of such holder's notes will be less than one percent (1%) of our outstanding common stock. This calculation is based on 21,289,655 shares of our common stock outstanding as of August 4, 2004. In calculating this amount for each selling securityholder, we treated as outstanding the number of shares of common stock issuable upon conversion of all of that holder's notes, but we did not assume the conversion of any other holder's notes, and, where applicable, we included any shares reported by the selling securityholder as being beneficially owned by such holder in addition to the registrable shares. The following selling securityholders would beneficially own the

percentage of shares noted below following conversion of the notes: UBS AG London Branch, 1.55%; Vanguard Convertible Securities Fund, 1.30%.

- (3) As of the date of the selling securityholder's questionnaire, the selling securityholder beneficially owned 8,900 shares of common stock in addition to the registrable securities indicated in the table.
- (4) CooperNeff Advisors, Inc. has sole investment power and shared voting power over the registrable securities. Christian Menestrier is the CEO of CooperNeff Advisors, Inc.
- (5) As of the date of the selling securityholder's questionnaire, the selling securityholder beneficially owned 3,335 shares of common stock in addition to the registrable securities indicated in the table.
- (6) The following natural person has voting or investment power over the registrable securities: Ann Houlihan.
- (7) The following natural person has voting or investment power over the registrable securities: Lawrence Keele.
- (8) The following natural person has voting or investment power over the registrable securities: Patrick Corrigan.
- (9) The following natural person has voting or investment power over the registrable securities: Tom Klein.
- (10) As of the date of the selling securityholder's questionnaire, the selling securityholder beneficially owned 3,414 shares of common stock in addition to the registrable securities indicated in the table.

This prospectus supplement is not complete without the prospectus dated August 19, 2004, and we have not authorized anyone to deliver or use this prospectus supplement without the prospectus.

The date of this prospectus supplement is September 20, 2004.
