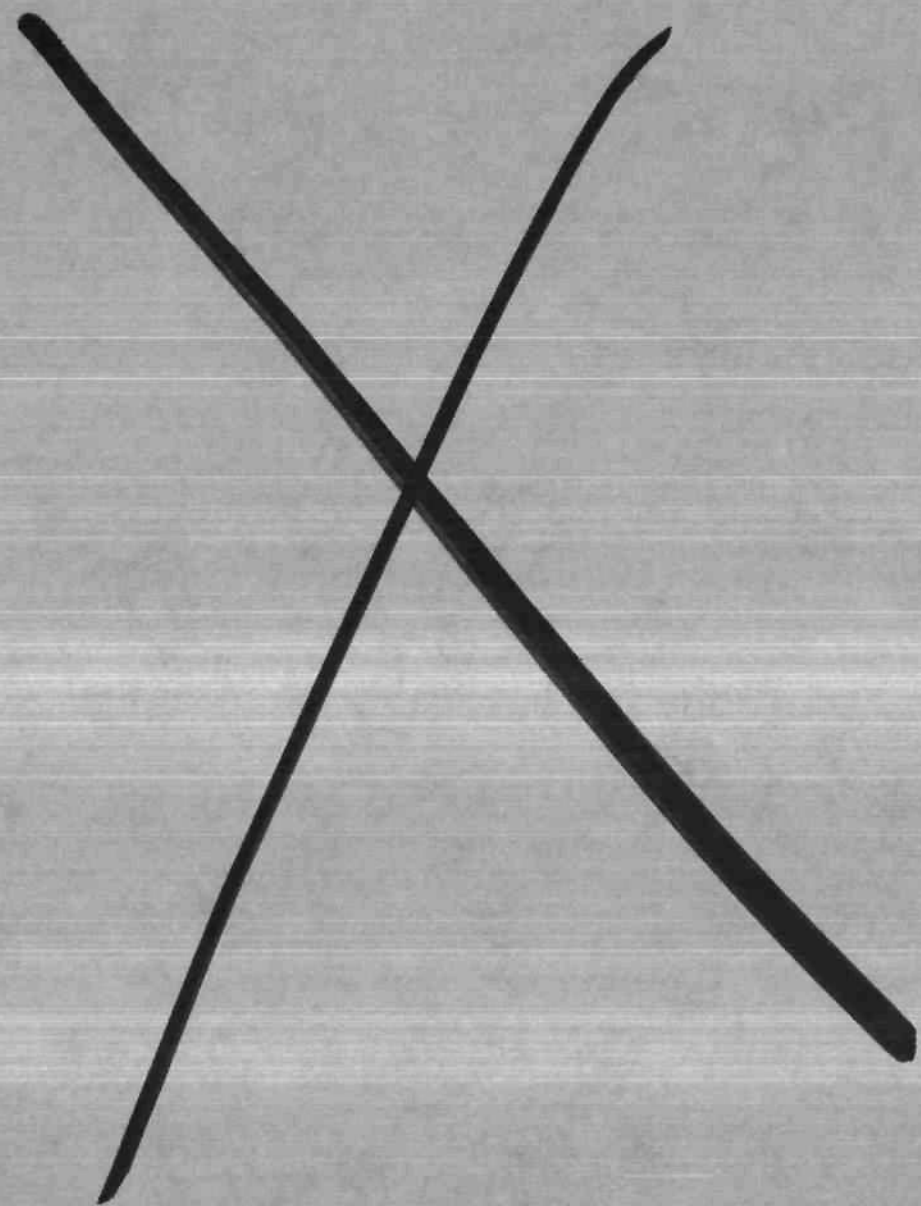

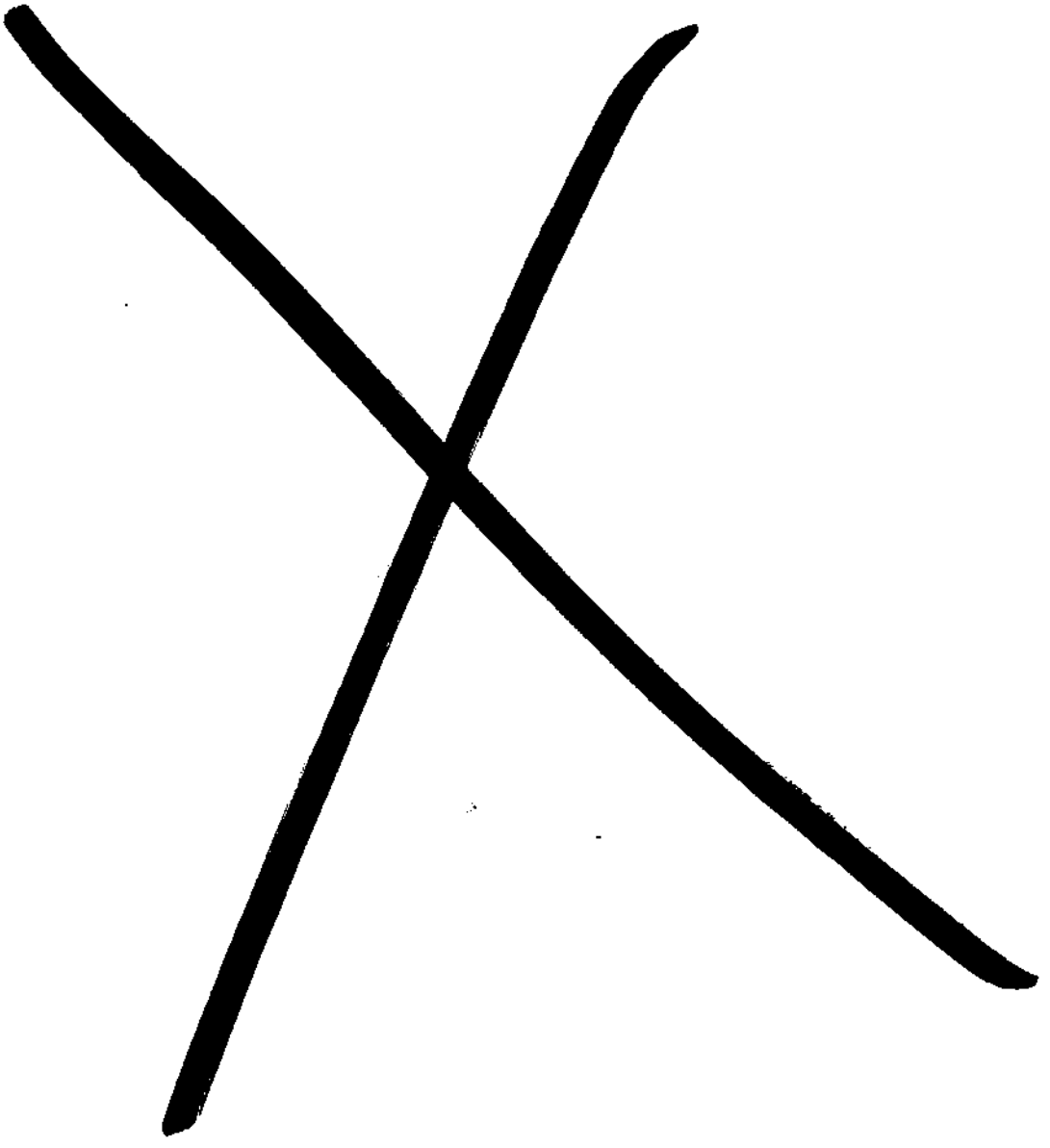

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# Research *Bulletin*

## OCTOBER MARKET WATCH: INVENTORIES AND BUSINESS NOW FLAT; SOME POSITIVE SIGNS NOTED

The *Market Watch* is a monthly Dataquest report that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

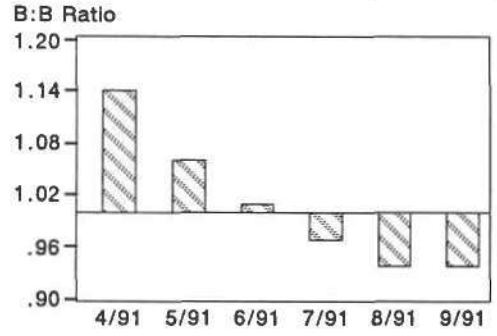



**Figure 2**
**DOC Computer Demand**

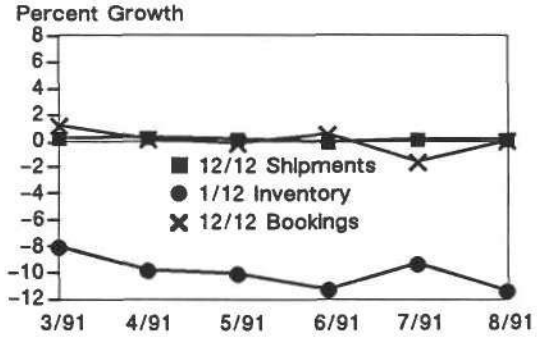



**Figure 3**
**Semiconductor Inventory Level**

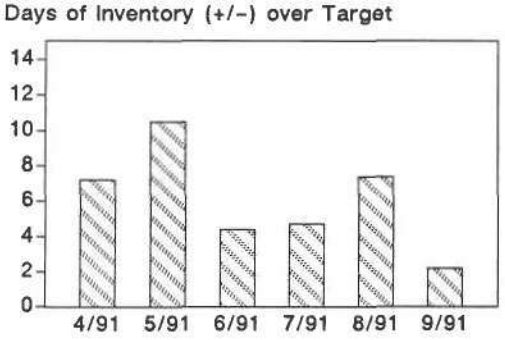
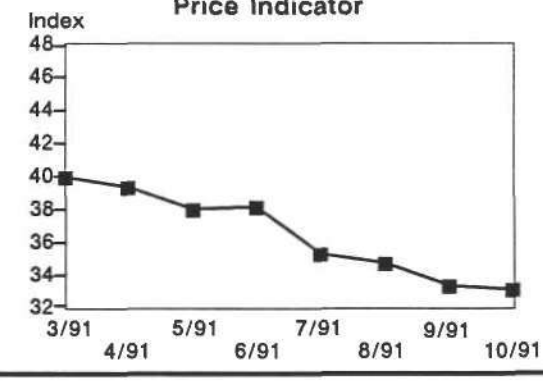



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, U.S. Department of Commerce, Dataquest (October 1991)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## STEADY AS IT GOES . . . BOOKINGS AND BILLINGS AVERAGES ARE STATIC

As Figure 1 illustrates, the book-to-bill ratio for September remained at a low of 0.94 following two below-parity months of this key index. The actual average booking and billings totals for September reflect a relatively unchanged picture since last month, with the three-month average booking level up a positive 0.2 percent and the corresponding average billing level up 1.0 percent over August. The flattening of order dollars ties in with the static price situation analyzed later in this article. Unit shipment levels appear to remain flat with inventory control, ensuring that order rates mirror system booking levels. Based on discussions with key users, we expect semiconductor order rates to remain relatively flat over the next quarter as the uncertain market conditions get worked out.

## COMPUTER ORDERS PICK UP SLIGHTLY; BILLINGS REMAIN FLAT

The annualized 12/12 rate of change for computer bookings rose above 0 percent growth to a positive 0.1 percent for the month of August. Combined with a flat 12/12 shipment rate of change of 0.2 percent and a drop in the 1/12 inventory rate to a negative 11.3 percent, the market for computers still reflects the slow/no growth equilibrium that began earlier this year (see Figure 2). As a result of the fierce price competition now going on, incremental increases in computer unit sales are not likely to affect the annualized dollar shipment rate in the near term. The new product announcements made this month may spark business levels upward, but these results will not be reflected in the Department of Commerce's numbers until late in the first quarter of 1992. Until then, although the ingredients exist for a business turnaround, assuaging customers' anxieties and meeting/exceeding their needs is the first priority now for suppliers.

## SEMICONDUCTOR INVENTORIES WITHIN TWO DAYS OF TARGET!

Figure 3 highlights that the difference between actual and targeted inventory levels for September was the lowest noted over the past six months (only 2 days!). The targeted inventory level for September rose to 23 days from the low point of 17 days noted in August, while the actual level remained at a flat 25 days. The actual inventory level has not changed for three consecutive months now, reiterating how well inventories are being managed in this flat market. The rise in average target levels appears to be an adjustment to better reflect an achievable goal versus a difficult-to-meet ideal. Forecast accuracy continues to be getting much attention from system companies as many are now planning next year's volume requirements. Close communication now with suppliers regarding current and future capacity expectations should include contingencies for upturns in business activity that Dataquest expects to see by the second quarter of next year.

## SEMICONDUCTOR PRICES LOW AND UNCHANGED

The flat pricing shown in Figure 4 reflects a current wait-and-see attitude on the part of suppliers now deciding what levels of semiconductor capacity will be needed in 1992. Supplies of DRAM, SRAM, and 32-bit microprocessors remain abundant, with lead times hovering around an 8-week average. As mentioned earlier, the religion of inventory control is keeping the current ease of availability from becoming an unneeded inventory buildup. The European reference pricing for the fourth quarter appears to be more in line with market dynamics (i.e., no appreciable price increases), and Japanese memory product pricing in the United States seems now to be in line with home market pricing. The issue of x9 SIMM pricing resulting from the Wang versus Toshiba and NEC litigation will most likely result in a 4 to 5 percent price adder for patent royalties on all x9 SIMMs (including the three-piece solution). Although there currently is some disruption of deliveries for Toshiba and NEC SIMMs, once this premium is absorbed into the average price level, continued price declines are still expected.

## DATAQUEST PERSPECTIVE

The overall market remains pensive—low inventories, flat/declining prices, and flat demand have become the accepted norm. Although most of the ingredients of an economic upturn in electronics are in place, the mixture for the next cycle is more dependent on software suppliers than hardware companies. In discussions with semiconductor users and suppliers at the recent Dataquest Semiconductor Conference in Monterey, California, the overriding theme was that enabling software needs to be better integrated into product introductions or revisions. Ease of use of existing (and future) system designs appears to be an area of hardware growth that requires increased coordination with software designers. As the economy s-l-o-w-l-y crawls out of its slump, most businesses are poised to take advantage of it. Continued focus on the fundamentals now remains the primary means of surviving until business picks up.

*Mark Giudici*

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# Research *Bulletin*

## OCTOBER PROCUREMENT PULSE: BUSINESS LEVELS FLATTEN AS INVENTORIES ARE UP AND LEAD TIMES DOWN

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This article explains what inventory and order corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

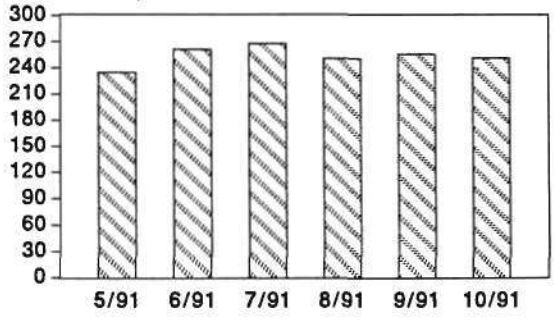



**Figure 2**
**Averaged Semiconductor Lead Times**

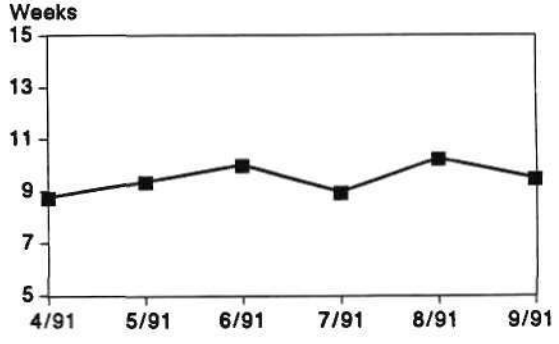
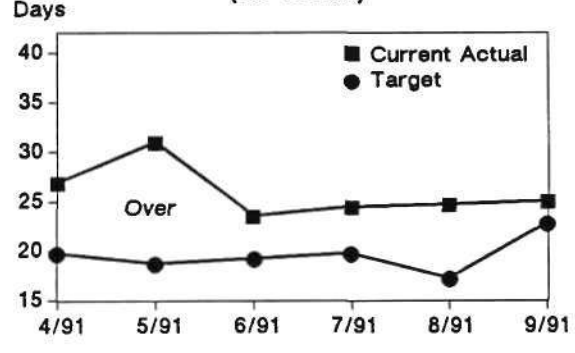



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

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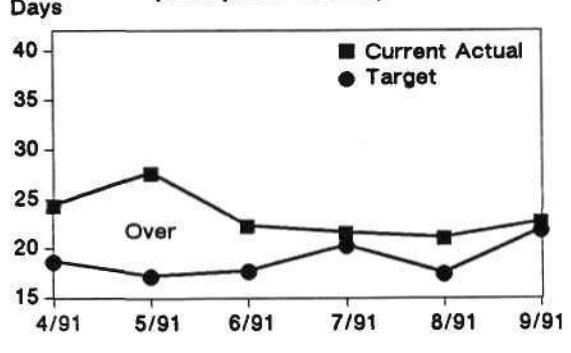


Source: Dataquest (October 1991)


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NASM Newsletters 1991: October-December 1991-25



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## ANOTHER FLAT MONTH OF SEMICONDUCTOR ORDERS MIRRORS THE SYSTEM MARKET

The overall trend of semiconductor order levels for the last six months has remained relatively flat, as seen in Figure 1. The 1.2 percent drop in our order index ties in with the overall business climate, which is basically in a holding pattern awaiting a turnaround in the economy. The six-month system sales outlook remains relatively rosy at a positive 7.3 percent, slightly lower that last month's 7.7 percent level. The computer subset of our sample has lowered its expectations to 5.8 percent from last month's 7.4 percent, primarily as a result of fierce price competition. Semiconductor prices continue to decline slowly at a negative 1.6 percent rate over last month, again tying in with the overall balanced market. Due to uncertainty in the direction of 4Mb DRAM demand, some Japanese suppliers are contemplating shifting capacity to consumer products where demand is stronger. If this occurs in aggregate, the firming of 4Mb prices as supplies tighten up could undo the economic crossover to the 1Mb device that occurred six months ago. Dataquest does not anticipate availability or price problems in the DRAM market because of the growing base of non-Japanese capacity now coming to production.

## LEAD TIMES DIP BELOW 10 WEEKS, AVAILABILITY REMAINS GOOD

As shown by Figure 2, the average lead time fell to 9.5 weeks from last month's six-month high point of 10.3 weeks. With a background of steady order levels, the slight blip in lead times seen last month has been adjusted for, and a more historical delivery span is again emerging. Accurate user forecasting continues to prevent delivery delays/extensions with strategic suppliers. Delivery of DRAMs in compliance with the recent U.S.-Japan Semiconductor Trade Arrangement is now well understood and is not causing delivery or price aberrations. Any concerted effort to control supplies of product to firm or raise prices in the current market will result in loss of revenue due to improved competitiveness in both the memory and microprocessor markets. Dataquest still foresees this steady market continuing for the near term as capacity levels of semiconductor suppliers accurately meet demand levels.

## SEMICONDUCTOR INVENTORIES INCH UP SLIGHTLY TO 25 DAYS

The slight rise in overall actual inventories (25.1 days versus last month's 24.8 days) illustrated in Figure 3 is actually no change when rounded out. What did change is the overall targeted inventory level that rose from 17.3 days to a historically consistent 22.9 days. This increase reflects a few respondents' raising inventory targets to reachable levels while keeping actual levels under control. A good example of inventory control is shown in Figure 4, where the target and actual inventories of the computer company respondents is less than one day (22.0 targeted versus 22.8 days actual)! As mentioned in earlier *Procurement Pulses* issues, the 20-day targeted inventory level and 30-day actual level appear to be evolving into a respective sub-20-day to sub-25-day target-actual inventory paradigm. Twelve turns of semiconductor inventory remains the aggregate target level as companies maintain cost control measures in the current flat market. Dataquest expects to see further improvements in inventory levels as forecasting accuracy improves.

## DATAQUEST PERSPECTIVE

Although the basic indices have not changed appreciably since our last report (or for the last three months), a slight bit of optimism is being seen in the user's outlook. Increased competition in the 32-bit microprocessor market will eventually translate into improved availability and pricing for these parts that, up until now, have enjoyed above-average demand in a flat market. Whether competitive 32-bit MPU pricing will stimulate growth in a replacement systems market (laptop PCs) or create new applications is a hot question now being discussed by many of the support chip suppliers that are planning capacity levels for next year. The basic fundamentals of forecast accuracy combined with improving availability should allow for sustainable business now, in the near term, and above-average supplier support over the next 12 to 18 months.

*Mark Giudici*

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# Research *Bulletin*

## SEPTEMBER MARKET WATCH: SEASONAL SLOWS STILL CAST HAZE ON DEMAND UPTURN

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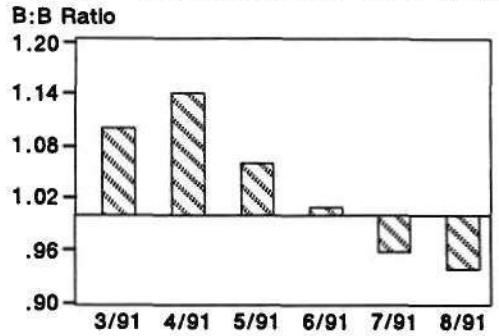


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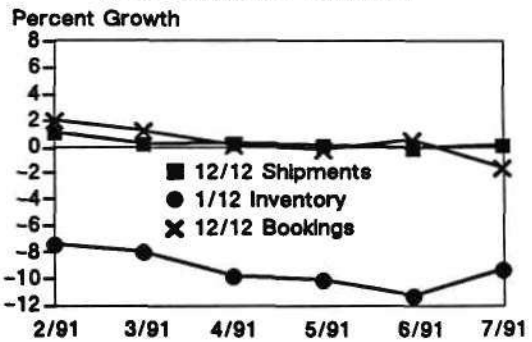


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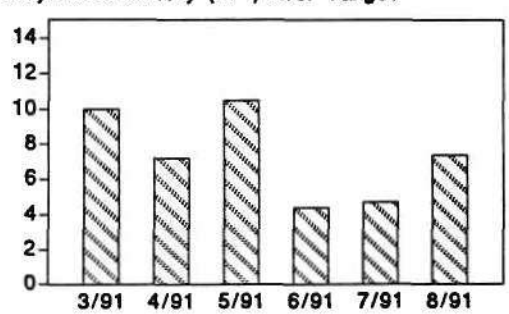


**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**


Source: WSTS, U.S. Department of Commerce, Dataquest (September 1991)


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## THE BOOK-TO-BILL SLIPS FOR THE FOURTH MONTH RUNNING . . . IT MUST BE SEPTEMBER!

Following the historical trend of the past three years (1988 to 1990), the August book-to-bill ratio declined to 0.94 after three months of the falling bellwether (see Figure 1). The three-month average bookings level for August fell 2.5 percent from July's level and was 1.2 percent lower than August 1990's comparable figure. The billing picture is somewhat brighter, with monthly billings for August up 5.3 percent over July levels and 0.9 percent higher (i.e., flat) than year-ago August levels. The "normal" seasonality of slow summer semiconductor activity is being compounded by a low demand for systems that does not appear to show signs of improving over the short term. Using history as a guide, the book-to-bill ratio continued to decline through November during the 1988-to-1990 three-year period. What this ratio highlights is ample availability and capacity amid a slow market.

## COMPUTER ORDER RATES GO NEGATIVE, BILLINGS REMAIN FLAT

For the first time in 53 months, the 12/12 rate of change for computer bookings dipped below negative 1.0 percent (7/91 = negative 1.5 percent, 2/87 = negative 2.2 percent)! The 12/12 billings rate remained relatively unchanged at 0.2 percent, and the 1/12 inventory rate increased slightly to negative 9.2 percent from the May low point of negative 11.2 percent (see Figure 2).

Although the annualized system booking rate is negative, inventories remain very low and under control. The continued market malaise affecting the electronics industry does not appear to be abating; however, recent new product announcements may spur incremental growth. With the rapid commoditization of systems, productivity improvements will be coming from software that makes generic hardware proprietary. As standards develop for next-generation operating systems and application software, the growth of computer systems and supporting peripherals should follow.

## SEMICONDUCTOR INVENTORY TARGETS TIGHTEN UP

Although Figure 3 appears to show an increase in inventory levels, overall actual inventories remained static at July's level of 25 days. What changed appreciably was the overall inventory target, which went from an average 20 days to 17 days! The net result is an increase of less than three days difference (2.7 days) added to last month's 4.7-day delta, which was primarily caused by tougher goals being set for inventory levels. The old 20-day target/30-day actual inventory range is being rapidly replaced by a sub-20/30-day inventory paradigm. As mentioned in the last *Market Watch*, improvements in inventory control now being seen were expected. The next area that many systems companies are addressing is forecast accuracy, which will result indirectly in further inventory level improvements.

## SEMICONDUCTOR PRICES CONTINUE TO SLIP, MATCHING SYSTEM DEMAND

Figure 4 illustrates that semiconductor pricing continued to slowly decline (negative 1.1 percent) compared with last month's index, again mirroring the relatively balanced (yet sluggish) market. Some below-market spot pricing of DRAMs and EPROMs continues to spice up a relatively mundane supply/demand balancing act. These low-price plays for market share have been short lived and of limited quantity to date. The confusion over home market versus export market pricing of DRAM by Japanese suppliers has subsided with some firming of prices by some suppliers. The quick coordination of the home market and export market pricing for Japanese DRAM suppliers is being addressed. Non-Japanese suppliers are cautiously taking advantage of the situation with products priced slightly lower.

## DATAQUEST PERSPECTIVE

Despite a sluggish summer, the fundamentals of tight inventory control and cost containment are still allowing the industry to quickly react to any change in demand. The combination of well-managed inventories with forecasting improvements will allow for a gradual acceleration out of the current slump. The balancing act of the market seen for the past six months continues to force companies and their suppliers to improve on the variables of the total cost equation (delivery + quality + price + technical support + customer service). Now that the annual contract negotiation season is upon us, many companies are meeting with their regional procurement divisions to better understand the overall market and plan how each region can improve their total costs. Because everyone currently is more or less in the same economic boat, satisfying the customer is the overriding goal that is the prime differentiator in determining whether business is made or lost.

*Mark Giudici*

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# Research *Bulletin*

## SEPTEMBER PROCUREMENT PULSE: ORDERS AND INVENTORIES STEADY, WHILE LEAD TIMES REBOUND

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This report explains what inventory and order corrections mean to both semiconductor users and manufacturers.

**Figure 1**
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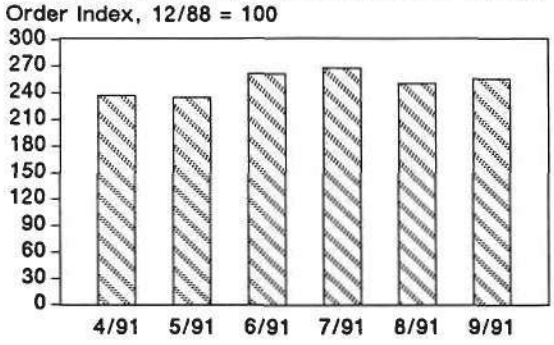


**Figure 2**
**Averaged Semiconductor Lead Times**

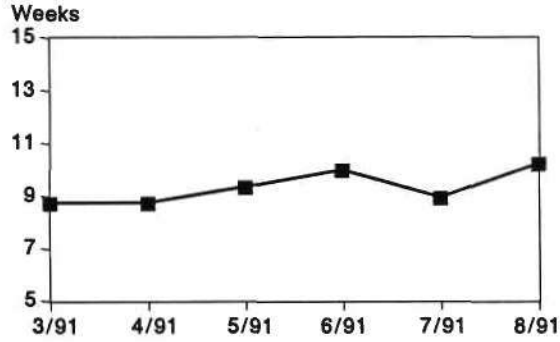


**Figure 3**
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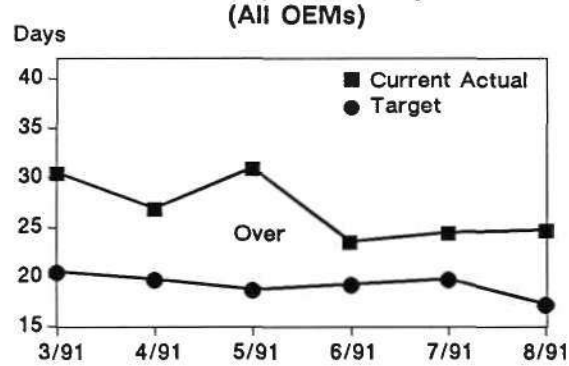


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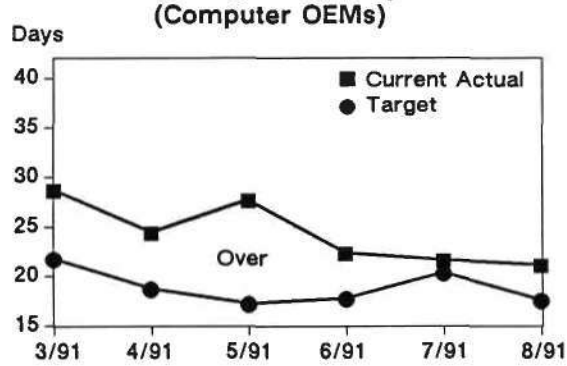


Source: Dataquest (September 1991)


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## SEMICONDUCTOR ORDER LEVELS FLATTEN, IN LINE WITH SYSTEM SALES

Figure 1 illustrates the relative static nature of semiconductor order levels over the past six months. The current level of semiconductor orders is only 1.6 percent higher than that seen in last month's survey and mirrors the overall electronics industry (i.e., unchanged). The survey respondents' six-month system sales outlook remains positive at 7.7 percent but is down from last month's 11.3 percent. As mentioned in last month's *Procurement Pulse*, the high system sales then forecast did not correlate with expected price declines in semiconductors and the overall flat macroeconomic/electronic market situation. The lower but positive six-month system sales outlook appears more realistic relative to the current and near-term market situation. Semiconductor prices are expected to decline, but at a slower pace than last month (negative 1.7 percent currently versus negative 2.4 percent). The reduction in the rate of price decline is due in part to the firming of DRAM prices by some large Japanese suppliers as they sort out the ramifications of the recent U.S.-Japan semiconductor accord. Some companies are discussing reducing production levels to better meet lower demand.

## LEAD TIMES EXTEND SLIGHTLY, NOW AVERAGING 10.3 WEEKS

The average semiconductor lead time rebounded back to slightly above 10 weeks versus last month's 9-week average. Although orders activity has remained steady, some suppliers have had unexpected orders placed because of the lack of competitors' delivery. In aggregate, these unforecast orders have extended the overall lead-time average. The balancing act of meeting static demand levels with an occasional uptick continues. Ongoing forecast accuracy on the users' part must be maintained and improved upon in order to achieve low inventory levels and predictable lead times. The confusion surrounding the U.S.-Japan Semiconductor Trade Arrangement (which was effective August 1) appears to be subsiding with a more coordinated effort being made to correlate regional DRAM pricing differences. In light of the steady-state supply demand situation, Dataquest continues to expect the average lead time to be within the 8- to 12-week range for the remainder of this year.

## SEMICONDUCTOR INVENTORIES LOW AND PLANNED TO GO LOWER

On-hand semiconductor inventories remained unchanged since last month, but the targeted goal declined by more than 10 percent! The overall average targeted and actual inventories for August were a respective 17.3 and 24.8 days compared with our last report's like figures of 19.8 and 24.5 days. The computer segment average target level for August declined to 17.6 days from last month's 20.4-day aberration, while actual levels inched down from 21.7 to 21.2 days. Figures 3 and 4 point out that the slope of each target line is near zero, while each actual inventory line has a definite negative inclination. The difference between target and actual is shrinking, attesting to the resolve of electronics companies to pare back inventories as much as possible to keep costs under control. It also appears that as actual inventories decline, target levels are more slowly reduced. The 20-day target, 30-day actual inventory standard seen for the past two to three years now looks more like an average 18-day target, 25-day actual inventory paradigm. The level of inventory controls now in place caused by flat business conditions will be maintained as business picks up as a result of price pressure in the systems markets that shows no sign of easing.

## DATAQUEST PERSPECTIVE

The status of availability, delivery, and pricing have not changed appreciably since our last report. All are very good and under control. Respondents continue to note that quality and support for obsolete products with end-of-life buys are areas that suppliers need to focus on in the near term. Although some memory devices are having longer lead times, semiconductor users need to ensure that there are no surprises with their suppliers now that the annual contract season is here. The intangible portion of the total cost function of product (for instance, customer service, technical support, good communication) is becoming more a factor in maintaining and growing business in the current market. With the tangible costs controlled, those companies that excel in the intangible areas will have the most to gain.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: 1991—THE YEAR TO WRITE OFF

*SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE BUSINESS CLIMATE

Signs of an economic recovery continue to mount, but the signals are mixed, as follows:

- U.S. real GNP growth in the second quarter was estimated to be a 0.4 percent seasonally adjusted annualized rate (preliminary).
- U.S. personal income and personal spending were both up 0.5 percent in June.
- The Conference Board's consumer confidence index remained essentially unchanged from June to July, reflecting households' persistent pessimism.
- The DOC's index of leading economic indicators climbed 0.5 percent in June, the fifth consecutive monthly increase, but factory orders fell by 1.4 percent across the board in June after a two-month run of greater than 2 percent increases.
- The National Association of Purchasing Management's index rose to 51.8 percent in July from 50.9 percent in June, the sixth increase in a row. (A reading over 50 percent generally indicates growth.) Much of the increase stemmed from production, a sign that the recovery in manufacturing is taking hold, and employment increases may soon follow.
- The U.S. unemployment rate fell to 6.8 percent in July from 7.0 percent in June.
- New-car sales were down 8.2 percent in July and down 9.4 percent in early August from year-earlier levels.
- Retail sales were up 0.5 percent in July, the third consecutive monthly gain.
- Housing starts rose 3.7 percent in July.
- Industrial production rose 0.5 percent in July, as industrial capacity utilization rose 0.2 percentage points to 79.7 percent.

The Dun and Bradstreet Corporation expects zero growth in U.S. real GNP in 1991, with positive growth in the second half offsetting the negative 1.7 percent average growth in the first half.

This is small consolation for electronics manufacturers, however, because real business fixed investment in capital equipment—of which computers represent 7 percent—is expected to lag overall economic growth. After falling a seasonally adjusted annualized rate of 18.4 and 1.6 percent in the first and second quarters, respectively, real business equipment investment is expected to grow 4.3 and 3.7 percent in the third and fourth quarters, respectively. For 1991 overall, real business equipment investment is expected to decline 2.5 percent from the 1990 level.

### EQUIPMENT MARKETS

According to Dataquest's August survey of major OEM semiconductor procurement managers, expectations of short-term production remain relatively optimistic: Overall six-month systems sales are expected to grow 9.8 percent, up slightly from 9.0 percent in July. Data processing OEMs' expected six-month growth is down to 8.7 percent compared with 10.0 percent in July. Six-month growth expectations ranged from 4 to 20 percent growth.

Computers and office equipment orders growth for the three months ended in June was 0.1 percent *above* year-earlier orders compared with negative 2.9 percent growth in May (see Figure 1). Shipments growth for the same period was 1.6 percent below year-earlier shipments compared with negative 1.9 percent growth in May. This provides a good news-bad news situation: July was the second month of improvement in orders


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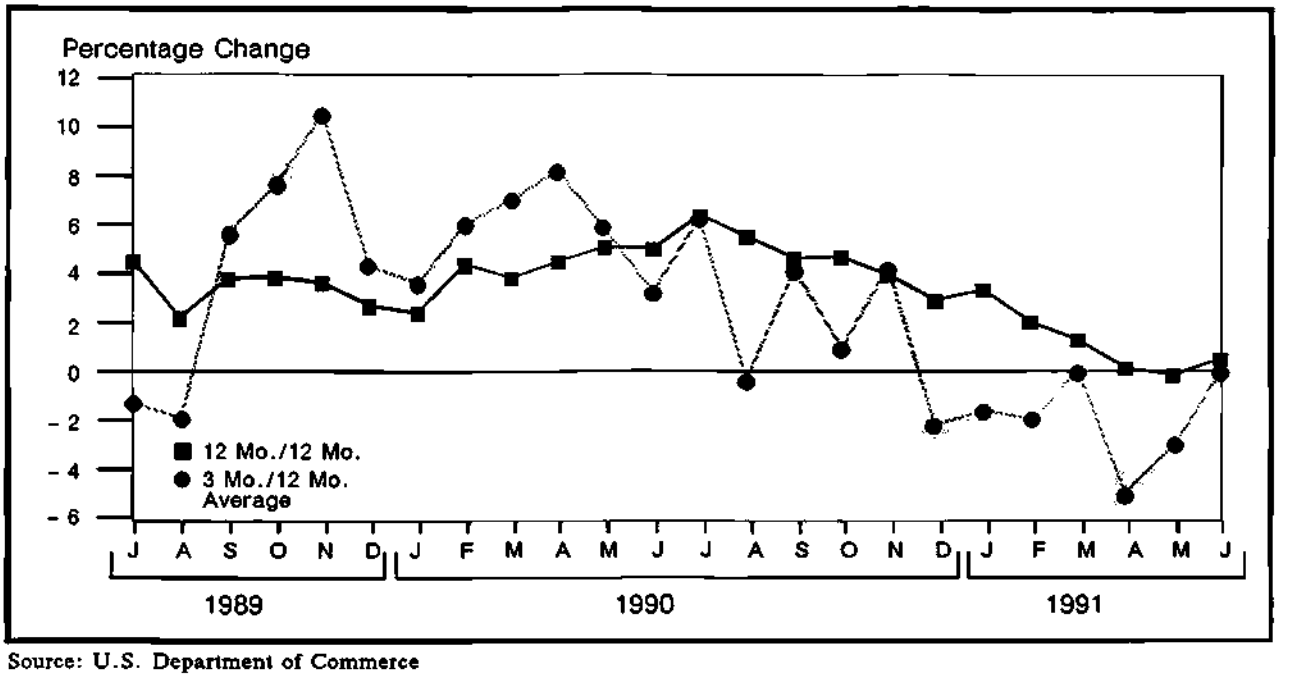
FIGURE 1
U.S. Computers and Office Equipment




Source: U.S. Department of Commerce

growth—granted, the rate is still negative, but it has become less negative in the last two months. Unfortunately, July was also the sixth consecutive month of negative shipments growth. June year-to-date orders and shipments growth are 0.1 and negative 2.0 percent, respectively. Inventories were at 7.5 weeks in June, down 0.9 weeks from June 1990 levels (see Figure 2).

Communications equipment orders growth for the three months ended in June was 10.3 percent below year-earlier orders compared with 5.0 percent decline in May. Inventories are at 6.0 weeks in June, down 0.4 weeks from year-earlier levels.

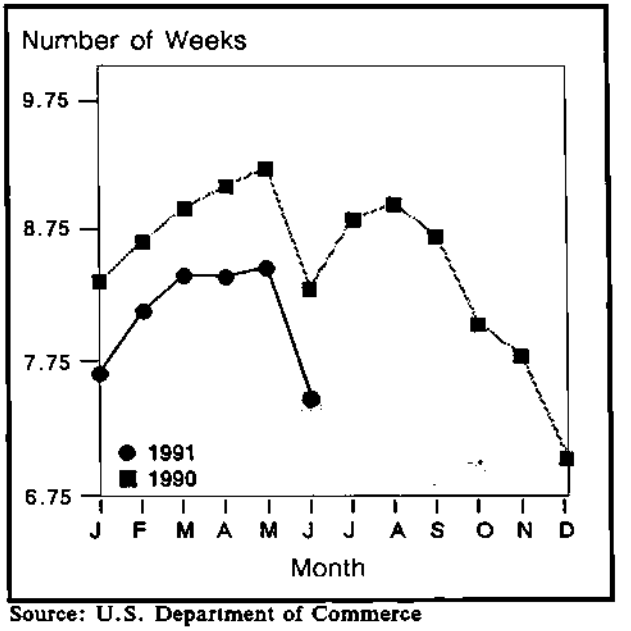
Orders growth for the three months ended in June was 10.6 percent below year-earlier orders for search and navigation equipment versus negative 21.7 percent in May, 5.0 percent below year-earlier orders for measuring and controlling devices versus negative 6.8 percent in May, and 3.7 percent above year-earlier orders for medical instruments versus 6.6 percent in May.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

While the signals portending an overall economic recovery, although mixed, continue to mount, the signals of recovery in the capital investment community remain a faint glimmer. Recovery in equipment investment—meaning spending on data processing equipment and, therefore, also semiconductors—will lag the overall expansion for the remainder of 1991. As for the pace of the electronics business recovery, Dataquest further expects growth to be relatively moderate compared with previous recoveries. The likelihood of a return to the hardware-buying binge days of the last decade is nowhere to be seen.

*Terrance A. Birkholz*

FIGURE 2
U.S. Computers and Office Equipment
Inventory-to-Shipments Ratio (Weeks)




Source: U.S. Department of Commerce

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# Research *Bulletin*

## AUGUST MARKET WATCH: AS THE SUMMER HEATS UP, THE MARKET CHILLS OUT

The *Market Watch* is a monthly Dataquest report that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### SEASONALITY SETS IN, THE BOOK-TO-BILL SLUMPS TO 0.96

The continued slippage of the North American book-to-bill ratio from 1.01 to July's 0.96, as shown in Figure 1, may not be as negative as it appears at first glance. Over the past four years,

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

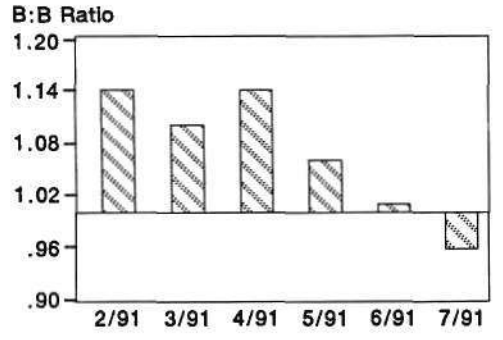



**Figure 2**
**DOC Computer Demand**

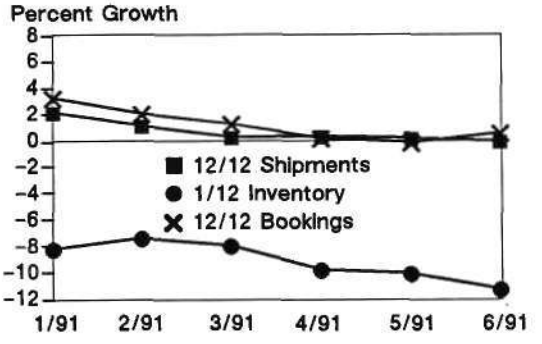



**Figure 3**
**Semiconductor Inventory Level**

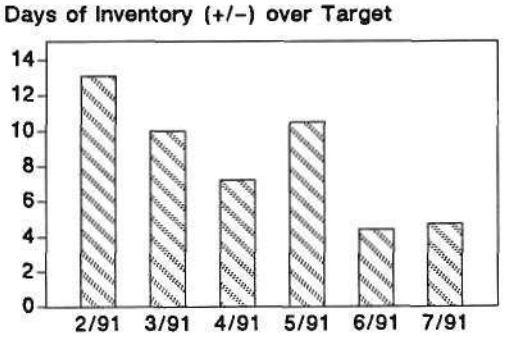
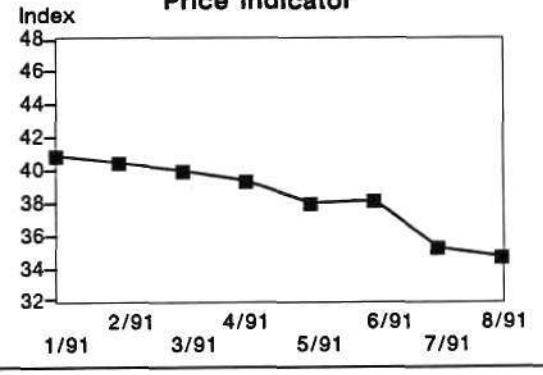



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, U.S. Department of Commerce, Dataquest (August 1991)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there has always been a June-July drop in this ambiguous market bellwether. What is notable in the figures for July 1991 is that although bookings are only 0.05 percent less (i.e., flat) than those of a year ago (July 1990), the corresponding billings level is 4.2 percent higher than in July 1990. As mentioned in earlier *Market Watches*, the billings bulge that began in the second quarter has now traveled through the shipment pipeline. Current lower semiconductor dollar booking levels are a combination of price reductions and lower unit volume because of the overall sluggish computer market.

## SHIPMENT AND ORDER RATES FOR COMPUTERS SHOW NO GROWTH OVER LAST YEAR

Figure 2 illustrates that for the past three months there has been a convergence of the annualized order and shipment rates for computers and office machines as tracked by the Department of Commerce. For June, the 12/12 shipment rate finally had no growth, while the 12/12 bookings rate regained a positive 0.6 percent. Reflecting good inventory control at the systems level that is mirroring sluggish sales, the monthly 1/12 inventory rate is 11.2 percent less than the comparable level of a year ago. Price pressure in the systems markets is also dampening shipment rates even as unit volume, in some cases, is increasing. The more volatile 1/12 booking rate for computers remained positive for a second consecutive month (5.3 percent for June), which is one of the first glimmers of a near-term business uptick seen in over six months.

## SEMICONDUCTOR INVENTORY LEVELS FLATTEN OUT

The overall actual-target inventory level delta remained under 5 days (4.7) for an unprecedented consecutive second month! The overall actual inventory level for July rose slightly to 25 days from last month's nadir of 24 days, while the target level remained at 20 days. The trend of reducing the difference between inventory reality to goals continues largely because of the impetus of the slow business environment. Inventory levels continue to be pared to where any sustained business increase will quickly translate into raw material orders. As mentioned last month, Dataquest expected to see continued improvements in inventory control for the rest of this year, and the computer subset of our monthly procurement survey did just that. As noted in this month's *Procurement Pulse*, the target-actual inventory difference for the computer company respondents was less than two (1.3) days! As the summer slows continue, further improvements in inventory levels and delivery scheduling are highly probable.

## SEMICONDUCTOR PRICES MATCH THE MARKET AND SLOWLY SINK

Prices declined only 1.5 percent from last month's average, again reflecting the slow but balanced semiconductor market. Although there are sporadic instances of DRAM spot pricing at 10 to 15 percent below market averages, overall prices for semiconductors continue to decline at a slow and manageable rate. The absence of FMVs has caused some confusion in the near-term pricing of DRAMs and SRAMs, where some "trial-balloon" flat-to-higher pricing of these parts is being tested by Japanese suppliers. As noted in earlier articles, the lack of FMVs has placed more focus on regional pricing differences that would highlight the selling of export products at a lower price than in the home market (i.e., dumping). In the current slow market, improvements in coordinating the regional pricing of Japan and the United States are needed for some Japanese suppliers to remain price competitive. Overall availability remains excellent for most, if not all, semiconductors, and Dataquest expects this trend to remain unchanged for the rest of the year.

## DATAQUEST PERSPECTIVE

As in the past three to four months, the current slow business climate puts focus on cost-reduction strategies and tactics to a higher degree than during growth periods. Inventories continue to be managed well, order levels are coming more in line with end-market sales, and availability/pricing remains manageable. The lack of a high-volume demand pull is partly because of recessionary fears, but more importantly a perception that, for the most part, many productivity improvements made via electronics (e.g., PCs, faxes) are now more than satisfactory. Additional expenditure to improve on the current installed base will require improved ease of use. Reflecting on the 10-year anniversary of the IBM PC, great improvements have been made in ease of use (remember VisiCalc?). Combining software with hardware at earlier system design stages appears to be needed to rekindle increased interest and demand to a perceived saturated market. The procurement function of a company will become an even more important communication link between the design and marketing groups (noting cost/availability) as this trend develops.

*Mark Giudici*

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# Research *Bulletin*

## AUGUST PROCUREMENT PULSE: LEAD TIMES AND ORDERS FALL, INVENTORIES STABILIZE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This article explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDER AND SYSTEM SALES OUTLOOK MIXED

As seen in Figure 1, this month's respondents expect to order an aggregate 6.3 percent fewer semiconductor dollars in August than was forecast

**Figure 1**
**Averaged Monthly Semiconductor Orders**

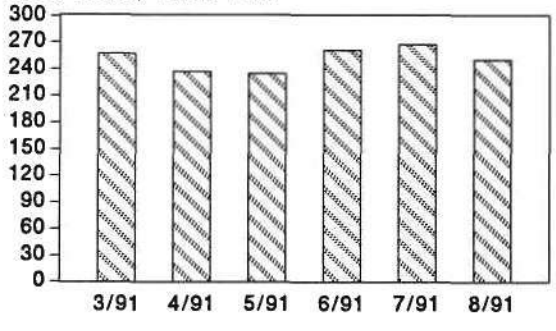



**Figure 2**
**Averaged Semiconductor Lead Times**

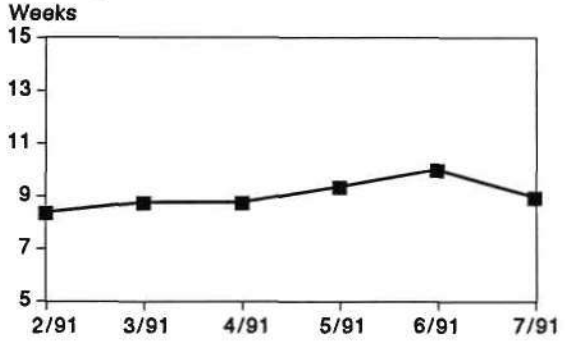
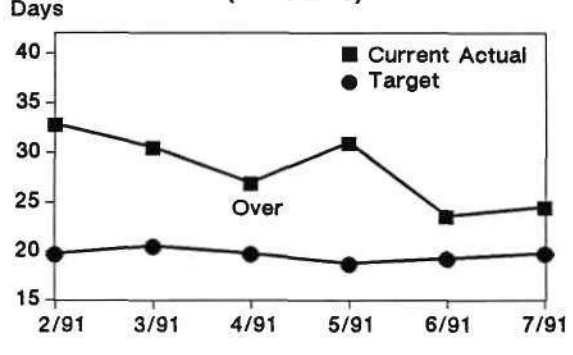



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

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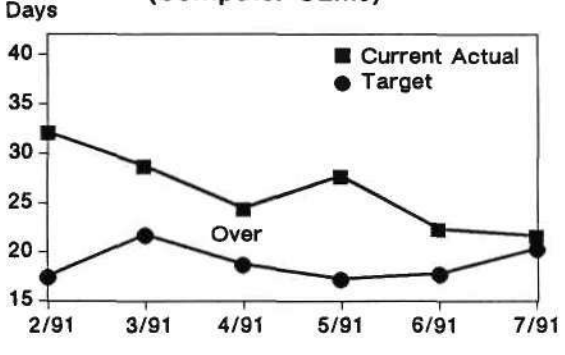


Source: Dataquest (July 1991)


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last month. This month's forecast in order activity is nearly half of the 11.1 percent rise in orders that were expected to be made in July. The average six-month system sales outlook remains upbeat at a current 11.3 percent, which is over 2 points higher than in the forecast given last month. The expected slowing rate of semiconductor order activity is not coinciding with a higher system sales forecast. This month's semiconductor price declines range from 0 to negative 5 percent, averaging at negative 2.4 percent, which is consistent with last month's negative 2.1 percent drop. Even expected price declines in raw materials do not totally explain expected higher system revenue (especially so in the current price-competitive electronics market). In discussions with clients, there are pockets of business strength, but the overall lackluster systems market is dampening the supply chain.

## LEAD TIMES CORRECT THEMSELVES DOWN TO NINE WEEKS

Average semiconductor lead times declined to 9.0 weeks from last month's 10.1-week level primarily because of lower order activity making parts easier to obtain. Figure 2 illustrates how the current average is more in line with the past six-month trend and correlates with the 4- to 12-week range in lead times currently being reported. Aside from an isolated problem with poor x32 DRAM SIMM availability, there were no availability problems for any semiconductor family. The cut in lead times reiterates the balancing act going on in the current stagnant market as suppliers adjust their delivery mix to meet a cautious demand schedule. Quite a few issues were noted in this month's survey, ranging from the above-mentioned SIMM problem to end-of-life buys for parts. An additional DRAM issue involved the new U.S.-Japan Semiconductor Trade Arrangement. Regional price differences between U.S. and Japanese markets are now to be noted in some contracts so that in order to avoid dumping accusations, parts bought in the United States from Japanese suppliers must be at or above the equivalent device price in Japan. It is conceivable that companies with offshore procurement offices could take advantage of any price differential between the two regions.

## SEMICONDUCTOR INVENTORIES MANAGED TO THE MAX

Figures 3 and 4 highlight that the continued tight control on inventory levels reflects the current tight market condition. The overall average targeted inventory level rose 0.6 days from 19.3 to a current 19.8 days. The overall average actual level rose from a historic low 23.6 days to a respectable (and still low) 24.5 days. The current 20/25 day target/actual ratio, is still below the historical 20/30 day ratio, which may rise again as business picks up. The responses from the computer segment of our sample noted a slight rise in targeted inventory levels from 17.8 to 20.4 days, while the actual average inventory level slipped to 21.7 days from 22.4 days. For the first time in years, one respondent (computer segment) was *below target* on inventory. Controlling inventory levels remains a very visible means to effect cost control in the current market. Dipping below targeted inventory levels increases the pressure put on suppliers to adhere to commitments and buyers to ensure that shortages do not appear.

## DATAQUEST PERSPECTIVE

Availability, delivery, and semiconductor pricing all remain very manageable in the current flat market. Focus remains high on inventory costs to keep them in line with business levels. There are no problem products to deal with, other than the potential for some price differentials for Japanese memory in the U.S. and Japanese markets. As the price negotiation cycle for next year approaches, the focus of many companies is to control the intangible cost factors (i.e., customer support with end-of-life buys and adherence to delivery schedules). The tangible cost control areas (e.g., price, quality, and inventory) are being well managed. Maintenance (or improvement) of current performance levels while raising the bar in other areas of the total cost equation will be the goal of many semiconductor users in the upcoming months.

*Mark Giudici*

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# Research *Bulletin*

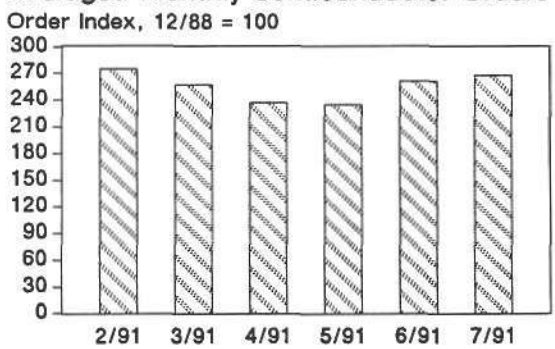
## PROCUREMENT PULSE: INVENTORIES UNDER CONTROL WHILE ORDERS, LEAD TIMES INCH UP

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This report explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### EXPECTATIONS FOR SEMICONDUCTOR ORDERS AND SYSTEM SALES RISE

Figure 1 illustrates that the general order level of semiconductors for this month's respondents has increased slightly (positive 11.1 percent) over last

**Figure 1**
**Averaged Monthly Semiconductor Orders**

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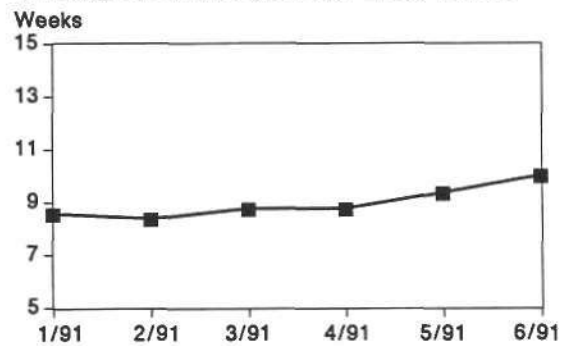
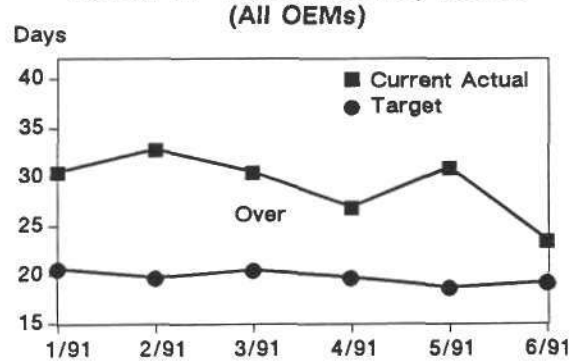



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

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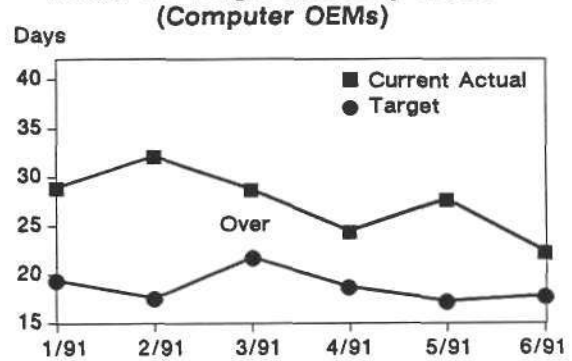


Source: Dataquest (July 1991)


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month, indicating a continuation of the slow growth trend of semiconductor sales. The respondents' overall six-month outlook for system sales has risen to 9 percent from 7.6 percent, again confirming the gradual positive trend of the electronics industry. The computer subset of this month's sample expects to see a more aggressive 10 percent six-month growth rate, which is up from last month's adjusted 9.2 percent positive forecast. From a revenue standpoint, most of our respondents expect to meet or approximate target levels. The challenge for most companies is to meet profit goals in an increasingly price-sensitive market. Dataquest expects semiconductor price competition to continue at a slightly faster rate than our respondents' current negative 2.1 percent for the rest of the year as FMVs disappear and end-use demand remains flat.

## AVERAGE LEAD TIMES RISE LESS THAN A WEEK—NOT A BIG DEAL

The overall average lead time for semiconductor delivery rose to 10.1 weeks from last month's corrected lead time of 9.4 weeks and continues to remain at the midpoint of the 8- to 12-week range of reported lead times. Figure 2 illustrates that this incremental rise is not significant but reiterates the current balance of overall semiconductor supply with demand. As expected, there have been very few reports of delivery problems for SMT standard logic since last month's report due to the adjusted increase in supply. End-of-life buys and quality remain noted issues for this month's respondents. These issues continue to require good communication for resolution. Coplanarity of high-lead-count plastic quad flat pak (PQFP) packaging is another concern that came up in the survey as well as from an independent inquiry this month. Continual improvements in communication, be it in forecasting, specification correlation, or procedural updates is the common thread of timely problem resolution. Proactive supplier support is becoming more of a differentiator in the current market environment.

## SEMICONDUCTOR INVENTORIES CORRECTED AGAIN

As seen in Figures 3 and 4, the semiconductor inventory seesaw has dipped again. The reduction in overall actual inventory levels dropped from the adjusted 30 days seen last month to a current 23.6 days, while the target inventory levels stayed at a relatively flat 19.5 and 19.3 days, respectively. The computer company respondents' actual inventories declined from 28.1 to 22.4 days, while the targeted levels also slipped to a respective 18.4 to 17.8 days. Inventory control and availability remain excellent, and no foreseen externality is expected to change this trend in the near term. Dataquest expects to see continued scrutiny put upon inventory levels, and, related with inventories, on-time delivery requirements also will be tightened.

## DATAQUEST PERSPECTIVE

Inventory control and semiconductor availability continue to be well managed. The issues relating to quality and the phasing out of obsolete components still remain with some users. The overall trend for slow system sales and moderate semiconductor orders combined with a focus on cost control paints a fairly bright picture for the near term. As the overall economy improves and demand increases, the need for accurate and timely forecasts and revisions will become paramount. Dataquest expects to see this trend continue for the rest of the year with capacity now in place (and planned for future production) keeping system companies well supplied for the foreseeable future.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: SYSTEMS MARKETS AT (OR NEAR) CYCLICAL TROUGH

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE BUSINESS CLIMATE

Dataquest believes that the worst of the recession is now over and that the coming months will reveal less severe declines—and probably improvement—in important economic indicators. For example, in the United States:

- Industrial production was up 0.5 percent in May, the second consecutive monthly increase.
- Capacity utilization was up 0.2 percentage points to 78.7 percent in May.
- Nonfarm employment was up 58,000, the first increase in 11 months.
- Housing starts were up 0.1 percent in May.
- Retail sales were up 1.0 percent in May.
- Consumer borrowing was up 2.8 percent in April.

Also, the index of the National Association of Purchasing Managers rose for the third month in a row in May—its highest level since August 1990. Much of the strength in the index came from a rise in new orders, which ended 10 months in a row of readings suggesting declining orders.

The dynamics of the incipient recovery will likely resemble that of previous upturns: The financial markets will lead, followed by consumer-durable goods such as homes, automobiles, and appliances. The materials market will then revive, and components for machinery will see increases in orders. When production capacity levels rise to meet demand in these markets, capital equipment purchases will grow, completing the business cycle recovery.

In contrast to previous expansions, the early indications are that the recovery will be relatively slow and mild.

### EQUIPMENT MARKETS

According to Dataquest's June survey of major OEM semiconductor procurement managers, expectations of short-term production remain positive. Overall six-month systems sales are expected to grow 7.6 percent, up from 6.5 percent in May. Data processing OEMs' expected six-month growth moderated to 8.3 percent compared with 10.0 percent in May.

Computer and office equipment orders growth for the three months ended in April was 4.8 percent *below* year-earlier orders compared with 0.1 percent growth in March (see Figure 1). April orders growth registered the greatest decline since growth turned negative in December. Inventories are at 8.4 weeks in April, down 0.7 weeks from April 1990 levels—a good sign that marginal orders are being filled from inventory, not incremental production.

Don't expect the PC business' competitive landscape to become any less rocky, even as overall business conditions begin to improve. Table 1 highlights Dataquest's expectations of some key segments of the PC market and the associated main memory DRAM consumption. The 80386SX system sales will take a big chunk out of 80286 system sales, particularly as these systems are loaded up with lots of memory to run the latest applications.

Communications equipment orders growth for the three months that ended in April was 0.9 percent above year-earlier orders compared with


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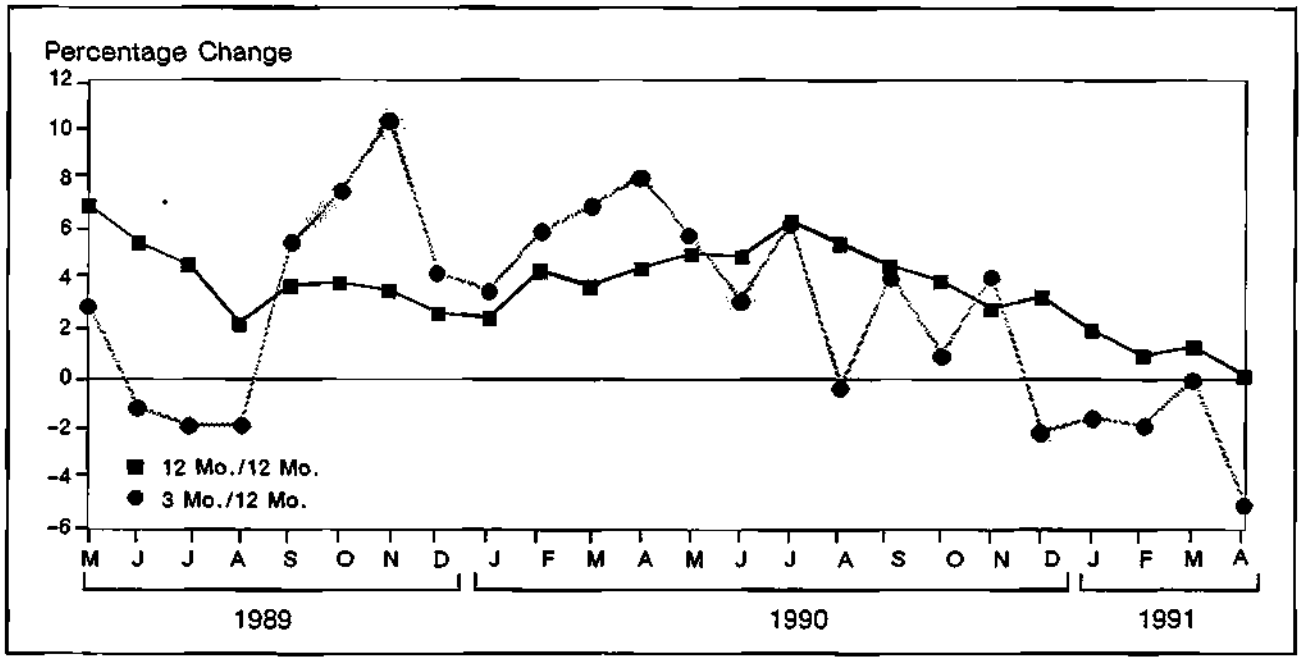
FIGURE 1
U.S. Computers and Office Equipment
Orders Growth (1989-1991)




Source: U.S. Department of Commerce

0.2 percent growth in March. Inventories are at 6.4 weeks in April, down 0.2 weeks from year-earlier levels.

Medical instruments and supplies remains the lone positive component of the instruments and controls aggregate, with orders growth for the three months ending in April up 2.3 percent above year-earlier orders compared with 1.3 percent growth in March.

Shrinking overall capital equipment spending holds back measuring and controlling equipment orders growth to negative 5.7 percent in April versus negative 5.1 percent in March. On the bright side, orders growth has been showing an improving trend—that is, declining by a smaller rate per month—since orders growth hit bottom in September.

TABLE 1
Worldwide PC Shipment and Associated DRAM Forecast by MPU
(Thousands of PCs/Thousands of MBs)

| System | 1990 | 1991 | 1992 |
|---|---|---|---|
| 80286 | 7,433/9,663 | 5,473/9,851 | 3,466/9,358 |
| 80386SX | 4,589/6,425 | 6,763/16,908 | 8,009/32,036 |
| 80386DX | 3,552/7,104 | 4,890/19,560 | 5,974/41,818 |

Source: Dataquest (June 1991)

Orders for search and navigation equipment—dominated by defense related expenditures—continued to lose ground in April, declining 11.8 percent from April 1990 levels and compared with negative 8.7 percent in March.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Dataquest's corporate parent, The Dun and Bradstreet Corporation, expects real U.S. GNP to resume expansion in the second quarter and accelerate through the first quarter of 1992. Similarly, business spending on capital equipment is expected to begin recovery in the second quarter and gain strength through year-end. As in previous recoveries, capital spending will lag overall spending because producers will want to make sure that an increase in aggregate demand is not a false start before adding productive capacity.

Indeed, April's orders data generally bear out this dynamic. The electronics production indicators suggest that the systems market have reached bottom. The best advice for now—look ahead and plan for the future recovery.

*Terrance A. Birkholz*

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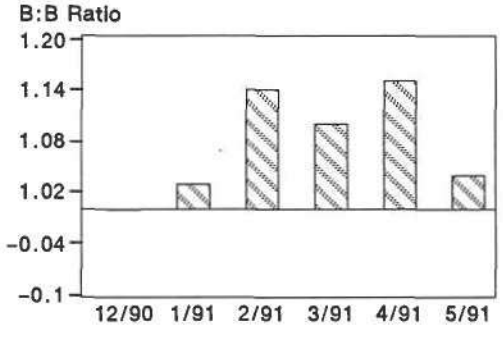
# Research *Bulletin*

## JUNE MARKET WATCH: OVERALL BUSINESS FLATTENS; MIDTERM OUTLOOK REMAINS POSITIVE

The *Market Watch* is a monthly Dataquest report that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

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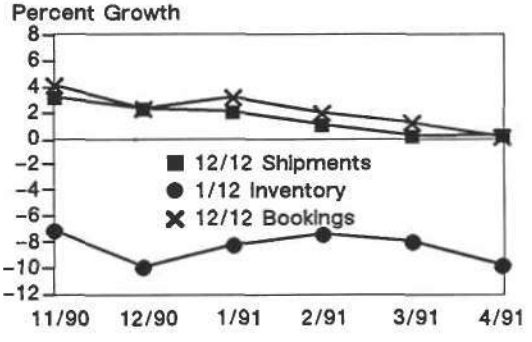


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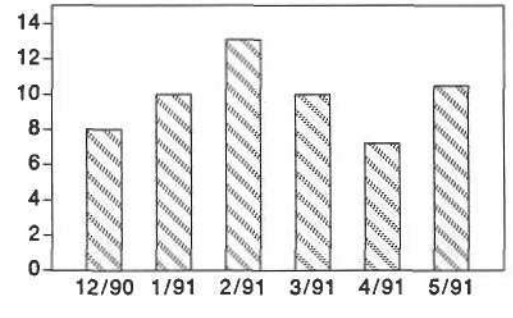


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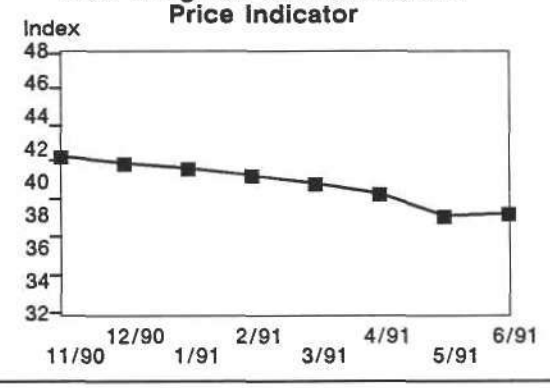


Source: WSTS, U.S. Department of Commerce, Dataquest (June 1991)


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## SKIDDING TO 1.04, THE BOOK-TO-BILL RATIO REFLECTS FLAT ELECTRONICS SALES

The actual numbers supporting the decline of May's book-to-bill ratio of 1.04 from April's 1.15 (see Figure 1) mirror a static market that is very conscious of cost (read: inventory) control. In the aftermath of post-victory optimism, many buyers again are facing the balancing act of semiconductor inventories against a slow-growth electronics market. Any uptick in orders not immediately tied to system sales has been quickly corrected through inventory control measures, and the record semiconductor bookings and billings seen in April are not an exception.

The question raised in last month's *Market Watch*, "How will the increase in orders (April) be absorbed by a flat systems market?" is being answered by managing inventory levels and curtailing orders where required. The May three-month moving-average bookings level was 6.9 percent less than April's corresponding level, while the May billings level was 8.2 percent higher than those seen in April. The higher billings level is primarily a function of previous orders making their way through the system, while order levels are back in sync with system demand. Once this order "bulge" works its way on through shipment, semiconductor order levels should equate to system shipment rates.

## COMPUTER INVENTORIES FALL IN RESPONSE TO FLAT SHIPMENT AND ORDER RATES

Figure 2 illustrates that both the shipment and order 12/12 rates of change have declined and are effectively flat with respective levels seen a year ago. Correspondingly, the inventory rate has declined, keeping inventory levels on par with business activity. The fact that the Department of Commerce data are listed in dollars masks what is shaping up to be a price war in the computer market. System unit shipments are generally growing at a moderate rate, while price pressure is forcing slower growth in revenue. This somewhat somber business picture is not without some positive attributes; semiconductor supplies are more than adequate to meet increases in demand, and low inventory levels (both system and semiconductor) will quickly translate into order activity when demand picks up.

## SEMICONDUCTOR INVENTORIES RISE TO HISTORICAL (STILL LOW) LEVELS

Our latest survey of procurement managers reflects a rise in semiconductor inventories to target goals, but the rise from a very low 27 days to 30 days still highlights good inventory control. Dataquest views this three-day average increase as a normal reaction to large order levels being delivered in a slow-to-flat electronics market. The May target/actual inventory delta of 10.5 days is up from April's 7.2 difference but is back to the 10-day overage seen in March. Average on-hand inventory levels of one month still reflect healthy business activity and, as mentioned before, consistent inventory control. Dataquest continues to expect inventory control to be a major factor in any turnaround in system and corresponding semiconductor growth.

## OVERALL PRICES STAY FLAT; AVAILABILITY REMAINS EXCELLENT

The overall price index for this month reflects very little movement because of flat demand combined with a relatively balanced supply of parts. The DRAM area is where price pressure is most noticeable, but only among non-Japanese suppliers. The current low volume of aggressive DRAM pricing is not enough to move the overall index.

In the upcoming months, the absence of the FMV system will allow all suppliers to price according to market demand levels, which may influence overall pricing. Aside from DRAMs, prices for logic, microprocessor, and nonvolatile memory products remain very steady and in fine tune with current demand levels. For the near and midterm, Dataquest expects some slow price declines, while availability remains a nonissue.

## DATAQUEST PERSPECTIVE

The flat/slow growth electronics market that we have been seeing for the past six months is now being reflected in the market statistics. All of the indicators (except inventory days) are listed in dollars, which hides the fact that unit shipments are still chugging along, although at reduced prices. The outlook for a new, high-volume product(s) pulling demand upward is not on the foreseeable horizon, so current demand levels, combined with supply, will not pose an availability constraint. The accuracy of the forecast function combined with cost control measures is sustaining and will continue to sustain companies in the current environment.

*Mark Giudici*

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# Research *Bulletin*

## JUNE PROCUREMENT PULSE: SEMICONDUCTOR ORDERS, INVENTORIES INCH UPWARD

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This article explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDERS RISE WHILE SYSTEM SALES FORECAST STABILIZES

*This month's respondents expect to incrementally increase their semiconductor order activity by 11.3 percent because of expected higher system sales over the next six months (see Figure 1). The*

**Figure 1**
**Averaged Monthly Semiconductor Orders**

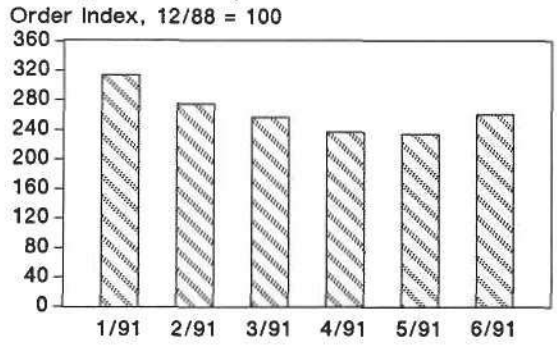



**Figure 2**
**Averaged Semiconductor Lead Times**

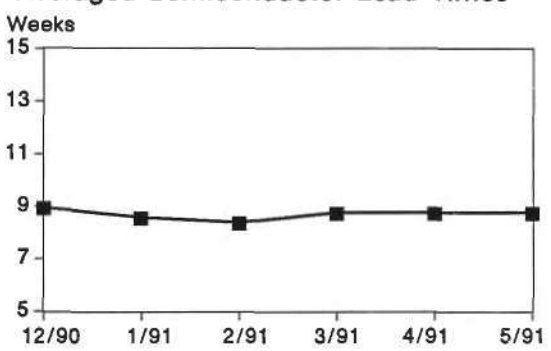



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

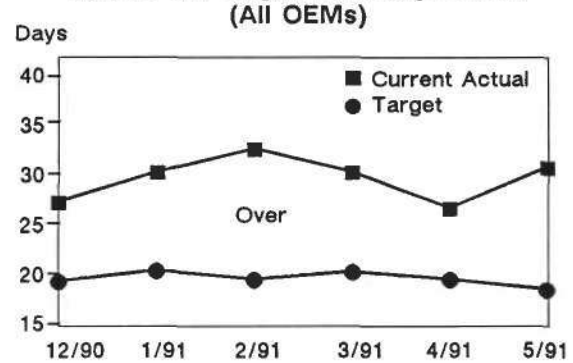
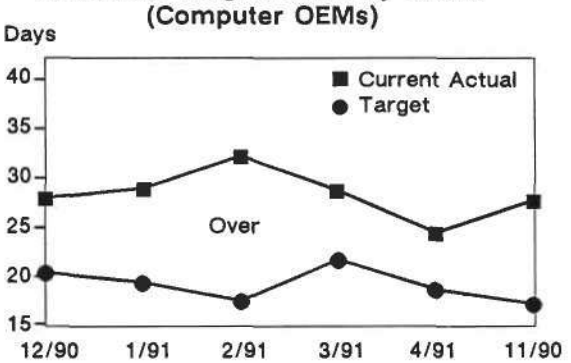



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (June 1991)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overall six-month system sales outlook rose again this month from 6.5 percent to a current 7.6 percent. This barometer of business optimism has nearly doubled over the past two months, going from 3.4 percent in April to 7.6 percent expected in June! The computer segment's response was muted somewhat from last month's aggressive 10 percent, six-month system forecast to a current 8.3 percent in the short term. The overall positive outlook continues to emphasize that although the general economic situation has been better, business is expected to improve at a gradual and manageable pace. In the absence of a large-volume, high-growth product(s) pulling demand, Dataquest believes that it is highly probable that the current spate of electronic system price cutting will continue to maintain and grow revenue streams.

## LEAD TIMES REMAIN UNCHANGED—NOT UNEXPECTED

The stability in semiconductor lead times shown in Figure 2 continues to highlight the supply/demand balance that has existed for approximately the past year. The current unchanged average lead time of 8.8 weeks is the mean of a 4- to 12-week range. As in the past several months, overall semiconductor availability remains excellent. There are some reports of continued lead time extensions for surface-mount standard logic in the 8- to 12-week range due to an unanticipated aggregate increase in SMT logic demand that started 8+ weeks ago and has kept lead times for these parts on the high end of the scale. As mentioned in earlier *Procurement Pulses*, this blip in extended lead times has been addressed with increased wafer starts and should be corrected in 4 to 6 weeks. On a related topic, respondents noted the availability of obsolete parts as being a continuing issue. The process of designing out of specific mature products and designing in of newer parts requires good communications between users and suppliers to help smooth over potential supply disruptions. As of this writing, it appears almost certain that a continuation of the U.S.-Japan Semiconductor Trade Arrangement will be signed. As mentioned in the May 10 *Dataquest Perspective*, a direct result of this agreement will be that U.S. semiconductor buyers of memory will no longer have to deal with FMVs and cost-based pricing.

## SEMICONDUCTOR INVENTORIES RISE AGAIN TO THE (LOW) HISTORICAL AVERAGE

The inventory reductions experienced over the past two months that resulted in sub-30-day overall inventory levels was adjusted upward, as seen in Figures 3 and 4. The current actual overall inventory level now stands at 31.1 days, up from last month's 27-day level, while respective targeted levels dropped to 18.8 from 19.8 days. The computer segment respondents' targeted and actual inventory levels followed a similar pattern, with the targeted level dropping to 17.3 days from 18.8 and respective actual levels increasing to 27.8 days from 24.5 days. Dataquest does not view these inventory increases as indicators of a trend, but more a balancing of near-term order rates with anticipated system demand trends. As noted in past *Procurement Pulses*, average target and actual inventory levels have not strayed far from the golden mean historical respective averages of 20 and 30 days; therefore, it would not be surprising to see a small increase in average target inventory levels in the near future. With inventory management ingrained as a potent cost-control tool, maintenance and long-term reduction of target and actual inventory levels remains a high priority of both semiconductor users and suppliers.

## DATAQUEST PERSPECTIVE

The overall electronics outlook remains positive, and semiconductor availability and pricing is excellent. Issues surrounding the phase in and phase out of systems and their corresponding component requirements remain an area where improvements in design engineering/procurement/supplier communications are needed. With order rates increasing, system sales forecasts positive, and the overall economic environment improving, the gradual and manageable low-growth scenario Dataquest has been depicting is playing out. Continued focus on communication regarding demand changes and design or quality concerns is being addressed that will reinforce the current growth mode.

*Mark Giudici*

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# Research *Bulletin*

## MAY MARKET WATCH: SEMICONDUCTOR MARKET STRONG WHILE SYSTEM SHIPMENTS REMAIN STATIC

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL JUMPS TO 1.15, BILLINGS NORMAL FOR APRIL

Figure 1 illustrates the relative strength of the past three months' semiconductor market compared with the prior three month period. April's preliminary book-to-bill ratio of 1.15 is the highest

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

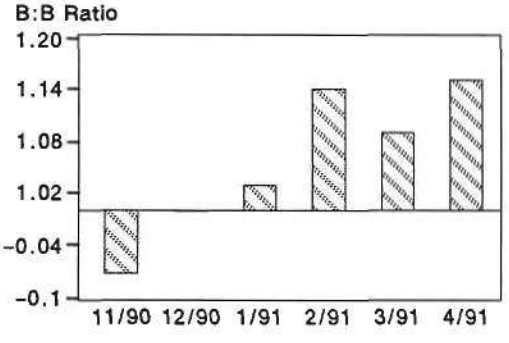



**Figure 2**
**DOC Computer Demand**

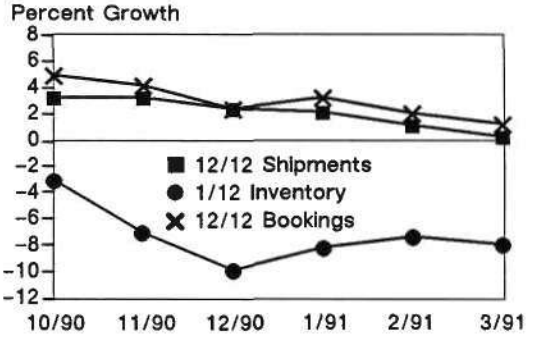



**Figure 3**
**Semiconductor Inventory Level**

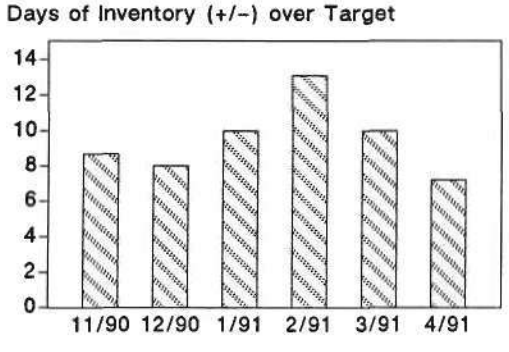
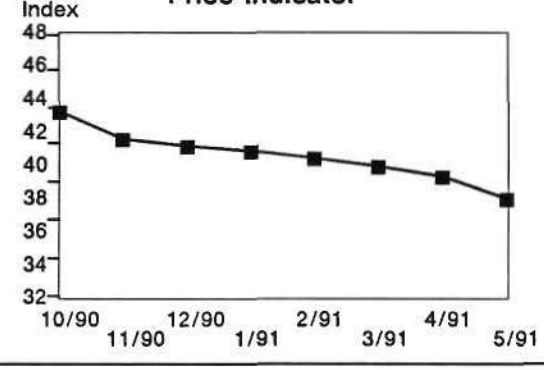



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, U.S. Department of Commerce, Dataquest (May 1991)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recorded since last May's 1.15 reading. Looking at the actual numbers, billings declined an understandable 16 percent in April from March, primarily due to the shift from March's five-week billing period to April's four-week month. Compared with February (the nearest four-week month), April billings are off 1.6 percent. On the bright side, April 1991 billings are 3.2 percent higher than April 1990. The booking level is what is causing the high rise in the book-to-bill ratio, which raises a valid question: How will this increase in orders be absorbed by a flat systems market? April's three-month moving average booking level exceeded March by 6.2 percent while totally surpassing January's (the last quarter beginning month) level by 19.9 percent. The momentum of increased order activity ties in with an improved economic environment (improved consumer confidence, lower interest rates) and the optimistic system sales outlook noted in this May's *Procurement Pulse*.

## COMPUTER BOOKINGS, SHIPMENTS, AND INVENTORY RATES STAGNATE

As seen in Figure 2, the Department of Commerce's data note a slight decline in all three rates of change that we track. Although the 12/12 booking and shipment rates remain positive, a respective positive 1.3 percent and positive 0.3 percent does not reflect moderate growth. These annualized growth rates compare with last month's bookings rate of positive 2.1 percent and a shipment rate of positive 1.2 percent. The 1/12 inventory rate declined slightly from March's negative 7.3 percent to the current negative 7.9 percent, reflecting how inventories of systems are matching the sluggish market. The flatness in the computer market is not being impeded by any product shortages or lead time delays per our procurement surveys. An upturn in demand (as expected by our procurement survey respondents) would be ably handled by the level of semiconductor capacity on hand.

## SEMICONDUCTOR INVENTORIES CONTROLLED FURTHER

Based on our latest procurement survey, overall inventory levels were pared below the 30-day level to an average of 27 days! Both target and actual average levels declined, resulting in a 7.2 day difference compared with last month's delta of 10 days as illustrated in Figure 3. This tight control of inventories reflects the improved levels of communication between semiconductor suppliers and users as well as the ongoing efforts to control costs in a flat market. Low inventory levels of components are a positive sign that reflects efficient operations and flexibility to react to quickly changing demand levels.

## PRICES S-L-O-W-L-Y DECLINE, AVAILABILITY EXCELLENT

Compared with last month, the only difference in pricing occurred in the memory area, causing the overall index to dip by 3.3 percent as seen in Figure 4. The overall market can currently be described as "in balance." Dataquest is beginning to hear of isolated below average pricing for 1Mb DRAMs from non-Japanese suppliers. Although currently the exception, this pattern of pricing was forecast back in February as a probable reaction to 1Mb DRAM production cutbacks by the major Japanese producers. With demand levels being adequately handled by current supplies, Dataquest expects to see more competition in the DRAM market, especially if the FMV system is abolished. The high-end microprocessor market may be in line for some long-overdue competition *if* Advanced Micro Devices gets a favorable ruling regarding the use of "386 type" microcode. Dataquest is closely following these developments and will report on them as more information becomes available.

## DATAQUEST PERSPECTIVE

The continued strength of the semiconductor market appears to be a leading indicator of where the electronics industry is heading. The overall economy and electronics market currently are in a no/slow growth phase that is expected to improve over the next two quarters based on the availability of money, anticipated consumer confidence, and increased demand. Gradual improvements in system shipments/demand are not expected to strain the supply line of semiconductors as long as accurate and frequent forecasting occurs and low inventory levels are maintained.

*Mark Giudici*

Dataquest
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May 24, 1991

Dear NASM Client:

The May issue of the SAMonitor (NSAM Newsletters 1991: April-June 1991-14) contains an error in the title of Table 1. The title does read:

Estimated Worldwide Personal Computer Shipments (Units)
Unit Growth (%) per Share of Total Unit Shipments (%)

Instead, the title should read:

Estimated Worldwide Personal Computer Shipments (Units)
Unit Growth (%) / Share of Total Unit Shipments (%)

Enclosed is a copy of the table with its title corrected.

The interpretation of the table is straightforward. For example, desktop PC unit growth was 3.7 percent in 1990; desktop unit shipments were 84.4 percent of total PC unit shipments in 1990.

No division operation is meant or implied by the slash mark.

I apologize for any inconvenience this error has caused you.

Take care and thank you for using Dataquest's NASM service.

Sincerely,

Terry

Terrance A. Birkholz
Industry Analyst
Semiconductor User and Applications Group

Enclosure

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# Research *Bulletin*

## SAMONITOR: MARKETS: TO YOUR MARK, SET, . . .

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE BUSINESS CLIMATE

Recently released economic statistics sent more intimations that a recovery is on the way, although it will be several months before it arrives.

The DOC's index of leading economic indicators rose a modest 0.5 percent in March, largely due to a burst of consumer optimism. This is the second consecutive increase—the indicators jumped 1.2 percent in February—after six months in a row of decline. The components of the index that tend to give the longest advance signal provided this increase.

Also, the DOC's initial report on the economy's overall health in the first quarter showed a deeper and broader-based weakness than was earlier expected. U.S. real GNP growth contracted at a 2.8 percent annual growth rate after declining by 1.6 percent in the fourth quarter of 1990.

### EQUIPMENT MARKETS

According to Dataquest's monthly survey of major OEM semiconductor procurement managers, expectations of short-term production have improved: Overall six-month systems sales are expected to grow 6.5 percent, up from 3.4 percent in April. Data processing OEMs' expected six-month growth also moved up to 10 percent, compared with 7 percent in April.

Table 1 highlights Dataquest's expectations of the worldwide personal computer market. Overall, PC production is expected to decelerate to 9.6 percent unit growth in 1991, down from 9.8 percent in 1990. Unit growth is expected to accelerate to 11.3 percent in 1992, however, reflecting the improvement of the business climate next year. Laptop and notebook growth should remain well above average through 1992. Desktop PC production, though, will be tightly squeezed from four fronts: a dearth of remaining available desktops, weak business conditions leading firms to postpone *marginal* PC purchases, substitution of low-end workstations for high-end PCs, and substitution of portable PCs for desktop units.

Dataquest expects the value of the worldwide workstation market to grow 25.1 percent in 1991, up from 20.1 percent in 1990, and to further accelerate to 32.6 percent in 1992.

Reviewing first-quarter performance, computers and office equipment orders growth for the three months ending in March was 0.1 percent above year-earlier orders, compared with negative 2.1 percent growth in February (see Figure 1). Inventories are at 8.5 weeks in March, down 0.4 weeks from March 1990 stocks (see Figure 2). *March was the first month of positive orders growth following three consecutive months of contraction.*

TABLE 1
**Estimated Worldwide Personal Computer Shipments (Units)**
**Unit Growth (%) per Share of Total Unit Shipments (%)**

| | 1990 | 1991 | 1992 |
|---|---|---|---|
| Total PC Shipments | 9.8/100.0 | 9.6/100.0 | 11.3/100.0 |
| Desktop | 3.7/84.4 | 2.6/80.7 | 0.6/74.7 |
| Laptop (DC) | 37.4/11.1 | 22.6/12.6 | 13.2/13.2 |
| Notebook | 1,175.0/1.7 | 68.1/2.7 | 110.1/5.3 |

Source: Dataquest (May 1991)


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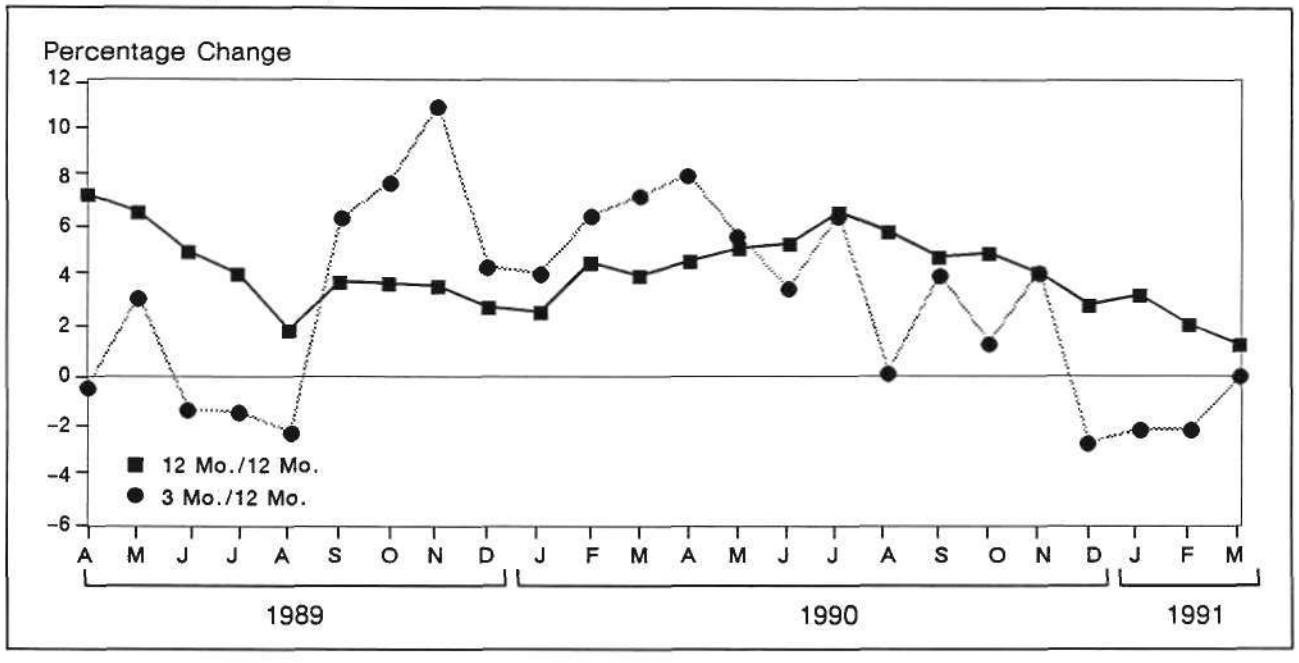
FIGURE 1
U.S. Computers and Office Equipment Orders Growth (1989-1991)




Source: U.S. Department of Commerce

The defense-related sector continues to depress communications production. Communications orders growth for the three months ending in March was negative 2.4 percent below year-earlier orders, compared with negative 2.9 percent in February. However, *nondefense*-related communications orders growth is a *positive* 2.5 percent year to date in March.

Instruments were hurt by sluggish manufacturing activity. Order growth for the three months ending in March was negative 3.9 percent below year-earlier orders, down from a positive 1.1 percent in February.

Systems manufacturers continue to be cautious about prematurely ramping up production; they fill orders by drawing down their inventories. Communications and instruments inventories are 6.4 weeks and 11.9 weeks, or 0.4 and 0.3 weeks below year-earlier levels, respectively.

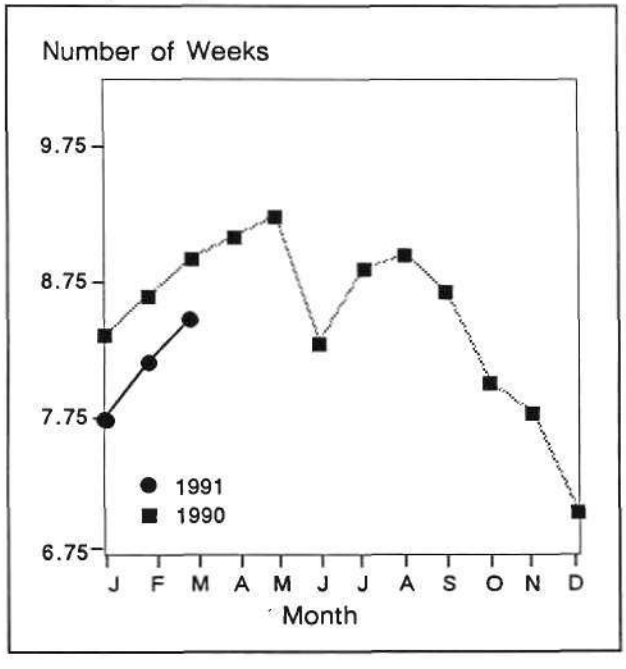
## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

The signs of a recovery in systems production growth remain faint. The April semiconductor book-to-bill ratio of 1.15, although strong and very welcome, overpredicts the short-term strength of the chip market.

We believe that systems production will resume positive growth approximately in synch with overall business conditions during the second half; the chip market will follow suit. Probably the surest sign that the business investment climate will improve is the Fed's recent easing of its monetary policy: Experience shows that the lag time between a policy change and its stimulation of business activity can be as short as six months. Once the Fed jump starts the expansion, the biggest concern will then be a resurgence of accelerating inflation.

*Terrance A. Birkholz*

FIGURE 2
U.S. Computers and Office Equipment Inventory-to-Shipments Ratio (Weeks)

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Source: Dataquest (May 1991)

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# Research *Bulletin*

## MAY PROCUREMENT PULSE: INVENTORIES CONTROLLED WHILE SYSTEM SALES FORECAST IMPROVES

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDERS STABILIZE, SYSTEMS OUTLOOK BRIGHTENS

This month's respondents expect to maintain last month's booking rate in order to contain inventory levels and balance incoming orders with

**Figure 1**
**Averaged Monthly Semiconductor Orders**

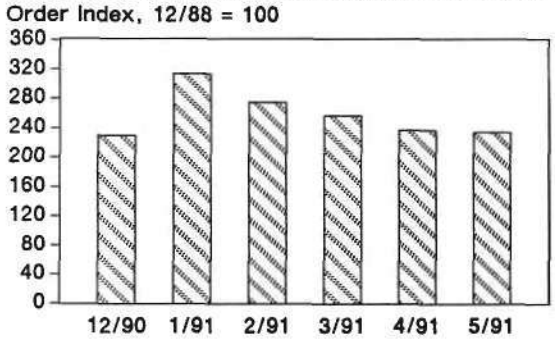



**Figure 2**
**Averaged Semiconductor Lead Times**

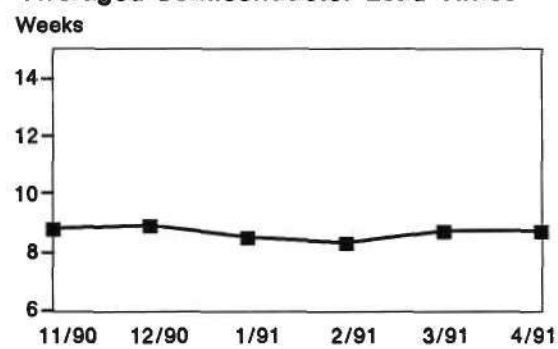
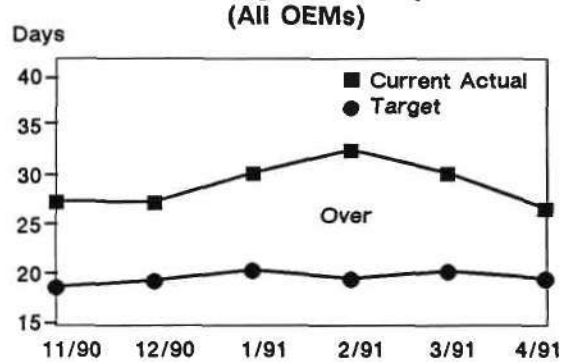



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

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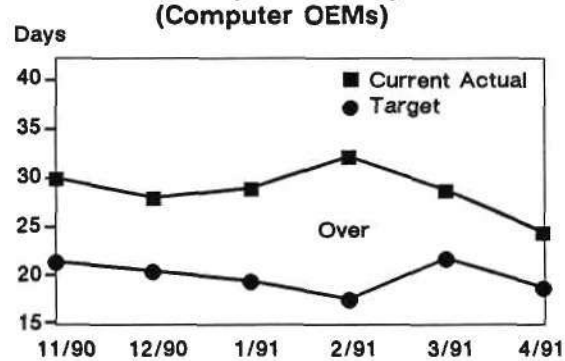


Source: Dataquest (May 1991)


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current system shipment rates (see Figure 1). The outlook for overall system sales over the next six months jumped from 3.4 percent noted last month to a current positive 6.5 percent forecast. The computer segment is even more optimistic, going from last month's 7 percent to a healthy 10 percent six-month sales growth average. It appears that the near-term system sales outlook is fluctuating around 5 percent for our overall sample and averaging out about 8 percent for the computer segment of our respondents. This low-to-moderate growth scenario ties in with Dataquest's forecast in that we foresee no significant disruption to semiconductor supplies nor a quick upturn in electronics growth that would disrupt the current market balance.

## STABLE LEAD TIMES ALLOW FOR ORDER FLEXIBILITY

As seen in Figure 2, lead times remain on average under nine weeks (unchanged since last month at 8.8 weeks). The stability in lead times continues to reflect a supply/demand balance that is also seen in flat to slightly lower prices compared with last month's levels. The overall availability of semiconductors remains excellent; however, there are isolated problems associated with some standard logic products that are expected to be corrected within two months. A notable percentage of last month's respondents mentioned quality as a key issue. This month, fewer respondents have noted quality as being a problem, but it still concerns 17 percent of our sample. Another area of consternation is the artificial price floor situation (particularly in Europe) for 4Mb DRAMs. Barring any dramatic price breaks after the current U.S./Japan Semiconductor Trade Arrangement expires, Dataquest expects overall stability of price and availability through the end of summer.

## SEMICONDUCTOR INVENTORIES CONTINUE TO GET PARED BACK

Figures 3 and 4 highlight the approximate two-month lag time it takes for companies to correct inventory excesses. For both the overall and computer samples, target and actual inventory levels have declined. The current overall targeted and actual inventory levels went from last month's respective 20.6 and 30.6 days to this month's response of 19.8 and 27 days, respectively. The largest drop in inventory adjustments came from the computer segment of our sample with targeted and actual levels dropping from a respective 21.8 and 28.8 days to a current response of 17.5 targeted and 23.1 actual inventory days on hand, respectively. This month's respondents, on average, have gone below the historical overall average target and actual inventory respective levels of 20 and 30 days. A growing minority of leading-edge companies are currently holding under 15 days of inventory. As this type of inventory management becomes more common, the previous historical inventory goals will decline.

## DATAQUEST PERSPECTIVE

The outlook for system sales is improving, while cost control measures as indicated by inventory reductions give a mixed signal as to where the market is headed. At the micromarket level, there are mixed levels of semiconductor orders (some large, some delayed, others smaller than forecast) that also reflect a continued uncertainty as to how the industry will fare. On average, order rates continue to move forward and supplies are more than able to meet this level of demand. With no large change of market dynamics foreseen for the remainder of the year, Dataquest continues to forecast moderate growth for semiconductors and single-digit growth for systems companies. This month's survey reinforces this forecast.

*Mark Giudici*

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# Research *Bulletin*

## APRIL MARKET WATCH: SEMICONDUCTOR BUSINESS CLIMBS AMID FLAT SYSTEMS MARKET

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL STABILIZES AT 1.09; BUSINESS IS BRISK

As seen in Figure 1, the book-to-bill ratio for March remained at a very healthy 1.09 compared with February's 1.09 ratio and a revised January ratio of 1.03 (up from 0.96). The figures behind the

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

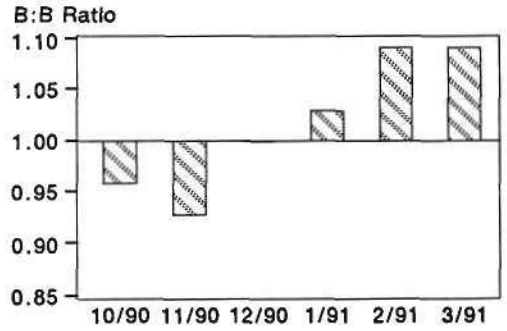



**Figure 2**
**DOC Computer Demand**

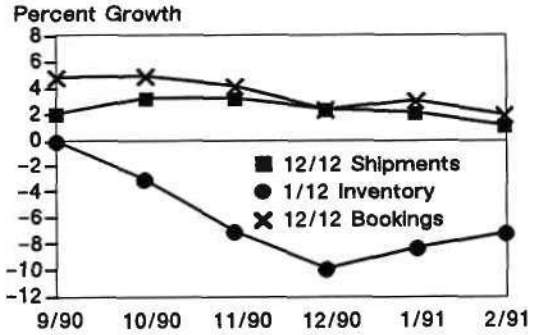



**Figure 3**
**Semiconductor Inventory Level**

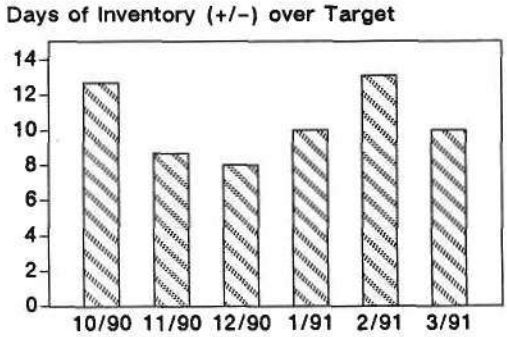
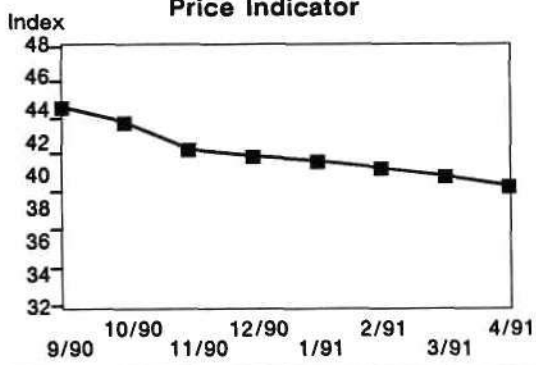



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, U.S. Department of Commerce, Dataquest (April 1991)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ratio continue to reflect positive business activity. The March three-month average bookings level climbed 7.2 percent over February, and the respective billings level was up 17.4 percent over last month. The steady systems sales expectations noted in our monthly procurement surveys are quickly being translated into semiconductor shipments due to consistent lead times and low inventory levels. The six-month electronics sales outlook per our sample returned to a realistic 3.4 percent forecast, down from the postwar optimistic 5.2 percent revised average rate noted last month.

## COMPUTER BOOKING AND BILLING RATES DIP; INVENTORY RATE RISES

Figure 2 shows that the Department of Commerce's (DOC's) February booking and billing rates for computers and office machines has declined slightly to 2.0 percent and 1.2 percent from a respective January rate of 3.1 percent and 2.1 percent. The 1/12 inventory rate again rose slightly, but it is still way below the annualized shipment rate. The flat electronics market reflects a very good balance between supply and demand from both a systems and a semiconductor perspective. In the absence of any new high-volume product or system, Dataquest continues to forecast low, gradual growth for the semiconductor market. Economic indicators point to a possible resumption of cautious consumer confidence that may push growth rates in electronics upward now that the uncertainty of war is past.

## SEMICONDUCTOR INVENTORIES REMAIN CONTROLLED

Figure 3 highlights that semiconductor inventory levels remain controlled with the difference between target and actual levels now at 10.0 days, down from last month's 13.1-day delta. As mentioned in last month's *Market Watch*, our procurement sample appears to be gravitating toward a "golden mean" of 20 days targeted and 30 days actual inventory levels. Last month's correction of targeted and actual levels of inventory resulted in golden mean 20.6-day target and 30.6-day actual levels for March. Adjustments to inventory variances within a month as noted here exemplify how communications have improved within organizations as well as with suppliers.

## OVERALL PRICES REMAIN STUCK, DELIVERIES ON SCHEDULE

The overall pricing situation is one of stasis as the high-volume memory market slowly moves along without noticeable price declines, and the high-priced microprocessor segment is in relative balance with demand. Availability for all semiconductors remains very good, yet 1Mb DRAMs still have the longest lead times (as high as 10 to 12 weeks) while the rest of the market averages 6 to 8 weeks. The impact of increases in non-Japanese DRAMs on the world market may begin to be seen in the next few weeks, which may depress average prices. Components delivery times are expected to remain predictable because of the balance of supply with current demand. The good communications that exist would alert suppliers to any future changes.

## DATAQUEST PERSPECTIVE

The second month of semiconductor booking and billings growth is encouraging and corroborates what the respondents to our monthly procurement survey have noted. Slow growth at the systems level combined with low inventory levels and abundant semiconductor supplies are allowing procurement managers to further hone forecasting methods and communication levels. Any change to system demand is quickly being transmitted to the semiconductor supplier. Dataquest expects this supply/demand balance to continue for the next three to six months as suppliers continue to match levels of semiconductor users' needs.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: A (FAINT) LIGHT AT THE END OF THE TUNNEL

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE BUSINESS CLIMATE

If ever there were the necessary conditions for the U.S. economy to resume expansion, they are certainly in place now, as shown in the following list:

- Decisive Gulf War victory boosting consumer and producer confidence
- Expectations of (continued) low world oil prices
- Low U.S. short-term interest rates
- Easing of Fed monetary policy

It is no coincidence that The Dun and Bradstreet Corporation's latest economic forecast calls for the U.S. real GNP to resume positive growth in the second quarter and for real GNP to grow 1 percent in 1991, the same rate as in 1990. Such a scenario would make the recent recession, and subsequent recovery, one of the mildest on record.

Several good reasons to expect a mild recovery are outlined as follows:

- Improved inventory control would negate the need for a steep ramp-up of production to build a cushion of product in anticipation of future consumption.
- The private sector's heavy debt burden will tend to divert marginal cash flows to debt service instead of capital formation.
- The fall in households' wealth due to the decline in home values in 1990 will tend to divert marginal income to saving instead of spending.
- Companies are reluctant to step up hiring plans because of concern over the durability and strength of growth.
- Decelerating growth in Germany and Japan will constrain U.S. exports.

This is the backdrop against which electronics manufacturers will operate for the remainder of 1991.

### EQUIPMENT MARKETS

A recent survey indicates that this optimism is not misplaced. The *Computer Reseller News* (CRN) March PC Index of microcomputer purchasing among Fortune 1000 companies found that just 30 percent of the respondents to a survey believed that the recession will last another six months. In comparison, the February PC Index found that 54 percent believed that the recession would last that long.

Also, if actual February spending levels are any indication, March should also be a strong month. February purchasing data show that spending is already growing, with the average Fortune 1000 company spending 42 percent more than expected for microcomputer hardware and software in February. Significantly, February is the second consecutive month in which actual spending outpaced projections. In January, CRN's PC index found that the average Fortune 1000 company spent 10 percent more than expected on PC hardware and software.

The end of the Gulf War had a lot to do with the burst in February spending. Indeed, there are signs that the postwar euphoria is subsiding: According to Dataquest's monthly survey of major OEM semiconductor procurement managers, overall six-month systems sales are expected to grow 3.4 percent, down from 5.2 percent in March. Data processing OEMs' expected six-month growth also moved down to 7 percent, compared with 8.4 percent in March. The downward revision in April's expectations reflects the moderation (not elimination) of business confidence from the swift victory in the Gulf War.

A review of February orders indicates that expectations of recovery need to be tempered: Computers and office equipment orders growth for the three months ended in February was 2.5 percent below year-earlier orders, compared with negative 2.1 percent growth in January (see Figure 1).


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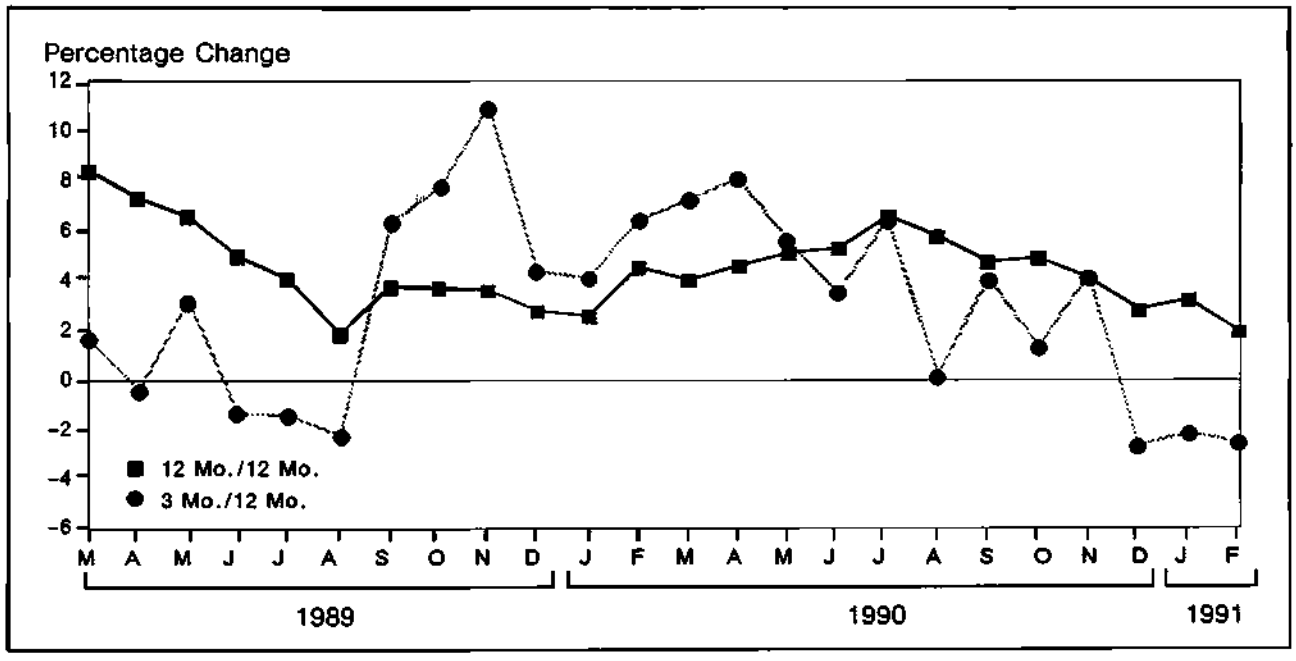
FIGURE 1
U.S. Computers and Office Equipment
Orders Growth
(1989-1991)




Source: U.S. Department of Commerce

Inventories are at 8.2 weeks in February, down 0.5 weeks from February 1990 stocks (see Figure 2). *February was the third consecutive month of orders contraction.*

Communications orders growth for the three months ended in February was 3.6 percent below year-earlier orders compared with negative 16 percent growth in January. *February was the sixth consecutive month of orders contraction.*

Instruments equipment order growth for the three months ended in February moved up 1 percent above year-earlier orders from negative 6.2 percent growth in January. *February was the first month of positive orders growth after five consecutive months of contraction.*

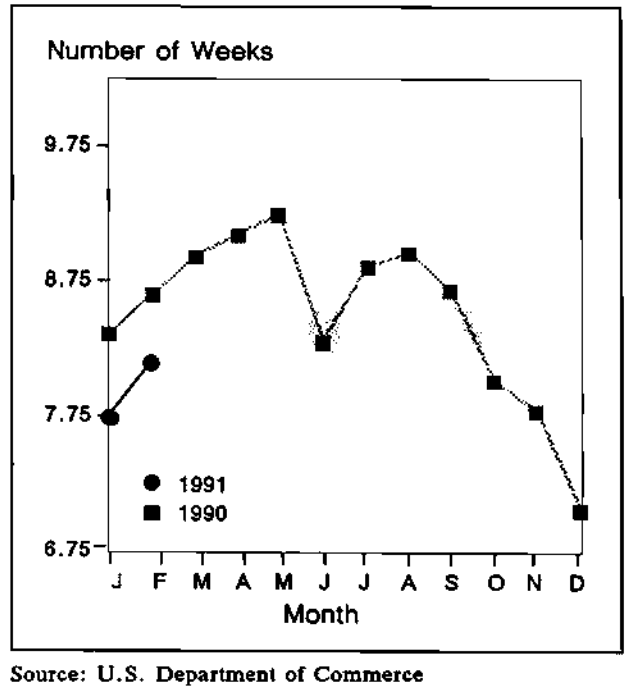
Inventories in communications and instruments are 6 and 11 weeks, or 0.5 and 0.6 weeks below year-earlier levels, respectively.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

There are signs, albeit faint ones, that a resumption of systems production is due in the second quarter. Whatever the timing of the turnaround, however, Dataquest believes that the coming expansion will be chiefly characterized by slow and steady acceleration in orders and shipments growth. Growth will likely accelerate through year-end and into 1992. There is a light at the end of the tunnel, and we do not believe that it is an approaching train.

*Terrance A. Birkholz*

FIGURE 2
U.S. Computers and Office Equipment
Inventory-to-Shipments Ratio (Weeks)




Source: U.S. Department of Commerce

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# Research *Bulletin*

## APRIL PROCUREMENT PULSE: BUSINESS STABLE AND POISED FOR PICKUP

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDERS TAPER OFF, SYSTEM OUTLOOK STILL POSITIVE

Respondents to this month's survey expect to order 8 percent fewer semiconductors in April relative to last month (see Figure 1). This slight decline in order activity is occurring in concert with

**Figure 1**
**Averaged Monthly Semiconductor Orders**

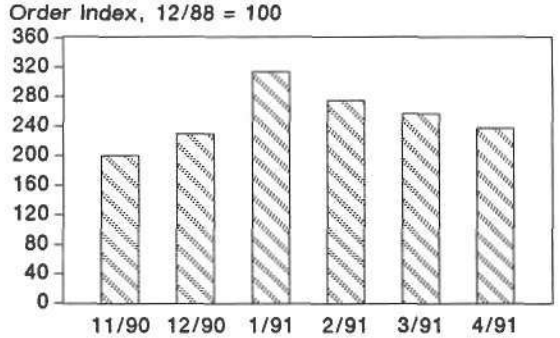



**Figure 2**
**Averaged Semiconductor Lead Times**

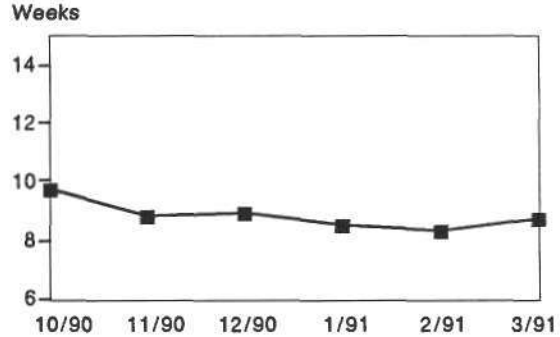



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

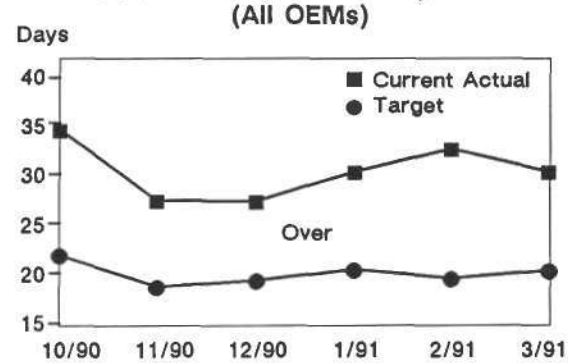
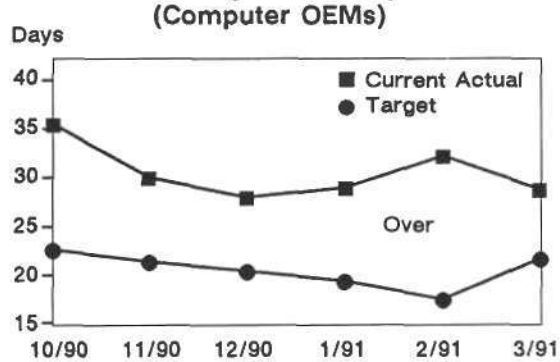



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (April 1991)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inventory control programs and more realistic post-war system sales forecasts. It appears that the post-Gulf War euphoria has worn off from last month's system sales expectations of 5.2 percent to the current six-month outlook of 3.4 percent. The computer subset of respondents' outlook also dipped, going from last month's 8.4 percent to a current 7 percent six-month growth rate. This dip in system sales expectations should be looked at in perspective. The positive forecast during the past nine months in the face of a war, uncertain business conditions, and governmental recessionary reports highlights the resiliency of the electronics industry.

## AVERAGE LEAD TIMES DID NOT CHANGE; IT JUST FELT THAT WAY

Figure 2 shows that, during the past six months, there has been very little, if any, average lead time movement from a mean of 9 weeks. The current 8.8-week average is up slightly from last month's 8.4 weeks, reflecting minor lengthening of some 1Mb DRAM deliveries. All other semiconductors are currently in good supply with all but one of this month's respondents not having any product problems. (One respondent noted some standard logic high-reliability package problems that were planned to be corrected.) After many months of dealing with a few isolated issues, 23 percent of respondents in this month's survey highlighted quality as a key issue needing attention. Although critical to today's semiconductor user, quality has lately been taken for granted because "all semiconductors are good quality." That cliche is not being upheld by some suppliers of major system companies. The current flat market, combined with abundant supplies of semiconductors, can become precarious for semiconductor suppliers that do not provide the basis for lower total cost—which is quality. Pricing remains flat on average, and Dataquest does not expect to see changes to the current semiconductor supply situation during the next six months.

## SEMICONDUCTOR INVENTORIES GET BACK TO WHERE THEY ONCE BELONGED

The two-month run-up in semiconductor inventories was corrected, as noted in this month's survey response and shown in Figures 3 and 4. Targeted levels rose slightly, while actual levels fell. The current overall targeted and actual inventory levels went from last month's respective 19.8 and 32.9 days to this month's reported 20.6 and 30.6 days. The computer company respondents also reported inventory improvements, with target and actual levels going from last month's respective 17.6 and 32.2 days to a current respective 21.8- and 28.8-day level. The semiconductor inventory correction seen this month coincides with progressive order level reductions over the past three months for our sample. For now, the historical average 20-day target and 30-day actual level of inventories has again been reached. Because availability remains very good, cost control through inventory management is still a very tangible way to meet cost reduction goals, because most commodity semiconductors are at historically low price levels. Dataquest continues to see inventories being pared wherever possible, but the historical golden mean of 30 days of actual inventories on hand may prove difficult to improve.

## DATAQUEST PERSPECTIVE

The slow growth trend of system sales and correlated semiconductor business is still chugging along in the absence of any high-volume product or segment able to push growth. Dataquest believes that the relative stability of demand also allows for gradual manufacturing and product changes to occur without the disruption caused by hyper over- or under-forecast demand levels. As mentioned previously, we noted only one problem product area, which involved packaging and not the chip itself. Besides that isolated instance, availability, prices, and lead times remain predictable and in balance. The quality issue remains key to all total cost improvement plans and should not be taken for granted, as a group of respondents are now communicating to their suppliers. Amid inventory shifts, supply/demand balances, and economic uncertainty, the transition to surface-mount components is now complete for our sampled respondents, and only one is noting a minor handling problem. Dataquest continues to forecast gradual growth for semiconductors for the rest of this year, and the current survey reinforces our forecast.

*Mark Giudici*

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# Research *Bulletin*

## MARCH MARKET WATCH: SYSTEM DEMAND STEADY WHILE SEMICONDUCTOR BOOKINGS JUMP

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

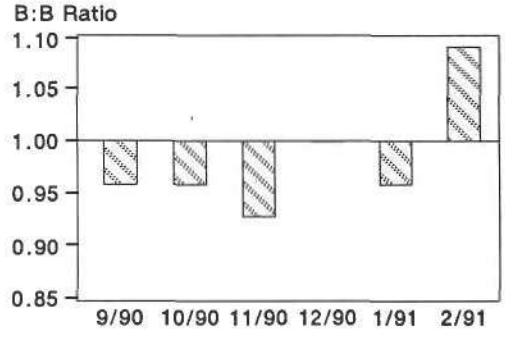



**Figure 2**
**DOC Computer Demand**

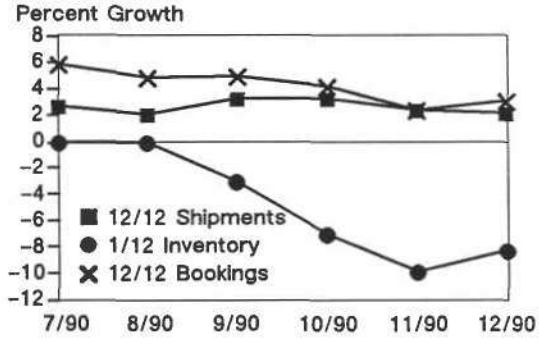



**Figure 3**
**Semiconductor Inventory Level**

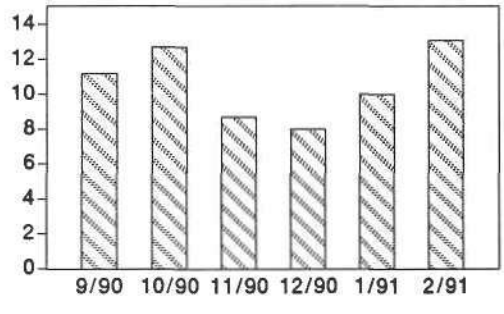
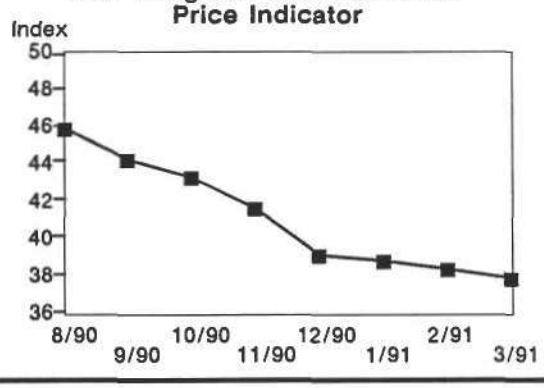



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, U.S. Department of Commerce, Dataquest (March 1991)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## THE BOOK-TO-BILL RATIO SKYROCKETS, AND THE NUMBERS LOOK GOOD

February's book-to-bill ratio jumped 13 points (1.09) from last month's level (0.96), as seen in Figure 1, while the actual booking-and-billing dollars reflect the increase in this business index. The three-month average bookings level rose 14.9 percent from January's level, while the corresponding billings average rose 1.1 percent. This is the first positive change in the semiconductor market in the past four months, and it correlates with data gathered in Dataquest's monthly procurement surveys that show steady expected system growth.

The six-month system sales outlook increased this month to 6.1 percent over last month's 3.7 percent forecast (see the March *Procurement Pulse*). As noted in previous issues of *Market Watch*, the current historically low semiconductor inventory levels quickly translate into bookings when system sales rise.

## COMPUTER BOOKINGS UP, INVENTORY RATE STABILIZES

Figure 2 shows a slight increase in the Department of Commerce's computer-annualized booking rate, while annualized shipments remained unchanged. The 1/12 system inventory rate has stopped falling, resulting from the change from shipping increased levels of finished goods inventory to balancing shipments from WIP that require raw material (components). The 12/12 bookings and billings rates for January are 3.1 and 2.1 percent, respectively, relative to December's equal rate of 2.4 percent for both bookings and billings. The Gulf War's resolution has removed one level of uncertainty in the market, and prewar economic concerns are again taking precedence.

## SEMICONDUCTOR INVENTORIES INCREASE SLIGHTLY AS PIPELINE FILLS

Figure 3 illustrates that the difference between target and actual inventory levels diverged in February to 13.1 days relative to January's delta of 10 days. Although this is an increase, it is more a correction of target levels than large increases in actual inventory levels. The actual inventory level rose from 31 to 32 days, while the target level declined from 21 to 19 days. As noted in earlier issues of *Procurement Pulse*, despite intentions to reach a targeted average of 20 days, an average of 30 days appears to be the realistic goal. The golden mean of 30-day semiconductor inventory is being tested, but current inventory control measures in place should correct any large variance.

## OVERALL PRICES STABILIZE, AVAILABILITY EXCELLENT

DRAMs are again the main reason why the price average shown in Figure 4 did not decline further this month. Overall availability remains good; the only exception is that some of the above-mentioned DRAMs have extended lead times of 10 to 12 weeks for some (not all) suppliers.

The overall forecast slow growth in electronics will continue to keep semiconductor availability good because of improved forecasting for these parts that is keeping semiconductor capacity in line with system demand. The current flattening of DRAM prices is partly the result of this supply/demand balance. As non-Japanese DRAM suppliers react to the relatively static price situation, we can expect to see increased supplies within the next 6 to 8 weeks and some increased competition in the 1Mb market.

## DATAQUEST PERSPECTIVE

The current increase in semiconductor booking activity is an encouraging sign that the procurement community's outlook for system sales is being acted on with increased semiconductor orders. Availability still remains excellent despite price firming in the DRAM arena and should remain because of forecasting mechanisms now in place in the majority of large to medium-size system companies.

The end of the Gulf War may not mean an instant pickup in sales, but its absence is one less unknown in a uncertain economy. Dataquest continues to forecast steady growth in the semiconductor market in line with slow and steady sales in the aggregate systems arena.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: THE SILVER LINING OF A SLOW MARKET RECOVERY

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE BUSINESS CLIMATE

A quick check of the economy's pulse indicates that the recession is still with us: In January, retail sales were down 0.9 percent; durable goods orders were down 0.7 percent; industrial production was down 0.4 percent; and in February, the civilian unemployment rate rose to 6.5 percent from 6.2 percent.

Four factors suggest that the economy should soon stabilize. One, inflation is pretty well under control, giving the Fed room to ease monetary policy. Two, actual inventory stocks are close to desired levels, so a pickup in aggregate spending should translate relatively quickly into a pickup in production. Three, the slight revival in consumer confidence that has begun should, by adding quickly to spending, begin to pull the economy out of recession. Four, low oil prices—now below preinvasion levels—will help by raising consumers' purchasing power.

The recovery, expected this spring, will be slow. The reasons include the absence of the usual strong stimulus from federal fiscal policy, the absence of the typical stimulus from financially strapped state and local sectors, less of an inventory rebound due to a milder-than-normal inventory cycle, and a prolonged slump in the construction business. Furthermore, potential growth in the next few years will be constrained by slower growth in labor force and productivity.

### EQUIPMENT MARKETS

In keeping with the recession, orders growth was negative across the major electronic equipment markets in January. Computers and office equipment orders growth for the three months ending in January was 3.1 percent below year-earlier orders, compared with negative 3.8 percent growth in December (see Figure 1). Inventories are at 8.1 weeks in January, down 0.7 weeks from January 1990 stocks (see Figure 2).

Communications orders growth for the three months ending in January was 15.8 percent below year-earlier orders, compared with negative 13.9 percent growth in December. *January was the fifth consecutive month of orders contraction.*

Instruments equipment orders growth for the three months ending in January fell 6.4 percent below year-earlier orders from negative 5.6 percent growth in December. As in communications, *January was the fifth consecutive month of orders contraction.* Inventories in both communications and instruments have been further tightened below year-earlier levels.

Despite a bleak showing in January, there is good news on the trade front: The U.S. trade deficit in electronic products *fell 54.3 percent in 1990,* according to statistics recently released by the Electronics Industry Association. The shrinkage was due primarily to a boost in computer exports.

Electronics exports grew 11.6 percent in 1990, and electronics imports grew 0.4 percent in 1990. Almost one-half (49.5 percent) of the dollar growth in exports was due exclusively to computer and industrial electronics gear. Dataquest believes that most of this gain is explained by the strong worldwide presence of U.S.-made workstations and the strong penetration of PCs in the European market.

For example, PC manufacturer Dell Computer Corporation's worldwide sales grew 41 percent in fiscal year 1991, which ended February 3, 1991; international sales grew 112 percent, and domestic sales grew 20 percent.

According to Dataquest's monthly survey of major OEM semiconductor procurement managers, overall six-month systems sales are expected to grow 5.2 percent, up from 3.7 percent in February. Data processing OEMs' expected six-month growth also moved up to 8.4 percent, compared with 5.9 percent in February. The upward revision in March's expectations reflects heightened business


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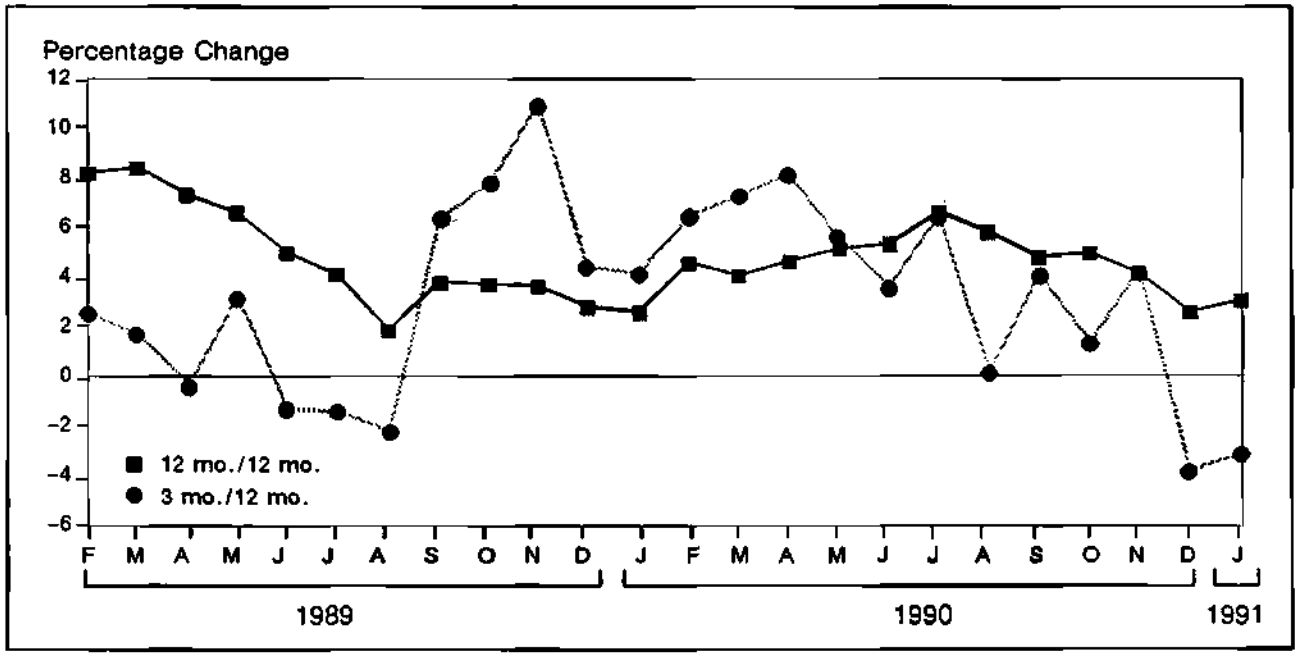
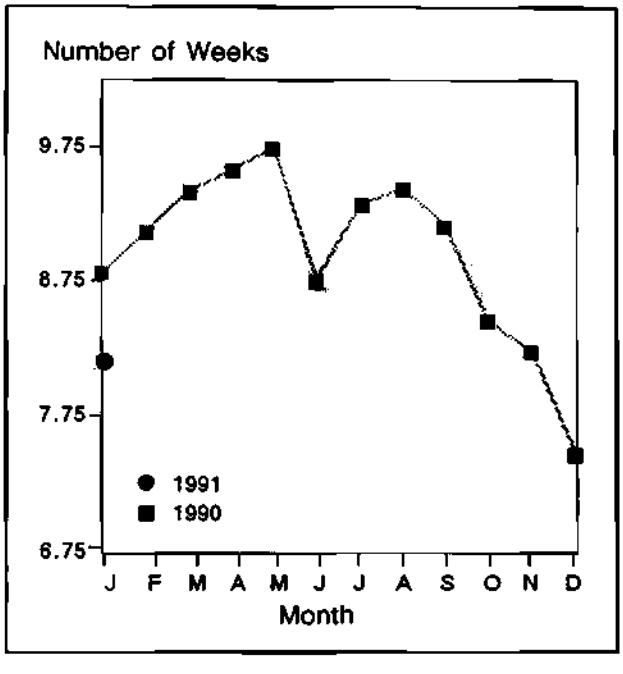
FIGURE 1
U.S. Computers and Office Equipment Orders Growth (1989-1991)




Source: U.S. Department of Commerce

FIGURE 2
U.S. Computers and Office Equipment Inventory-to-Shipments Ratio (Weeks)




Source: U.S. Department of Commerce

confidence stemming from the swift victory in the Gulf War.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Systems orders growth will not return to a sustained positive trend until business investment spending recovers in the second quarter. However, the aforementioned factors that are expected to hold back the economic recovery are also likely to moderate systems markets' growth.

However, moderate recovery is not necessarily undesirable. Experience has shown that slower market growth is typically less variable than—and therefore preferable to—faster growth. Simply put, it is an easier and more forgiving environment. Business planners can execute a more continuous strategy than an abrupt stop-and-go policy.

Some will say that slower growth entails the risk of an industry that is operating too close to the edge of another downturn being pushed into it by some unexpected event. This, also, is not necessarily the case. Slower growth, close to the systems and semiconductors industries' potential, is more stable and sustainable than growth in excess of its potential, leading to further downturns and all the instability and housecleaning such an outcome would entail.

*Terrance A. Birkholz*

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# Research *Bulletin*

## MARCH PROCUREMENT PULSE: BUSINESS OUTLOOK MIXED, INVENTORIES RISE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

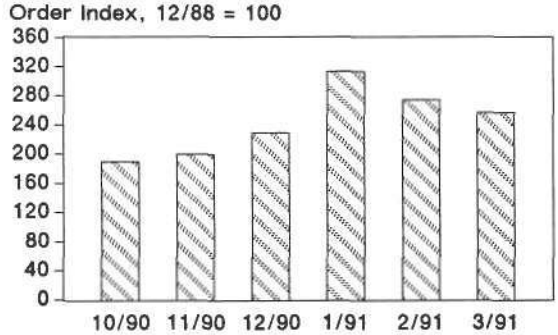



**Figure 2**
**Averaged Semiconductor Lead Times**

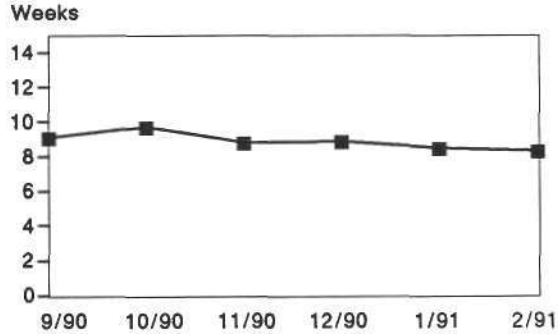



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

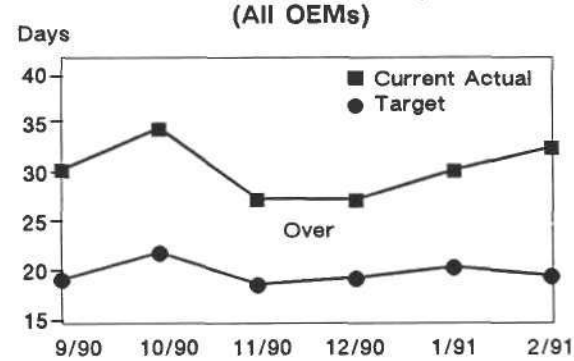
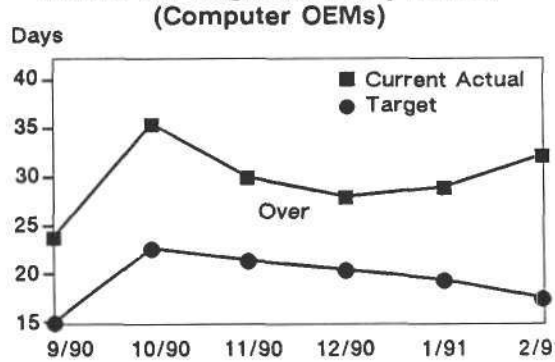



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (March 1991)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## SEMICONDUCTOR ORDER LEVELS DOWN, SYSTEM BUSINESS OUTLOOK UP

Figure 1 shows that this month's respondents expect to slightly reduce (by 6.5 percent) their semiconductor order levels in March relative to February. This small reduction in anticipated order activity does not signal a lowering of general demand but rather inventory correction measures being made for specific components. For the past two months, the six-month system sales outlook has ebbed and flowed with the status of the situation in the Persian Gulf. The current procurement managers' six-month outlook for system sales improved from last month's 3.7 percent to 5.2 percent. The computer sample raised its six-month systems outlook even higher, from 5.9 to 8.4 percent. It appears that the prewar slow-growth trend in system sales has resumed now that the Gulf War is successfully concluded. Dataquest continues to expect slow growth in the systems market and related semiconductor arena due to the lack of any high-volume new product that could pull growth higher.

## LEAD TIMES REMAIN BORING AND STABLE

Figure 2 illustrates, with actual data points, a semiconductor market at a textbook supply-demand equilibrium. February's lead time average of 8.4 weeks is slightly down from last month's 8.6 weeks and 2 days less than December's 9 weeks. The semiconductor market has been balanced in this manner for the last nine months (six months shown) to the extent that some memory suppliers shifted production levels to change demand to the next-generation (and higher-profit) devices. With the exception of 1Mb DRAMs, lead times have remained stable as demand and supply have weathered both peace and wartime economic uncertainties with little variance in delivery schedule. Overall prices continue to remain flat or slowly declining (except for the 1Mb DRAM) as buyers continue to seek cost-based price reductions where applicable. Dataquest sees the possibility that as early as May 1991 some DRAM suppliers could take advantage of the current firming of 1Mb DRAM contract prices and relatively longer (10+ weeks) lead times by increasing production now and later undercutting the ASP. If enough incremental 1Mb shipments are made (beginning late in Q2 1991), the pre-Q1 1991 average price erosion could resume. Except for the 1Mb–4Mb DRAM supply situation, Dataquest does not foresee any supply or price volatility over the next six months.

## SEMICONDUCTOR INVENTORIES UP, CORRECTIONS UNDER WAY

Semiconductor inventory levels rose for the second consecutive month, while targeted levels were lowered to force adjustments. The overall targeted and actual levels went from last month's respective 20.7 and 30.6 days to this month's reported 19.8 and 32.9 days. The computer segment of the survey again this month reported a diverging of targeted and actual inventory levels, going from last month's respective 19.5 and 29.0 days to this month's reported 17.6 and 32.2 days. The overall incremental increase in semiconductor inventory since December (19 percent in days) is being addressed and corrected with a lowering of order levels (negative 18 percent in dollars since January's high) combined with anticipated increased demand-driven usage. Because availability is not a problem, Dataquest continues to observe inventories being a very closely watched and manageable cost-control index and expects actual levels soon to come into line with the historical actual average of 30 days.

## DATAQUEST PERSPECTIVE

Historically, the Gulf War will be seen as having little effect on real-time electronics business, other than compounding the overall market's uncertainty level. The cessation of hostilities and coincidental increased market optimism may not be the beginning of a trend, but they highlight the volatility of the market in the absence of large, identifiable demand-generating products. The average slow-growth pattern seen in the second half of 1990 appears for now to be picking up momentum. None of this month's respondents noted any problem products, and a minority noted quality as a current concern. In the continued absence of supply problems, demand issues are being addressed with forecast improvements and increased supplier-user planning updates. One of this year's Semiconductor Supplier-of-Year Award winners mentioned that "the trust involved with sharing long-range plans with your customer takes a big step, almost like a marriage...." In any relationship, good communication is key to preventing and solving problems. This supplier won the award because his company listened and responded to customers' needs. World-class suppliers and customers communicate.

*Mark Giudici*

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# Research *Bulletin*

## FEBRUARY MARKET WATCH: FLAT EQUIPMENT DEMAND AND MANAGED SEMICONDUCTOR SUPPLIES REFLECTED IN STABLE AND LOWER BUSINESS LEVELS

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### ANOTHER SLIGHT RISE IN THE BOOK-TO-BILL RATIO, BUT THE NUMBERS TELL OTHERWISE

January's book-to-bill ratio rose slightly to 0.96, up from December's 0.95 level, as seen in Figure 1. Although the ratio is up, the actual

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

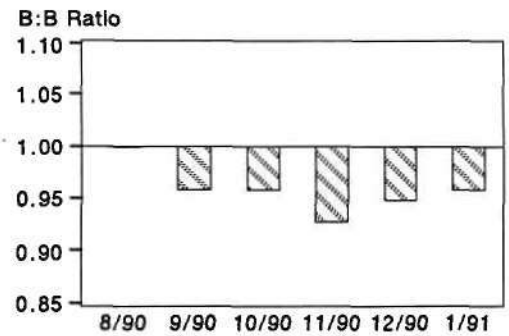



**Figure 2**
**DOC Computer Demand**

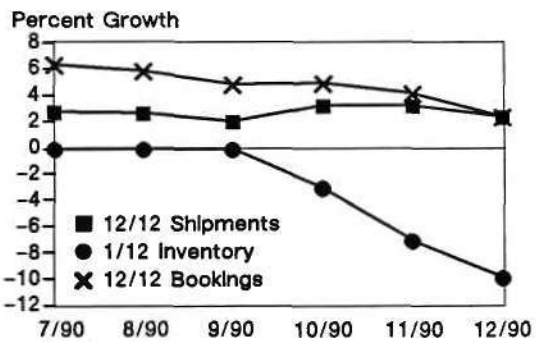



**Figure 3**
**Semiconductor Inventory Level**

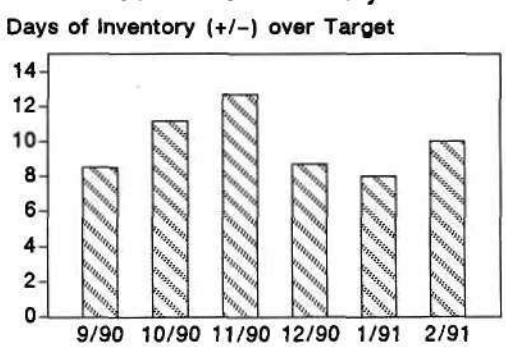
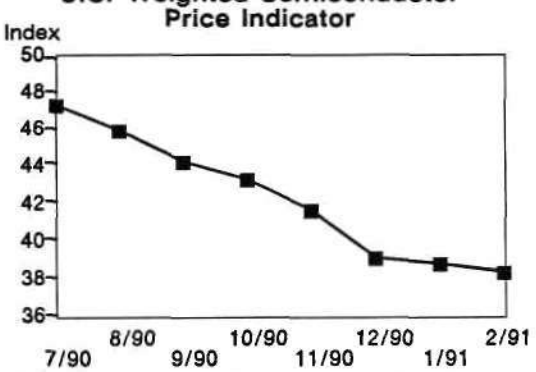



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, U.S. Department of Commerce, Dataquest (February 1991)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NASM Newsletters 1991: January-March 1991-06



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average booking and billing dollars show a *steady decline* for the last three months. The only bright spot in the billing numbers is that last month's semiconductor shipments were a meager 4.3 percent higher than January 1990's billing equivalent. The expected increase in semiconductor purchases noted in the January *Procurement Pulse* did not materialize, partly because of the uncertainty surrounding the economy and the Iraq war. The six-month business outlook for systems buyers is still positive (3.7 percent) but down from the last month's prewar optimism of 6.9 percent. This lowering of expectations will not severely impact semiconductor order rates, because user semiconductor inventories on average remain at the 30-day level.

## COMPUTER BOOKINGS AND SHIPMENT RATES MERGE, INVENTORY RATES CONTINUE TO DIVE

Figure 2 illustrates the slippage of the December bookings and shipment rates of computers and business machines to an equal rate of 2.45 percent from 4.2 percent and 3.3 percent, respectively, reported in November. The decline in inventory rates seen in the Department of Commerce's December numbers reflects efforts to improve year-end financials in view of slow sales and confidence in the ready availability of raw materials to replenish shelves in balance with future needs. The Iraq war appears to be adding another layer of psychological uncertainty to an existing soft economy, which is resulting in some delays to system orders. Dataquest still expects the year to reflect a steady growth pattern in semiconductor business (9 percent worldwide), although the near term may result in lower-than-average growth because of the war.

## SEMICONDUCTOR INVENTORIES RISE TO AVERAGE LEVELS

The levels of respondent users' semiconductor inventories rose slightly (by 3 days to 31 days) this month; targeted levels also increased (by 1 day to 21 days). The resulting 10-day difference is 3 days more than last month's difference and generally reflects lower system sales that most likely will be adjusted for next month. The outlook for system sales during the next six months still is positive at 3.7 percent but is not as rosy as last month's prewar 6.9 percent forecast. The continued positive business outlook is expected to be maintained regardless of the war and could be negatively affected only by a dramatic financial mishap. Dataquest expects semiconductor users to continue to hold semiconductor inventories at about a 30-day average and will balance this padding with their system sales levels.

## OVERALL PRICES FLATTEN, AVAILABILITY REMAINS GOOD

Largely because of the recent flattening of DRAM prices, the overall price level as per the most recent *DQ Monday Report* has remained unchanged since last month's review. Because of selected fourth-quarter 1990 production reductions by some Japanese memory suppliers, the overall 1Mb DRAM market price has flattened, and non-Japanese suppliers continue to follow the Japanese lead in firm pricing for this device. Lead times for memory and most other semiconductor products remain consistent and predictable. Dataquest does not expect the current level of price stability to be maintained because of the steady/slow growth demand pattern now in motion. Memory price declines may resume if non-Japanese suppliers in aggregate try to take advantage of stable prices by increasing shipments. This scenario, if enacted, will not be felt in the market for six to eight weeks because of the fabrication time needed for the additional parts.

## DATAQUEST CONCLUSIONS

System sales expectations remain in a low growth mode, and procurement plans closely mirror this outlook as semiconductor inventories are maintained at a constant level. The overall availability of semiconductors remains very good despite some memory production cutbacks. Forecasting continues to improve, keeping inventories of both suppliers and users controllable. In the near term, Dataquest expects to see steady semiconductor demand levels and stable supplies equaling flat prices and lead times. Looking beyond the next three months involves considering the directions of the economy and the war. Low growth being the status quo, a resumption in economic growth and/or a resolution to the war could perk up a reluctant electronics market.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: FEW BRIGHT SPOTS IN FIRST HALF SYSTEMS OUTLOOK

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE BUSINESS CLIMATE

The Middle East war should not create a fiscal crisis. The Congressional Budget Office, after reviewing a variety of credible military outcomes, set broad fiscal boundaries for the war of between $28 billion and $86 billion, to be paid out over several years. Of course, the final bill will depend on the length of the war, the allies' financial support, and the extent of replacement of weapons stocks. But even this initial range places the annual amortized cost at *less than 0.5 percent of the United States' $5.5 trillion GNP.*

Despite the war, Dataquest continues to stand by its forecast of a short and shallow recession. Our corporate parent, The Dun & Bradstreet Corporation, expects U.S. real GNP growth to contract negative 0.5 percent in first quarter 1991, compared with negative 2.3 percent growth in fourth quarter 1990. Beyond the first quarter, real GNP growth is expected to be positive and accelerating. The worst (war) scenario would delay recovery until the third quarter of 1991. Overall, we expect real GNP growth to slow to 0.6 percent in 1991, down from 0.9 percent in 1990.

### EQUIPMENT MARKETS

The recessionary virus infected the computer business in a big way in December. Computers and office equipment orders growth for the three months ended in December was 4.3 percent below year-earlier orders, compared with 4.3 percent growth in November (Figure 1).

Manufacturers have not been caught off guard, however: Companies draw down inventories to fill orders. Inventories fell 0.5 week in December, maintaining November's 1.1 week differential below last year's stocks (Figure 2). Overall, computer orders were up 2.5 percent in 1990, compared with 2.8 percent in 1989.

Among the fastest-growing data processing segments was the PC disk drive arena; makers of 3.5-inch drives had especially good growth. For example, the following companies reported the following revenue increases in fourth quarter 1990 over fourth quarter 1989:

- Maxtor Corporation—110.6 percent
- Quantum Corporation—108.3 percent
- Conner Peripherals—85.3 percent

Communications orders growth for the three months ended in December fell 15.4 percent below 1989 orders from negative 18.1 percent in November. *December was the fourth consecutive quarter of orders contraction.* Defense-communications orders continue to pull down aggregate orders growth. Overall, communications equipment orders were down 2.5 percent in 1990, compared with 10.1 percent in 1989.

Instruments equipment order growth for the three months ended in December fell 5.7 percent below year-earlier orders from negative 5.2 percent in November. As in communications, *December was the fourth consecutive quarter of orders contraction.* An unusually strong fourth quarter 1989 combined with sluggish capital investment spending to depress orders activity. Overall, instruments orders were up 1.4 percent in 1990, compared with 3.7 percent in 1989.


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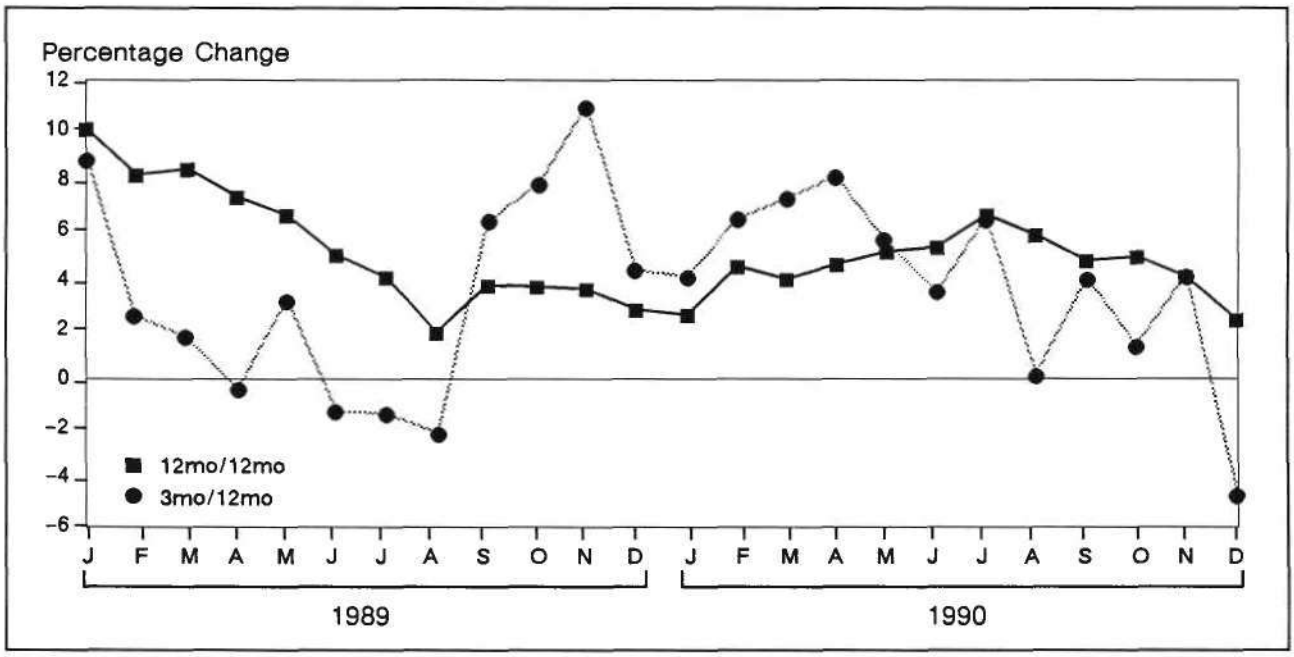
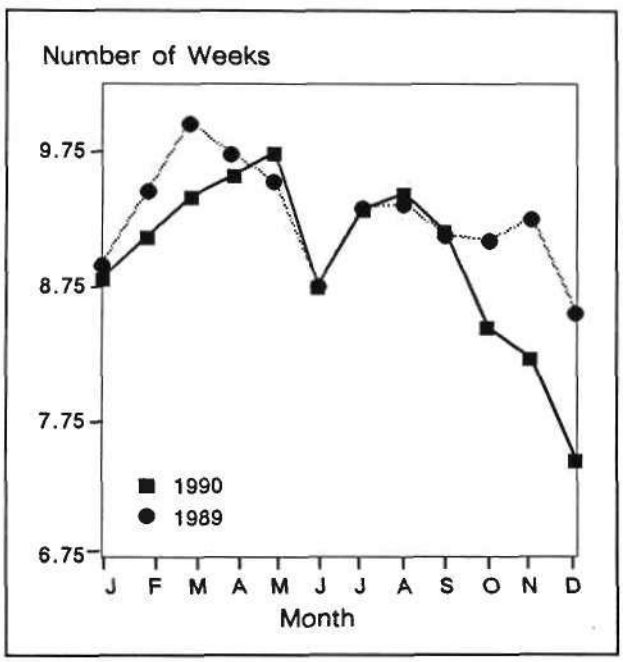
**FIGURE 1**
**U.S. Computers and Office Equipment Orders Growth (1989-1990)**




Source: U.S. Department of Commerce

**FIGURE 2**
**U.S. Computers and Office Equipment Inventory-to-Shipments Ratio (Weeks)**




Source: U.S. Department of Commerce

According to Dataquest's monthly survey of major OEM semiconductor procurement managers, overall six-month systems sales are expected to grow 3.7 percent, down from 6.9 percent in January. Data processing OEMs' expected six-month growth also moved down to 5.9 percent, compared with 8.5 percent in January. The steep revision in February's expectations is more the result of over-optimism in January than a *deepening* pessimistic outlook.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Systems orders growth will not pick up significantly until business investment spending begins to recover during the second quarter. Until then, computer orders growth will hover in the 2 to 4 percent range. Most of this year's growth will occur during the second half.

In the meantime, the best chip growth opportunities are desktop peripherals, laptops, and workstations. Companies that continue with this business during the first half will have an advantage over the competition when the marginal systems areas follow suit during the second half.

*Terrance A. Birkholz*

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# Research *Bulletin*

## FEBRUARY PROCUREMENT PULSE: BUSINESS LEVELS FLATTEN, INVENTORY LEVELS STABILIZE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

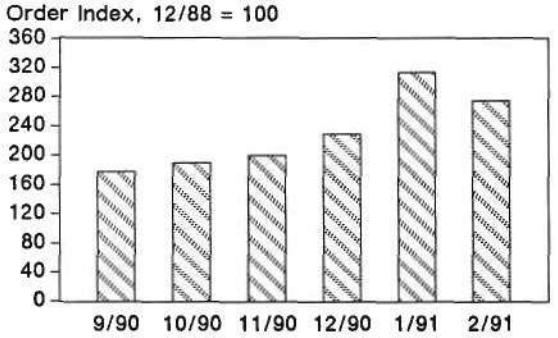



**Figure 2**
**Averaged Semiconductor Lead Times**

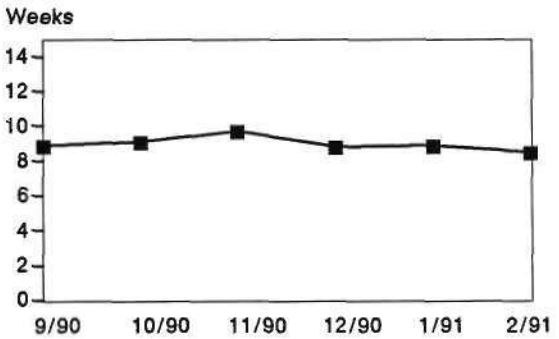



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

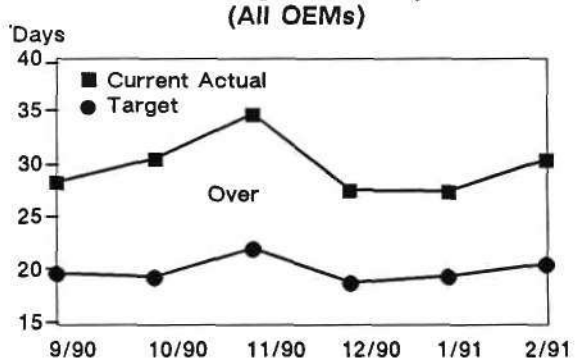
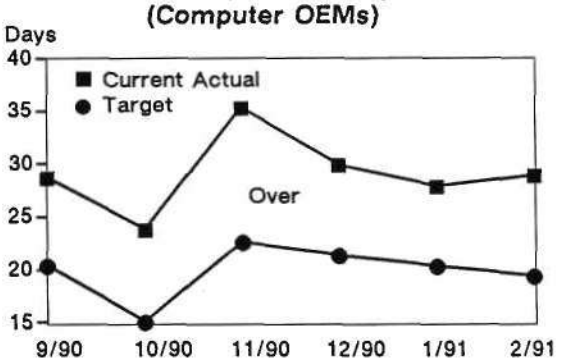



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (February 1991)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## WARTIME WORRIES COMPOUND BUSINESS UNCERTAINTY

As seen in Figure 1, the expected order levels for semiconductors in February should decline slightly—12 percent—from last month's increased expectations. The events that occurred between this and last month's survey (i.e., the Iraq war, recessionary fears) have added an additional level of uncertainty to the fragile order-inventory balance that was adroitly being maintained during the past six months. Although the purchasing expectations were lower than expected in January, the overall trend in order-level activity continues to be positive, in line with a lower but positive system sales forecast. This month's six-month system sales outlook averaged 3.7 percent compared with last month's 6.9 percent figure. Prewar optimism that the Iraq crisis could be resolved peacefully may have biased some of last month's responses that were recorded in the January 1 through 10 time frame. Dataquest continues to expect slow growth in system sales because of replacement and isolated new product introductions that will directly correlate with slow semiconductor sales for the next two quarters.

## HO-HUM, LEAD TIMES REMAIN EFFECTIVELY UNCHANGED

Figure 2 shows how little lead times have deviated from their 9-week average of the past six months. The current level of 8.6 weeks is two days less than last month's average of 9 weeks. Overall semiconductor availability remains excellent, with all of this month's respondents noting no problem devices. Lead times for 1Mb and 4Mb DRAMs are being watched closely. Because of production reductions by major Japanese suppliers, prices have firmed for these products. Lead times remain stable, but there are isolated increases for the 4Mb density as crossover pressure continues to raise demand levels for this part. Non-Japanese DRAM suppliers are currently taking advantage of the firming of 1Mb DRAM prices but may resume downward pricing once fab adjustments now being made reach the market in two to three months. Suppliers capable of producing the 4Mb DRAM are focusing all efforts to maximize shipments in order to meet pent-up crossover demand and garner attractive profits and market share. Dataquest does not foresee extension in the overall lead time for semiconductors, but isolated DRAM increases may occur in the next few months.

## INVENTORIES RISE SLIGHTLY, YET REMAIN VERY MANAGEABLE

Overall reported targeted and actual inventory levels rose from a respective 19.7 and 27.6 days to 20.7 and 30.6 days. The computer segment's inventory levels moved in opposite directions this month. For computer manufacturers, the respective targeted and actual levels changed from 20.5 and 28 days to the current 19.5- and 29-day average. Both Figures 3 and 4 illustrate how, amid business uncertainty, procurement operations have controlled inventory at about a 30-day actual level while striving for an ideal average 20-day target. As mentioned in last month's *Procurement Pulse*, average inventory levels rose in response to last month's anticipated increase in orders. The expected drop in orders this month is also being tempered by this small blip in inventories. Dataquest foresees no long-term shortage of semiconductors (including DRAMs) that would require inventory increases.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

The war with Iraq has not directly impacted the overall direction of system demand, but it has blunted the traditional quick rise in order activity in the first quarter. Orders for both systems and semiconductors on average appear to be on a slow growth curve, with both industries experiencing pockets of above- and below-normal sales. Although non-Japanese DRAM suppliers are following the upward price trend, availability remains very good for the 1Mb device. The shift to the 4Mb DRAM in the next few months may increase some suppliers' lead times, but this situation will be corrected by the end of the second quarter as the number of suppliers increase and production yields improve. Dataquest forecasts the low growth in demand for electronics experienced before the war to continue for the next six months, and this growth trend may increase when hostilities end.

*Mark Giudici*

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a company of The Dun & Bradstreet Corporation

# Research *Bulletin*

## SAMONITOR: SYSTEMS MARKETS' GROWTH PROSPECTS IMPROVE—SLIGHTLY

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE BUSINESS CLIMATE

Contrary to the doom and gloom forecast by the popular press, Dataquest believes that the most likely scenario is a short and shallow recession. Dataquest's corporate parent, The Dun & Bradstreet Corporation, expects U.S. overall economic activity to continue to contract in Q1 1991 at negative 0.5 percent real GNP growth, compared with negative 2.3 percent decline in Q4 1990. Beyond the first quarter, we expect real GNP growth to be positive and accelerating. Overall, real GNP growth will decelerate to 0.6 percent in 1991, down from 0.9 in 1990.

At best, the world economy faces a prospect of slow growth in 1991. However, enough *avoidable* hazards—e.g., a liquidity crisis caused by an unexpected rash of bank failures or a full-blown trade war—exist to create a probability of the short and shallow recession turning into a long and deep one.

### EQUIPMENT MARKETS

Computer and office equipment orders growth for the three months ended in November was 4.4 percent above year-earlier orders, compared with 1.4 percent growth in October (Figure 1). Since July, orders growth has gone from monthly acceleration to deceleration, showing a distinct lack of trend.

Computer manufacturers are drawing down inventories to fill orders, making a conscientious and successful effort to control overhead costs. Inventories fell 0.3 week in November, a healthy 1.1 weeks below last year (Figure 2); and three-month shipments ended in November were up 4.7 percent over 1989 levels, compared with 4.4 percent in October.

The popular press' portrayal of doom and gloom in the electronics business notwithstanding, the *top-tier* PC manufacturers should be fruitful ground for chipmakers in 1991. Strength will stem from strong product lines and aggressive pricing strategies, as follows:

- Continued price cuts and the expected February introduction of a lightweight portable should boost IBM sales.
- Apple's business will be helped by the new low-priced Macintosh Classics line introduced last October.
- Compaq's business should thrive from the new PC line introduced last year and its fast-selling PC notebooks.
- AST Research's laptop and 486-based machines should ensure top-tier competitiveness.

Relatively higher saturation and slower economic growth indicate that U.S. shipments growth will fall short of European and Japanese shipments.

The second-tier manufacturers of relatively undifferentiable (i.e., commodity) PCs will feel the brunt of the tough business climate in 1991 as they continue to exploit their sole competitive edge—low price.

Communications equipment orders growth for the three months ended in November fell by 18.2 percent below 1989 orders from negative 5.1 percent in October. Recent losses are due to defense-communications equipment; the commercial sector still holds up relatively well. Growth should rebound to low single-digit rates in the next three months. Communications inventories declined 0.2 weeks in November to 9.1 weeks, down 1.2 weeks from 1989 levels.

Instrument equipment order growth for the three months ended in November fell to negative 5.1 percent below year-earlier orders from negative 1.4 percent in October. Instrument inventories


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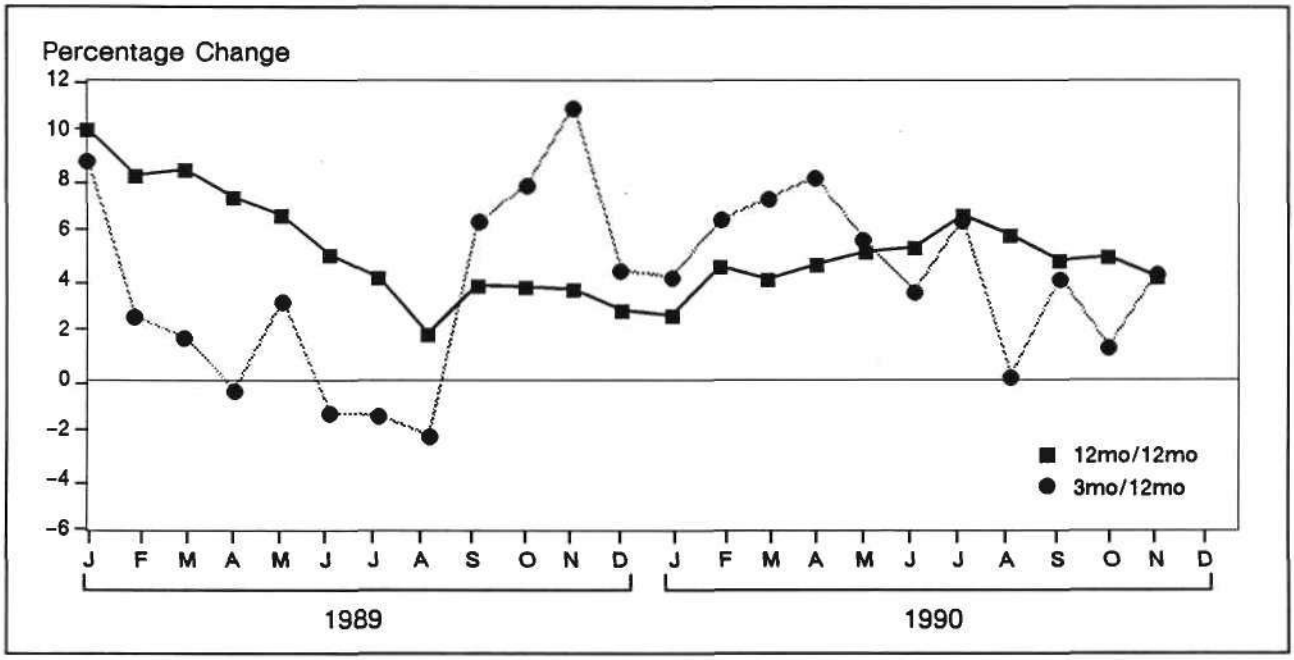
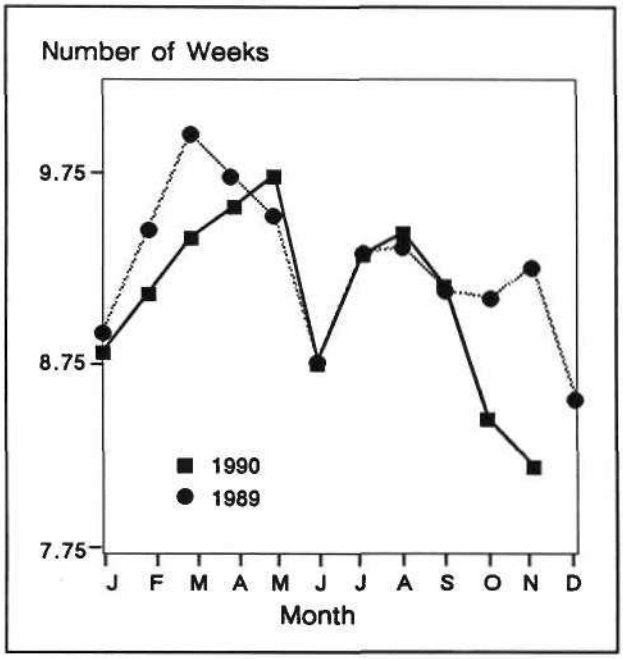
FIGURE 1
U.S. Computers and Office Equipment Orders Growth (1989-1990)




Source: U.S. Department of Commerce

FIGURE 2
U.S. Computers and Office Equipment Inventory-to-Shipments Ratio (Weeks)




Source: U.S. Department of Commerce

stayed unchanged at 9.6 weeks in November, down 0.6 weeks below year-earlier levels.

Dataquest's monthly survey of major OEM semiconductor procurement managers continues to support improvement in the systems-market outlook: Overall, six-month systems sales are expected to grow 6.9 percent, up from 4.1 percent in December. Data-processing OEMs' expected six-month growth moved up to 8.5 percent, compared with 6.8 percent in December. January represents the second consecutive month of increased optimism in six-month systems-business expectations.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

We expect systems markets to grow 3 to 5 percent in the first half of 1991. Low inventories are evidence that while business conditions are lackluster and the Middle East war hampers planning, systems companies do an excellent job of managing operations. Lean inventories will help minimize the whipsaw effect and price swings as systems production growth picks up later this year.

We advise semiconductor manufacturers to not let expectations be dampened by recent economic and geopolitical events. The best way to catch the modest growth wave this year is to concentrate on technology factors yielding long-term competitive advantage and not be sidetracked by short-run uncertainties.

*Terrance A. Birkholz*

Dataquest
a company of
The Dun & Bradstreet Corporation

January 29, 1991

NORTH AMERICAN SEMICONDUCTOR MARKETS

ERRATA

Dear Client:

In our January research bulletin entitled "January Market Watch: Near Term Chip Demand Wavers While Inventories And Prices Remain Under Control" there were some errors. Please substitute the enclosed revised newsletter for the one previously issued.

We apologize for any inconvenience this may have caused. If you have any questions, please call Maria Valenzuela at (408) 437 8262.

Sincerely,

Kimberlie C. Southern
Document Coordinator

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Dataquest
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# Research *Bulletin*

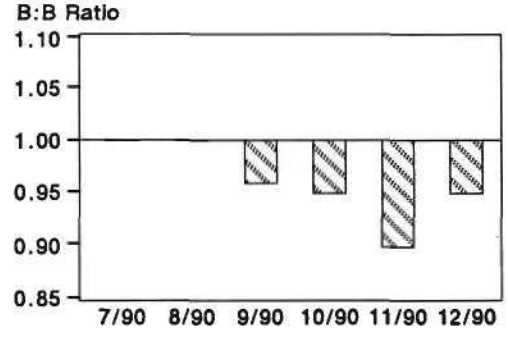
## JANUARY MARKET WATCH: NEAR-TERM CHIP DEMAND WAVERS WHILE INVENTORIES AND PRICES REMAIN UNDER CONTROL

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL RATIO RISES, YET THE OUTLOOK REMAINS MIXED

The book-to-bill ratio for December rose to 0.95, up from November's nadir of 0.90 as seen in Figure 1. The actual numbers that make up this

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

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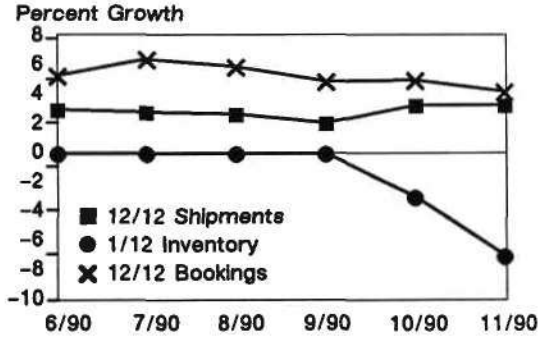



**Figure 3**
**Semiconductor Inventory Level**

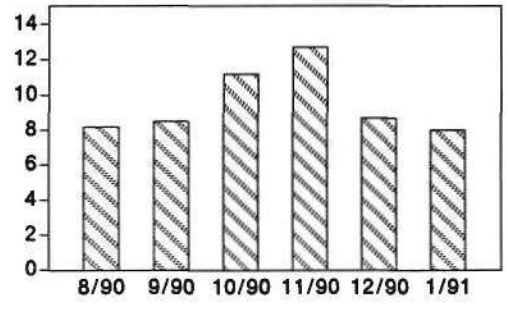
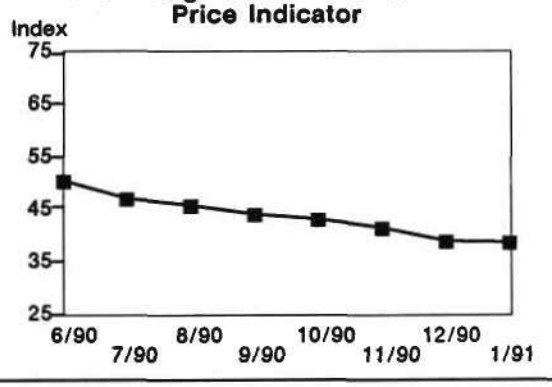



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, US Department of Commerce, Dataquest (January 1991)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ratio tell a different story, however. The three-month average booking and billing numbers both *declined* in December, a five-week month, compared with November. This decline also runs counter to the traditional year-end semiconductor sweep outs that often resulted with this same material coming back as returns in the following quarter. The year-end drop in shipments is also a sign that semiconductor suppliers are running operations with low finished goods inventories and did not have excess parts to ship. The overall low-inventory levels of users and improved forecasting now experienced in the industry also have affected the resistance to this year-end "tradition." As mentioned in January's Procurement Pulse, NASM Newsletter 1991-01, semiconductor users expect to buy more semiconductors in January in line with an improved six-month systems sales outlook of 6.9 percent growth.

## COMPUTER BOOKING AND INVENTORY RATES SLIP, SHIPMENTS FLATTEN

The Department of Commerce data shown in Figure 2 noted a leveling off of the annualized shipment and inventory rates compared with year-ago levels, while the bookings rate slipped less than 1 percent. The 12/12 rates for November shipments and bookings are a respective 3.3 percent and 4.2 percent, compared with October's rates of 3.3 percent and 5.0 percent. Currently occurring from month to month is a seesaw pattern of quarterly booking rates that historically confirms the slow/low growth trend expected in the near term. For example, the 3/12 booking rate of change for computers was 4.4 percent in November, 1.4 percent in October, 4.2 percent in September, and 0.03 percent in August. With no new product expected to greatly increase demand, combined with the uncertainty surrounding developments in the Middle East, Dataquest expects this slow/low growth demand pattern to continue for the next six months.

## SEMICONDUCTOR INVENTORY TARGET/ ACTUAL LEVEL STABILIZES

The difference between targeted and actual semiconductor inventory levels improved less than one (0.7) day (see Figure 3) per this month's procurement manager survey. The respective targeted and actual semiconductor inventory levels now are 19.6 and 27.6 days versus last month's corresponding 19.0 and 27.7 days. The relatively unchanged inventory picture continues to cement the notion that cost control and forecasting accuracy have become a standard procedure and not the latest fad. The increased positive outlook of systems companies (see January 1991 *Procurement Pulse*, NASM Newsletter 1991-01) should quickly be reflected in increased semiconductor orders due to the current low-inventory levels once the actual systems orders are backlogged.

## PRICE DECLINES CONTINUE DESPITE PRODUCTION CUTBACKS

Prices continue their downward slide per this month's review of *The DQ Monday Report*, as seen in Figure 4. Memory prices have slowed their rate of decline and in some cases have stabilized or risen slightly due to aggregate fear of an "upcoming shortage" prophesied by some Japanese suppliers. Once the shortage is seen for what it is, (i.e., hype) prices (including memory) are expected to continue to decline at a slow and steady rate due to the lack of sustained increase in demand that can overshoot planned capacity levels. This steady level of demand is being tested by uncertainties about the Middle East, which also will dampen price levels. As mentioned in last month's Market Watch, overall semiconductor prices will continue to decline regardless of supplier or Middle East actions.

## DATAQUEST CONCLUSIONS

The demand picture for the overall electronics market remains positive, but at a sustainable slow growth rate. Semiconductor availability remains very good, which should not hamper reactions to any increases in system demand. Cost control is forcing both users and chip suppliers to keep inventories as lean as possible, again allowing them to adjust quickly to demand changes at the order level. The best method to avoid surprise price swings is to maintain regular forecast schedules with suppliers, communicating demand needs as soon as possible. Dataquest does not expect to see dramatic shifts in near-term demand that would alter the current supply/demand situation.

*Mark Giudici*

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# Research *Bulletin*

## JANUARY PROCUREMENT PULSE: BUSINESS UPTICK FORESEEN; AVAILABILITY REMAINS GOOD

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### PLANNED INCREASES IN SEMICONDUCTOR ORDERS BACKED BY SYSTEM SALES EXPECTATIONS

Figure 1 shows how this month's respondents expect to increase their semiconductor order levels compared with the last five months. The large

**Figure 1**
**Averaged Monthly Semiconductor Orders**

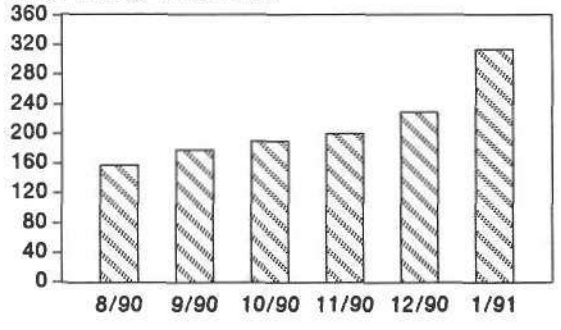



**Figure 2**
**Averaged Semiconductor Lead Times**

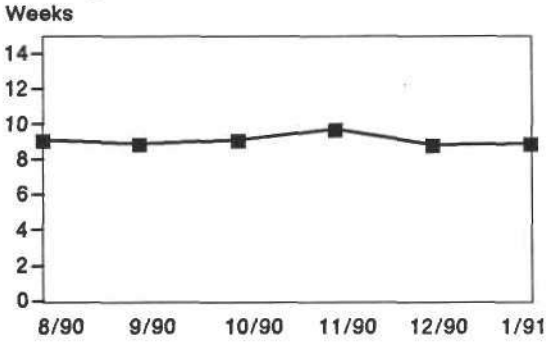



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

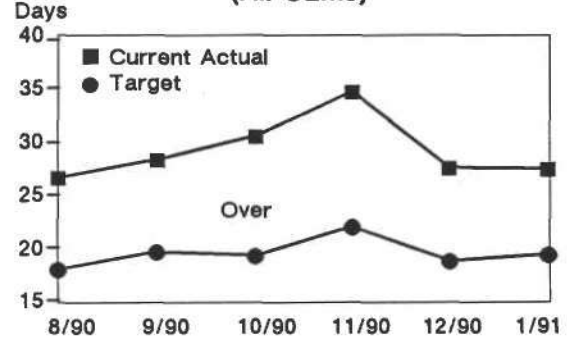
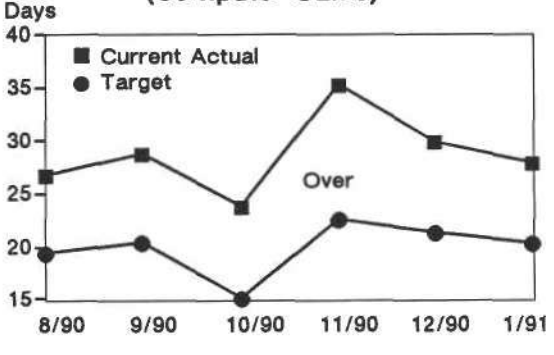



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (January 1991)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NASM Newsletters 1991: January-March 1991-01



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(37.1 percent) expected jump in orders is attributable to a combination of the following:

- Inventory replenishment, now that year-end financials have been recorded
- Positive system demand signals
- Additional purchases of some safety stock DRAMs on the off chance that Japanese supplier warnings of DRAM production cutbacks affect availability

For the second consecutive month, the six-month outlook for overall system and computer sales has increased from a respective 4.1 percent and 6.9 percent for last month to a current 7.1 percent and 8.5 percent. Dataquest still expects to see continued low growth in electronics, even if the worst-case scenario occurs in the Middle East.

## LEAD TIMES REMAIN FLAT, EDGING UP TO 9.0 WEEKS

Figure 2 illustrates that, for all practical purposes, semiconductor lead times have centered around a 9.0-week average for the past six months. This month's average response of 9.0 weeks is up two days from last month's 8.9 weeks, reiterating that availability is very manageable. Aside from the problems with video RAM availability mentioned by one respondent, there were no problems with semiconductor deliveries despite stated cutbacks in production by some Japanese suppliers. Some smaller users of 32-bit microprocessors have been notified that allocations for these high-end parts will remain in effect through 1991. Midsize to large system companies should not have availability concerns through the next six to nine months, as capacity levels are more than adequate to meet current demand levels. A wild card to watch is AMD's "386-type" product. When and if it is legally produced, it will further improve an already improved availability situation for the high-end Intel microprocessor offerings. The key issues this month are cost reductions and domestic ECL supplies.

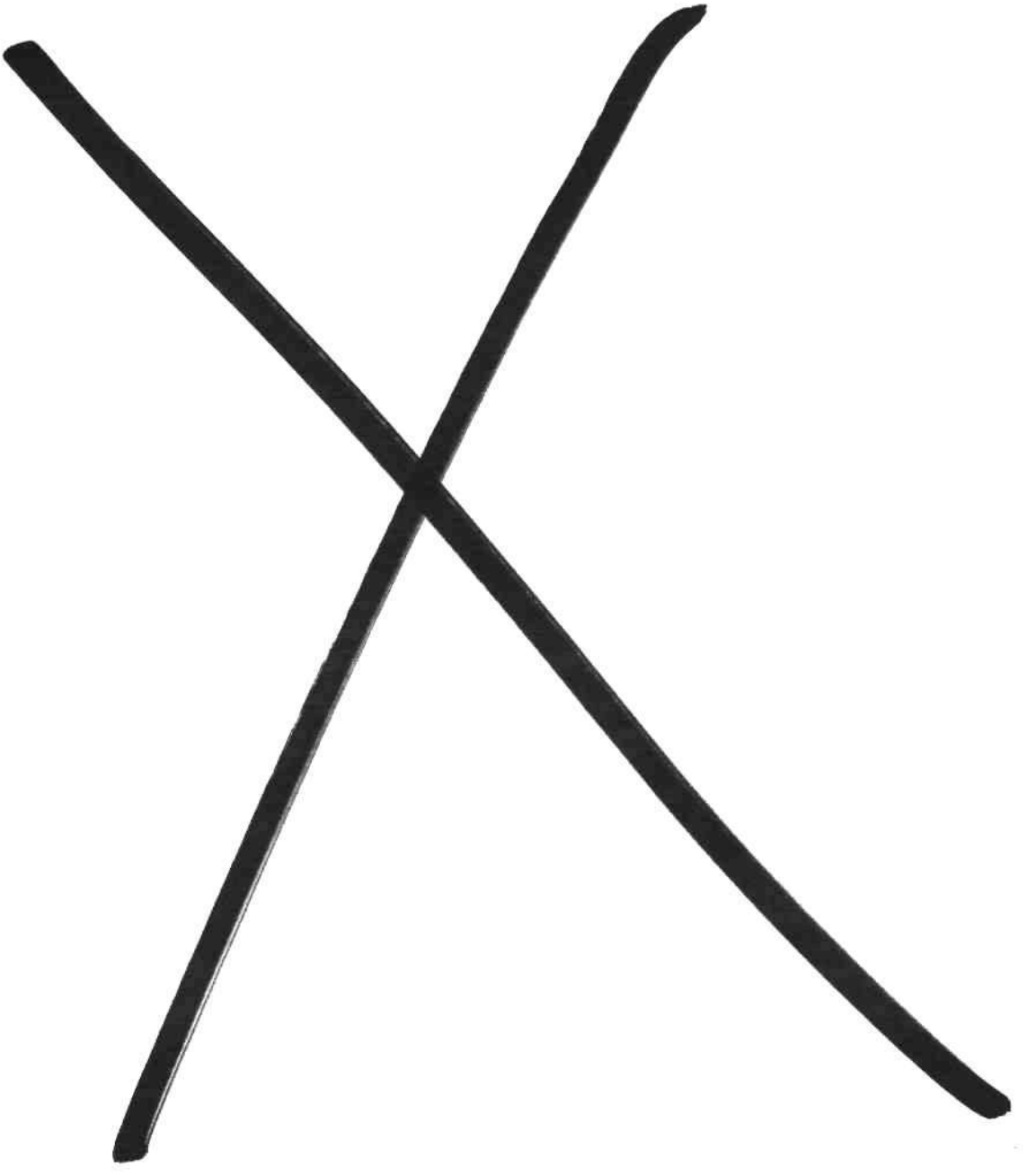
## INVENTORIES STABILIZE AT SUB-30-DAY LEVELS

The overall average targeted and actual inventory levels stabilized at a respective 19.6 and 27.6 days from 19.0 and 27.7 days noted last month, a sub-30-day average inventory that remains a very laudable achievement. The computer subset's targeted and actual inventory levels declined from last month's 21.5 and 30.0 days to this report's 20.5 and 28.0 days, respectively. The minor increase in overall inventories is a by-product of last month's uptick in orders that weren't quickly shipped out. In line with this month's expected order increase, it is likely that another slight increase in inventories may be reflected in next month's *Procurement Pulse*.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Despite increased Middle East tensions, the outlook for system sales and semiconductor orders remains increasingly positive. Inventory levels are low, which will force any shift in system demand to correlate with semiconductor demand. In spite of Japanese suppliers' continued statements of limited DRAM supplies, these parts are expected to remain abundant for the foreseeable future as other suppliers are capable of picking current levels of demand. The continued ease of semiconductor availability is allowing predictable prices and delivery schedules that help system companies cope with the uncertain economic situation. Dataquest still sees a low-growth market for both systems and semiconductors for the next six months as the economy reacts to the outcome of the Middle East crisis.

*Mark Giudici*



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# Research *Bulletin*

## DECEMBER MARKET WATCH: DEMAND SLOWS, BUT INVENTORIES AND PRICING DECLINE IN KIND

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL RATIO DIPS TO 0.90; SHORT-TERM ORDER LEVELS MIXED

The book-to-bill ratio declined to a new low, 0.9, after two subparity months in September and October (see Figure 1). The three-month average

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

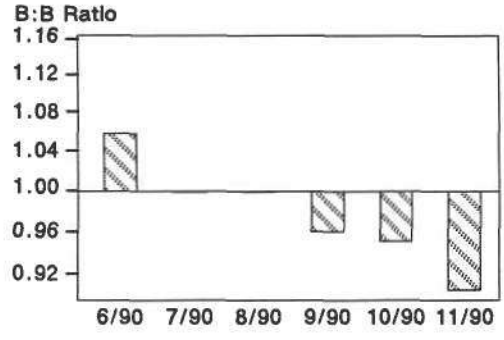



**Figure 2**
**DOC Computer Demand**

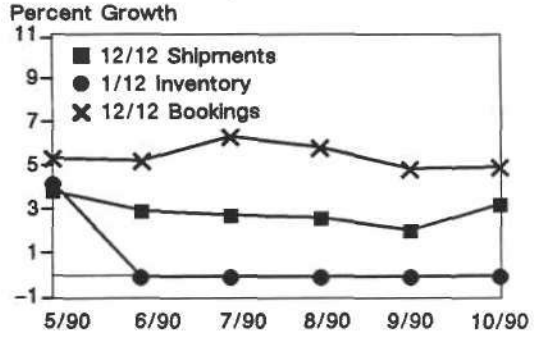



**Figure 3**
**Semiconductor Inventory Level**

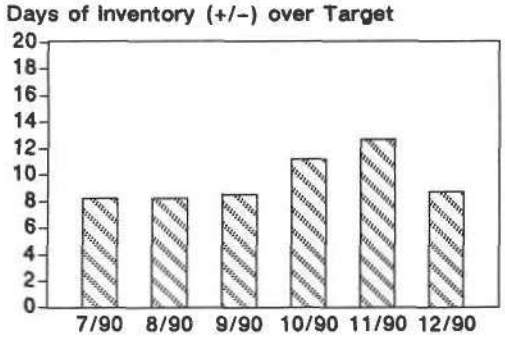
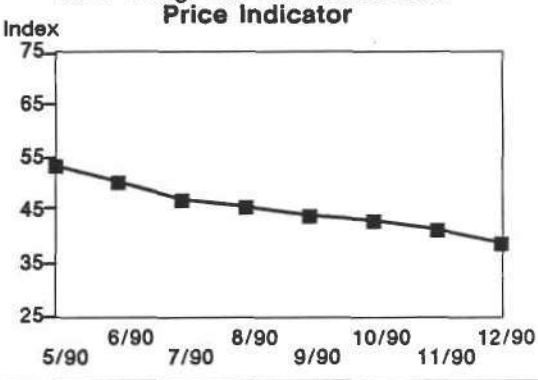



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, US Department of Commerce, Dataquest (December 1990)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bookings level dropped 6.0 percent from October's level and fell 5.4 percent from the November 1989 mark. Total semiconductor billings (three-month average) for November rose 2.1 percent over October 1990 levels and were essentially flat (negative 0.1 percent) compared with November 1989 billings. The current level of semiconductor business as shown in dollars is fairly consistent with the end-market business dynamic that is trying to maintain a low year-end cost of sales for both finished goods and raw materials. The semiconductor inventory bubble discussed in last month's *Market Watch* also contributed to a reduction of some major companies' orders. As mentioned in the December Procurement Pulse (SUIS newsletter 1990-43), the current low-growth forecast for system sales has possibly bottomed out, with procurement managers expecting a 4.0 percent six-month increase in system sales relative to last month's 3.1 percent growth outlook. To meet this demand, in December buyers expect to increase semiconductor orders 29.4 percent over November's levels. The steady demand for systems and ready availability of semiconductors combined with controlled inventories is allowing procurement to closely match order levels of ICs with end-system shipments. Even with proposed cutbacks in Japanese memory products, Dataquest expects this environment to continue for the next six months.

## COMPUTER INVENTORIES FLAT, BOOKINGS STABILIZE, AND SHIPMENTS CLIMB

Figure 2 shows a fairly balanced low-growth scenario that is predicated on abundant, stable supplies of raw material (i.e., semiconductors). The annualized (12/12) shipment level rate rose in October to 3.3 percent over last month's 2.0 percent level, reinforcing earlier data that shipment levels will remain at low-growth levels through year-end. The new order bookings 12/12 rate rose slightly to 5.0 percent relative to last month's 4.8 percent level, foretelling steady growth during the next two quarters. Looking at the near-term historical comparison of bookings, the current three-month period (August to October) versus the previous three-month period (May to July) for new computer orders shows an increase of 1.0 percent, confirming this low-growth trend. Dataquest does not foresee any change in near-term demand patterns that would alter this low-growth trend.

## SEMICONDUCTOR INVENTORIES REDUCED; TIME FOR YEAR-END AUDITS

Figure 3 illustrates how the delta between targeted and actual inventories declined this month. Also important is that the targeted and actual inventory levels have declined as well, from 22.2 and 34.9 days to 19.0 and 27.7 days, respectively. The ready availability of semiconductors and improved forecast reviews have allowed for quick corrections to above-plan inventory levels, as seen in this month's fix to last month's inventory increase. As mentioned in last month's *Market Watch* (SUIS newsletter 1990-40), this correction was anticipated as companies finalize their year-end sales pushes and moderate semiconductor orders. Beginning next month, Dataquest expects to see a return to pre-year-end buying patterns that are based on system sales expectations.

## PRICES CONTINUE TO DECLINE AS DEMAND FLATTENS OUT

Figure 4 shows how semiconductor abundance continues to cause prices to decline as semiconductor demand becomes more a direct function of system sales. Because of the relatively slow and steady growth of computers (see Figure 2) and electronics as a whole and the overshoot of semiconductor supply relative to that demand, we expect prices to continue their gradual decline for the next six months. The direction that the Middle East crisis takes will have some effect on capital spending plans which, in turn, may negatively impact semiconductor sales because of close association with system and semiconductor shipments. Regardless of the crisis' outcome, semiconductor prices are expected to continue to decline.

## DATAQUEST CONCLUSIONS

Overall electronic system demand remains in a low and steady growth mode which, considering the alternatives, is relatively positive. The implications of this market environment on semiconductor procurement depends on frequent and accurate forecast updates with suppliers. Visibility of short- and midterm demand currently is forcing suppliers to readjust quickly to changes in annual contracts, which results in lower inventories for both users and suppliers. Dataquest expects the current method of forecast-update-procure on a quarterly (or more frequent) timetable to continue as long as this slow electronics market continues. Although time-consuming and cumbersome, it is proving to be the best way yet to control costs and improve service.

*Mark Giudici*

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# Research *Bulletin*

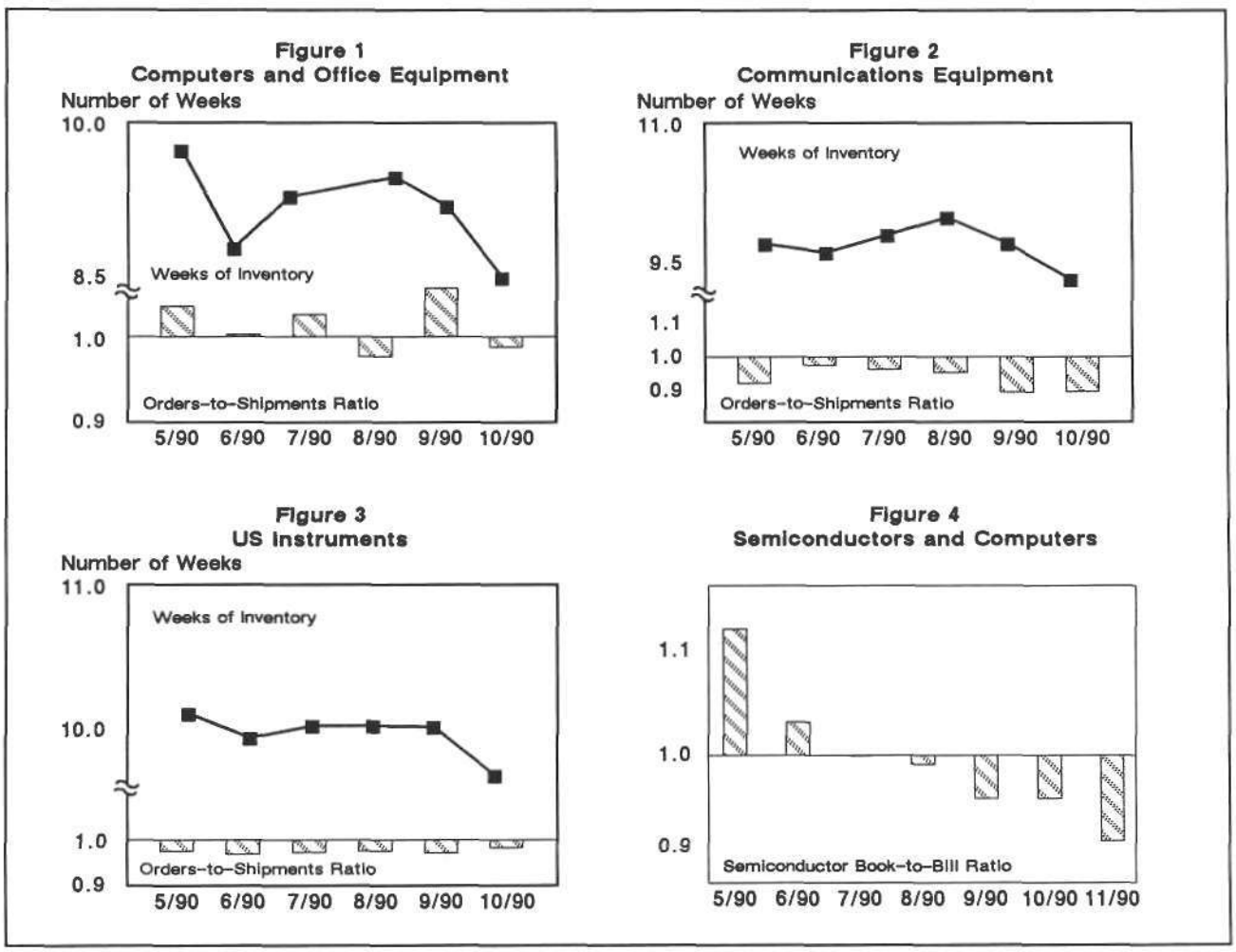
## SAMONITOR: SYSTEM MARKETS SLOW TO YEAR-END CLOSE

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

### Computers and Office Equipment

Orders growth for the three-month period ended in October was only 1.4 percent above year-earlier orders compared with 4.2 percent in




Source: WSTS, US Department of Commerce, Dataquest (December 1990)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September. Shipment growth for the same period rose sharply to 4.3 percent in October from negative 0.5 percent in September. The orders-to-shipments ratio (see Figure 1) fell to 0.99 in October from 1.05 in September, reflecting the meager 0.8 percent increase in October orders, dominated by the 7.2 percent increase in shipments. Inventories continued their seasonal downturn, moving down 0.7 week in October to 8.5 weeks, a healthy 0.6 week below last year's level. Computers and office equipment production growth continues to be hampered by the effects of waning growth trends in centralized data-processing systems, increasing saturation of traditional fully configured desktop business systems plus cutthroat price competition combined with a generally slow, macroeconomic-wide equipment investment environment.

## Communications Equipment

Orders growth for the three-month period ended in October fell a negative 5.1 percent below year-earlier orders from negative 4.7 percent in September. Recent weakness in orders growth is more a result of exceptionally strong third and fourth quarter 1990 orders growth than a sudden collapse in market fundamentals. Shipments growth for the same period decelerated to 5.0 percent in October from 6.9 percent in September. The orders-to-shipments ratio (see Figure 2) was unchanged in October at 0.90 compared with September, reflecting order's shrinkage and shipment's deceleration. *September is the eighth consecutive month that the ratio has been below parity.* Inventories continued their second-half downturn, declining 0.3 week in October to 9.3 weeks, 1.4 weeks below year-earlier levels. In view of the unusually brisk orders growth during the second half of 1989 and the outlook of sluggish business investment spending through the first quarter of 1991, Dataquest forecasts orders growth in the 0 to 3 percent range in the coming months.

## Instruments

Orders growth for the three-month period ended in October fell a negative 1.3 percent below year-earlier orders compared with a negative 0.2 percent decline in September. *This is the second consecutive month of negative orders growth.* Shipments growth for the same period slowed to 1.3 percent in October from 1.9 percent in September. The orders-to-shipments ratio (as shown in Figure 3) rose to 0.99 in October from 0.97. Inventories fell 0.4 week to 9.5 weeks in October and are currently 0.6 week below year-earlier levels. As in the communications sector, quick growth in the fourth quarter of 1989, and delayed business investment plans make it increasingly likely that *orders growth will*—at best—be flat through the first quarter of 1991.

## SEMICONDUCTOR DEMAND

U.S. semiconductor bookings (three-month moving average) fell a negative 6.0 percent in November to $1,121.5 million, while billings fell a negative 1.5 percent to $1,241.5 million. As a result, the October book-to-bill ratio (see Figure 4) fell to 0.90 in October from 0.95 in September. October bookings were a negative 5.4 percent below year-earlier orders.

Dataquest's monthly survey of major OEM semiconductor procurement managers supports improvement in the systems market outlook: Overall, six-month system sales are expected to grow 4.0 percent, up from 3.1 percent in November. Data processing OEMs' expected six-month growth moved up to 6.5 percent compared with 6.0 percent in November. *This growth represents the first uptick in expectations for the last six months.*

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Dataquest and the Dun & Bradstreet Corporation maintain that the overall U.S. economy will avoid recession (strictly defined as two consecutive quarters of negative real GNP growth)—albeit narrowly. We expect fourth quarter 1990 growth and first quarter 1991 growth to be negative 0.4 percent and 0.8 percent, respectively. The investment outlook is more pessimistic. Real business equipment investment is expected to be negative 7.1 percent in the fourth quarter and negative 2.9 percent in the first quarter. The good news is that real GNP and equipment investment growth are expected to accelerate throughout 1991. Given this sluggish-to-moderate growth environment, semiconductor manufacturers can expect a commensurate improvement in the systems and silicon market in 1991.

This improvement should not be construed to mean that the chip and systems business is expected to be any less forgiving in 1991. Even as the business climate improves, profit margins are expected to be under a lot of pressure. In the distant past, technological competence was a *sufficient* condition for profitability; supernormal growth was the safety net that absolved companies from poor business practices. Not so in the future; as we move into the next stage of industry maturation, technological competence will become an increasingly minimal *necessary* condition for a company's corporate survival. The practice of basic, fundamentally sound corporate policy will be of increasing relative importance to earning competitive or superlative rates of return.

*Terrance A. Birkholz*

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# Research *Bulletin*

## DECEMBER PROCUREMENT PULSE: ENDING THE YEAR ON A POSITIVE NOTE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### A RISE IN SEMICONDUCTOR ORDERS PLANNED

Figure 1 illustrates how this month's survey respondents expect to increase semiconductor orders by 29.4 percent over last month's levels. Last month's expected 5.0 percent rise in orders was

**Figure 1**
**Averaged Monthly Semiconductor Orders**

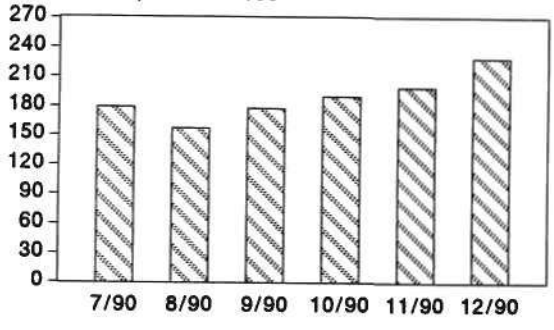



**Figure 2**
**Averaged Semiconductor Lead Times**

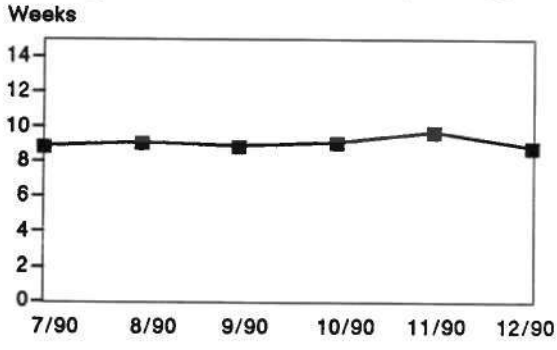



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

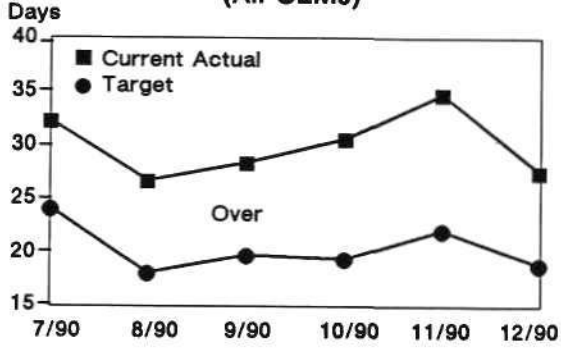
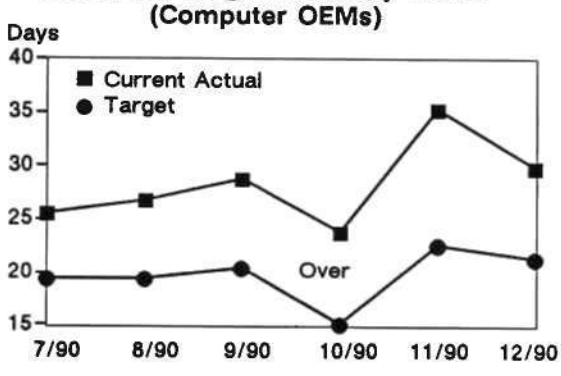



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (December 1990)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tempered by a slight increase in inventories that, as shown later in this bulletin, has been corrected. The most recent buying optimism reflects an increase of confidence in system sales. For the first time in six months, buyers expect a slight rise in system sales from last month's overall 3.0 percent growth level to 4.1 percent. The computer system buyers' outlook also is up, to 6.7 percent from last month's 6.0 percent level. Although one month does not make a trend, this slight uptick in system sales expectations possibly signals a bottoming of the "low-growth" sales scenario of the past few months. Dataquest sees little indication that a large downturn in systems or semiconductor business will occur in the next six months.

## LEAD TIMES REMAIN STEADY—DIP TO BELOW NINE WEEKS

This month's average lead time dipped to 8.9 weeks from last month's 9.8-week level, as shown in Figure 2. For the *fourth consecutive month, all survey respondents reported no problem products*, attesting that availability continues to be a nonissue. Although many products are available with sub-eight-week lead times, it appears that many users prefer a six-to-eight-week planning window that allows for adjustment to month-to-month system shipment variances. Overall pricing declined an average of 2.1 percent since last month. Dataquest continues to see no impediment to ready availability and lower pricing for all semiconductors for the next two quarters, because current capacity should be more than enough to meet demand levels for the next six months. Quality and obsolescence are the main concerns facing semiconductor users this month; both are areas in which suppliers may be able to stand out in this very competitive market.

## SEMICONDUCTOR INVENTORY LEVELS ARE ADJUSTED DOWNWARD

Both targeted and actual inventory levels declined this month, reflecting the combination of corrections to last month's uptick and efforts to improve financial reports. As shown in Figures 3 and 4, the overall targeted and actual inventory levels declined to 19.0 and 27.7 days, respectively, compared with last month's comparable levels of 22.2 and 34.9 days. The computer segment's targeted and actual inventory levels dropped to 21.5 and 30.0 days, respectively, versus last month's comparable 22.8- and 35.5-day levels. As mentioned in last month's *Procurement Pulse*, these reductions in inventory were expected. Semiconductor billing levels are expected to rise by 8.1 percent this month after last month's negative 3.2 percent average, which effectively reduced inventories. The current average billing increase illustrates how semiconductor procurement is becoming more closely tied to the overall cycle of the electronics industry. Despite intentions to target inventory levels to about a 20-day average, it is becoming apparent that the actual average of 30 days (±3 days) is the norm.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

The low-growth systems sales outlook and tightly controlled inventory level trend continues. Because no large volume "new" product is pulling demand, semiconductor capacity levels are able to exceed current needs. Availability, predictable pricing, and delivery performance have become the mainstay at current business levels. Many suppliers have noted improvements in forecast accuracy from users, which is helping keep overall inventory levels (for both users and suppliers) manageable. Dataquest continues to expect steady (but low) system and semiconductor demand for the next two quarters until the overall economy sorts itself out and the Middle East crisis is resolved.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: DON'T BATTEN DOWN THE HATCHES (YET)

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

#### Computers and Office Equipment

Orders growth for the 3-month period ended in September was 4.3 percent above year-earlier orders compared with 0.3 percent in August.

**Figure 1**
**Computers and Office Equipment**

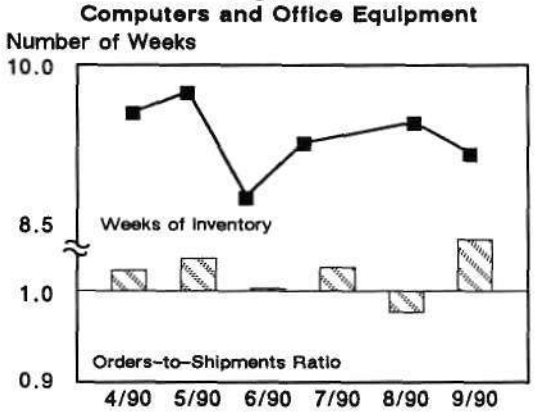



**Figure 2**
**Communications Equipment**

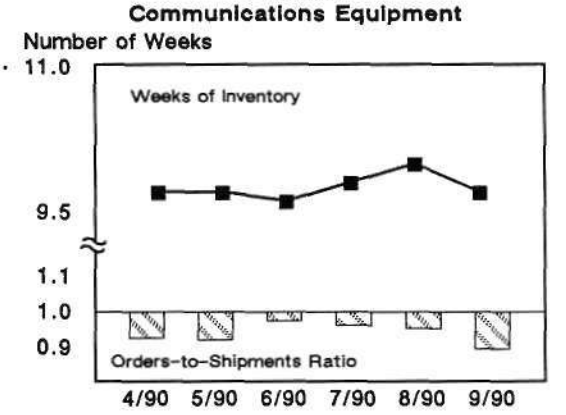



**Figure 3**
**US Instruments**

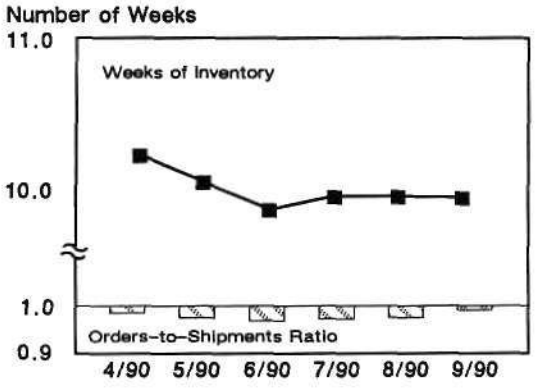
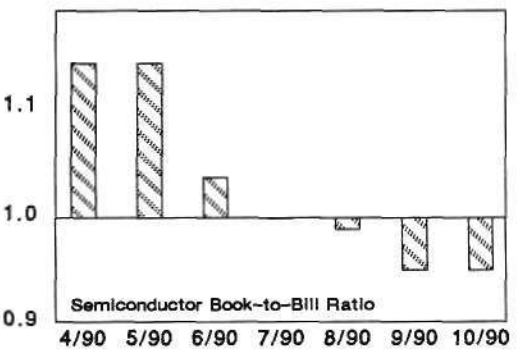



**Figure 4**
**Semiconductors and Computers**




Source: WSTS, US Department of Commerce, Dataquest (November 1990)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Shipments growth *fell for the third consecutive month:* September 3-month-ended growth fell 0.3 percent below year-earlier shipments compared with a 0.4 percent decrease in both July and August. The orders-to-shipments ratio (Figure 1) rose to 1.050 in September from 0.098 in August, reflecting a 7.6 percent rebound in September orders from August. Inventories began their seasonal downturn on schedule, moving down 0.3 week in September to 9.2 weeks, 0.1 week above last year's level. This news is especially welcome given shipments' recent lackluster performance. The prospect of a Persian Gulf war and the adverse impact of tightening credit on what was already meager capital spending make it increasingly likely that orders growth will remain flat for the rest of 1990 and spill over into the first quarter of 1991 compared with year-earlier orders.

### Communications Equipment

Orders growth for the three-month period ended in September fell 4.5 percent from 7.9 percent in August. Month-to-month orders volatility arises from the relatively discontinuous flow of defense-related communications orders and therefore should not be construed as an indication of underlying business conditions fragility. Shipments growth for the same period accelerated insignificantly to 7.0 percent in September from 6.9 percent in August. The orders-to-shipments ratio (Figure 2) fell for the third consecutive month in September to 0.90 from 0.95 in August, reflecting the 4.1 percent drop in orders and the 2.0 percent rise in shipments from August to September. *September is the seventh consecutive month the ratio has been below parity.* Inventories remain tightly controlled, edging down 0.2 week in September to 9.7 weeks, 1.4 weeks below year-earlier levels. In view of the unusually brisk orders growth in the second half of 1989 and the sluggish equipment investment spending outlook through year-end, Dataquest forecasts orders growth in the 0 to 3 percent range. We expect orders growth to accelerate during 1991's first quarter as the business investment climate improves.

### Instruments

Orders growth for the three-month period ended in September decelerated to 2.2 percent above year-earlier orders from 2.9 percent in August. *Excepting July, orders growth has slowed continuously from 9.1 percent in March.* Shipments growth for the same period slowed to 2.1 percent in September from 5.2 percent in August. In spite of this slowdown, the orders-to-shipments ratio (Figure 3) rose to 0.99 in September from 0.97 in August, reflecting a 2.0 percent increase in orders and a 0.6 percent decrease in shipments in September from August. Inventories remained unchanged in September at 9.9 weeks and currently are 0.5 week below year-earlier levels. As in the communications sector, quick growth in the fourth quarter of 1989 and delayed investment plans make it increasingly likely that orders growth will further decelerate—and probably flatten—during the remainder of 1990 compared with year-earlier orders, and will accelerate in the first half of 1991.

## SEMICONDUCTOR DEMAND

US semiconductor bookings (three-month moving average) rose 0.4 percent in October to $1,193.6 million, while billings rose 0.7 percent to $1,260.5 million. As a result, the October book-to-bill ratio (Figure 4) remains unchanged from September at 0.95. Belying this apparent sluggishness, October bookings were 5.1 percent above year-earlier orders.

Dataquest's monthly survey of major OEM semiconductor procurement managers supports the increasingly pessimistic systems-market outlook: Overall, six-month system sales are expected to grow 3.0 percent, down from 3.4 percent in October. *However, data processing OEMs' expected six-month growth has remained almost unchanged at 6.0 percent in November compared with 5.9 percent in October.*

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Two factors continue to contribute to an outlook of slow—albeit positive—electronic systems growth in the next three to six months. First, the additional layer of uncertainty stemming from the Persian Gulf crisis has collided head-on with what was an already lackluster capital investment climate: Business' equipment investment spending growth is expected to fall 3.0 percent in the fourth quarter, down from 8.2 percent in the third quarter. Investment spending is, however, forecast to begin recovery in the first quarter of 1991 at 2.2 percent growth and to accelerate throughout 1991.

More specifically, though, *over two-thirds of last year's growth occurred in the final third of the year.* That performance will be tough to match—not to mention beat—but should not be misinterpreted as meaning that we are headed for "the crash of 1991."

*Terrance A. Birkholz*

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# Research *Bulletin*

## NOVEMBER MARKET WATCH: CONTINUED FLAT DEMAND AND ABUNDANT SUPPLIES KEEP PRICES DOWN AND LEAD TIMES LOW

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL RATIO STABILIZES AT 0.95 AND LIFE GOES ON

The book-to-bill ratio for October remained at the 0.95 level set last month for September, as seen in Figure 1. On the bookings side, the October 1990 three-month moving average for new

**Figure 1**
**US Semiconductor Book-to-Bill Ratio**

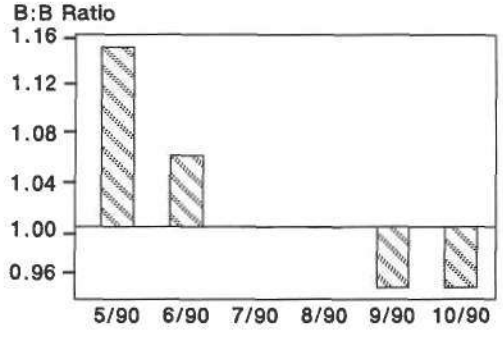



**Figure 2**
**DOC Computer Demand**

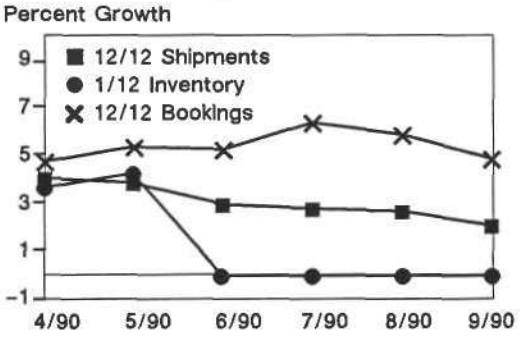



**Figure 3**
**Semiconductor Inventory Level**

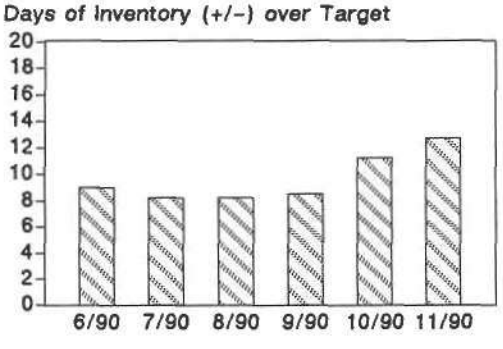
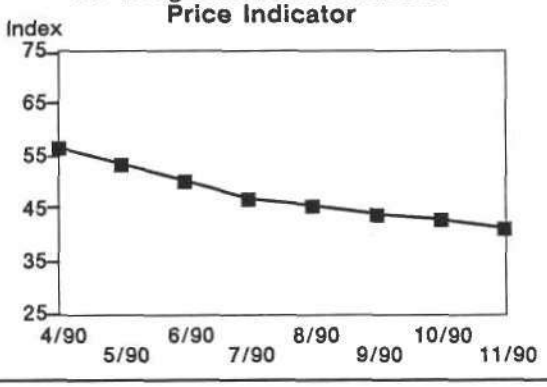



**Figure 4**
**US Weighted Semiconductor Price Indicator**




Source: WSTS, US Department of Commerce, Dataquest (November 1990)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orders remained flat at September's average level and was 5.1 percent higher than the relative booking level set in October 1989. The October 1990 billing level dropped 13.8 percent from September, which is in line with a shift from a five-week month to a four-week month. The October 1990 monthly billings were 0.5 percent lower than the October 1989 level. What do these numbers mean? When these data are combined with the relatively positive six-month procurement outlook (see the November *Procurement Pulse*, NASM newsletter number 1990-35) and the current Department of Commerce (DOC) data (see Figure 2), the message is that bookings levels are accurately reflecting end-system demand levels. Although the semiconductor business is not booming, it is stable and currently above last year's level. The expected steady system demand will continue to keep semiconductor order levels relatively stable for the next three to six months.

## COMPUTER INVENTORIES RATE REMAINS FLAT, BUT ANNUALIZED SHIPMENT AND ORDER RATES SLIP

This month's DOC historical data for computers again reflect what Dataquest's procurement surveys have intimated earlier this year—system demand is positive but not spectacular. On an annualized basis, the shipment rate remained above 2.0 percent, at 2.1 percent (down from last month's 2.7 percent level). This dip is a function of the annualized ratio being affected by earlier flat bookings rates set this summer. The 12/12 bookings rate slipped from 5.9 percent to 4.9 percent, mainly as a result of a past near-term decline in the bookings rate that has corrected itself this month. The 3/12 bookings rate rose in October to 4.3 percent from September's zero growth rate, which in turn was down from August's 6.6 percent 3/12 bookings rate. This uptick in quarterly bookings rates reinforces the notion that overall system demand remains positive (although low) and that supporting semiconductor orders will continue to remain flat to positive in units if not in revenue.

## USER SEMICONDUCTOR INVENTORIES RISE, YEAR-END CORRECTION EXPECTED

Besides the rise in actual (34.9 from 30.7 days) and targeted (22.2 from 19.5 days) inventory levels seen this month, the delta between the two also increased, to 12.7 days. This unanticipated rise is due mainly to lower-than-anticipated October system sales, which left some raw material on the shelves. Based on past inventory control corrections seen this year, Dataquest expects average inventories to drop to approximately the 30-day level within two months for, if nothing else, year-end financials. An expected end-of-year systems sales push will eat into inventory levels, although many buyers are planning on incrementally increasing semiconductor purchases in the short term.

## STABLE DEMAND + OVERABUNDANT SUPPLIES = CONTINUED LOWER PRICES

The semiconductor abundance of the past few months has transformed into an oversupply in some cases, as suppliers now are able to ship some logic, non-32-bit MPUs, and SRAM devices from stock. Because users still are closely watching costs via inventory control and delivery scheduling (as well as price), suppliers that meet or exceed performance commitments are gaining user share of mind. Overall lead times are still under 10 weeks (9.8 weeks), with the longer delivery times going to 32-bit MPUs. All other products are being delivered with no problems seen by the user community. It also appears that the uncertainty over oil prices has not and most likely will not affect the cost of plastic-packaged parts. The current perceived easing of tensions in the Middle East also is keeping orders free of recession-based cutbacks. The abundance of semiconductor supplies and the expected steady demand over the next six months will allow for the planning of controlled price declines for all components.

## DATAQUEST CONCLUSIONS

The demise of electronics industry growth presaged by economic doomsayers is a bit premature. Although the market is not booming, and there are signs of softness in some areas, the overall picture is for flat to low (less than 5 percent) growth for approximately the next six months. Inventory control by users and suppliers is keeping business up to a sustainable level, and the semiconductor business is mirroring the end-market trends remarkably well. What semiconductor users need now are ways to keep costs low while simultaneously improving the quality, delivery, and service provided by their suppliers. Suppliers in turn require forecasts that are accurate and reliable so that performance levels can rise. Dataquest expects the current uncertain business environment to continue on through the end of the year. Realistic performance requests by users and commitments kept by suppliers will keep the market buoyant through these trying times.

*Mark Giudici*

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# Research *Bulletin*

## NOVEMBER PROCUREMENT PULSE: EXTERNAL ECONOMICS AFFECT CURRENT SYSTEM SHIPMENTS—SEMICONDUCTOR ORDERS AND INVENTORIES INCH UPWARD

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDERS EXPECTED TO INCREASE

Figure 1 shows that this month's respondents expect to order approximately 5.0 percent more semiconductors than last month's estimate. It is interesting to note that for the first time, buyers in

**Figure 1**
**Averaged Monthly Semiconductor Orders**

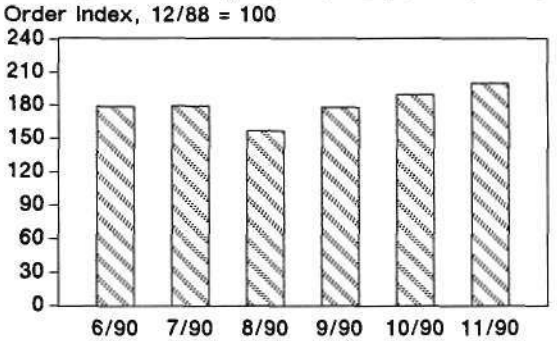



**Figure 2**
**Averaged Semiconductor Lead Times**

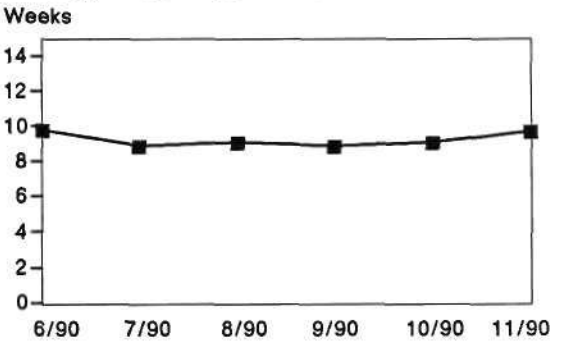



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

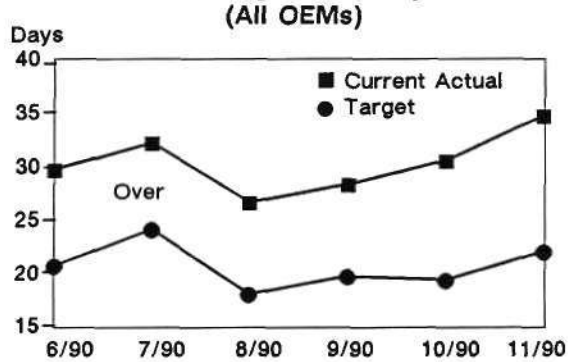
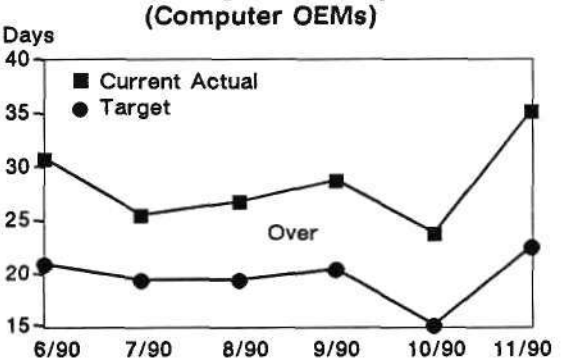



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (November 1990)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aggregate expect to buy at twice the level of the 12/88 index of 100 shown in the graph. The overall six-month system sales outlook still remains positive at an overall average of 3.0 percent relative to last month's 3.4 percent, while the outlook for computer sales during the same period is up slightly to 6.0 percent from last month's 5.9 percent. This continued relatively positive outlook in the face of daily negative economic news highlights the notion that the electronics industry does not necessarily follow the national economic mood. The flat-to-positive outlook reflected in this US survey is also prevalent in Europe, based on feedback from a recent European trip. Although pockets of slow growth exist in both regions, the overall outlook is for slow, not negative, growth over the next six months.

## LEAD TIMES IRRELEVANT AS SUPPLIES REMAIN ABUNDANT

The average lead time rose slightly to 9.8 weeks over last month's 9.3-week level, as seen in Figure 2. This increase of two days is not to be seen as a tightening of supply or an increase in demand. Instead, it reflects minor adjustments of users to better coordinate overall system demand with component delivery. For the past seven months, the average lead time has remained below 10 weeks, with some averages as low as 6 weeks because of abundant supplies. For the third consecutive month, respondents noted *no component availability problems*. Dataquest expects all semiconductors to remain *plentiful for at least the next six months* because of current and planned available fab capacity and demand levels. Concerns over quality and phaseouts of obsolete parts were voiced this month, highlighting an area that suppliers need to work on. There were no problems with surface mount packages again this month.

## SEMICONDUCTOR INVENTORIES RISE SLIGHTLY AS END SYSTEM BILLINGS DROP

Billings for overall end systems were down by a negative 3.2 percent for the first month in a year as the slowdown in demand seen in the past three months begins to be seen in shipment levels. On an average, Figures 3 and 4 show that inventories of semiconductors incrementally rose this month both for targeted and actual levels due to these lower system shipments that left some components on the shelf. The good inventory control systems now in place generally take no more than two months for any adjustment to be made relative to end-system demand. One respondent company plans to drastically reduce semiconductor order levels in order to control inventories. The targeted and actual levels of semiconductors for the overall sample rose to a current 22.2 and 34.9 days, respectively (versus 19.5 and 30.7 days last month), while the computer segment showed a targeted and actual rise of 22.7 and 35.5 days, respectively (versus last month's levels of 15.3 and 24.0 days). This large rise in the computer segment's semiconductor inventories appears to be a one-month aberration due to the slowdown in system demand and will be watched very closely in the upcoming months.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Although semiconductor order levels are expected to increase and six-month system demand remains flat to positive (both in the United States and in Europe), some signs are evident of near-term softness in the US electronics sector that is being felt by semiconductor suppliers. Availability, price, and customer service are not current problems for users, but in some cases, quality issues and end-of-life buys are. Inventory control is being rigidly maintained to avoid large swings in order levels. The cliché of forecast accuracy continues to be a major tool not only to gauge system demand, but also to control raw material inventories. The end-of-year sales push is now beginning, and many companies will ramp up shipments while trying to keep inventories lower than average to improve financial statistics. Continuous, accurate forecasts that fine-tune any change in need (through December 31 and then for next year) continue to be the way many companies are coping with the current market.

*Mark A. Giudici*

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# Research *Bulletin*

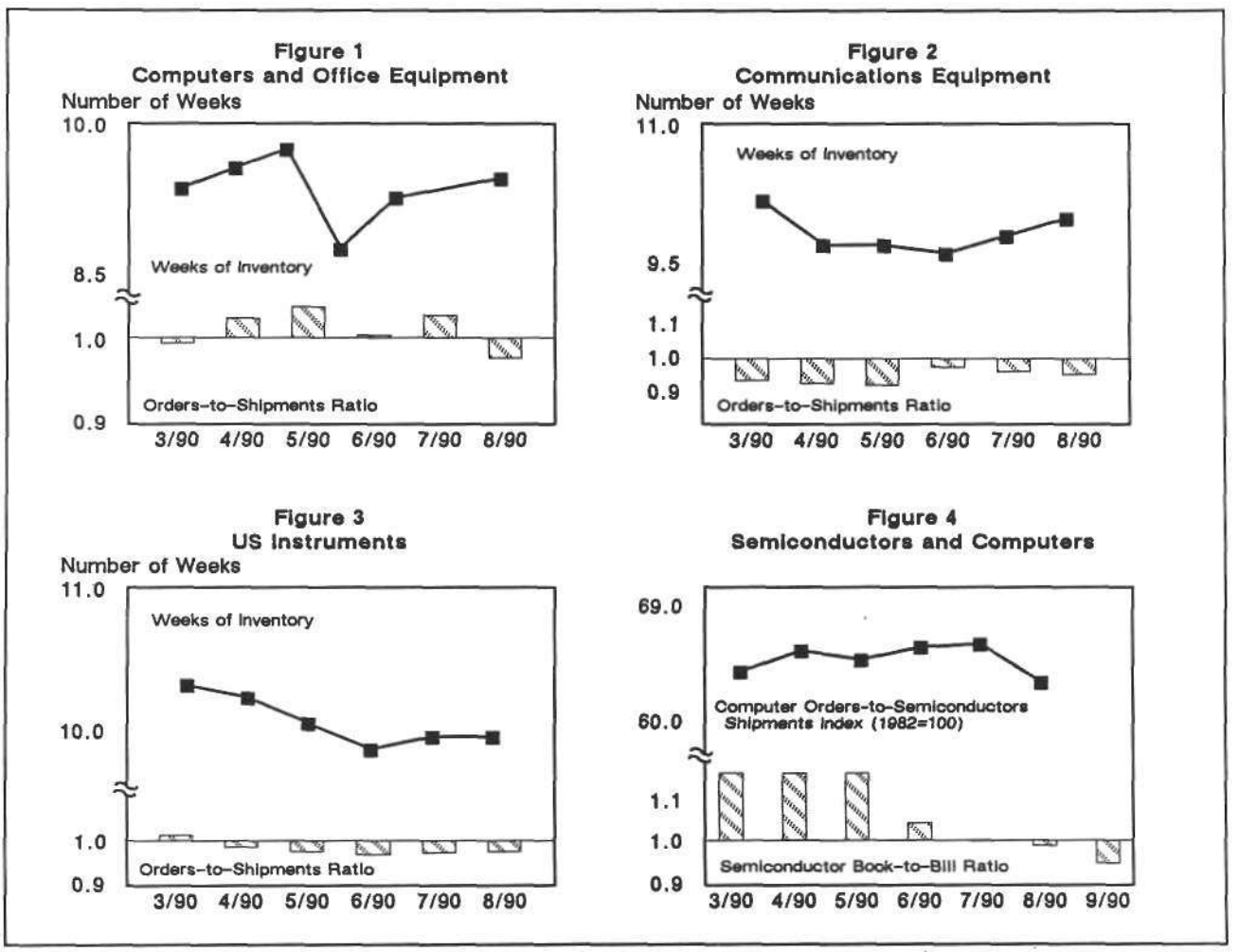
## SAMONITOR: PERSIAN GULF CRISIS CASTS PALL OVER WEAKENING SYSTEMS MARKETS

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

#### Computers and Office Equipment

Without exception, business conditions registered a poor showing in August. Orders growth for the three-month period ended in August was only




Source: WSTS, US Department of Commerce, Dataquest (October 1990)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0.3 percent above year-earlier orders compared with 6.6 percent in July. Shipments growth for the same period fell 0.5 percent below year-earlier shipments compared with a 0.4 percent decrease in July. *August was the slowest orders-growth month in the last 12 months and is the second consecutive month of negative shipments growth.* The orders-to-shipments ratio (Figure 1) fell to 0.980 in August from 1.024 in July, reflecting the 3.7 percent drop in August orders from July's level. Fortunately, manufacturers have kept a tight reign on inventories. Inventories edged up only 0.1 week in August to 9.5 weeks, 0.1 week above last year's level. Strong growth in last year's fourth quarter, combined with rising tensions in the Persian Gulf and their adverse impact on what was already sluggish capital spending, make it increasingly likely that orders growth will remain flat during the remainder of 1990 compared with year-earlier orders.

## Communications Equipment

Orders and shipments growth began to show signs of stabilization in August. Orders growth for the three-month period ended in August accelerated slightly, to 8.0 percent from 7.6 percent in July. Shipments growth for the same period decelerated to 6.5 percent in August from 7.1 percent in July. The orders-to-shipments ratio (Figure 2) slipped for the second consecutive month, from 0.96 in July to 0.95 in August, reflecting the 1.2 percent drop in August orders from July. *August was the sixth consecutive month that the ratio has been below parity.* Inventories remain tightly controlled, edging up only 0.2 week in August to 10.0 weeks, 1.7 weeks below year-earlier levels. In view of the unusually brisk orders growth during the second half of 1989 and the sluggish equipment investment spending outlook through year-end, Dataquest forecasts that the upcoming months will be marked by deceleration in orders and shipments growth, with both stabilizing in the 3.0 to 5.0 percent range.

## Instruments

Business conditions weakened across all indicators in August. Orders growth for the three-month period ended in August decelerated to 2.9 percent above year-earlier orders from 5.0 percent in July. Except for July, orders growth has slowed continuously from 9.1 percent in March. Shipments growth for the same period slowed to 5.2 percent in August from 6.0 percent in July. The orders-to-shipments ratio (Figure 3) remained unchanged at 0.97 in August and below parity for the fifth consecutive month, reflecting the 0.7 percent drop in August orders from July. Inventories remained unchanged in August at 9.9 weeks in July and are currently 0.8 week below year-earlier levels. Brisk growth in last year's fourth quarter and postponed investment plans make it increasingly likely that *orders growth will decelerate further—and probably flatten—during the remainder of 1990,* compared with year-earlier orders.

## SEMICONDUCTOR DEMAND

The US semiconductor market bookings and billings were mixed in September. Bookings (three-month moving average) fell 0.9 percent in September to $1,188.5 million, while billings rose 3.0 percent to $1,251.3 million. As a result, the September book-to-bill ratio (Figure 4) slid to 0.95, down from 0.99 in August. Despite the erosion in DRAM ASPs, September bookings were 9.8 percent above year-earlier orders.

Dataquest's monthly survey of major OEM semiconductor procurement managers supports the increasingly pessimistic systems-market outlook. Overall, six-month system sales are expected to grow 3.4 percent, down from 4.2 percent in September. *Data processing OEMs' expected six-month growth has fallen to 5.9 percent in October from 6.1 percent in September.*

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Year-to-date and 12-month-ended electronic systems orders are 5.6 and 8.3 percent above year-earlier levels, respectively. Under ordinary circumstances, this growth would be regarded as respectable and sustainable, albeit modest.

Two factors, however, combine to contribute to *an outlook of significantly slower growth through year-end.* Generally, the ripples of uncertainty from the Persian Gulf crisis have collided head-on with what was an already lackluster capital investment climate. Business equipment investment spending growth is expected to decelerate significantly in 1990 to 0.5 percent, down from 5.2 percent in 1989, and to accelerate only 2.0 percent in 1991.

More specifically, 69.9 percent of growth in the value of 1989 systems orders occurred during the September through December period. In other words, *over two-thirds of last year's growth occurred in the final third of the year.* The corollary is simple: The toughest stretch of the year is yet to come!

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# Research *Bulletin*

## OCTOBER MARKET WATCH: AVAILABILITY REMAINS A NONISSUE WHILE DEMAND STABILIZES

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL CONTINUES TO SLIDE . . . DOWN TO 0.95

This month's book-to-bill ratio slid to 0.95 from last month's 0.99 level, indicating at first glance that the market is softening (see Figure 1).

**Figure 1**
**US Semiconductor Book-to-Bill Ratio**

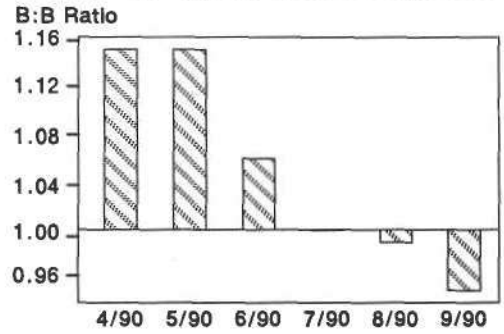



**Figure 2**
**DOC Computer Demand**

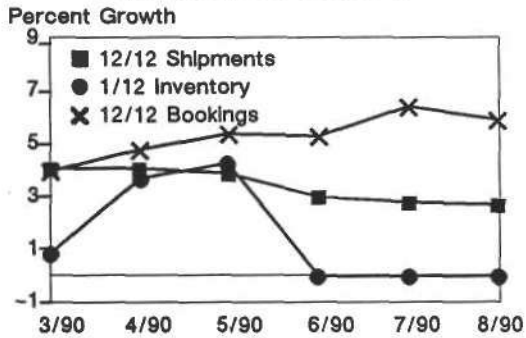



**Figure 3**
**Semiconductor Inventory Level**

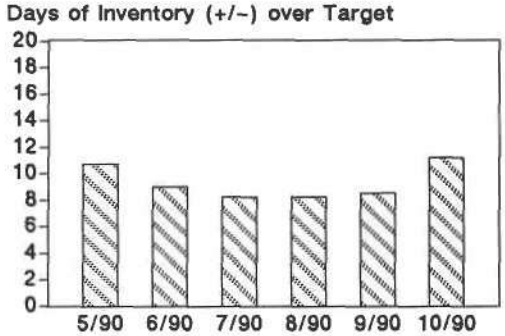
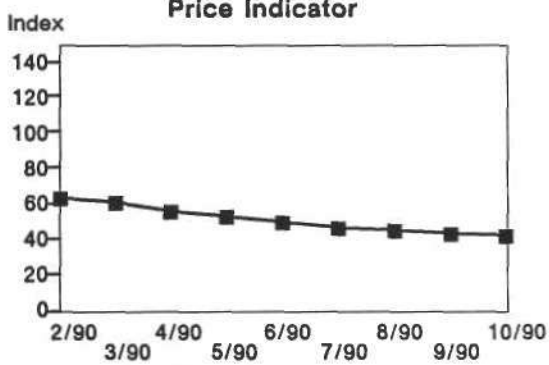



**Figure 4**
**US Weighted Semiconductor Price Indicator**




Source: WSTS, US Department of Commerce, Dataquest (October 1990)

Source: WSTS, US Department of Commerce, Dataquest (October 1990)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Although the ratio is below parity for the second consecutive month, the absolute numbers show that continued strength exists in both bookings and billings relative to comparable time periods. The good news is that this year's September bookings were 9.8 percent higher than last year's September booking level, and billings for September tied the record high set in March 1989. The not-so-good news is that September 1990 bookings were 0.9 percent lower than August and 7.1 percent lower than the last quarter-end month (June 1990). Last month's question regarding why August booking and billing levels rose over July has been partially resolved. The preliminary July figures have now been finalized upward, resulting in a lower booking and flat billing average for August. Once the August book-to-bill totals are finalized, the decline trend noted in the last three months' *Procurement Pulse* should reflect that semiconductor booking levels are in synch with system order rates.

## COMPUTER SHIPMENT RATE FLAT, ORDERS OFF, AND INVENTORIES STEADY

The Department of Commerce (DOC) historical data on computer and office machine shipment and booking activity (see Figure 2) confirm what our surveyed procurement managers have been forecasting for the past three months. System shipment growth has stabilized, and booking rates are expected to flatten out through the end of the year. The actual 12/12 shipment and bookings rates of 2.7 percent and 5.9 percent, respectively, indicate moderate growth for the year, but what is disconcerting is the shorter-term 3/12 bookings rate showing zero growth in bookings relative to the same period last year. This amount compares with the 6.6 percent positive 3/12 rate posted last month. This flat near-term system bookings level will negatively impact the long-term 12/12 booking and corresponding shipment rates by year-end if sustained. Referring again to the surveyed procurement managers six-month outlook, we can expect 0 to 5 percent system sales growth during the next six months. Users' low inventory levels of both systems and semiconductors should allow for quick adjustment of order levels, depending on system demand. In other words, if there is a system demand slowdown, the current inventory situation will not allow a repeat of the 1984 to 1985 inventory balloon fiasco that effectively stopped orders because of large inventory stocks on buyers' shelves.

## SEMICONDUCTOR INVENTORY LEVELS REMAIN STEADY

The delta between targeted and actual semiconductor inventory levels rose slightly to 11.2 days over last month's 8.5-day difference, mainly because of lowering the system demand relative to forecast. Semiconductor order rates are expected to be reduced to offset this difference, because system sales are expected to remain flat for the next three months. The average actual semiconductor inventory level of 31.0 days versus last month's 29.0-day level still is historically low, and inventory control programs should correct this blip in inventory within one or two months. Average target levels declined slightly to 19.0 days from last month's 20.0-day level. As mentioned in last month's *Market Watch*, shifts in system demand are directly affecting inventory levels.

## SEMICONDUCTOR PRICES CONTINUE TO DECLINE SLOWLY

The continued abundance of all semiconductors, combined with steady but flat demand, is allowing buyers the opportunity in some cases to lower prices and increase supplier support levels above and beyond ongoing long-term supplier/user relationships. Respecting long-term arrangements and improving supplier support levels have allowed many suppliers to cement and gain market share in established accounts. Overall lead times remain steady at nine weeks. Most of the price declines noted were in the volatile memory (DRAM and SRAM) area, while logic, linear, and microprocessors remained relatively stable. We expect to see continued price erosion in volatile memory products and, to a lesser extent, in the EPROM arena. Because of the large percentage of plastic (oil-based) package costs in standard logic devices, a possibility of future price increases for these parts exists because of perceived/real oil price increases related to the Middle East crisis.

## DATAQUEST CONCLUSIONS

Availability, lead times, and quality levels currently are given in the market. Suppliers are meeting user needs with supply and support. In return, users are trying to fine-tune their forecasting accuracy in order to prevent excess inventory and improve delivery performance in the face of an increasingly cost-competitive environment. It is too soon to note any impact of the Middle East crisis on system or semiconductor sales, but if prolonged, the crisis may negatively impact market psychology, which would delay some capital expenditures. Order delays are net lost business, and inventory controls become even more critical. Forecast accuracy and adherence to delivery commitments will continue to be key areas of concern in the next three to six months.

*Mark A. Giudici*

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# Research *Bulletin*

## OCTOBER PROCUREMENT PULSE: UNCERTAINTY IN THE MARKET STAGNATES ORDERS, OVERALL INVENTORY AND LEAD TIMES REMAIN CONSTANT

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDERS TO LEVEL OUT

As seen in Figure 1, this month's respondents expect in aggregate to reduce their semiconductor orders approximately 4.0 percent over last month's

**Figure 1**
**Averaged Monthly Semiconductor Orders**

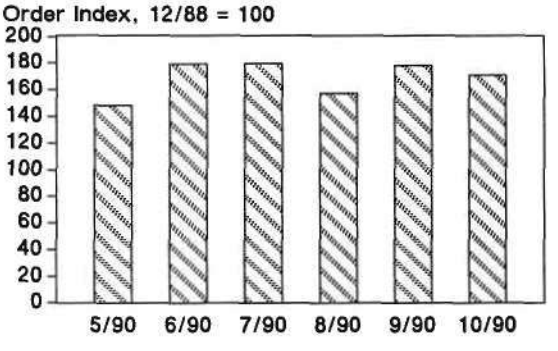



**Figure 2**
**Averaged Semiconductor Lead Times**

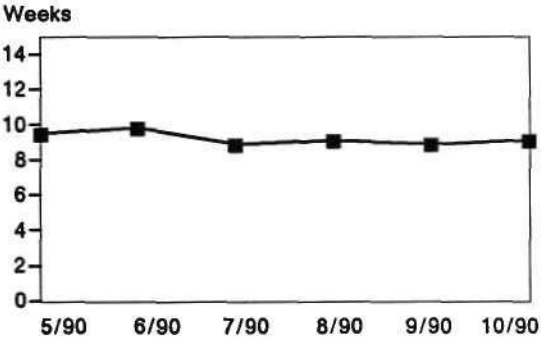



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

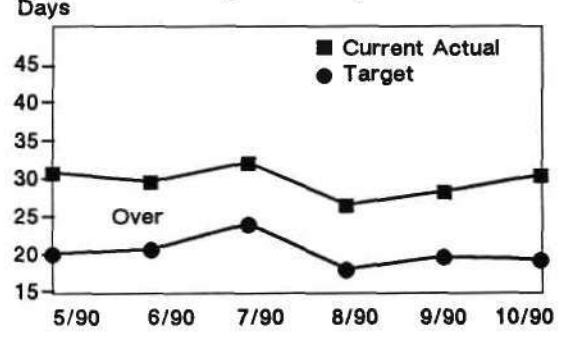
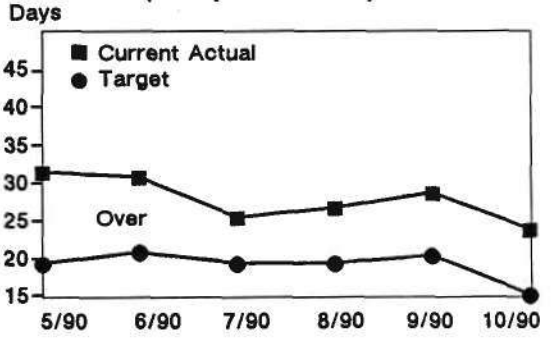



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (October 1990)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## LEAD TIMES VERY MANAGEABLE AS AVAILABILITY OF PRODUCT REMAINS EXCELLENT

The average lead time increased slightly (by one day) to 9.2 weeks over last month's responses. As seen in Figure 2, the stability of lead times gravitating around a nine-week average has been the norm for the past six months. This month's respondents effectively are having *no* availability problems and Dataquest expects the availability situation to remain good for the next six months. The recent ruling favoring AMD in the protracted AMD/Intel 80286-80386 litigation still leaves many issues unresolved, including the availability of second-sourced 80386 devices. There are a few surface-mount product problems regarding handling and test and some new product offerings. Other than these minor irritants, availability is good and is expected to remain so.

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Overall semiconductor inventories remained stable compared with the targeted and actual estimates reported last month, as shown in Figures 3 and 4. The current target and actual inventory levels of 19.5 days and 30.7 days, respectively, compare closely with the corresponding 19.9 days and 28.5 days set last month. The computer segment reported a decline in both target and actual semiconductor inventory levels. Computer semiconductor inventories are now down to a target and actual level of 15.3 days and 24.0 days, respectively, versus last month's levels of a corresponding 20.6 days and 28.8 days. These low and well-managed inventory levels ensure that any change in the overall demand for systems will be reflected quickly in semiconductor order rates. Forecast accuracy and adherence to contracted delivery schedules are getting large amounts of attention now that inventories have proven to be manageable.

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The ripples of uncertainties surrounding the Middle East crisis appear to be affecting the overall electronics market. Although not negative, the current outlook is less positive than in the past. Semiconductor availability is currently excellent and, as yields improve with the 4Mb DRAM, will only improve. Inventories remain under control, much to the relief of both suppliers and users. What is now being emphasized is the need to forecast accurately and to adhere to delivery commitments. As one supplier mentioned, now that semiconductor inventories are in line with end-system demand, "the (semiconductor) order pipeline will be kept running, even though it may be a smaller-diameter pipe."

*Mark A. Giudici*

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# Research *Bulletin*

## OCTOBER MARKET WATCH: AVAILABILITY REMAINS A NONISSUE WHILE DEMAND STABILIZES

The *Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL CONTINUES TO SLIDE . . . DOWN TO 0.95

This month's book-to-bill ratio slid to 0.95 from last month's 0.99 level, indicating at first glance that the market is softening (see Figure 1).

**Figure 1**
**US Semiconductor Book-to-Bill Ratio**

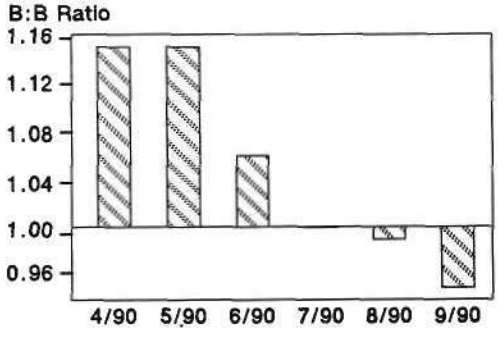



**Figure 2**
**DOC Computer Demand**

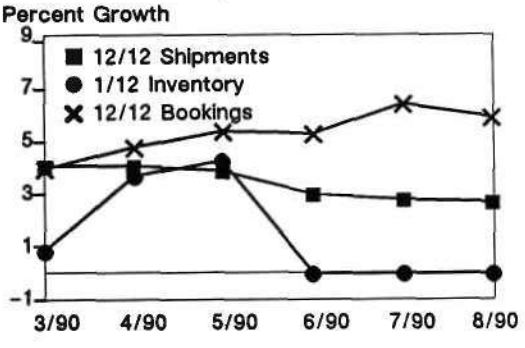



**Figure 3**
**Semiconductor Inventory Level**

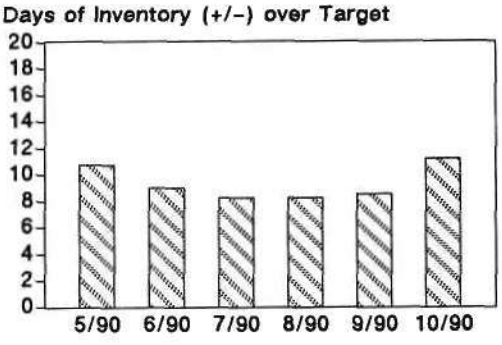
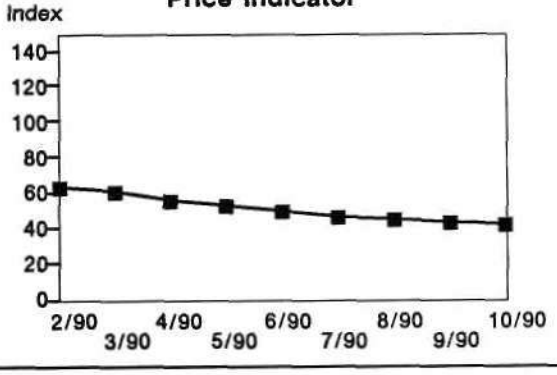



**Figure 4**
**US Weighted Semiconductor Price Indicator**




Source: WSTS, US Department of Commerce, Dataquest (October 1990)

Source: WSTS, US Department of Commerce, Dataquest (October 1990)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Although the ratio is below parity for the second consecutive month, the absolute numbers show that continued strength exists in both bookings and billings relative to comparable time periods. The good news is that this year's September bookings were 9.8 percent higher than last year's September booking level, and billings for September tied the record high set in March 1989. The not-so-good news is that September 1990 bookings were 0.9 percent lower than August and 7.1 percent lower than the last quarter-end month (June 1990). Last month's question regarding why August booking and billing levels rose over July has been partially resolved. The preliminary July figures have now been finalized upward, resulting in a lower booking and flat billing average for August. Once the August book-to-bill totals are finalized, the decline trend noted in the last three months' *Procurement Pulse* should reflect that semiconductor booking levels are in synch with system order rates.

## COMPUTER SHIPMENT RATE FLAT, ORDERS OFF, AND INVENTORIES STEADY

The Department of Commerce (DOC) historical data on computer and office machine shipment and booking activity (see Figure 2) confirm what our surveyed procurement managers have been forecasting for the past three months. System shipment growth has stabilized, and booking rates are expected to flatten out through the end of the year. The actual 12/12 shipment and bookings rates of 2.7 percent and 5.9 percent, respectively, indicate moderate growth for the year, but what is disconcerting is the shorter-term 3/12 bookings rate showing zero growth in bookings relative to the same period last year. This amount compares with the 6.6 percent positive 3/12 rate posted last month. This flat near-term system bookings level will negatively impact the long-term 12/12 booking and corresponding shipment rates by year-end if sustained. Referring again to the surveyed procurement managers six-month outlook, we can expect 0 to 5 percent system sales growth during the next six months. Users' low inventory levels of both systems and semiconductors should allow for quick adjustment of order levels, depending on system demand. In other words, if there is a system demand slowdown, the current inventory situation will not allow a repeat of the 1984 to 1985 inventory balloon fiasco that effectively stopped orders because of large inventory stocks on buyers' shelves.

## SEMICONDUCTOR INVENTORY LEVELS REMAIN STEADY

The delta between targeted and actual semiconductor inventory levels rose slightly to 11.2 days over last month's 8.5-day difference, mainly because of lowering the system demand relative to forecast. Semiconductor order rates are expected to be reduced to offset this difference, because system sales are expected to remain flat for the next three months. The average actual semiconductor inventory level of 31.0 days versus last month's 29.0-day level still is historically low, and inventory control programs should correct this blip in inventory within one or two months. Average target levels declined slightly to 19.0 days from last month's 20.0-day level. As mentioned in last month's *Market Watch*, shifts in system demand are directly affecting inventory levels.

## SEMICONDUCTOR PRICES CONTINUE TO DECLINE SLOWLY

The continued abundance of all semiconductors, combined with steady but flat demand, is allowing buyers the opportunity in some cases to lower prices and increase supplier support levels above and beyond ongoing long-term supplier/user relationships. Respecting long-term arrangements and improving supplier support levels have allowed many suppliers to cement and gain market share in established accounts. Overall lead times remain steady at nine weeks. Most of the price declines noted were in the volatile memory (DRAM and SRAM) area, while logic, linear, and microprocessors remained relatively stable. We expect to see continued price erosion in volatile memory products and, to a lesser extent, in the EPROM arena. Because of the large percentage of plastic (oil-based) package costs in standard logic devices, a possibility of future price increases for these parts exists because of perceived/real oil price increases related to the Middle East crisis.

## DATAQUEST CONCLUSIONS

Availability, lead times, and quality levels currently are given in the market. Suppliers are meeting user needs with supply and support. In return, users are trying to fine-tune their forecasting accuracy in order to prevent excess inventory and improve delivery performance in the face of an increasingly cost-competitive environment. It is too soon to note any impact of the Middle East crisis on system or semiconductor sales, but if prolonged, the crisis may negatively impact market psychology, which would delay some capital expenditures. Order delays are net lost business, and inventory controls become even more critical. Forecast accuracy and adherence to delivery commitments will continue to be key areas of concern in the next three to six months.

*Mark A. Giudici*

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# Research *Bulletin*

## OCTOBER PROCUREMENT PULSE: UNCERTAINTY IN THE MARKET STAGNATES ORDERS, OVERALL INVENTORY AND LEAD TIMES REMAIN CONSTANT

The *Procurement Pulse* is a monthly update of critical issues and market trends based on surveys of semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDERS TO LEVEL OUT

As seen in Figure 1, this month's respondents expect in aggregate to reduce their semiconductor orders approximately 4.0 percent over last month's

**Figure 1**
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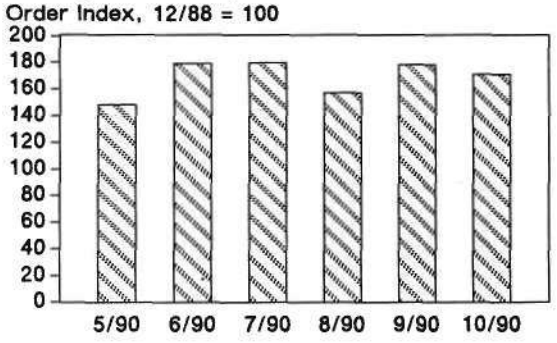


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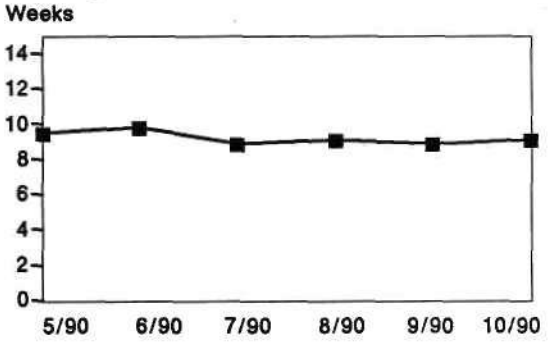


**Figure 3**
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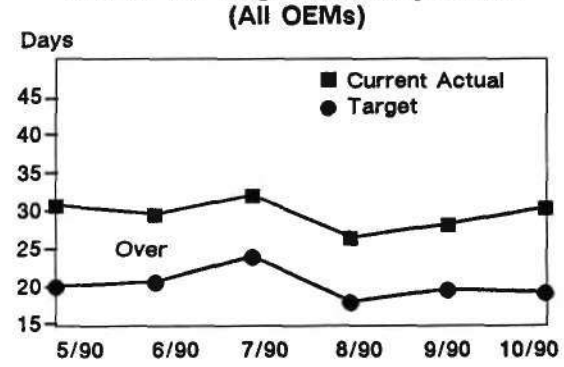


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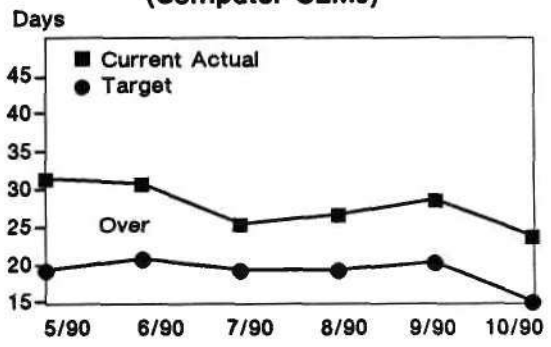


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# Research *Bulletin*

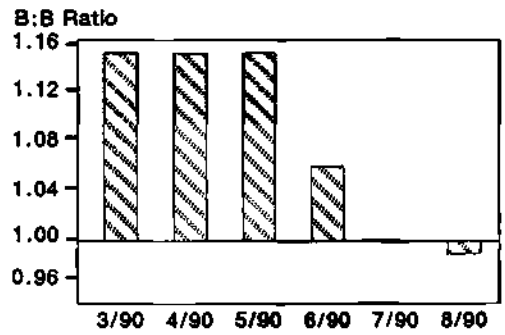
## SEPTEMBER MARKET WATCH: SEMICONDUCTOR AVAILABILITY EXCELLENT WHILE DEMAND STABILIZES, REFLECTING STABLE SYSTEMS BUSINESS

*Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL SLIPS BELOW THE 1.00 MARK TO 0.99

This month's book-to-bill ratio slipped slightly to 0.99 from last month's 1.00 level, as seen in Figure 1. Seasonality aside, this dip is not an unprecedented event. However, looking at the

**Figure 1**
**US Semiconductor Book-to-Bill Ratio**

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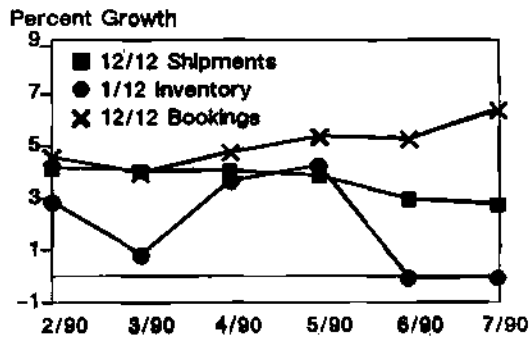


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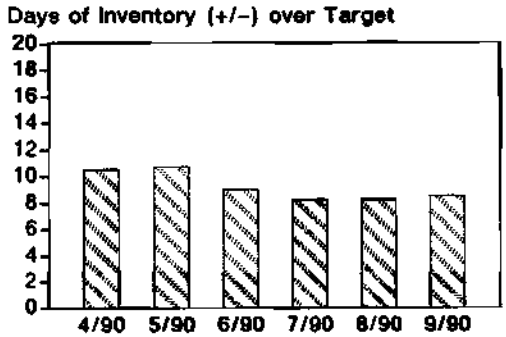


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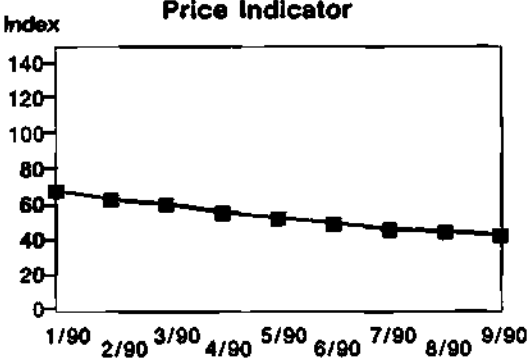


Source: WSTS, US Department of Commerce, Dataquest (September 1990)


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actual booking and billing dollars highlights an interesting situation that may be developing. The actual three-month averages of *bookings and billings both unexpectedly rose* over last month's averages. The 16.6 percent rise in August billings over July's levels can be partly attributed to the billing of comparatively higher-priced DRAMs that were booked in June and July. The 0.9 percent higher bookings level in August over July is interesting in that Dataquest has not seen any large-scale price stabilization or unit order increases that would warrant this type of growth. It is possible that the anticipated year-end sales push has begun a month early because the respondents to this month's Procurement Pulse (SUIS newsletter number 1990-31) survey expect to order 13.0 percent more semiconductors in September than in August. The last time a positive annualized billings growth rate occurred in August after a negative rate in July was in 1986, the beginning of the most recent positive growth cycle for semiconductors.

## THE COMPUTER BOOKING RATE CONTINUES TO CLIMB, SHIPMENTS RATE REMAINS FLAT, AND INVENTORIES DIVE

The US Department of Commerce (DOC) data shown in Figure 2 illustrate that although the latest annualized shipment rate slipped to 2.8 percent from last month's 3.0 percent, computer companies actually had less inventory on hand relative to the same time last year. The last time the 1/12 inventory rate was less than 1.00 was November 1987. The annualized bookings rate rose again, from June's 5.3 percent to July's 6.4 percent, showing how continued strength in system demand is buoying up an otherwise lackluster market. The continued expansiveness of computer demand may be tested, due to the uncertainty surrounding the Iraq crisis. It is likely that some percentage of those companies planning capital expenditures may delay purchases that in turn will affect the aggregate near-term demand for systems. The annualized shipment rate most likely will not be appreciably affected by these near-term perturbations due to the momentum of prior months' bookings. The trickle-down effect of postponed (lost) system demand most likely will impact the semiconductor industry in the mid- to late fourth quarter, exacerbating an already abundant supply situation.

## SEMICONDUCTOR INVENTORY LEVELS REMAIN CONTROLLED, READY TO RESPOND TO ANY DEMAND CHANGE

The stability in the delta between targeted and actual inventory levels of 8.5 days relative to the last two months' 8.2-day difference points out how well inventory levels remain under control (see Figure 3). There was a slight increase in both targeted and actual semiconductor inventories of 20 and 29 days versus last month's respective levels of 18 and 27 days. This increase primarily is due to anticipation of stronger fourth-quarter system sales. The ebb and flow of system demand is being directly transferred toward semiconductor inventory levels. Any change in system demand (up or down) will be reflected in semiconductor inventory levels, thus keeping the order pipeline flowing.

## STABLE DEMAND + ABUNDANT SUPPLIES = CONTINUED LOWER PRICES

Abundant supplies of all semiconductors continue to allow gradual price reductions for the average semiconductor "breadbasket," as seen in Figure 4. The largest price declines have come in the DRAM (expected) and microprocessor (unexpected) families. Despite efforts of some DRAM suppliers to match flat demand levels with like supplies, other suppliers bent on gaining market share have aggressively taken business with lower prices. Flat demand for systems has finally caught up with the midrange to high-end microprocessor market. Lead times for most Intel 32-bit microprocessors have been reduced to within a 10- to 12-week interval, and prices also have declined somewhat, matching demand levels. The other semiconductor families (logic, ASIC, and linear) that already were at rock-bottom prices have not had much price movement.

## DATAQUEST CONCLUSIONS

The inventory controls of semiconductor suppliers and buyers are maintaining an adequate order flow of chips in the face of static demand. Now that availability is a nonissue, many large users are focusing on lead time predictability and reduction, which is very feasible in many areas. The uncertainty surrounding the overall economy as it relates to the Middle East may have some negative fallout on semiconductor growth, but it will alleviate semiconductor users' shortage fears. Forecasting accuracy and commitments—both of which, to date, have been well executed—are of paramount concern for both users and suppliers.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: THE SKY IS *NOT* FALLING

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

### Computers and Office Equipment

Orders and shipments growth were mixed in July. Orders growth for the three-month period ended in July was 5.6 percent above year-earlier

**Figure 1**
**Computers and Office Equipment**

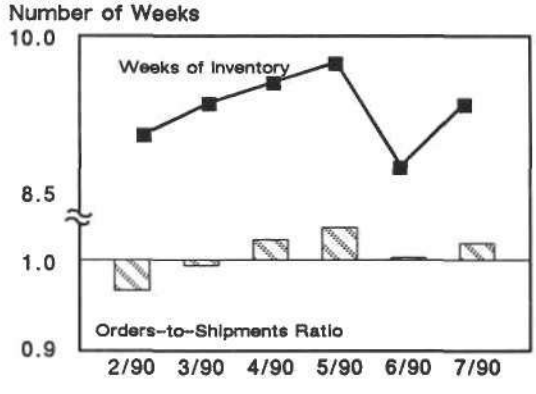



**Figure 2**
**Communications Equipment**

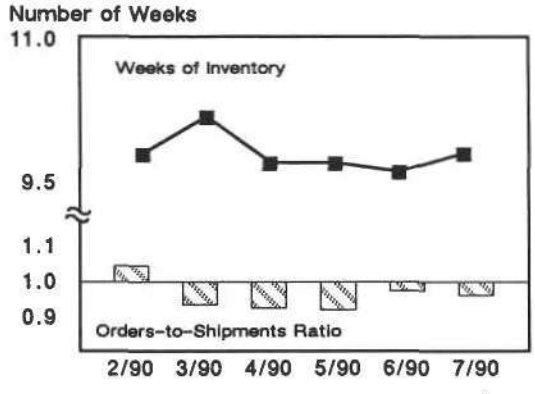



**Figure 3**
**US Instruments**

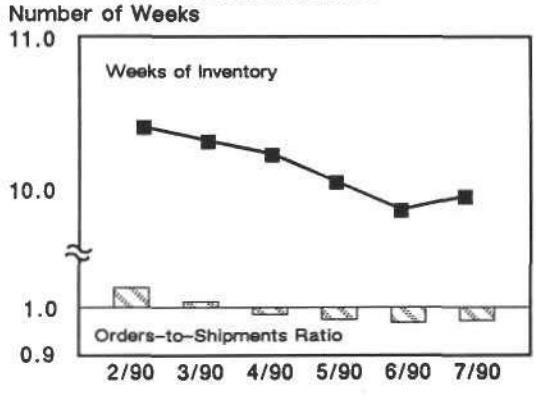
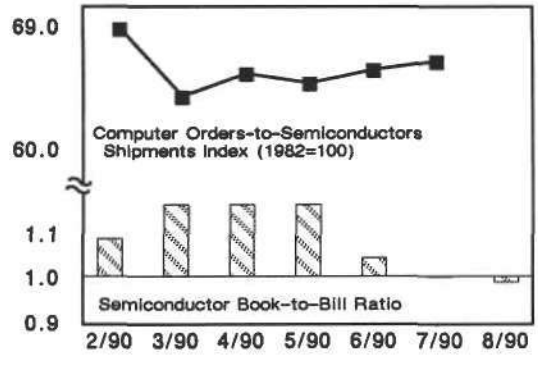



**Figure 4**
**Semiconductors and Computers**




Source: WSTS, US Department of Commerce, Dataquest (September 1990)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orders compared with 3.6 percent in June. Since January, there has been no discernible trend in orders growth; rather, growth cycled up in the first quarter, then down in the second quarter. Shipments growth for the same period *fell 0.6 percent below year-earlier shipments* compared with a 0.5 percent increase in June. *July is the fourth consecutive month of decelerating shipments growth, down 7.5 percentage points from the previous cyclical peak of 6.9 percent in March, and the first month of negative growth since June 1987.* The orders-to-shipments ratio (Figure 1) moved up to 1.02 in July from 1.00 in June, reflecting orders' good showing relative to shipments. Inventories rebounded in July to 9.4 weeks from 8.8 weeks in June but remain only 0.1 week above last year's level, indicating good control by manufacturers. Given the orders-shipments growth-rate gap and the well-managed inventory stocks, Dataquest expects shipments growth to rebound in the coming months, even if orders growth remains relatively stable for the remainder of the year (the most likely scenario).

### Communications Equipment

As previously forecast by Dataquest, *orders growth for the three-month period ended in July decelerated to 7.6 percent, down from 13.8 percent in June, after accelerating continuously since March.* Shipments growth for the same period accelerated to 7.1 percent in July from 4.9 percent in June. Despite this expansion, the orders-to-shipments ratio (Figure 2) slipped from 0.98 in June to 0.96 in July—the fifth consecutive month that the ratio has been below parity. Inventories remain tightly controlled, edging up only 0.2 weeks in July to 9.8 weeks, 1.9 weeks below year-earlier levels. Given the unusually brisk orders growth during the third and fourth quarters in 1989, Dataquest expects the coming months to be marked by further deceleration in orders growth combined with mild acceleration in shipments growth, with both stabilizing in the 5 to 7 percent range by year end.

### Instruments

Orders growth for the three-month period ended in July rebounded to 5.0 percent above year-earlier orders from 3.2 percent in June. Shipments growth for the same period slowed to 6.0 percent in July from 6.4 percent in June. Inventories moved up slightly, from 9.8 weeks in June to 9.9 weeks in July, and are currently 0.8 weeks below year-earlier levels. The orders-to-shipments ratio (Figure 3) remained unchanged at 0.97 in July and below parity for the fourth consecutive month. The ratio's recent downward movement reflects the simultaneous decrease in orders and increase in shipments and is more a correction toward stability than an indication of underlying market weakness. We expect orders and shipments growth to fluctuate in the 5 to 7 percent range in the next months.

## SEMICONDUCTOR DEMAND

The US semiconductor market expanded in August. Bookings (three-month moving average) rose 0.9 percent in August to $1,199.5 million; billings rose 2.4 percent to $1,215.1 million. But the book-to-bill ratio fell below parity from 1.00 in July to 0.99 in August, due to billings' relatively stronger showing (Figure 4).

Although semiconductor demand has returned to pre-summer levels, our monthly survey of major OEM semiconductor procurement managers continues to support an outlook of slower, but nonetheless positive, short-term growth: Overall, six-month system sales are expected to grow 4.2 percent, down from 5.5 percent in August. *Data processing OEMs' expected six-month growth fell to 6.1 percent in September from 8.3 percent in August.*

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Contrary to popular belief, the sky is not falling, nor is it expected to do so anytime soon. True, the rate of economic growth has slowed over the past 12 months, but the US unemployment rate is 5.6 percent, lower than it has been for any year between 1974 and 1987, and factory capacity utilization is 83.0 percent, exceeded in only 6 of the past 20 years. Both of these measures reflect relatively tight labor and product markets. Further, the recent rise in oil prices resulting from the Middle East crisis is not likely to push the economy into recession. Real GNP and employment should continue to expand. Recent moderation in systems growth is more the result of the Fed's policy of reigning in aggregate demand to bring down inflation than insufficient demand unique to the systems markets.

Although it would be imprudent to completely ignore the increase in Middle East tensions, Dataquest advises systems manufacturers to tend their business with an eye more toward *pre*-crisis fundamentals and expectations than give undue weight to the recent turn of world events.

*Terrance A. Birkholz*

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# Research *Bulletin*

## SEPTEMBER PROCUREMENT PULSE: ORDERS TO PICK UP WHILE INVENTORIES STABILIZE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDER LEVELS EXPECTED TO RISE

The respondents to Dataquest's monthly procurement survey expect to increase their semiconductor order levels 13 percent over last month's

**Figure 1**
**Averaged Monthly Semiconductor Orders**

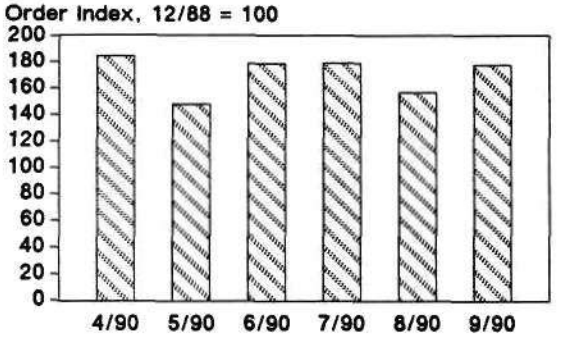



**Figure 2**
**Averaged Semiconductor Lead Times**

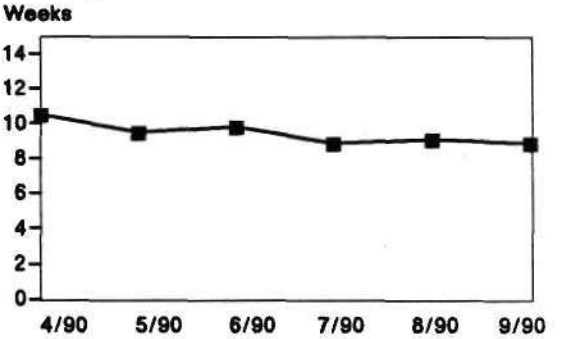



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

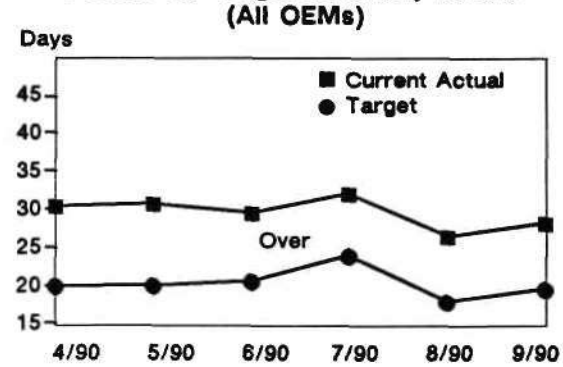
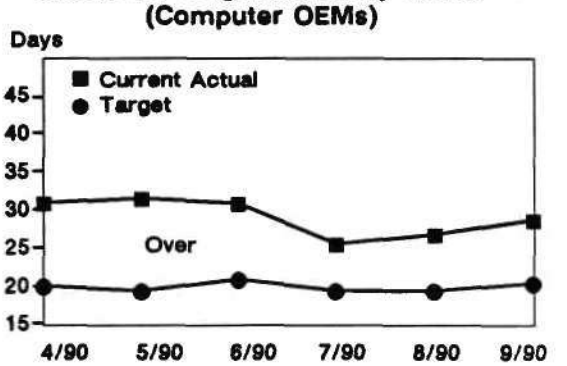



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (September 1990)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levels. It appears that the overall demand level for semiconductors is returning to presummer levels (see Figure 1). We still expect system sales for the next six months to be positive on average, ranging between negative 20 percent and positive 20 percent. Continuing the trend of the past six months, the only negative sales outlook is that of the military segment. The current system sales outlook for the next six months is for 4.2 percent positive growth compared with the 5.5 percent six-month growth forecast that was expected last month. The computer outlook currently is for a 6.1 percent six-month growth rate versus last month's forecast of 8.3 percent. Although one month of increased order expectations does not make a trend, the anticipated fourth-quarter upturn in business may be beginning early.

## NO SURPRISE! AVAILABILITY A NONISSUE WHILE AVERAGE LEAD TIMES REMAIN UNCHANGED AT NINE WEEKS

Figure 2 shows the closest thing to a straight line in lead times, with a variance of no more than one week over the past six months. The current lead time average is 9 weeks and ranges from 6 to 12 weeks. All respondents except one are not having *any* problems in procuring parts at this time. One respondent still is having some difficulty in getting high-end Intel microprocessors. According to recent survey work, the availability of Intel devices also will become a nonissue. The only collective issue seen this month is for shorter lead times. For the first time, 100 percent of the respondents are using surface-mount technology, and only one company is noting problems with handling and testing.

## SEMICONDUCTOR INVENTORIES RISE BY ONE DAY; STILL UNDER 30 DAYS!

In correlation with anticipated higher order rates in September, inventory levels are expected to rise slightly for both targeted and actual levels, as seen in Figures 3 and 4. For both the overall and computer respondents, the targeted and actual inventory levels are forecast to be 20 and 29 days, respectively. Inventory control still remains one of the most visible areas for cost cutting. There was only one day of actual inventory increase over last month's levels that relates to this month's anticipated higher order rate. The continued attention paid to improved lead times should have a positive effect on inventory levels as forecasting accuracy continues to improve.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Despite the uncertainty surrounding the Mideast crisis, this month's respondents expect to increase order rates and will raise inventory levels slightly to account for the anticipated increased year-end business push. Forecasting accuracy still is a major concern for suppliers and users as both continue to work hard at keeping their respective inventory levels low and controllable. With inventory levels historically very low, the upturn in anticipated system sales should be reflected in increased semiconductor orders, as this month's results attest. Currently, there are no problems with semiconductor availability, and Dataquest does not expect to see any future problems through the rest of the year.

*Mark A. Giudici*

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# Research *Bulletin*

## AUGUST MARKET WATCH: THE MIDSUMMER SLOWS SETTLE IN, AND THE AVAILABILITY IS EASY

*Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill *Flash Report*. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL SLIPS TO PARITY

Continuing the summer slide that began in late May, July's book-to-bill declined to 1.00 from June's 1.06 level. The expected lower semiconductor bookings, noted in last month's *Procurement*

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

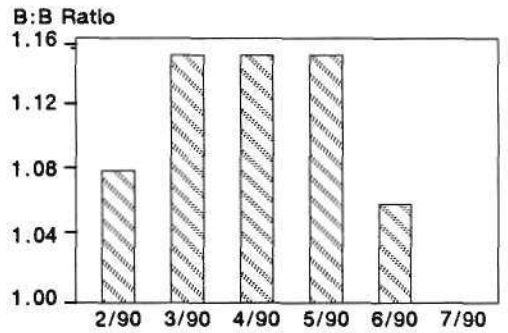



**Figure 2**
**DOC Computer Demand**

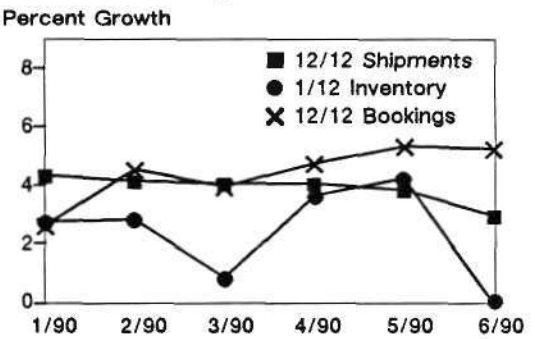



**Figure 3**
**Semiconductor Inventory Level**

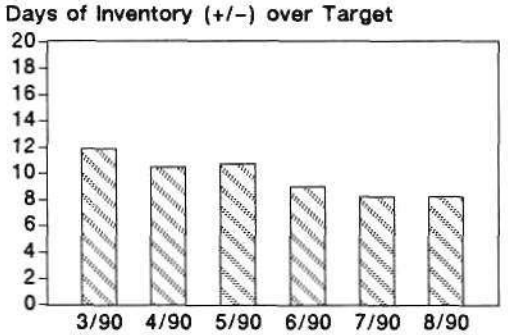
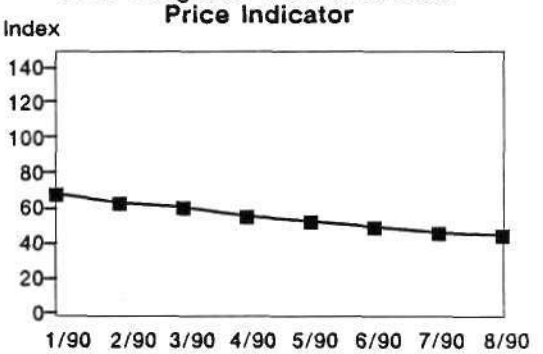



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: WSTS, US Department of Commerce, Dataquest (August 1990)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*Pulse* as being based on seasonal factors, have resulted in the current lower book-to-bill ratio. Compared with the five-week month of June, July's bookings declined 6.4 percent and billings were down 16.7 percent. Because there was 20 percent less time to ship product in July than in June, the lower figures appear to be in line. Looking at the prior quarter's activity highlights seasonality. The reduction in booking activity for July was 12.8 percent lower than the comparable April 1990 figure (the prior four-week month that followed a five-week month), while billings were 4.9 percent less than last April. This slight decline in semiconductor business will continue because of lower (but still positive) growth in system sales expectations in the next six months, combined with good inventory control.

## SYSTEM SALES AND INVENTORY RATES DIP, YET BOOKINGS RATE RISES

The US Department of Commerce (DOC) historical data (Figure 2) shows that the computer shipment rate slipped to an annualized (12 month) rate of 3 percent growth compared with the comparable year-earlier 12-month period ending in June. For the same time period, the bookings rate rose to 5.3 percent, while the June 1990 inventory rate was flat compared with the June 1989 rate. Although the shipment rate declined slightly from last month's 3.9 percent level, the bookings rate has continued to rise as discussed in the past three *Market Watch* issues. This occurrence is due to the expanded pervasiveness of computers in the economy and the current upgrade (not necessarily new machine) trend that is being fueled by continually lower-cost memory. As noted in this month's *Procurement Pulse* (newsletter SUIS-28), the 6-month system sales outlook remains positive but a bit lower at 7.3 percent versus last month's 9.5 percent response. This forecast is mostly due to year-end (December) versus January sales expectations of most companies. Although concern exists regarding the effect of an oil shock on the economy, it is too early to determine to what extent the events occurring in the Middle East will impact the electronics industry. We soon will publish a newsletter on this topic.

## SEMICONDUCTOR INVENTORIES REMAIN UNDER CONTROL

The current delta between targeted and actual inventory levels of semiconductors remained unchanged from last month's gap of 8.2 days (Figure 3). Overall targeted and actual inventory levels have declined to slightly lower than average levels of 18 and 27 days, respectively, compared with the 24 and 32 days seen last period. The reduction in average inventory levels points out how closely inventory control matches business activity levels. Although we are not in the middle of a boom market, controlled inventory levels will ensure that there is a more direct relationship between system sales and semiconductor demand.

## SLACK DEMAND FUELS STEADY PRICE DECLINES

Prices continue to slip, primarily in the spot memory arena as some companies resort to aggressive pricing to maintain or grow market share in the face of steady and/or seasonally lower demand. The SRAM and EPROM markets also are being affected by market-share-hungry suppliers forcing some of these prices down. There appears to be relative pricing calm in the mature standard logic and linear markets, primarily because of their already very low prices. Another area of price stability is in the 32-bit microprocessor market, where sole-source marketing is gaining few friends in the user community. Although lead times have improved for Intel devices, prices have not declined as predictably as expected. As overall availability improves, prices will continue to decline for the rest of the summer, primarily in the commodity volatile memory markets and for some 16-bit Intel devices as well. Logic, linear, and 32-bit microprocessor pricing will continue to remain relatively flat for the different reasons mentioned above.

## DATAQUEST CONCLUSIONS

The continued abundance of commodity memory and logic semiconductors relative to flat demand is forcing lower prices and related lower revenue for semiconductor suppliers. Suppliers' performance remains a key determinant in incremental business and the retention of existing business as some long-term contract buyers have begun to consider taking advantage of limited spot-market buys. Inventory control remains the gospel, and system companies' requirement for components will quickly correspond with system sales levels relative to past business cycles. Now is a good time to solidify long-term supply arrangements that will benefit both parties in the upcoming year.

*Mark A. Giudici*

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# Research *Bulletin*

## SAMONITOR: ELECTRONICS INDUSTRY ENTERS PERIOD OF MODERATE GROWTH

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

#### Computers and Office Equipment

*Orders and shipments growth slowed down for the second and third consecutive months, respectively, in June.* Orders growth for the

Figure 1
Computers and Office Equipment

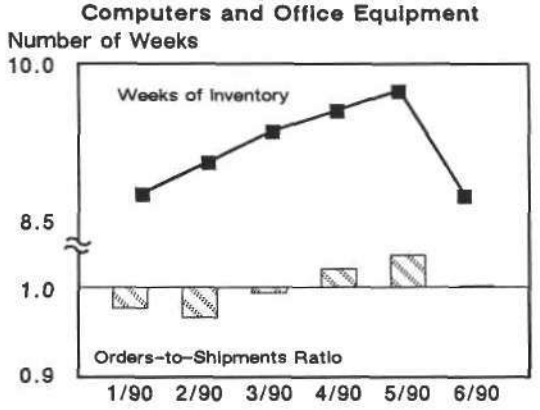



Figure 2
Communications Equipment

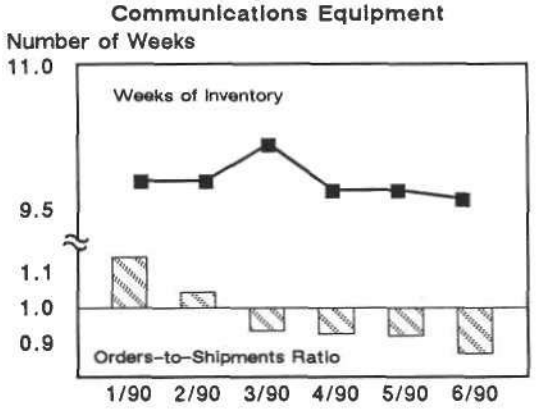



Figure 3
US Instruments

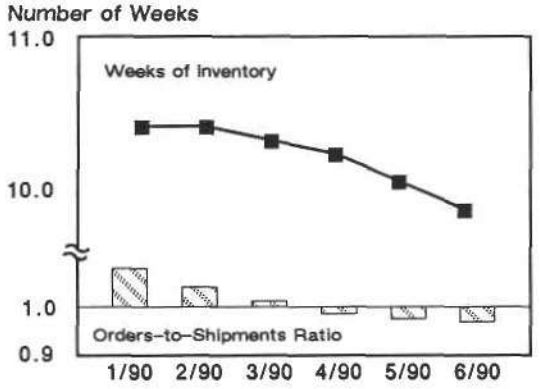
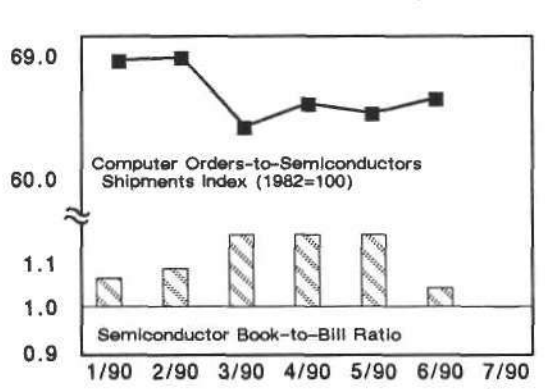



Figure 4
Semiconductors and Computers




Source: WSTS, U.S. Department of Commerce, Dataquest (August 1990)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three-month period ended in June was 3.3 percent above year-earlier orders compared with 5.6 percent in May. Shipments growth for the same period was only 0.2 percent above year-earlier shipments compared with 2.1 percent in May. *This spring's deceleration in shipments represents the steepest three-month growth-rate descent—6.7 percentage points since March—since orders growth fell 7.3 points between July and October 1985.* Less ominous, but still significant, is the recent deceleration in orders by 4.9 percentage points since April—the steepest two-month slowdown since orders growth fell 6.9 points from November 1989 through January 1990. After rising for three consecutive months, the orders-to-shipments ratio (Figure 1) fell to 1.00 in June from 1.03 in May, reflecting a slowdown in orders compared with shipments. As expected, inventories were due for a correction and fell a full week in June to 8.8 weeks—equal to last year's level—from 9.8 weeks in May. Orders and shipments growth may remain sluggish through the rest of the summer. Unless overall economic growth (capital spending in particular) improves this autumn—an increasingly unlikely scenario—Dataquest does not expect orders growth to improve much through the end of the year.

## Communications Equipment

As forecast by Dataquest, *orders growth for the three-month period ended in June accelerated for the third consecutive month, to 12.3 percent above year-earlier orders,* compared with 12.1 percent in May. Shipments growth for that period decelerated for the second consecutive month to 4.8 percent in June from 5.4 percent in April. The orders-to-shipments ratio (Figure 2) advanced from 0.92 in May to 0.97 in June, reflecting a resurgence in orders. Inventories remain well managed, edging down 0.1 weeks in June to 9.6 weeks, 1.3 weeks below year-earlier levels. The rate of orders and shipments growth acceleration and deceleration has begun to slow, indicating a probable market movement into a period of dampened growth fluctuations in contrast to first-half growth marked by wide swings. Dataquest expects the coming months to see deceleration in orders growth and mild acceleration in shipments growth, both stabilizing in the 5 to 7 percent range.

## Instruments

Orders growth for the three-month period ended in June slowed for the third consecutive month to 3.2 percent above year-earlier orders compared with 5.1 percent in May. Shipments growth for the three-month period ended in June also slowed, to 6.4 percent above year-earlier levels, compared with 7.2 percent in May. The orders-to-shipments ratio (Figure 3) declined for the fifth consecutive month, to 0.97 in June from 0.98 in May. As stated in last month's *SAMonitor,* the ratio's downward movement masks the market's real health. Inventories continued to edge down from 10.0 weeks in May to 9.8 weeks in June and currently 0.9 weeks below year-earlier levels, as manufacturers fill shipments from inventory in the absence of rising orders. We believe that the market is in the midst of a correction and will converge toward more stable growth in the next few months.

## SEMICONDUCTOR DEMAND

The US semiconductor bookings (three-month moving average) fell 6.4 percent in July to $1,189.1 million, while July billings fell 1.4 percent to $1,187.1 million. As a result, the US semiconductor market book-to-bill ratio fell from 1.06 in June to parity in July (Figure 4). Dataquest cautions its clients not to read unwarranted pessimism into these numbers: Seasonality and 1Mb DRAM price declines continue to mask the market's underlying strength. Indeed, discrete components' book-to-bill—a relatively more stable indicator of underlying system demand—remained unchanged in July at 1.07 compared with June.

Our monthly major OEM semiconductor procurement manager survey supports the outlook of slower short-term growth: Overall, six-month system sales will grow 5.0 percent, down from 7.3 percent in July. *Data processing OEMs' expected six-month growth fell to 8.3 percent in August from 11.0 percent in July.*

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

The moderation of systems growth that Dataquest expected has arrived. Continued—albeit sluggish—economic growth should provide a foundation for moderate systems-market expansion through year end. The most likely hazard to growth is an escalation of Mideast tensions supporting world oil prices at current levels for several months. Indeed, there can be no doubt that world business conditions have entered a heightened state of uncertainty—the bane of business, particularly investment. In this climate, we urge our clients to pay keen attention to their core businesses and to sharpen their competitive advantages in these areas. Eternal vigilance on competitiveness is the surest way to catch the next wave of growth.

*Terrance A. Birkholz*

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# Research *Bulletin*

## AUGUST PROCUREMENT PULSE: SEASONALITY SLOWS ORDERS, BUT INVENTORIES STILL UNDER CONTROL

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDERS SLIP SEASONALLY

The semiconductor order level of respondents is expected to decline by 21 percent this month, primarily because of the traditional summer slowdown in bookings (see Figure 1). This month's

**Figure 1**
**Averaged Monthly Semiconductor Orders**

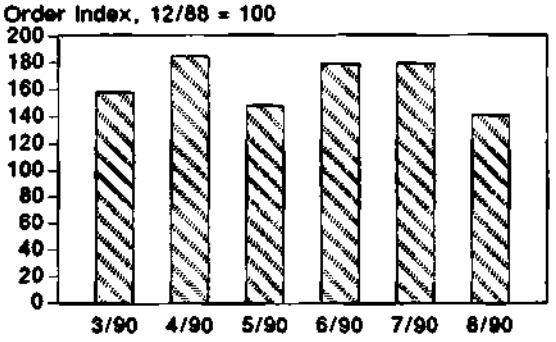



**Figure 2**
**Averaged Semiconductor Lead Times**

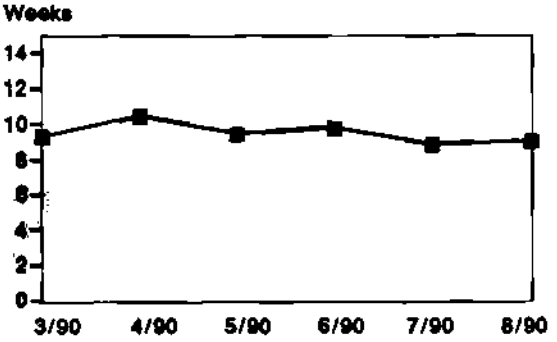



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

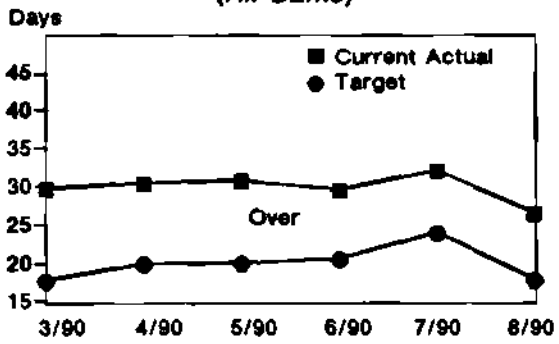
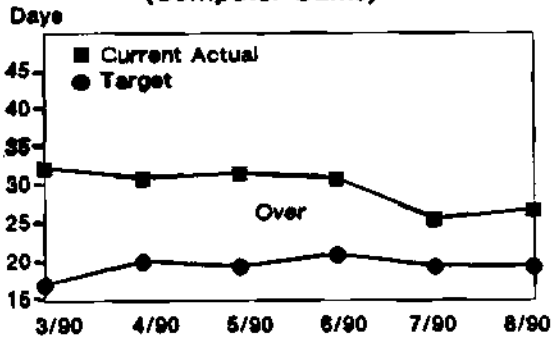



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (August 1990)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respondents also expect another slight decline in system sales primarily because of seasonal demand patterns that were also noticed last month. The range of responses still predicts systems sales growth to be between negative 20 percent and positive 25 percent during the next six months. It is important to note that the only negative forecast was from a military-system respondent. The current six-month outlook forecasts 5.5 percent overall systems sales growth and 8.3 percent positive growth in the computer sector, compared with last month's rates of 7.3 percent and 11.0 percent, respectively. Dataquest expects the seasonal slowdown to continue through September, at which time order levels should increase to meet year-end demand.

## LEAD TIMES STABILIZE AT NINE PLUS WEEKS, AVAILABILITY REMAINS EXCELLENT

Although Figure 2 shows a slight lead time increase of 9.3 weeks over last month's 9.0 weeks, the range in responses has narrowed, with a low of 6.0 and a high of 12.0 weeks. Aside from some isolated problems with 80386SX availability, no other product problems were noted. The DIP shortage in standard logic has been effectively resolved with the combination of reduced demand and increased capacity. Currently, there is no difference in price or lead time for most SMT or DIP standard logic products. Isolated problems still exist for some SMT users regarding testing and handling of parts and the availability of engineering-status SMT devices.

## SEMICONDUCTOR INVENTORIES GO WITH THE SEASONAL FLOW . . . LOW AND UNCHANGED

As seen in Figures 3 and 4, inventory levels for all of this month's respondents are expected to decline this month to a targeted and actual level of 18 days and 27 days, respectively. The computer segment of the sample has stabilized with targeted inventories at 20 days, but actual levels have risen 1 day to 27 days. Inventory control still is the main cost-cutting "religion," and efforts to cut the target to actual deltas are ongoing. With semiconductor inventories at their current low levels, upticks in system demand expected this fall should quickly translate into increases in semiconductor order levels. The focus on the current improved availability and lead times will continue through forecasting improvements as demand picks up.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

With the summer slow season in full swing, the control of inventories and the focus on supplier performance are getting priority because availability and predictable pricing now are nonissues for most users. Forecast accuracy and the 1991 plans of many users continue to force the regular communication of short- and longer-term needs to suppliers. Semiconductor supplies are expected to remain abundant for the rest of this year, allowing users an opportunity to create or cement supplier relationships for reliable and cost-effective deliveries. Suppliers should continue to see the order pipeline remain constant through the summer, with the traditional fall system order increase translating readily into semiconductor bookings.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: EQUIPMENT MARKETS SHOW SIGNS OF STABILITY

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

#### Computers and Office Equipment

Shipments growth slowed down in May for the second consecutive month. Shipments growth for the three-month period ended in May was

Figure 1
Computers and Office Equipment

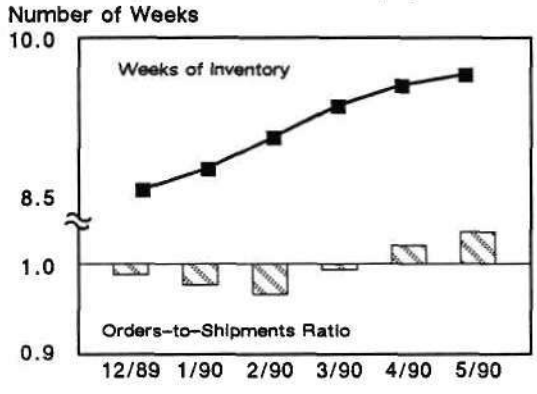



Figure 2
Communications Equipment

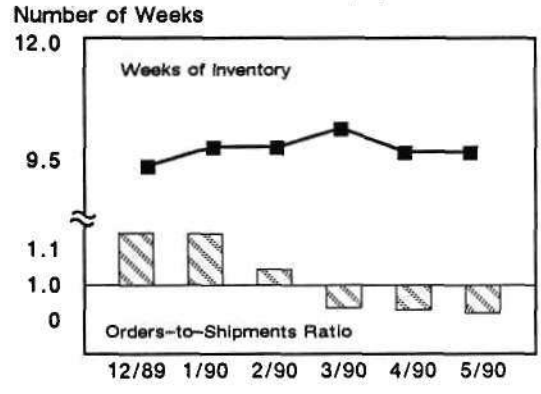



Figure 3
U.S. Instruments

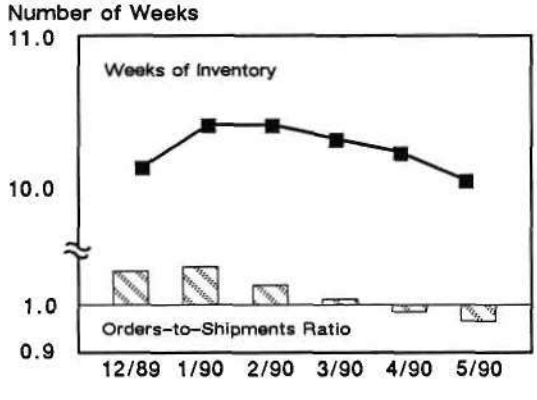
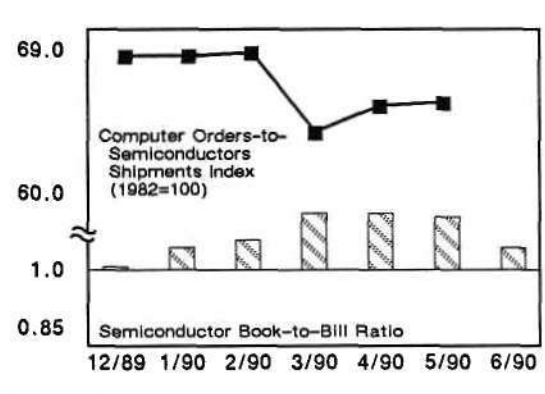



Figure 4
Semiconductors and Computers




Source: U.S. Department of Commerce, World Semiconductor Trade Statistics, Dataquest (July 1990)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2.9 percent above year-earlier shipments, compared with 5.2 percent in April. Given the first quarter's surge in shipments growth, the slowdown is not wholly unexpected. Dataquest believes that it has run its course. Orders growth for the same period was 6.4 percent above year-earlier orders compared with 8.2 percent in April. Also in May, 6- and 12-month-ended orders growth were 6.4 percent and 5.4 percent, respectively, above year-earlier orders. The close proximity of these growth rates suggests that orders growth is also approaching stability. As a result of improved business conditions, the orders-to-shipments ratio (Figure 1) rose for the third consecutive month, to 1.03 in April. Inventories edged up slightly to 9.7 weeks in May from 9.6 weeks in April, 0.2 weeks above last year's level. The seasonal downturn in inventories is overdue; levels should begin to fall in June. Barring some unforeseen outside disturbance, Dataquest expects the coming months to be marked by stable orders and shipments growth, in the 3 to 6 percent and 5 to 7 percent range, respectively.

### Communications Equipment

*As forecast by Dataquest, orders growth continued to rebound in May.* Orders growth for the three-month period ended in May was 12.1 percent above year-earlier orders compared with 6.1 percent in April. Shipments growth for the same period decelerated to 5.4 percent in May from 9.0 percent in April. The decline in the orders-to-shipments ratio (Figure 2) from 0.93 in April to 0.92 in May belies the health of this market and is more a reflection of a correction in orders growth from the extraordinary rates that occurred during the fourth quarter of 1989 and early in the first quarter of 1990. Inventories are exceptionally lean at 9.7 weeks, a full 1.5 weeks below year-earlier levels. Dataquest believes that the recent large oscillations in growth should dampen in the coming months, with shipments growth stabilizing in the 5 to 7 percent range and orders growth decelerating and settling down in the same region.

### Instruments

Orders growth for the three-month period ended in May was 5.1 percent above year-earlier levels compared with 7.4 percent in April; shipments growth for the same period was 7.2 percent above year-earlier levels compared with 6.4 percent in April. The decline in the orders-to-shipments ratio (Figure 3) masks the real health of the market: Late last year, actual orders growth overshot sustainable orders growth; actual orders are now undershooting the trend to correct for this previous error. Inventories edged down from 10.2 weeks in April to 10.0 weeks in May and are currently 0.8 weeks below year-earlier levels. Dataquest believes that recent activity reflects the market's correction to more sustainable long-run growth rates. Stability should be realized in the next few months.

## SEMICONDUCTOR DEMAND

In June, the US semiconductor market stepped back from the growth it had realized in recent months. US market bookings (three-month moving average) fell 8.0 percent in June to $1,270.4 million, while June billings fell 0.2 percent to $1,203.5 million. Furthermore, DRAM price pressure continues to depress the value of the market; June shipments are 8 percent below last year's level. As a result, the US semiconductor market book-to-bill ratio fell from 1.14 in May to 1.06 in June (Figure 4). Computer market growth shows no sign of abating in coming months, which should foster continued chip market growth.

Dataquest's monthly survey of major OEM semiconductor procurement managers supports our optimistic outlook: Overall, six-month system sales are expected to grow 7.3 percent, down from 9.5 percent in June. Among data processing OEMs, however, expected six-month growth has risen from 9.6 percent in June to 11.0 percent in July.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Production growth is beginning to show signs of moderating and stabilizing; witness the decelerating growth in computer shipments and the convergence of 3-, 6-, and 12-month-ended computer orders growth. Barring some unforeseen shock to the electronics industry and aggregate investment spending, we see little reason for moderate growth not to continue.

From a semiconductor manufacturer's perspective, this dynamic is good news: Better that the end-equipment markets should grow moderately, but stably, rather than swing wildly from high to low growth.

*Terrance A. Birkholz*

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# Research *Bulletin*

## JULY MARKET WATCH: WITH DEMAND FLAT, SUPPLIES REMAIN ABUNDANT

*Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill Flash Report. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### WHAT GOES UP. . .THE BOOK-TO-BILL SUCCUMBS TO SUMMER

The June book-to-bill dropped to 1.06 from May's 1.14 level, reflecting the seasonal slowdown in bookings and the residual high billings levels

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

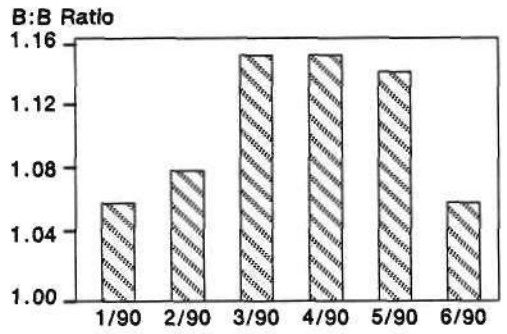



**Figure 2**
**DOC Computer Demand**

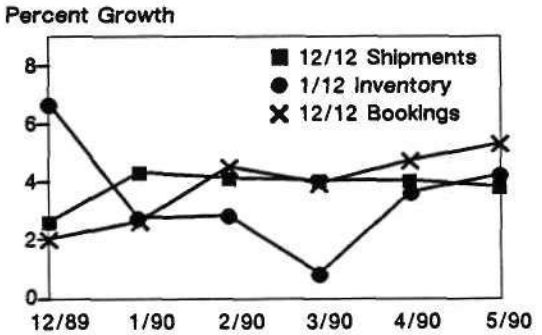



**Figure 3**
**Semiconductor Inventory Level**

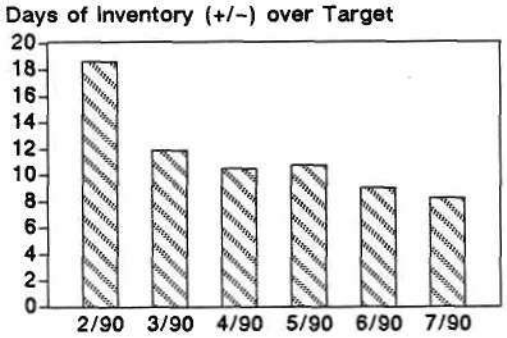
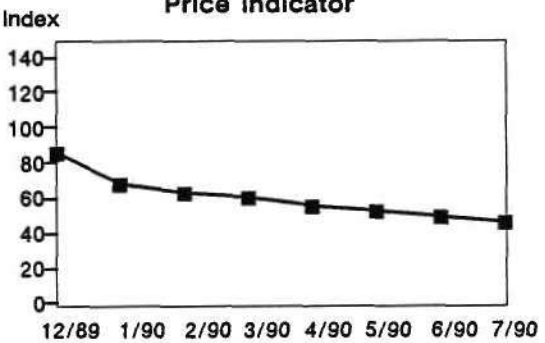



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: US Department of Commerce, World Semiconductor Trade Statistics, Dataquest (July 1990)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from the last three months of increased bookings (see Figure 1). Although the "summer slows" are not a new phenomenon, the relative level of bookings decline this June is within the norm. The three-month moving average bookings rate for June is almost 8 percent (7.9 percent) less than May's peak. Comparing the last quarter-ending month (March 1990) with June, we see also that June bookings are down close to 5 percent (4.7 percent). Demand for semiconductors remains positive, although at a lower level, primarily due to seasonality rather than a real drop-off in end-system demand. Dataquest still expects to see positive book-to-bill ratios for the next two months because of the inertia of the past three months of bookings working through the system relative to static booking levels that are forecast by the respondents of our monthly procurement survey.

## SYSTEM SALES RATE FLATTENS WHILE BOOKINGS RATE RISES

The US Department of Commerce (DOC) data on computer sales and inventory rates shown in Figure 2 illustrate the relatively positive demand picture that users have been forecasting for the past five to six months in our monthly procurement surveys. May's 12/12 booking rate of 5.4 percent is above the 4.7 percent level recorded for April, while the 12/12 billing rate has remained a constant 3.9 percent for both months. Quarterly data show that the 3/12 bookings and billings rates both declined in May to 6.4 percent and 2.9 percent from April's 8.2 percent and 5.2 percent, respectively. This dip in near-term (3/12) booking and shipment rates is seasonal, historically lasting from May through August (prompting the semiconductor summer slowdowns) and should not be taken as a lack of system demand. Continued optimism exists for system sales for the next six months, as per our sampled procurement managers (see the July issue of *Procurement Pulse,* SUIS newsletter number 1990-24). This optimism, as well as the DOC data, leads us to anticipate that continued positive system sales and readily available semiconductors will be the norm for the remainder of the year.

## SEMICONDUCTOR INVENTORIES REMAIN MANAGED

The gap between targeted and actual semiconductor inventory levels again declined to 8.2 days from last month's 9.0-day delta (see Figure 3). Overall targeted and actual inventory levels have risen slightly to 24 and 32 days from 20 and 29 days, respectively. This rise is due primarily to an increased sample size and is not indicative of a trend to downplay the importance of inventory control. It appears that, despite good intentions, the actual inventory levels continue to hover around 12 turns a year, which is historically very good considering that 4 to 5 turns a year was considered average five years ago. Inventory control remains a priority, is being well managed, and is allowing more time to be spent on fine-tuning forecasting accuracy.

## ABUNDANT SUPPLIES + FLAT DEMAND = DECLINING PRICES

Prices continue to decline, partly due to flat demand levels, but primarily because some DRAM suppliers are aggressively pricing 256K and 1Mb devices in efforts to gain market share. Isolated areas of aggressive SRAM and EPROM pricing also are keeping overall memory pricing down. Pricing for standard logic continues to remain unchanged, with improvements in DIP capacity now beginning to ease the lead time extensions that have plagued these parts lately. Microprocessor pricing historically changes very slowly, and this month is no exception. Supplies of Intel 32-bit devices have increased, easing the three- to six-month lead times that some customers had to accept a few months ago. The overall semiconductor supply picture continues to improve, with prices and lead times expected to become increasingly manageable.

## DATAQUEST CONCLUSIONS

The summer slows have arrived, and they have brought with them the seasonal forecasting and backlog jitters that perennially mark the season. With flat order rates, focus is being put on delivery commitments and incoming quality levels. Looking beyond the near term, even if system sales remain at their current levels of 4 to 5 percent growth, the corresponding semiconductor growth should come very close to Dataquest's forecast of negative 3.5 percent US growth for 1990, primarily due to the price erosion now being seen.

On the positive side, inventory levels of approximately 30 days ensure that the order pipeline will remain filled. Component supplies continue to remain predictable and abundant, while demand is steady but low. Solid foundations for long-term supplier-user relations can be cemented in markets like this.

*Mark Giudici*

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# Research *Bulletin*

## JULY PROCUREMENT PULSE: DEMAND STABILIZES WHILE INVENTORIES REMAIN LOW BUT MIXED

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDERS SEASONALLY LEVEL OFF

As seen in Figure 1, this month's respondents expect to maintain the order levels of last month mainly because of the traditional summer-month slow period that is affected by vacation schedules.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

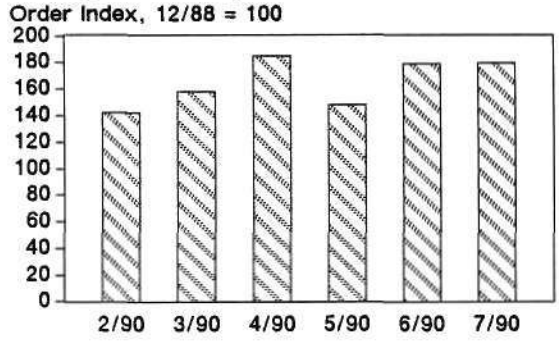



**Figure 2**
**Averaged Semiconductor Lead Times**

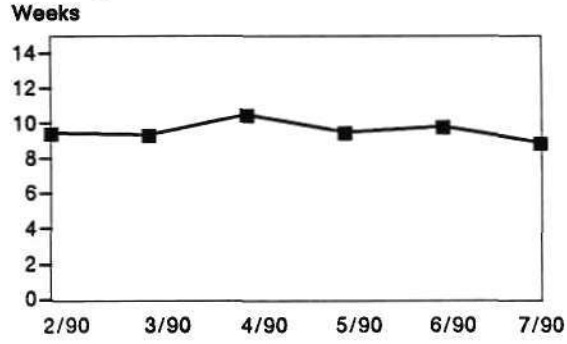



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

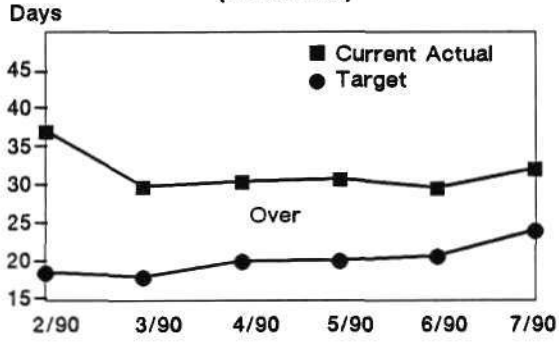
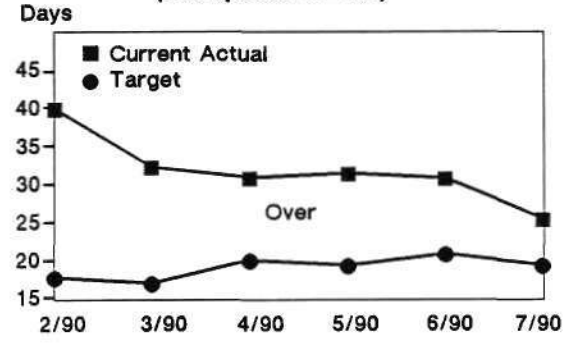



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (July 1990)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Reflecting the seasonal stabilization in semiconductor orders is a slight decline in the six-month system sales outlook. There is also a break in the last four months' trend of a unanimously positive system sales outlook. The range now spreads from a low of negative 20 percent to a high of 25 percent. The only negative respondents (two) came from the military and telecommunications industries. The current outlook is for 7.3 percent overall systems sales growth through January 1991 (versus 9.4 percent in our last survey). The computer company respondents expect to see an increase of 11.0 percent in sales compared with last month's outlook of 9.6 percent. Even with the improved forecasting and inventory control measures in place, the effects of vacation schedules on order rates still impact business. Dataquest expects overall semiconductor orders to continue this steady to slower pace until the end of summer, after which most buildups for year-end sales begin.

## LEAD TIMES DIP TO NINE WEEKS, AVAILABILITY OUTLOOK EXCELLENT

Reflecting the continued improvement of semiconductor availability, current average lead times have dropped to 9.0 weeks from last month's 9.9 weeks with a range of 6.0 to 15.0 weeks for this reporting period (see Figure 2). For the most part, respondents to this month's survey noted no major product problems. The DIP-packaged standard logic shortage is beginning to ease as a result of selected increases in capacity and the aforementioned stabilization of demand.

The continued shift to surface mount also is easing longer lead times for DIP products. As expected in earlier reports, the TTL PLD availability also is improving as capacity increases catch up with demand. Some supply problems still plague the 80386SX parts, but they are expected to be resolved by the end of the summer as capacity ramp-ups are completed.

## OVERALL INVENTORIES SLIGHTLY UP, COMPUTER COMPANIES DOWN

Figures 3 and 4 illustrate that overall target and actual semiconductor inventories have risen while the computer company subset has declined somewhat. This is due to an increase of noncomputer companies that responded to the survey. The overall inventory situation is still very manageable, with an average of 32 days of inventory on hand versus a 24-day target. Computer companies continue to improve inventory control, with 26 days of inventory on the shelf versus a 20-day target. With inventory under control, attention is focusing on suppliers' delivery and lead-time commitments, especially for surface-mount devices.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

The stability in the electronics market is now weathering the summer slow season. Inventories remain under control, while order rates are expected to remain flat for the next month or so. Even with seasonality considered, the focus on cost control and accurate forecasts combined with readily available components is keeping the order pipeline filled. Semiconductor supplies are expected to remain abundant for the rest of 1990. In the absence of major problems, the focus now is on improving upon current levels of forecasting accuracy and delivery schedules. As these fundamentals of procurement continue to be improved, the overall order flow pipeline as a result will remain full.

*Mark Giudici*

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# Research *Bulletin*

## JUNE MARKET WATCH: WITNESS A PLACID ELECTRONICS MARKET, MADE OF STABLE DEMAND AND ADEQUATE SUPPLIES

*Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill *Flash Report*. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL JUMPS TO A ROBUST 1.14!

Reflecting the positive but slow growth in systems demand, the May book-to-bill ratio rose sharply from 1.09 in April to the current

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

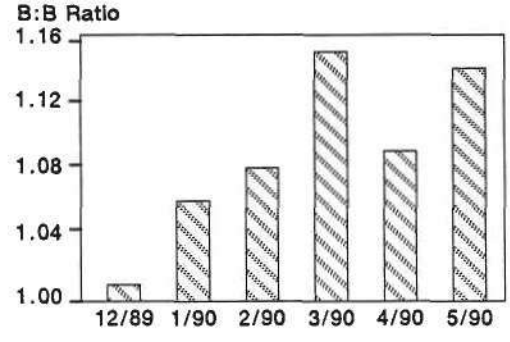



**Figure 2**
**DOC Computer Demand**

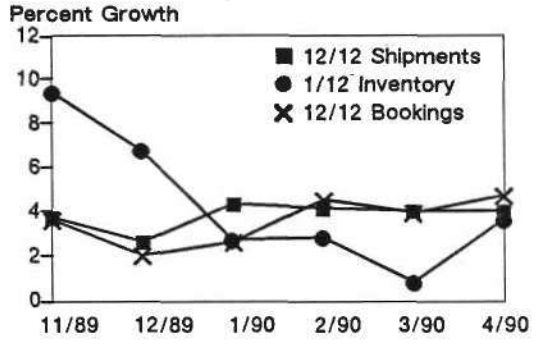



**Figure 3**
**Semiconductor Inventory Level**

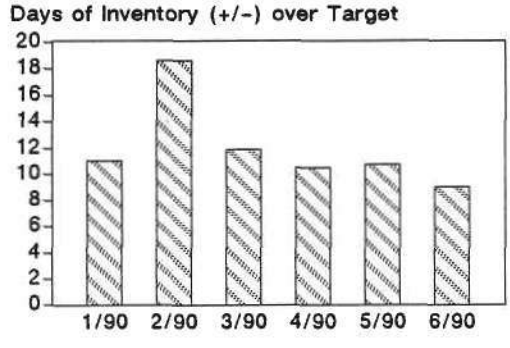
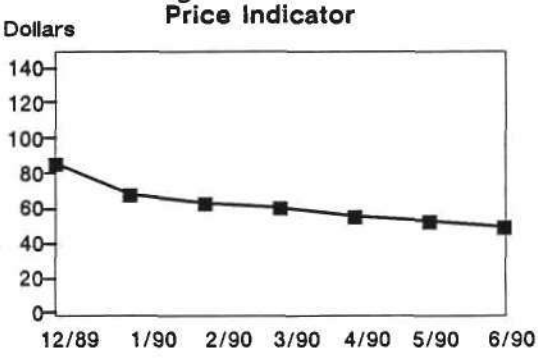



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: U.S. Department of Commerce, World Semiconductor Trade Statistics, Dataquest (June 1990)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1.14 (Figure 1). The actual numbers for May on a three-month moving average show a 7.8 percent increase in bookings and a 5.7 percent rise in billings over April. This strong semiconductor booking activity appears to be linked with the continued optimistic system sales outlook and confidence that inventories can be controlled. As noted in last month's *Market Watch*, the continuation of a positive book-to-bill ratio is expected for the remainder of the summer because of the sustained dynamics of the systems market. What was not anticipated was the increase in bookings activity over the prior month's levels. Dataquest still expects a positive book-to-bill ratio for the next three months, but at a rate that is more in line with system sales growth.

## APRIL SYSTEM SALES AND BOOKINGS REMAIN FLAT WHILE INVENTORIES RISE TO NORMALCY

The US Department of Commerce data on computer sales and inventories (Figure 2) illustrates that 12/12 system booking and shipment rates of 4.8 and 4.1 percent, respectively, have been relatively constant since the first of the year. Last month's dip in inventory levels relative to last year's levels appears to be an anomaly that has now returned to more traditional levels. While annualized computer shipments stabilize at a positive rate, the short-term 3/12 bookings rate continues to grow. (The 3/12 bookings rate is currently at 8.7 percent.) The positive system sales outlook that has been reported by our surveyed procurement managers for the past four months in the *Procurement Pulse* is being realized in actual bookings now. Procurement managers' continued optimism for the next six months, combined with adequate semiconductor supplies, should provide for manageable procurement and inventory control in the upcoming months.

## SEMICONDUCTOR INVENTORIES REASONABLY CONTROLLED

Both target and actual semiconductor inventory levels dipped slightly (to 20 and 29 days, respectively), resulting in a smaller gap between target and actual of 9 days for this month (Figure 3). Because of the relative sluggishness in system sales, cost-control measures remain the main focus on earnings growth for most, if not all, of the companies polled. Although inventory levels have not reached targeted levels, they remain at a stable and controlled 12 turns a year. There continues to be room for improvement, especially regarding DIP standard logic and PLD supplies versus forecasts, but generally the inventory situation is under control.

## PRICES PREDICTABLY DECLINE IN LINE WITH EXPECTATIONS

Figure 4 illustrates that semiconductor prices continue to decline slowly, primarily because of competition in the DRAM and SRAM markets and coinciding with the easing of 32-bit MPU availability/pricing. Some price stability continues in the standard logic DIP segment due to an aggregate supplier shift to SMT products that left existing DIP demand unmet in some cases. Adequate supplies of all semiconductors (TTL PLDs and DIP logic included) are now, or soon will be, noticed in the market. Compared with the unspectacular but steady growth of system sales, the chip supply is expected to keep downward pressure on overall prices for the next four to six months.

## DATAQUEST CONCLUSIONS

Dataquest believes that semiconductor procurement from both a buyer and a supplier perspective is currently predictable relative to the same situation a year ago. Some areas of improvement still remain and are being addressed. The "religion" of cost control and the accompanying need for forecasting accuracy has become the norm for most large users. The ancillary benefit for smaller companies is that the increased discipline to meet delivery commitments for larger companies is improving the overall market. Dataquest expects continued improvements in most semiconductor supplies throughout the summer months. In the absence of a large increase in aggregate demand, semiconductor availability and procurement will remain predictable.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: ALL SYSTEMS ARE "GO"

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

#### Computers and Office Equipment

The computer market improved in April. Shipments growth for the three-month period ended in April was 5.8 percent above year-earlier

**Figure 1**
**Computers and Office Equipment**

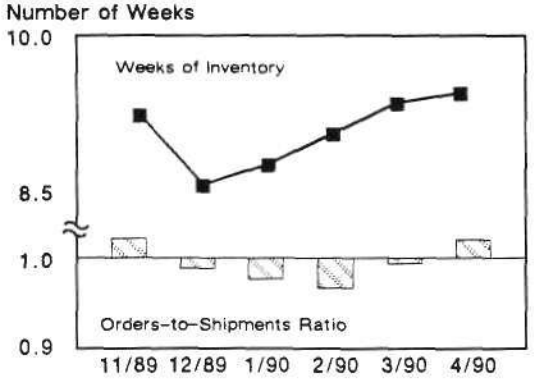



**Figure 2**
**Communications Equipment**

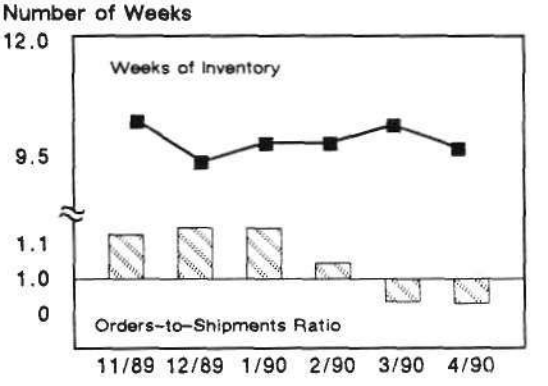



**Figure 3**
**U.S. Instruments**

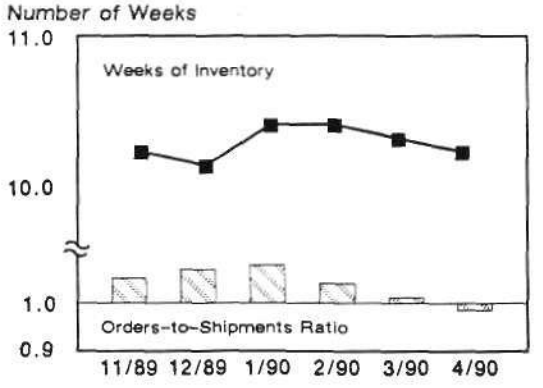
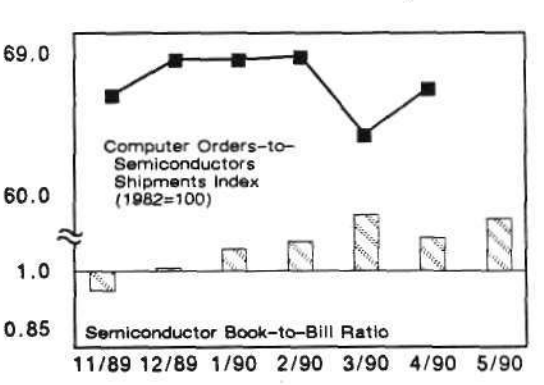



**Figure 4**
**Semiconductors and Computers**




Source: U.S. Department of Commerce, World Semiconductor Trade Statistics, Dataquest (June 1990)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shipments, compared with 6.9 percent in March. Although April is the first month of deceleration since growth reached its cyclical trough of 1.8 percent in December 1989, Dataquest believes that there is little cause for alarm: The first quarter's surge in shipments growth was in response to last year's fourth quarter surge in orders. We believe that the shipments surge has run its course and that the coming months will be marked by similar moderate growth as shipments growth stabilizes. Orders growth for the same period was 8.7 percent above year-earlier orders, compared with 7.3 percent in March. *Orders growth has accelerated continuously from 4.2 percent in January this year.* As a result of improved business conditions, the orders-to-shipments ratio (Figure 1) rose from parity in March to 1.02 in April. Inventories edged up slightly to 9.5 weeks in April from 9.4 weeks in March but are 0.2 weeks below last year's level, so excessive stocks are not a problem. During the next several months, Dataquest expects orders growth to stabilize around current rates and expects shipments growth to decelerate, then stabilize.

## Communications Equipment

*As forecast by Dataquest, orders growth rebounded in April.* Orders growth for the three-month period ended in April was 5.4 percent above year-earlier orders, compared with 1.4 percent in March. Orders growth is likely to accelerate a few percentage points in the coming months as the market closes in on stability. Shipments growth for the same period remains brisk at 8.9 percent above year-earlier shipments, compared with 8.7 percent in March. The strength of recent shipments growth reflects the carryover from last year's strong fourth quarter sales. The decline in the orders-to-shipments ratio (Figure 2) from 0.94 in March to 0.93 in April belies the health of this market and reflects shipments' relative improvement in April over March when compared with orders' improvement. Inventories have begun their seasonal decline to 9.7 weeks in April and are 1.6 weeks below year-earlier levels as well. With a minimum of inventory slack in the market, Dataquest expects orders and shipments growth to accelerate and decelerate, respectively, toward roughly equal and stable rates in the coming months.

## Instruments

Orders growth for the three-month period ended in April was 7.4 percent above year-earlier levels, compared with 9.1 percent in March. Shipments growth for the same period was 6.4 percent above year-earlier levels, compared with 5.8 percent in March. The decline in the orders-to-shipments ratio (Figure 3) masks the true expansion in the market and is more reflective of the 1.6 percent decline in April orders from March. Inventories continued to edge down from 10.3 weeks in March to 10.2 weeks in April; they are currently 0.8 weeks below year-earlier levels. Dataquest believes that recent shipments and orders activity reflects the market's correction to more sustainable growth rates. The coming months should be marked by relatively stable growth.

## SEMICONDUCTOR DEMAND

US semiconductor market growth accelerated in May. US market bookings (three-month moving average) rose 5.3 percent in May to $1,379.6 million while May billings rose 2.9 percent to $1,205.6 million. As a result, the US semiconductor market book-to-bill ratio rose to 1.14 in May, from 1.09 in April (Figure 4). The strength of orders by computer manufacturers is helping to buoy the market despite softness in the DRAM area. As expected, computer orders' seasonal upturn occurred on schedule: The three-month period ended in April advanced 5.3 percent ahead of March. Also as expected, the computer-orders-to-semiconductor-shipments index, a leading indicator of chip orders and shipments, rose in April to 66.9 from 64.0 in March (Figure 4). April's upturn in the index signals continued expansion in the chip market as systems orders translate into chip sales.

Dataquest's monthly survey of major OEM semiconductor procurement managers supports this optimism: *Procurement managers' six-month system sales forecast for OEMs has risen for the fourth consecutive month, to 9.4 percent in May from 7.8 percent in April.*

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

The systems-market recovery is on schedule and is gathering steam. Advancing system sales have spilled over to the semiconductor market, which had record bookings in May. The upcoming summer months, typically a slow period of the year for the chip business, will be the next short-term obstacle facing the semiconductor industry.

From a purely demand-side perspective, there are no indications in the electronics market that signal a slowdown in growth in the near term. The macroeconomic fundamentals of growth are in place: Businesses surveyed in April and May plan to increase capital spending 6.7 percent this year. Desired system inventories are close to actual inventories, thus minimizing the slack in the electronics-systems food chain. Recent past departures of orders and shipments growth from trend have been corrected and are now close to more stable, long run rates. As it stands now, "all systems are 'go'."

*Terrance A. Birkholz*

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# Research *Bulletin*

## JUNE PROCUREMENT PULSE: INVENTORIES CONTROLLED WHILE BOOKINGS AND LEAD TIMES INCH UPWARD

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDER LEVELS EXPECTED TO RISE, KEEPING PACE WITH SYSTEM SALES EXPECTATIONS

The order rates for semiconductors are expected to increase in June, which is in line with the past four months of system sales expectations.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

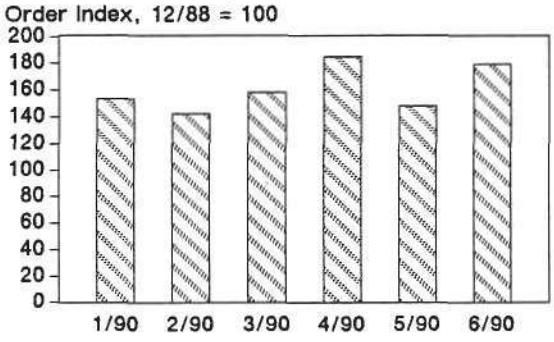



**Figure 2**
**Averaged Semiconductor Lead Times**

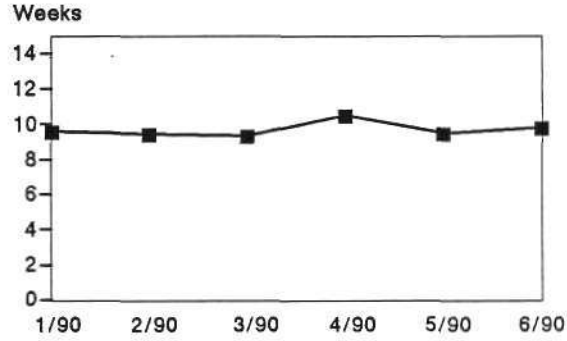



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

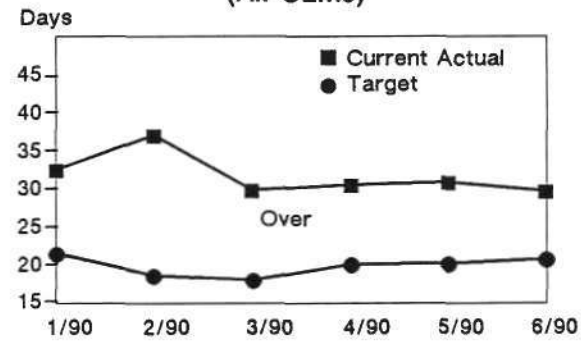
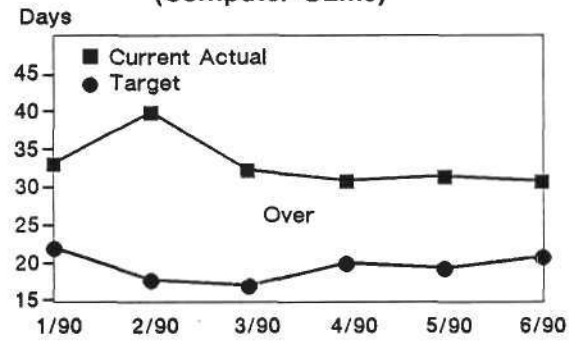



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




Source: Dataquest (June 1990)


NASM Newsletters 1990: April-June 1990-20

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This month's respondents expect to order 20 percent more semiconductors over last month's slight dip in bookings. Over the past six months, order levels have seesawed around the 150 index level (see Figure 1), which indicates that buying patterns have stabilized. The continued optimism of the procurement community regarding system sales is now considered a trend. For an unprecedented four months in a row, the lowest system sales forecast is flat, while the highest forecast indicates a 25 percent increase. The overall average outlook for the next six months has risen from last month's 7.8 percent growth to the current 9.4 percent growth. The upcoming slow summer months again will be a good test of system sales resiliency. As it stands now, the outlook continues to be good.

## LEAD TIMES RISE BY THREE DAYS, BUT AVAILABILITY STILL GOOD

Respondents to this month's survey are seeing lead times stabilize at between 8 to 13 weeks, with an average of 9.9 weeks versus last month's 9.6-week level (see Figure 2). The availability of Intel 32-bit MPUs has begun to ease as capacity increases begin to be seen in the market. Another availability issue is DIP-packaged standard logic, which still has an additional two- to four-week lead time over similar SOIC logic parts. It appears that SOIC capacity has finally surpassed aggregate demand levels at the expense of DIP capacity, while DIP logic demand has remained steady. The continued shift to surface-mount products will resolve this minor irritation. The only other availability problem is the TTL PLD supply crunch, which is still stretching lead times out beyond 16 to 18 weeks for some parts. As mentioned in last month's *Procurement Pulse*, this crunch appears to be a supply problem and not a large increase in aggregate demand. Supplies should begin to improve within 30 to 60 days as wafer-start increases begin to enter the market.

## INVENTORY LEVELS ABOVE TARGET, BUT UNDER CONTROL

As seen in Figures 3 and 4, inventory levels have remained very constant for the past three months. Although targeted levels are not being reached, the overall level of actual inventory on hand hovers at approximately 30 days (currently 29.9 days). This inventory turn rate of 12 (360 days/30 days inventory) is being well managed, allowing for future improvements toward the targeted turn rate of 18 (360 days/20 days targeted). Continued scrutiny of overall costs is keeping both buyers and suppliers in close communication regarding supply requirements and direct inventory levels. Delivery still remains a problem for some users in our survey; it could reduce actual inventory levels further if improved.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Stability in the overall electronics market has been the norm now for the past four months. With electronic system demand in a slow growth mode, the corresponding semiconductor supply (with few exceptions) is meeting demand adequately at reasonable prices. Dataquest believes that the current situation is not a cosmic flaw in an otherwise chaotic business cycle. Rather, the aggregate focus on cost control and the mandatory forecast improvements have resulted in many, if not most, electronics companies keeping material costs down in face of unspectacular sales. The availability of semiconductors continues to improve, based on aggregate available capacity, and demand levels are such that no shortages are foreseen for the rest of 1990. Dataquest anticipates that the continued exchange of accurate forecast information will help make 1990 a relatively healthy year for both the electronics and semiconductor industries in an otherwise flat market.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: SYSTEMS OUTLOOK REMAINS UPBEAT

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

### Computers and Office Equipment

The computer market continued to improve in March. Shipments growth for the three-month period ended in March was 6.3 percent above

**Figure 1**
**Computers and Office Equipment**

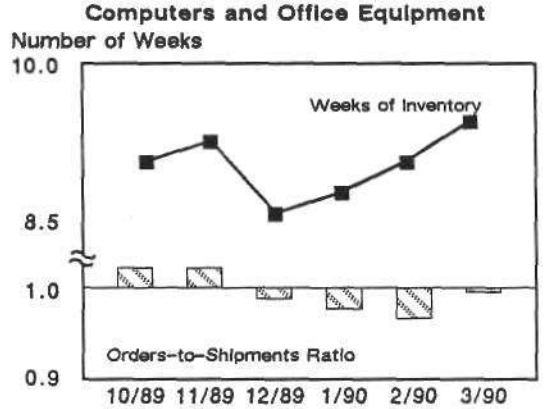



**Figure 2**
**Communications Equipment**

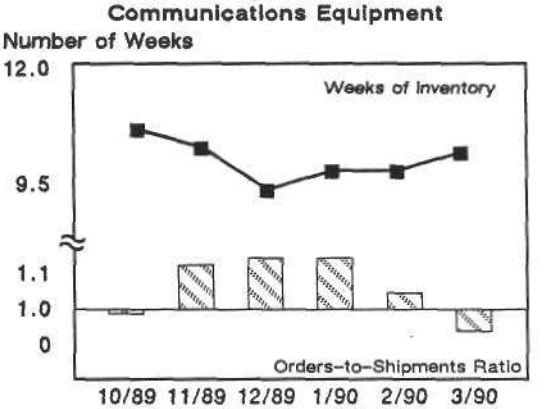



**Figure 3**
**U.S. Instruments**

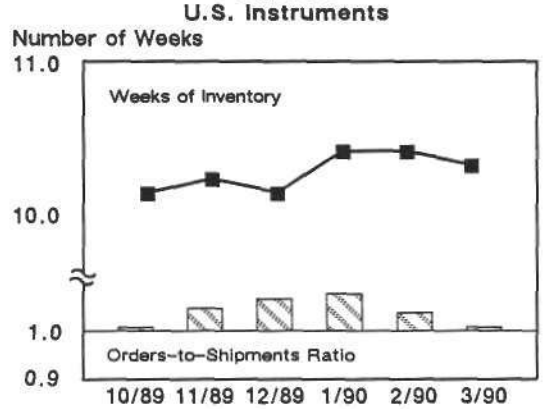
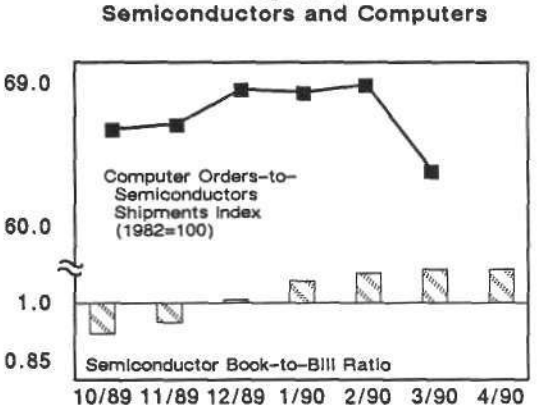



**Figure 4**
**Semiconductors and Computers**

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Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
May 1990


NASM Newsletters 1990: April-June 1990-19

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year-earlier shipments, compared with 6.8 percent in February. Orders growth for the same period was 6.8 percent above year-earlier orders, compared with 6.5 percent in February. Improved market conditions helped turn around the orders-to-shipments ratio, which rose to parity in March after falling for three consecutive months (Figure 1). Inventories continued their seasonal upward movement to 9.5 weeks in March, up from 9.0 weeks in February but still 0.5 weeks below last year's level. During the next several months, Dataquest expects orders growth to stabilize around current rates. However, shipments growth is expected to accelerate in response to the fourth quarter's run-up in orders growth. Growth in computer production already has been felt in the chip market. As production continues to expand, all signals indicate that the chip market should continue to follow suit.

### Communications Equipment

As forecast by Dataquest, orders growth continued to decelerate in March. Orders growth for the three-month period ended in March was only 1.5 percent above year-earlier orders, compared with 10.3 percent in February. Given the unusual run-up in growth late last year, this recent slowdown is more likely to be the result of a return to normalcy from unsustainably high growth than the result of a fundamental change in business conditions. Shipments growth for the three-month period ended in March was 8.9 percent above year-earlier shipments, compared with 9.8 percent in February. As a result of the recent decline in orders growth, the orders-to-shipments ratio (Figure 2) fell for the second consecutive month to 0.94 in March, from 1.05 in February. March inventories were 10.2 weeks, continuing their seasonal upward movement, but nonetheless were 1.4 weeks below year-earlier levels. For the next few months, Dataquest expects orders growth rates to accelerate and then become more sustainable, in the 8 to 10 percent range, while shipments growth should remain relatively stable.

### Instruments

Orders and shipments growth improved significantly in March. Orders growth for the three-month period ended in March was 9.1 percent above year-earlier levels, compared with 6.3 percent in February. Shipments growth for the same period was 5.8 percent above year-earlier levels, compared with 3.7 percent in February. Although the orders-to-shipments ratio (Figure 3) moved down in March to 1.01, from 1.04 in February, March orders and shipments growth acceleration indicates a healthy market. March inventories edged down slightly to 10.3 weeks, from 10.4 weeks in February; they are 0.7 weeks below year-earlier levels. Dataquest believes that recent shipments and orders activity reflects the continuation of a market correction to more sustainable growth rates. The coming months should be marked by relatively stable growth.

## SEMICONDUCTOR DEMAND

The U.S. semiconductor market continued to expand in April, albeit at a meager pace. U.S. market bookings (three-month moving average) rose 1.0 percent in April to $1,279.3 million, while billings rose 0.8 percent in April to $1,172.0 billion. As a result, the U.S. semiconductor market book-to-bill ratio remained 1.09 in April, unchanged from March (Figure 4). Recent stability in DRAM prices and moderate expansion in non-DRAM chip areas likely have contributed to the ratio's recent activity.

As expected, the computer-orders-to-semiconductor-shipments index, a leading indicator of chip orders and shipments, fell significantly in March to 63.7, from 69.1 in February (Figure 4). Dataquest maintains that this decline is more a response to first quarter seasonality in computer orders—which typically trend downward during the first quarter and upward the remainder of the year—than an indication of a contracting market. Computer market fundamentals are sound. So far this year, three-month-ended computer orders have been ahead of last year and accelerating: 4.2 percent in January, 6.5 percent in February, and 6.8 percent in March. Dataquest expects the index to begin its upward trend in April, portending continued expansion in the chip market as the year unfolds.

Dataquest's monthly survey of major OEM semiconductor procurement managers supports this optimism: *Procurement managers' six-month system sales forecast for overall OEMs is 7.8 percent, while computer OEMs expect an 8.0 percent increase through October.*

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

The outlook for U.S. electronic equipment production growth remains upbeat and shows no sign of running out of steam anytime soon. As the expansion matures and the fundamental determinants of growth solidify, variability in month-to-month business activity should lessen, thus adding to the expansion's durability. In turn, on a *unit basis*, the semiconductor market should continue to expand at a moderate rate. On the other hand, because of ASP variability, *revenue growth* is likely to stabilize and decline in selected products. Dataquest continues to advise semiconductor manufacturers not to underestimate the strength of the current expansion. History shows how easily and quickly market share can be lost because of undue pessimistic bias in forecast judgment.

*Terrance A. Birkholz*

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# Research *Bulletin*

## MAY MARKET WATCH: DEMAND REMAINS STEADY WHILE SUPPLIERS FINE-TUNE PRODUCTION LEVELS

*Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill *Flash Report*. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL STABILIZES AT A HEALTHY 1.09

As seen in Figure 1, the April book-to-bill ratio has steadied at a strong 1.09 level. This stability again reinforces the notion that the overall systems business remains steady, with no large

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

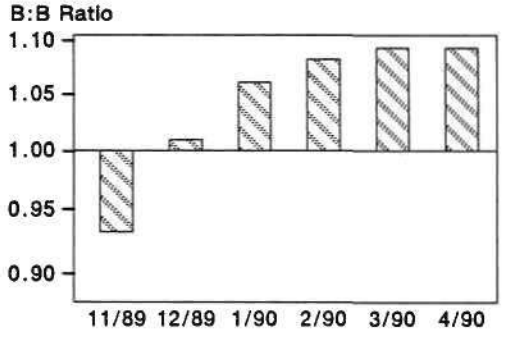



**Figure 2**
**DOC Computer Demand**

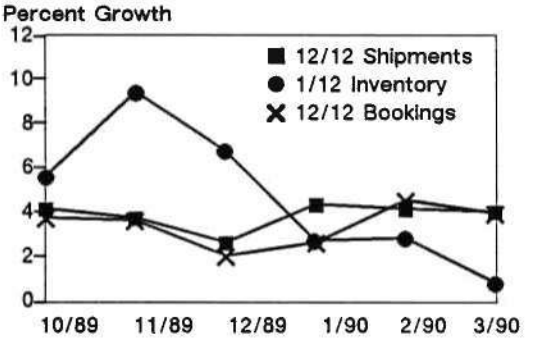



**Figure 3**
**Semiconductor Inventory Level**

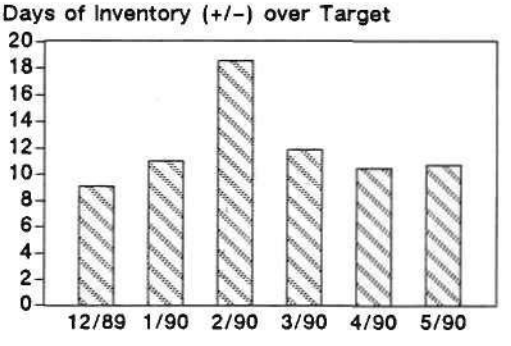
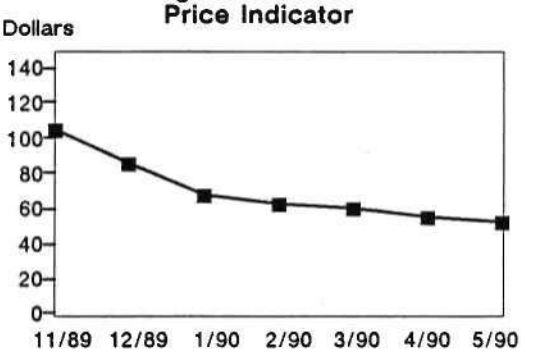



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**

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Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
May 1990


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fluctuations either up or down foreseen. Although April 1990 bookings are 2.7 percent lower than those of April 1989, they are 3.8 percent higher than January 1990 (the last first month of a quarter), signifying continued stable growth. Billings for April 1990 are also higher than for January 1990 by 5.8 percent, reflecting an increase in volume as well as price stabilization that has occurred over the past three months. Dataquest believes that the positive semiconductor business generated in the first four months of this year and the upbeat six-month system sales outlook (see SUIS newsletter number 1990-19, entitled "Bookings and Lead Times Dip, Inventories Remain Unchanged") will keep the book-to-bill ratio positive through the next four months.

## MARCH COMPUTER BOOKINGS AND BILLINGS BALANCED, INVENTORIES DIP

Figure 2 illustrates that both booking and billing 12/12 rates of change for computers in March balanced out at 4.0 percent and 4.1 percent, respectively. The 3/12 bookings rate of 6.8 percent points out that recent bookings continue to outpace annualized rates and indicates continued growth. In addition, system inventory levels relative to last year have fallen, ensuring that replenishments also will stimulate semiconductor order levels. As just-in-time (JIT) philosophies permeate the industry, some of this inventory reduction may become permanent, however. As mentioned last month, these data continue to corroborate our *Procurement Pulse* findings of purchasing managers' positive system sales outlooks. Indicators continue to point to gradual improvements for near-term system and semiconductor markets.

## SEMICONDUCTOR INVENTORIES ALSO STABILIZE

The gap between target and actual semiconductor inventories remained the same as last month because of unchanged aggregate levels this month (see Figure 3). The continued emphasis on cost control is forcing inventory control. This management of inventory levels is dependent on good communication between suppliers and users, and the current controllable inventory level (still 12 turns/year) is evidence that good working relations pay off on the bottom line. No matter how good communication is now, users still require suppliers to continue working on delivery performance improvement to increase the inventory turns ratio.

## PRICES CONTINUE TO DECLINE GRADUALLY

The combination of DRAM production controls, 32-bit MPU demand increases, and now PLD allocations has not stopped the gradual price erosion shown in Figure 4. Memory prices have continued to decline slowly despite the efforts of major Japanese manufacturers to match supplies with demand. Both DRAM and SRAM prices continue to slip as non-Japanese competitors and some second-tier manufacturers vie for market share increases. Aside from the Intel 32-bit MPU world, 8- and 16-bit microprocessors are being marketed aggressively with some 80286-12 products going for under $10! Although currently there is some lengthening of PLD lead times, supplies should soon increase to meet the unanticipated quick upturn in demand. Dataquest expects overall prices to continue to decelerate slowly or at most remain the same over the next few months. We expect some suppliers to continue trying to gain market share via price reduction in the face of relatively steady demand.

## DATAQUEST CONCLUSIONS

Both users and suppliers continue to closely watch the very steady electronics market for any signs of change (either up or down) that would require changes in procurement plans. As of now, forecast information and semiconductor supplies are adequate to match a predictable, if unspectacular, electronics market. Although there is always room for improvement in the art of forecasting, those that are achieving three- to six-month forecasts as accurately as possible are consistently keeping their overall inventories and costs lower than average. Dataquest expects current tight supplies of some key devices to improve, beginning next month, in response to production decisions made last month. We believe that these increases in supply combined with accurate forecasts will continue to lower overall inventory costs.

*Mark Giudici*

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# Research *Bulletin*

## MAY PROCUREMENT PULSE: BOOKINGS AND LEAD TIMES DIP, INVENTORIES REMAIN UNCHANGED

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDER RATES DIP, YET SYSTEM SALES OUTLOOK STILL UPBEAT

Although this month's respondents expect to order approximately 24 percent fewer semiconductors in May than in April (see Figure 1), the system

**Figure 1**
**Averaged Monthly Semiconductor Orders**

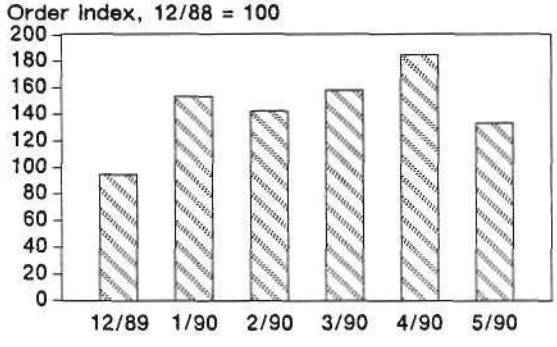



**Figure 2**
**Averaged Semiconductor Lead Times**

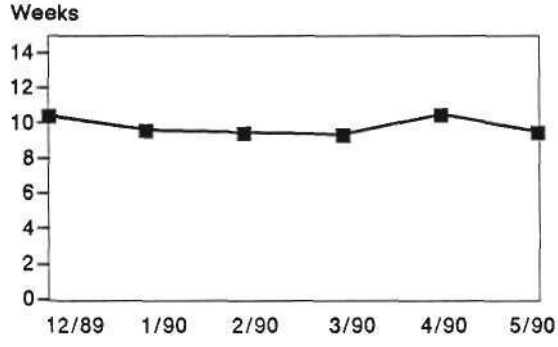



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

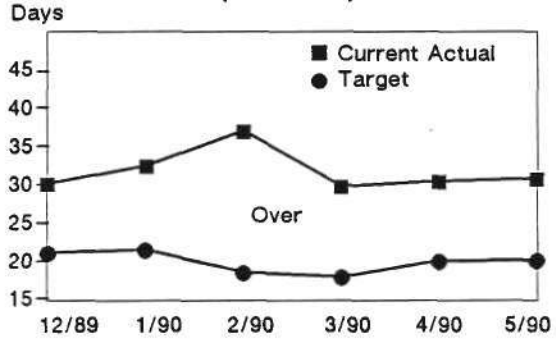
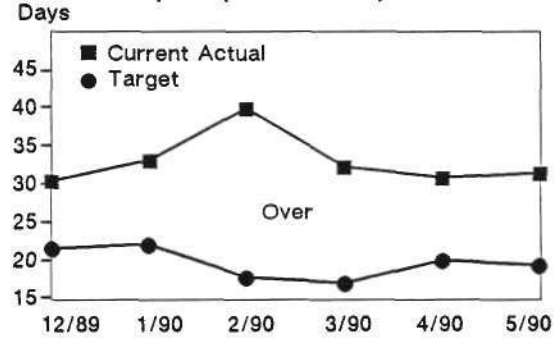



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**

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Source: Dataquest
May 1990


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sales outlook for the next six months remains positive. Procurement managers' six-month system sales forecast for overall OEMs is 7.8 percent, while computer OEMs will have an 8.0 percent increase through October. In addition to the positive forecast, last month's system sales rose by 4.2 percent overall, while computer OEMs had a 6.4 percent sales increase. The continued stability in semiconductor supplies relative to consistent demand is resulting in a very manageable (on the verge of routine) procurement situation. This type of market is written about in textbooks but seldom lasts—all participants are carefully watching every indicator for any sign of change. For now, the "cautious optimism" cliché is apropos.

## AVAILABILITY CURRENTLY GOOD AND GETTING BETTER: SOIC LOGIC HAS SHORTER LEAD TIMES THAN SIMILAR DIP PRODUCT!

Overall lead times continue to be a very manageable 9.6 weeks, as shown in Figure 2. Some products still have long (over 14 weeks) lead times, including Intel 32-bit MPUs, some DIP standard logic products, and, new to the list, TTL PLDs. The availability of the 386SX and -DX parts will begin to improve by mid-June as Intel's production ramp-up begins to reach the market. Standard logic surface-mount capacity appears to have met pent-up demand, yet DIP demand continues to remain steady, straining the reduced capacity of overall DIP products. The net result is that SOIC logic lead times are 2 to 4 weeks shorter than comparable DIP lead times. As the trend of user demand for SMT increases, this short-term imbalance is expected to be corrected in 4 to 10 weeks. The PLD allocation situation (with lead times as long as 20 weeks for some high-speed parts) is not due to any large increase in demand. AMD's recent sale of its San Antonio, Texas, fab to Sony and selected consolidation of some older MMI fabs has decreased some of the worldwide PLD capacity, but not to the extent of causing threefold increases in lead times. Although prices have not yet risen appreciably, we will be closely watching the developments of this situation.

## INVENTORY LEVELS STABILIZE

The reductions of targeted and actual inventory levels accomplished over the past two months appear to be stabilizing in line with reduced order rates and steady system demand. As seen in Figures 3 and 4, the overall level of targeted versus actual inventories (20.3 days versus 31.0 days, respectively) and computer OEM target (19.6 days) versus actual (31.7 days) inventory levels illustrates the continued difficulty in reaching an inventory goal of less than 30 days. If DRAMs are removed from the inventory count, there is less than one day's difference to these figures in targeted versus actual inventory levels. This fact emphasizes that DRAM availability is good and continues to be well managed. Lead-time improvement and on-time delivery remain issues that need attention, according to this and last month's respondents. As these two areas improve, the chasm between actual and target inventory levels will continue to shrink.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

The continued stability of the overall systems market provides procurement managers the opportunity to manage both material costs and inventory levels because of the absence of any major "fire-fighting" problems. The user need for improved lead times and scheduled deliveries points out that although the market is running smoothly, it is not the time to become complacent. Most, if not all, indicators show ready availability of ICs through the summer and fall months. Barring any large upswing in demand, this market will allow users to cement good business relationships with their suppliers and also let superior suppliers stand out.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: "HE WHO HESITATES, LOSES"

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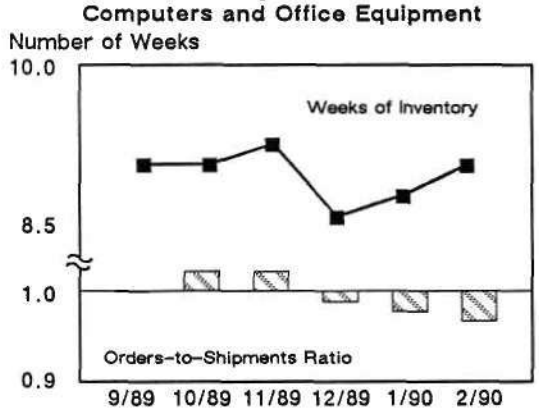


Figure 2
Communications Equipment

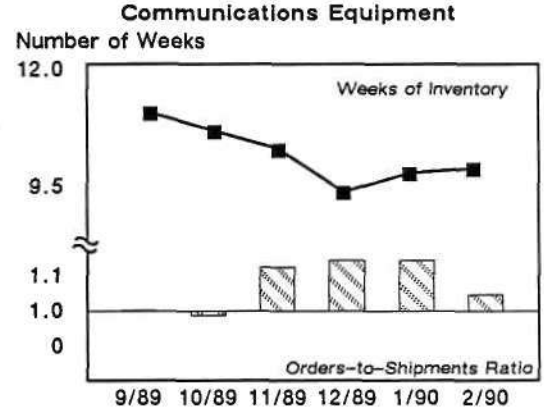


Figure 3
U.S. Instruments

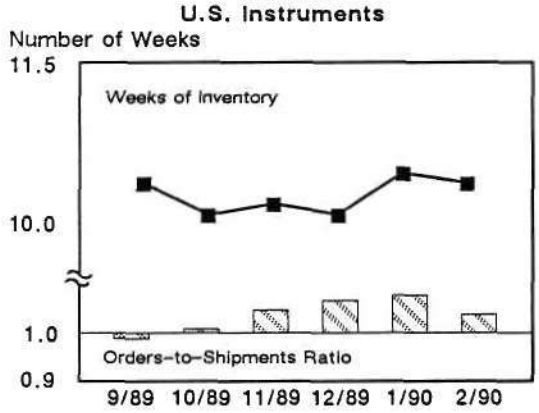


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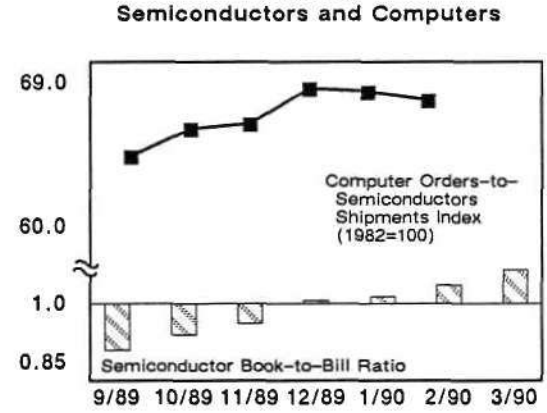
Figure 4
Semiconductors and Computers




Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
April 1990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year-earlier shipments, compared with 4.2 percent in January. Orders growth for the same period was 6.3 percent above year-earlier orders, compared with 4.2 percent in January. Furthermore, February shipments and orders were 9.5 percent and 14.1 percent, respectively, above year-earlier levels. *The year-long deceleration in trend growth that shipments experienced during 1989 appears to have turned the corner.* The orders-to-shipments ratio (Figure 1) fell for the third consecutive month and has been below parity for as many months. However, in view of the recent positive showing in growth, the ratio's decline can be dismissed as a temporary aberration of the data: Because of variations in growth rates, the dollar value of orders recently has overtaken the dollar value of shipments. Inventories edged up 0.3 weeks to 9.1 weeks in February; but they are probably close to target, given that they're nonetheless 0.4 weeks below last year's level. Dataquest sees nothing on the horizon that should reverse the current upswing in growth. This upswing will bode well for the chip industry, which should experience a similar demand-driven upturn soon, if it hasn't already.

## Communications Equipment

As we projected in last month's *SAMonitor*, orders growth has slowed and the shipments growth pace has begun to accelerate. Orders growth for the three-month period ended in February was 11.1 percent above year-earlier orders, compared with 17.5 percent in January. February's decline in growth is more likely a return to slower, sustainable growth than an indication of a coming trend in further deceleration. Shipments growth for the three-month period ended in February was 10.5 percent above year-earlier shipments, compared with 6.4 percent in January. Most likely, the jump in shipments growth is due to a similar jump in orders growth during the fourth quarter of last year. Business conditions are positive, so February's 0.1 decline in the orders-to-shipments ratio (Figure 2) to 1.05 is probably only transitory and, like orders, a return to normalcy. Inventory levels edged up to 9.9 weeks; nevertheless, they are 1.10 weeks below year-earlier levels. During the next few months, Dataquest expects orders growth rates to stabilize in the 8.0 to 10.0 percent range, while shipments growth should remain relatively brisk and then subside to high single-digit rates.

## Instruments

Growth remained healthy and positive in February but has decelerated since the vigorous showing in the fourth quarter. Orders growth for the three-month period ended in February was 6.1 percent above year-earlier levels, compared with 7.6 percent in January. Shipments growth for the same period was 3.6 percent above year-earlier levels, compared with 5.7 percent in January and 6.0 percent in December. The orders-to-shipments ratio (Figure 3) moved down to 1.04 in February, from 1.08 in January. Inventories edged down slightly to 10.4 weeks, about 0.4 weeks below year-earlier stocks. Dataquest believes that recent shipments and orders activity reflects a market correction to slower growth rather than a trend toward further deceleration. The coming months should be marked by relatively stable growth.

## SEMICONDUCTOR DEMAND

The U.S. semiconductor market expanded in March, following a minor contraction in February. U.S. market bookings (three-month moving average) rose 5.4 percent in February to $1.267 billion, while February billings rose 1.7 percent to $1.163 billion. As a result, the U.S. semiconductor market book-to-bill ratio increased to 1.09 in March from February's 1.05 (Figure 4). *This ratio is the highest since July 1988, when it reached 1.10.* Recent stability in DRAM prices probably contributed to the ratio's boost in March.

The computer-orders-to-semiconductor-shipments index, a leading indicator of chip orders and shipments, fell slightly to 68.0 in February, from 68.5 in January (Figure 4). Dataquest believes that this decline is a result of first quarter seasonality in computer orders rather than an indication of a declining market: Monthly orders typically show a declining trend during the first quarter but a rising trend during the remainder of the year. For the three-month period ended in February, average computer orders fell 3.1 percent from January, while average semiconductor shipments for the same period declined 2.4 percent. *More important, though, is that computer orders are 14.1 percent above year-earlier orders.* Although seasonality may push the index down in March, Dataquest expects the computer orders, and therefore the index, to continue on an upward trend in the second quarter, portending continued expansion in the chip market as the year unfolds.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

U.S. electronic equipment production is in the midst of a nascent expansion that shows no sign of reversal any time soon. As the expansion matures, the fundamentals of growth should solidify and add to the expansion's durability and stability. In turn, the semiconductor market has begun to turn the corner, albeit modestly. Caution is natural—even warranted—when markets enter emerging stages of growth. But Dataquest also cautions semiconductor manufacturers not to underestimate the strength of the coming expansion. Indeed, to be caught by surprise could entail nothing less than the loss of future market share.

*Terrance A. Birkholz*

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# Research *Bulletin*

## APRIL MARKET WATCH: DEMAND PICKS UP WHILE OVERALL SUPPLIES CURRENTLY KEEP UP WITH THE PACE

*Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill *Flash Report*. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

### THE BOOK-TO-BILL JUMPS HIGHER THAN EXPECTED

The March book-to-bill ratio jumped up to 1.09 (see Figure 1), which reflects a combination of quarter-end business and price firming in memories

Figure 1
U.S. Semiconductor Book-to-Bill Ratio

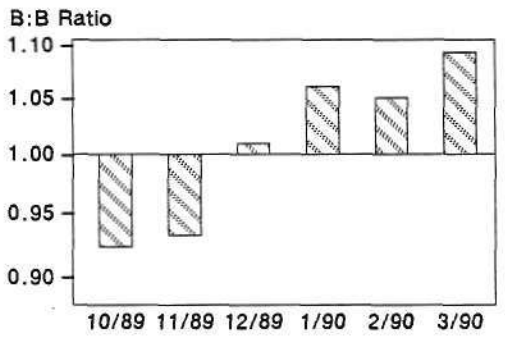



Figure 2
DOC Computer Demand

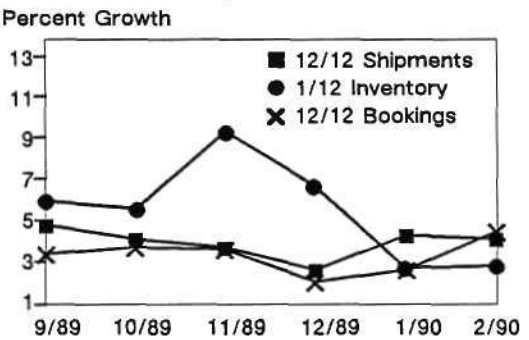



Figure 3
Semiconductor Inventory Level

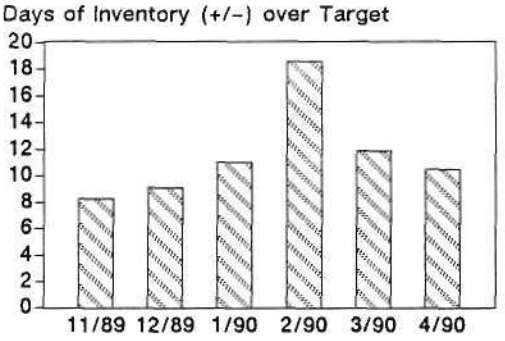
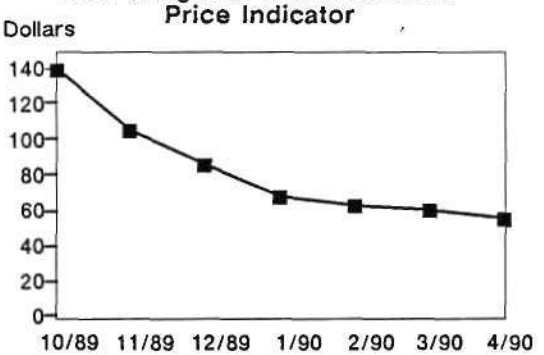



Figure 4
U.S. Weighted Semiconductor Price Indicator

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Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
April 1990


NASM Newsletters 1990: April-June 1990-15

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as mentioned last month. March 1990's bookings (3.2 percent) and billings (5.9 percent) show an upturn relative to the last five-week month, which was December 1989. However, compared with one year ago (March 1989), bookings are up only 0.2 percent and billings are down 5.3 percent. Prices for many product families (e.g., some volatile memories, standard logic, 32-bit microprocessors) continue to stabilize, a fact that is contributing to the higher bookings level in dollars, yet the volume in units remains fairly flat. Because of the three- to four-month delay in any market effect based on any supply changes made now, Dataquest expects the book-to-bill to continue to remain positive for the upcoming three- to six-month time frame.

## FEBRUARY COMPUTER DEMAND AND INVENTORY STABILIZE WHILE BOOKINGS PICK UP

As shown in Figure 2, the latest DOC computer shipment and inventory rates have remained flat relative to last month, while the annualized bookings rate has risen slightly. These data correlate with the Dataquest *Procurement Pulse* surveys that also have shown optimism in the computer shipment outlook. What is *important to note here is that the bookings rate (4.6 percent) finally has risen above the shipments rate (4.2 percent) for the first time since April 1988!* The last time the 12/12 bookings curve crossed over the 12/12 billings curve was in January 1987, when it continued to pull shipment rates up for the next 21 months. The gradual and steady nature of the 12/12 rate analysis ensures that overall computer business will improve; the question is, for how long? At this point, Dataquest does not foresee any large help or hindrance that would alter this gradual, positive trend for the remainder of 1990.

## SEMICONDUCTOR INVENTORIES FALL FURTHER

The gap between target and actual semiconductor inventory levels again has declined, as shown in Figure 3. Besides the target/actual variance reduction, the absolute levels for both have remained relatively static. With inventory at low and controllable levels (12 turns per year), the communications between semiconductor suppliers and users that are necessary to maintain this momentum are being made. Continued emphasis on cost control will keep pressure on inventory levels even as systems business picks up.

## PRICE REDUCTIONS CONTINUE AT A S-L-O-W-E-R RATE

Figure 4 shows the continued reduction in overall price based on our biweekly survey in *The DQ Monday Report.* To better reflect changes in market demand, Dataquest changes this report's product mix on a periodic basis. This month's price curve reflects the updated product mix of historical pricing for the existing *DQ Monday Report* product mix. Because of the relatively flat pricing for 32-bit MPUs, DRAMs, and standard logic, the overall price decline curve has flattened and, as mentioned last month, will continue to remain flat due to production corrections for these product families that were implemented in the first quarter of this year. As demand picks up in the equipment arena, suppliers will want clear signs that it is sustainable. Some suppliers will continue to take advantage of the current price stability by trying to gain market share via price cuts. We forecast continued price stabilization through June, but aggressive suppliers will keep the price reduction train on track thereafter.

## DATAQUEST CONCLUSIONS

The unspectacular yet positive market dynamics train that currently is keeping bookings, shipments, and inventory levels manageable continues to roll along. Demand for computers and systems in general appears to be rising slowly relative to the past, and component supplies currently are managing to meet this recent uptick. Barring any overt market control scheme (either government or consortia devised), suppliers of critical semiconductors will manage to meet demand once the average three-month fabrication cycle begins. A very competitive market still exists for key semiconductors, and the suppliers involved in no way want their constraints to benefit their competitors. The combination of a competitive market and users continuing to provide constant, accurate six-month rolling forecasts will allow strategically astute suppliers to meet this demand and grow with the end markets.

*Mark Giudici*

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# Research *Bulletin*

## APRIL PROCUREMENT PULSE: BOOKINGS AND LEAD TIMES RISE, WHILE INVENTORIES TUMBLE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

### SEMICONDUCTOR ORDER RATES ACCELERATE WHILE SALES OUTLOOK REMAINS ROSY

This month's survey respondents expect to book an average of 17 percent more semiconductors this month over last month because past forecasts in system sales have turned into orders

**Figure 1**
**Averaged Monthly Semiconductor Orders**

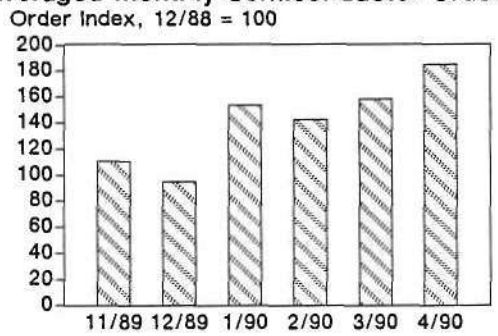



**Figure 2**
**Averaged Semiconductor Lead Times**

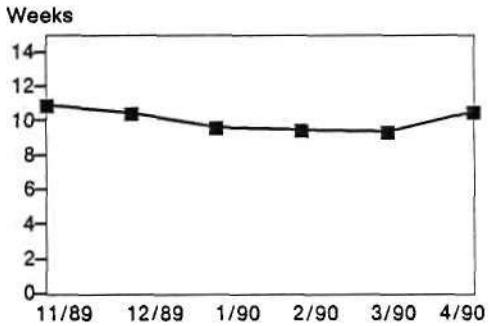



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

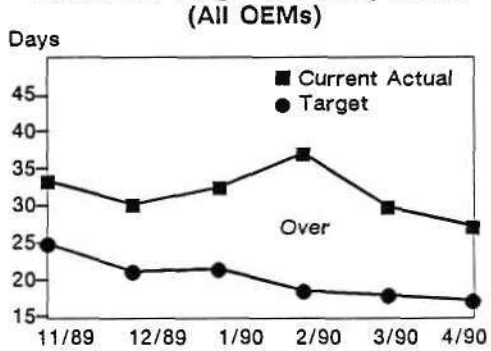
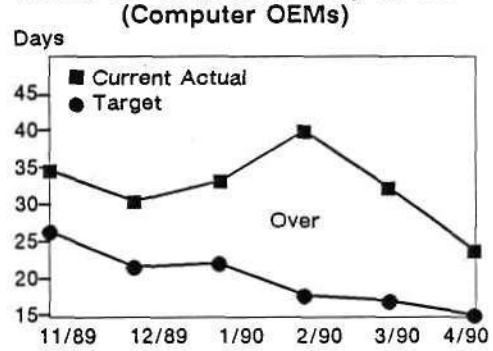



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**

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Source: Dataquest
April 1990


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that are now being built and shipped. As seen in Figure 1, the semiconductor booking rate of the past three months has been relatively steady yet higher than the previous three months. Coinciding with this procurement activity is an overall system sales forecast that continued to rise from 6.0 percent in January to the 9.1 percent recorded this month. The outlook for computer OEMs is brighter than last month, with expected sales of 8.9 percent over the next six months compared with a similar outlook of 7.4 percent that was taken in our last survey. The overall market dynamics that provide stability from which consistent, predictable procurement plans can be implemented are in place.

## OVERALL AVAILABILITY REMAINS MANAGEABLE; SOIC LOGIC AND 32-BIT MPU SUPPLIES STILL TIGHT

Figure 2 shows a slight uptick in lead times over last month's level (10.6 weeks versus 9.5 weeks). This upturn was mainly due to the continued shortage of SMT standard logic devices, Intel 32-bit microprocessors, and, to a lesser extent, some high-speed DRAM products. Customers under contract note little or no impact to increased lead times that now are affecting the spot market. Improvement in the supply of SMT logic has taken awhile but is expected to occur by midyear. Intel expects to increase shipments of the 386SX and DX parts by midyear to meet pent-up demand. The reason given for delaying increased supplies (e.g., expenditure) has been to see whether or not demand for SOIC logic would be sustained. Dataquest believes that the Motorola-Hitachi patent snafu that temporarily sent shock waves through the 68030 user base will be quickly resolved out of court. Supplies for these critical parts should not be hampered by legalities.

## BOTH TARGET AND ACTUAL INVENTORY LEVELS ARE REDUCED

In light of stable system demand and overall reliable supplies of semiconductors, users have lowered both targeted and actual levels of inventories this month relative to last month's poll (overall levels are 17.4 versus 27.4 days, and computer OEM levels are 15.3 versus 24.1 days, respectively). If DRAMs are taken out of the inventory equation, inventory targets and actuals turn out to be overall at 16.7 and 24.2 days and computer OEMs at 14.6 and 20.3 days, respectively. This fact emphasizes that DRAM inventories are healthy, and shortage fears are unfounded. As seen in Figures 3 and 4, there has been a steady improvement in inventory control over the past six months if February's results are disregarded. This progress is partly because of improved communications and implied trust between suppliers and users and the overriding issue of cost control. One of the main concerns that arose in this month's responses was the need for improvement on delivery commitments. On-time delivery, which is the number one user issue as noted in our annual procurement survey, apparently still requires additional attention by suppliers.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Dataquest believes that the perception of stability in the systems and components markets is allowing procurement managers to improve their forecasting and internal cost-control mechanisms. Implicit in this control is increased dependency on key suppliers by users that require fine-tuned deliveries that are on time. With a few isolated exceptions, overall pricing continues to decline; however, not at the pace seen in the first quarter of this year. As users shift their focus to supplier performance to keep their own costs down, suppliers must strive to maintain this level of confidence by meeting customer needs to the letter. We do not expect any major semiconductor supply disruptions in the next six to nine months, which provides an opportunity for users to hone their inventory and cost-control skills and judge their semiconductor supply base.

*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: COMPUTER ORDERS AND SHIPMENTS IMPROVE...*MODESTLY*

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

#### Computers and Office Equipment

The computer market showed some signs of *modest* improvement in January. Shipments growth for the three-month period that ended in January

Figure 1
Computers and Office Equipment

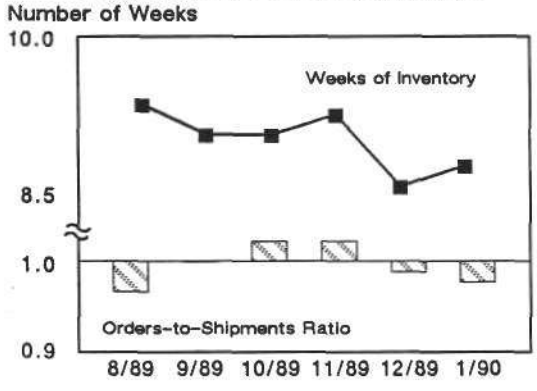



Figure 2
Communications Equipment

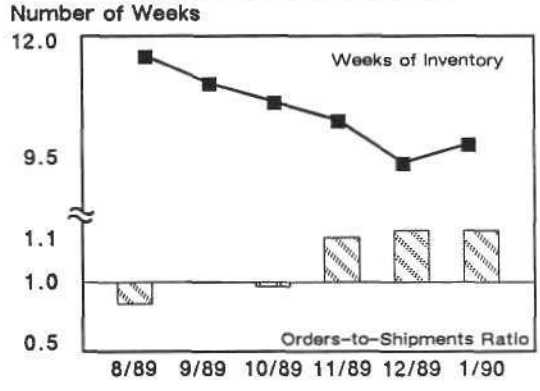



Figure 3
U.S. Instruments

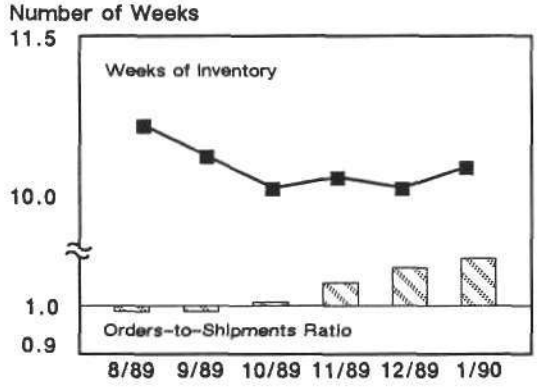
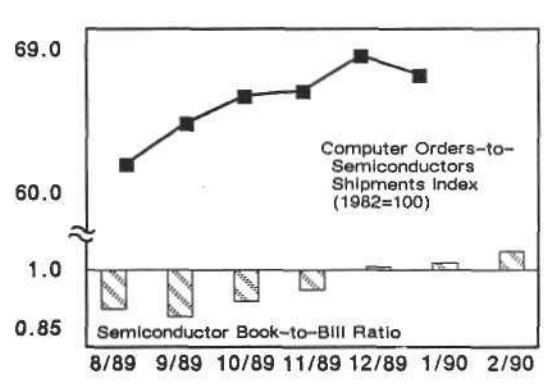



Figure 4
Semiconductors and Computers

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Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
March 1990


NASM Newsletters 1990: January-March 1990-13

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were 4.7 percent above year-earlier levels, compared with 1.8 percent in December. *This is good news: It may mean the end of the year-long deceleration in trend growth that shipments experienced during 1989. Furthermore, December shipments growth has been revised upward from a previously reported negative 0.3.* January orders growth was 4.5 percent above year-earlier orders, compared with 4.4 percent in December. The orders-to-shipments ratio (Figure 1) fell slightly from 0.99 in December to 0.98 in January. Although this is the second consecutive month that the ratio has been below parity, such a slight decrease is probably merely a random dip. Inventories edged up slightly to 8.8 weeks in January from 8.6 weeks in December, but they should be no problem as long as levels don't continue to rise in coming months. For the time being, the quickening pace in recent months' orders growth has halted the decline in shipments growth. Dataquest expects shipments growth to continue at a modest pace during the coming months.

## Communications Equipment

Communications market business conditions continue to improve. The orders-to-shipments ratio (Figure 2) remained at 1.15 in January. Orders growth for the three-month period ending in January was 17.5 percent above year-earlier levels, compared with 17.2 percent in December. Shipments growth for the same period was 6.4 percent above year-earlier levels, compared with 6.5 percent in December. Inventory levels edged up slightly to 9.8 weeks in January from 9.4 weeks in December, at least partly in response to improved business conditions. With orders growth rates running more than twice the shipments growth rates and a minimal amount of finished goods in manufacturers' inventories, Dataquest expects orders growth to stabilize during the next several months and shipments growth to accelerate, narrowing the growth-rate gap.

## Instruments

The instruments market is marked by continued improvement also. The orders-to-shipments ratio (Figure 3) moved up again in January to 1.10 from 1.08 in December. Orders growth for the three-month period ending in January was 10.1 percent above year-earlier levels, compared with 7.7 percent in December. Shipments growth for the same period was 6.7 percent above year-earlier levels, compared with 6.6 in December. Inventories edged up slightly from 10.1 weeks to 10.3 weeks in January. As in the communications market, with orders growth outpacing shipments growth and inventories remaining well managed, we expect shipments growth to pick up in the coming months and orders growth to moderate.

## SEMICONDUCTOR DEMAND

The U.S. semiconductor market book-to-bill ratio increased to 1.05 in February from January's 1.03 (see Figure 4). The ratio's increase, however, is a result of the *value* of billings falling *faster* than bookings: U.S. market bookings (three-month moving average) fell 1.0 percent in February to $1,202.2 million, while February average billings fell 4.2 percent to $1,143.4 million. This shrinkage probably is due to the recent decline in DRAM ASPs rather than to changes in unit volume. Indeed, Dataquest's estimate of the weighted average of U.S. semiconductor prices fell 7.2 percent in February, continuing a trend that began last year. The weighted-average price rose 1.8 percent during the first week in March, however, reflecting recent stabilization in DRAM prices. The next few months' book-to-bill ratio could get a boost if prices remain stable, which is likely, and unit volumes continue to increase.

For the three-month period ending in January, average computer orders fell 2.4 percent from December and average semiconductor shipments for the same period declined 4.3 percent. As a result, the computer-orders-to-semiconductor-shipments index, a leading indicator of chip orders and shipments, fell slightly to 67.5 in January from 68.7 in December (see Figure 4). More important, however, is the fact that the index has been rising since March 1989, so February's decrease is probably of minor consequence. Dataquest expects the index to continue on its upward trend during the coming months, in turn indicating continued expansion in the chip market.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Recent expansion in North American equipment markets portends commensurate growth in semiconductor *unit* shipments. But recent downward price pressure—particularly with respect to DRAM prices—has biased overall expansion in the *value* of the market. (In 1989, MOS memories accounted for 34 percent of total North American semiconductor consumption, thus explaining a sizable portion of its total variability.) In light of this, Dataquest recommends that equipment and semiconductor manufacturers pay close attention to equipment orders and shipments growth rates and to the *non*memory portion of the semiconductor market in order to formulate an unbiased expectation of business activity for the rest of 1990.

*Terrance Birkholz*

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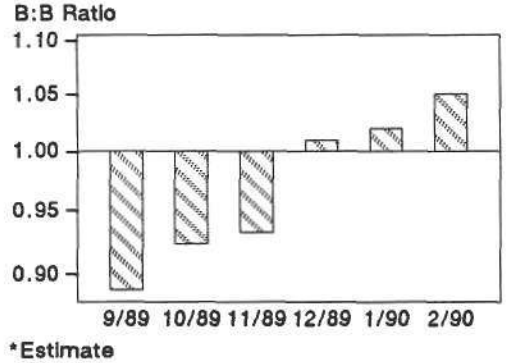
# Research *Bulletin*

## MARCH MARKET WATCH: THE MARKET KEEPS SLOWLY CHUGGING ALONG

*Market Watch* is a monthly Dataquest bulletin that is released after the SIA book-to-bill *Flash Report*. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**




*Estimate

**Figure 2**
**DOC Computer Demand**

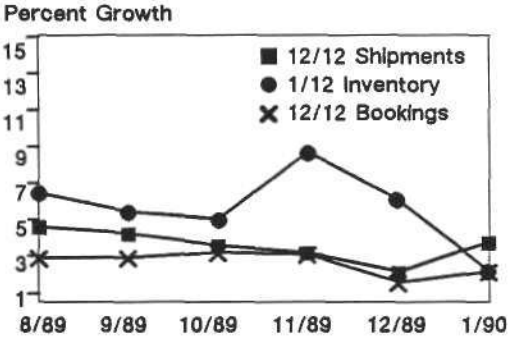



**Figure 3**
**Semiconductor Inventory Level**

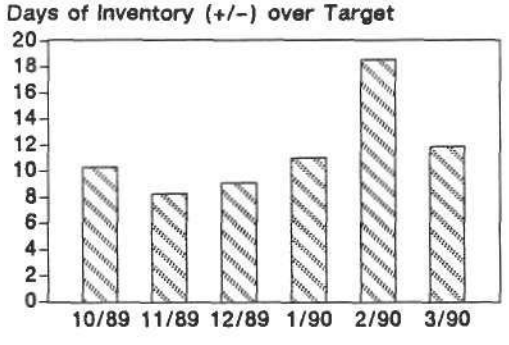
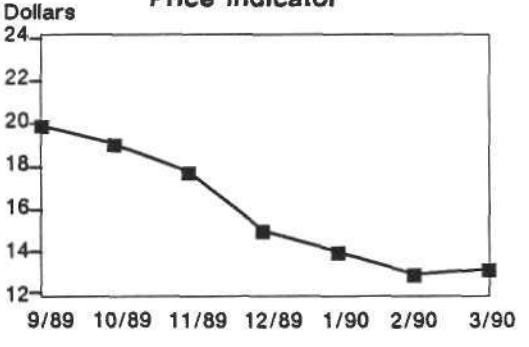



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**

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Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
March 1990

Source: Dataquest
March 1990


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## THE BOOK-TO-BILL CONTINUES TO RISE

The February book-to-bill ratio of 1.05 (see Figure 1) appears on the surface to bode well for the semiconductor industry, but the actual numbers tell a different story. For the last two months, both three-month average bookings and billings have declined in dollar terms. In effect, the billings dollar average has declined faster than the bookings average! This phenomenon primarily is due to the last five months' price erosion, which now is being felt as billings. The volume of units still remains steady, and there are signs of unit growth in the upcoming months. With the recent stabilization in memory prices, bookings dollars should rise faster even if unit shipments remain flat.

## JANUARY COMPUTER DEMAND STABLE, BUT INVENTORIES PLUMMET

The bookings and shipments of computers have remained relatively flat, but system inventories have dropped substantially (see Figure 2). The 3/12 booking rate-of-change indicator is still rising faster than the annualized 12/12 rate (4.5 percent versus 2.7 percent). This early indicator of annualized growth reflects what buyers have been saying in our monthly procurement surveys (see the *Procurement Pulse* bulletins). What is encouraging is the trend of inventory rates relative to shipment and bookings rates. For the first time in eight months, the 1/12 inventory rate is equal to the annualized bookings rate for computers. Inventory control of both systems and components is allowing for quicker response time to the needs of the market.

## SEMICONDUCTOR INVENTORIES OF USERS ALSO FALL

The reduced gap in actual versus targeted inventory levels dipped this month, as shown in Figure 3, even though targeted inventory levels declined slightly. The bulge of semiconductor inventories in February was worked down by increasing system shipments and slowing some order levels. The importance of inventory control was emphasized by the reduction of average inventories by more than one week in a month's time (30.0 days versus 37.3 days). This fairly brisk 12 turns of inventory per year is a reminder to semiconductor suppliers that low inventories continue to require very close communication between buyer and seller.

## PRICES ON AVERAGE ACTUALLY CREEP UPWARD!

Semiconductor supplies in aggregate have at last come into balance with demand; the price indicator has risen $0.24 since our last analysis (see Figure 4). DRAM production cutbacks announced late last year are being felt now as anticipated. Coinciding with the memory supply situation is the Intel 32-bit microprocessor supply hiccup that has stretched lead times out to 18 weeks and flattened steady price reductions. Intel expects to meet demand within three months, but the DRAM supply is dependent on how well users forecast their next six to nine months of requirements and how well suppliers meet that demand. It will take three months to see a trend change in the market once any uptick in demand is acted upon with increased wafer starts. Therefore, until at least June, Dataquest expects to see stable prices while system demand remains flat.

## DATAQUEST CONCLUSIONS

The overall market continues to bump along with steady but unspectacular demand, and suppliers have cut supplies to match this unexciting goal. Inventories of both systems and components are under control and are expected to remain so for the near future as a result of the close communication most suppliers have with their key customers. We continue to see positive outlooks coming from our monthly procurement surveys, concurring with the historical Department of Commerce trend lines. Now that supply has slowed and met demand, Dataquest believes that the test is whether or not users can accurately forecast their *real* six month needs and whether or not suppliers can meet this test. Overall cost levels for 1990 hang on the results of this exercise.

*Mark Giudici*

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# Research *Bulletin*

## MARCH PROCUREMENT PULSE: BOOKINGS AND SALES OUTLOOK STEADY; INVENTORIES, LEAD TIMES, PRICES DECLINE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

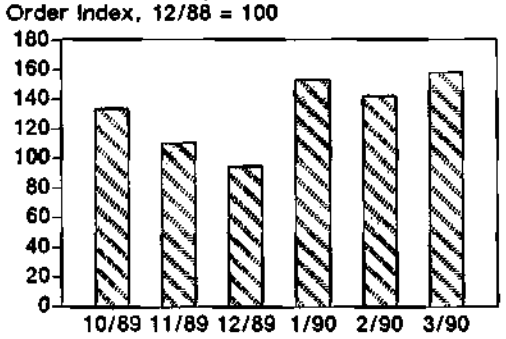



**Figure 2**
**Averaged Semiconductor Lead Times**

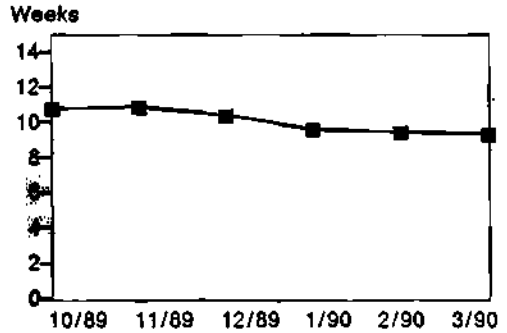



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

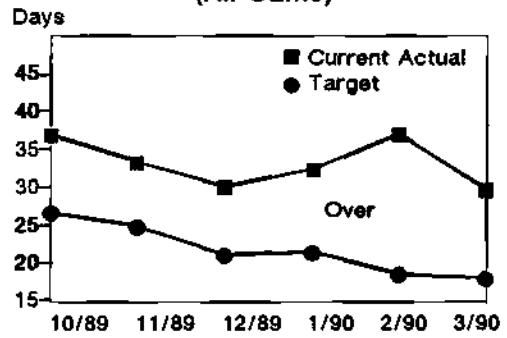
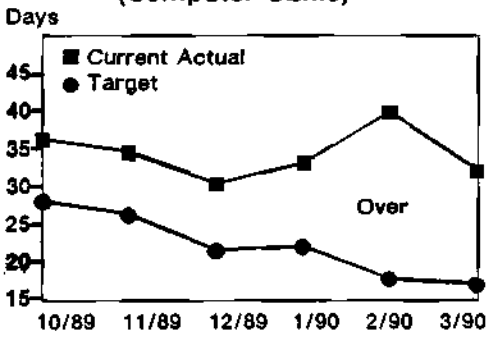



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**

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Source: Dataquest March 1990


NASM Newsletters 1990: January-March 1990-11

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Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

## SEMICONDUCTOR ORDER RATES STABILIZE, MATCHING SYSTEM SALES EXPECTATIONS

This month's respondents expect to balance a forecast increase in system sales with slightly higher semiconductor order levels. This increase in orders is being tempered by the slight bulge in inventories that existed last month. Figure 1 shows that since January there has been a steady, higher level of order rates, which was partly due to the replenishment of exhausted inventory but primarily was in response to higher system sales. The overall sales outlook continues to increase in optimism, going from a six-month forecast of 6.0 percent in January to 7.2 percent in February and resulting in a current 9.5 percent outlook for March. The respective outlook for the computer company respondents is positive, but it has stabilized slightly—January at 5.8 percent, February at 8.2 percent, and March at 7.4 percent. For the second consecutive month, no respondents anticipated negative sales during the next six months (the range remains from a flat growth rate to positive 20 percent). Combined with current sales of 2.3 percent over last year's levels seen for the whole sample, the steady optimistic sales outlook for the next six months allows for manageable component forecasting.

## AVAILABILITY REMAINS GOOD WITH ISOLATED POCKETS OF LENGTHY LEAD TIMES

The overall availability of semiconductors remains excellent, as seen in Figure 2, with overall lead times now running at 9.5 weeks. The only smudge in an otherwise clear picture is the continued lengthy lead times for SOIC standard logic and 80386SX products. Currently, there is *much furor* over *rumored DRAM shortages* and the availability outlook for the next three to six months. As stated in last December's *Procurement Pulse*, the production cutbacks that were set then would most likely affect the spot market in February, which did happen. Spot pricing and lead times have risen slightly, but *contractual orders* continue to *receive priority* by all DRAM suppliers. Users should place top priority on *accurate and frequent forecasting* for the next six to nine months to ensure adequate memory supplies.

## INVENTORY TARGETS STABILIZE WHILE ACTUAL LEVELS FALL

Actual inventory levels have fallen in aggregate, as seen in Figures 3 and 4. Cost control programs that are religion in most companies continue to ensure that inventory costs remain manageable. A relatively bright sales outlook is allowing order rates to remain up while concurrent inventory reduction programs continue. The overall targeted inventory levels declined less than a day for both the overall and computer OEM samples, down to 18.1 and 17.2 days, respectively. The large drop in actual inventories for overall and computer OEMs resulted in levels of 30.0 and 32.5 days on hand, respectively. This drop results in an average reduction of more than a week of inventory in one month! If DRAMs are taken out of the actual inventory equation, the results are 27.8 and 29.2 days for the overall and computer samples, respectively. This fact implies that *user DRAM inventories are adequate* and negates the need for a panic-buy psychology that could cause supply shortages.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Stable semiconductor order rates and the low-key optimism forecast in system sales continue to provide optimum conditions for predictable supply cost forecasts. Dataquest has heard that some system companies are shirking the responsibility of forecasting DRAM requirements on a regular basis, preferring instead to take opportunistic pricing on short notice. With DRAM supplies remaining stable for the next three to six months and system demand appearing to increase, it is imperative that users communicate their short- and long-term supply needs on a regular basis. What applies to memory also is key for other critical components—for instance, 32-bit microprocessors and SOIC logic parts also require constant focus. Product pricing remains steady and in many cases continues to decline. Lead times for most products remain within eight weeks. Suppliers that are unsure of demand often opt for the safe course of the status quo. In times of incremental demand increase, staying with the status quo can result in shortages. Frequent, accurate forecasts will allow for the current supply situation to continue.

*Mark Giudici*

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# Research Newsletter

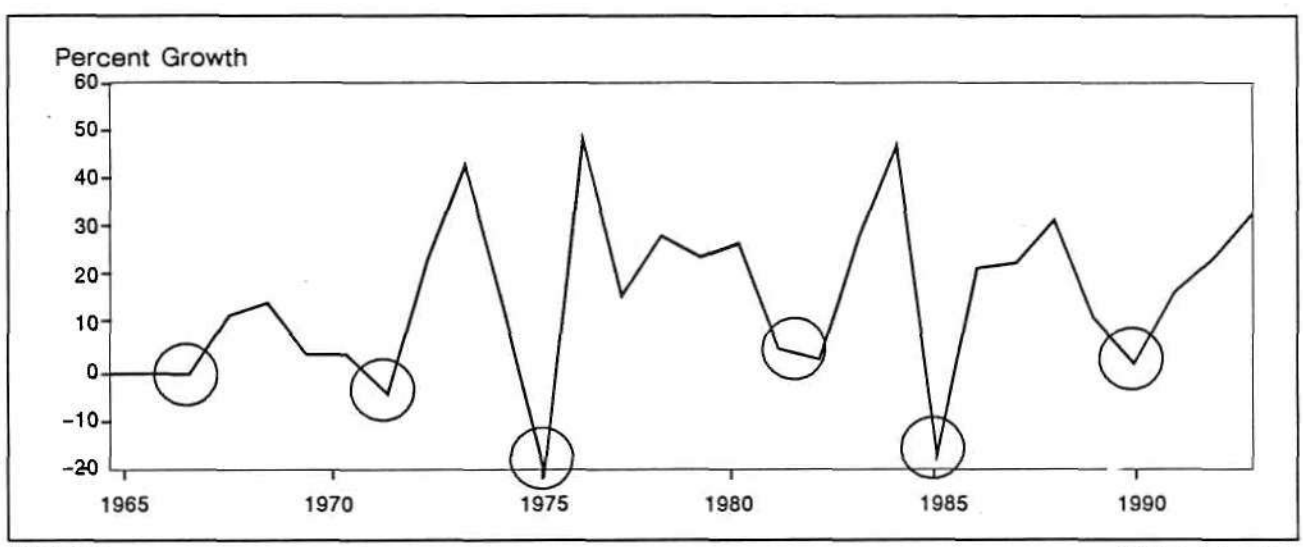
## TRUE OR FALSE: USER-SUPPLIER RELATIONSHIPS TO CHANGE IN THE 1990s?

*Strategic partnering* was proposed in the early 1980s to describe how semiconductor customers and suppliers should conduct business with each other. But when the industry had a severe downturn in 1985, suppliers scrambled after every deal, and prices fell through the floor. When the industry finally had a mild boom in 1988, buyers chased after every available part, DRAM shortages developed, and spot-market lead times and prices went through the roof. Then in 1989, DRAMs became plentiful again and prices fell to record lows.

Is *strategic partnering* the solution to reducing the wild swings (see Figure 1) that have occurred in the semiconductor industry during the past 25 years? Buyers and sellers had a chance to find out at Dataquest's annual conference for semiconductor users and suppliers, held again this year in San Francisco, California. The more than 180 attendees to the two-day February conference included buyers (45 percent), sellers (40 percent), and persons from government agencies, investment firms, and the trade press (15 percent). Eleven of the top 15 North American users (e.g., those that purchased more than $7 billion of semiconductors in 1989) were represented, along with delegates from 13 of the top 15 worldwide semiconductor suppliers.

This newsletter summarizes the conference by discussing the changes affecting the semiconductor

**FIGURE 1**
**Estimated Worldwide Semiconductor Industry Revenue**
**(Would Closer User-Supplier Relationships Reduce the Swings?)**

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industry today, ways in which Dataquest clients can seize opportunities while hedging the downside, industry forecasts for the 1990s, and Dataquest's second annual "Semiconductor Supplier of the Year" award.

## CHANGES AFFECTING THE INDUSTRY TODAY

The worldwide electronics industry continues to evolve, and developments in microelectronics show no signs of slowing down. Regions and technology are the two major areas of change affecting the industry today.

### Regions

A supplier with headquarters located in one world region must deal effectively with customers located in different world regions. "(Having) resident experts in foreign countries is the key to success," explained Linn Nelson, executive vice president and cofounder of Barnel International. "To be global means to act local," echoed Kevin McGarity, senior vice president and manager of worldwide marketing for Texas Instruments' Semiconductor Group.

Distributors will either decline or prosper in the 1990s as the electronics industry becomes more global in scope. It all depends on whether or not distribution channels can adapt to changing needs such as VLSI/ULSI and customer-specific products. "Distribution must skate to where the puck will be," urged Charles Clough, president and chief executive officer of Wyle Laboratories, "if U.S. distributors are to increase the competitiveness of American equipment manufacturers and maximize the marketing efficiency of American semiconductor manufacturers."

What should a U.S. or Asian semiconductor supplier do to be competitive in the European Community? "Learn how to communicate," replied Jean-Pierre Melia, member of the board of Fiat Semelco and purchasing director of its Magneti Marelli France division. True buyer-supplier partnerships are important for risk sharing, forecasting, and long-term commitment, with technical cooperation preserving mutual interest during booms and crises. "The European electronics industry *believes* in 1992, European industry *is* restructuring now, and new opportunities *exist* beyond 1992," predicted London-based Jim Eastlake, senior industry analyst for Dataquest's European Semiconductor Industry Service.

### Technology

The high R&D food chain of specification through design is collapsing as semiconductor companies focus on implementing systems with application-specific standard products (ASSPs). "System and semiconductor companies are coming together," stated John Rizzo, vice president of marketing for Momenta Corporation.

During 1989, 1Mb DRAMs went from shortages in the first half, to oversupply and multitier pricing in the third quarter, to production cutbacks and severe price erosion in the fourth quarter. The 4Mb DRAM is expected to have an unusually difficult market introduction in 1990. "The rules for memory ICs have not changed; each cycle is just different," concluded Fred Jones, associate director of Dataquest's Semiconductor Industry Service and manager of the Memory segment.

ASICs are integrated circuits that are dedicated to a single user. One type of ASIC, the MOS gate array, will have an increase in usage of 25 percent between 1984 and 1994. "ASICs allow a shorter time to market for a greater total product revenue," reported Jerry Banks, senior industry analyst for Dataquest's Semiconductor Industry Service. Mixed-mode ASICs, which combine both digital and analog circuits on the same IC, allow a reduction in the number of ICs in the equipment and reduce the problems of interconnection between ICs while optimizing circuit operation. "Users must learn about mixed-signal ASICs and suppliers must learn to specialize in markets and applications for this segment of ASICs to maximize its potential," advised Gary Grandbois, senior industry analyst for Dataquest's Semiconductor Industry Service.

## SEIZING OPPORTUNITIES WHILE HEDGING THE DOWNSIDE

Change brings uncertainty, which creates risk. The industry can hedge risk by specializing in a segment of the electronics manufacturing cycle, forming closer user-supplier relationships, and exploring the possibility of a futures market for key electronic components.

### Specializing

Greater product complexity and new market and product needs have led to specialized markets and products, which in turn have led to innovations such as fabless semiconductor companies.

Executives now have a greater choice in organizing an enterprise to serve a market, and customers benefit from the better service. "Semiconductor companies in 1990 are based on either technology, specialized products and technology, or design," summarized Michael Canning, vice president of manufacturing for fabless Cirrus Logic.

## Relationships

What's in store for the 1990s is the sharing of problems to develop joint solutions users and suppliers need to form partnerships for R&D, applications, design, process, and applications success. "Do what the customer wants when he wants it done," recommended Charles Thompson, senior vice president and director of world marketing for Motorola's Semiconductor Products Sector.

Japanese semiconductor companies assimilate the local culture and business practices when they form a subsidiary in a foreign country because their customers demand it. "U.S. equipment manufacturers want to be treated the same all over the world and at the same time treated as a Japanese equipment manufacturer would be treated in Japan," revealed Robert Brown, senior vice president of semiconductor operations for Toshiba America Electronic Components. "Global service issues include early access to new technology, technical assistance, logistic support, local manufacturing, flexibility, and quality products."

The automotive industry is sometimes cited as a role model for the electronics industry because of close relationships between the users and suppliers of automotive assemblies. "Improved supplier responsiveness is (a) win/win (situation)," proclaimed Gene Richter, executive director of corporate procurement for Hewlett-Packard. Mr. Richter's newness to data processing electronics—he has been in this field for 18 months—enables him to evaluate the issues of the day with the objective eye of an outsider. Based on more than a decade of experience in the industrial and automotive sectors (with Black and Decker and Ford Motor Company), he challenged suppliers to pay more attention to fundamentals (e.g., planning, communicating, measuring, and follow-up) and to upgrade sales organizations (e.g., more resources, more training, more clout, and more global in scope).

Users today expect minimal inventory, guaranteed lead times, and a reduced vendor base. Sole-sourced components, however, still make users nervous unless they have formed a mutually dependent partnership with a supplier. A supplier, in turn, can use this opportunity to provide a total cost and value analysis for the user. To keep sole-source suppliers honest, Frank Gill, senior vice president of sales for Intel, reminded the audience that "a socket may be sole-sourced, but the electronic function is not."

Multichip modules are packages with two or more VLSI die, which make it possible to build higher-performance systems. Many technical and business challenges still face this new but promising idea. "Relationships between single IC suppliers, system houses, and strong package suppliers are required," recommended Dr. William Steingrandt, director of product development and marketing for Alcoa Electronic Packaging.

## Futures

DRAM price volatility, coupled with its commodity nature, suggests futures as a familiar risk-management tool for modern business. "A DRAM is a small sliver of highly refined sand," explained Hoon Won, chief executive officer of Memory Clearing Corporation, "and can be traded like any other commodity." If the DRAM futures market does become a reality in upcoming months, it would be regulated by the Commodity Futures Trading Commission.

# INDUSTRY FORECASTS FOR THE 1990s

Every year at this conference, Dataquest forecasts markets, applications, and prices for the upcoming year and the next five years. Dataquest and The Dun & Bradstreet Corporation presented these latest forecasts.

## Markets

The U.S. economy is going global in the 1990s because of structural changes taking place in the international economy. "Real GNP for the U.S. economy is expected to grow only 2.4 percent in 1990 and 3.4 percent in 1991," summarized Joseph Duncan, vice president, corporate economist, and chief statistician for The Dun & Bradstreet Corporation.

The U.S. equipment industry is healthy with an orders-to-shipments ratio at parity or greater and an equipment inventory that is being well managed. "Worldwide electronic equipment production is expected to grow 5.4 percent in 1990, 7.3 percent

in 1991, and 8.6 percent in 1992," predicted Terrance Birkholz, research analyst for Dataquest's Semiconductor User and Applications Group.

Although equipment production increases each year at a steady 5 to 10 percent, semiconductor production swings between negative 20 and positive 50 percent (see Figure 1). "The semiconductor industry pauses every five years to catch its breath," concluded Hal Feeney, group vice president and director of Dataquest's Components Group. The industry is projected to grow at a compound annual growth rate (CAGR) of 18 percent between 1990 and 1994 (see Figure 2).

In every region of the world, offshore semiconductor manufacturers are becoming local producers. "The next five years will continue the trends of new sources and regions. There will be adequate capacity," predicted George Burns, industry analyst for Dataquest's Semiconductor Equipment and Materials Service. Because of the effects of trade policies and subsidies, however, the possibility of overcapacity in 1995 looms on the horizon.

Costs, not availability, are the overall key issues among users this year. "Top user issues in 1990 include on-time delivery, pricing, and cost control," summarized Mark Giudici, product manager and senior industry analyst for Dataquest's Semiconductor User and Applications Group. Overall, respondents to Dataquest's annual purchasing survey plan to have a 9.6 percent semiconductor purchasing growth in 1990, with medium-size semiconductor companies the most optimistic about growth. However, "survey respondents expect 1990 growth to be at almost half that of 1989," reported Carolyn Doles, industry analyst for Dataquest's Central Research Group, which supports the Components Group.

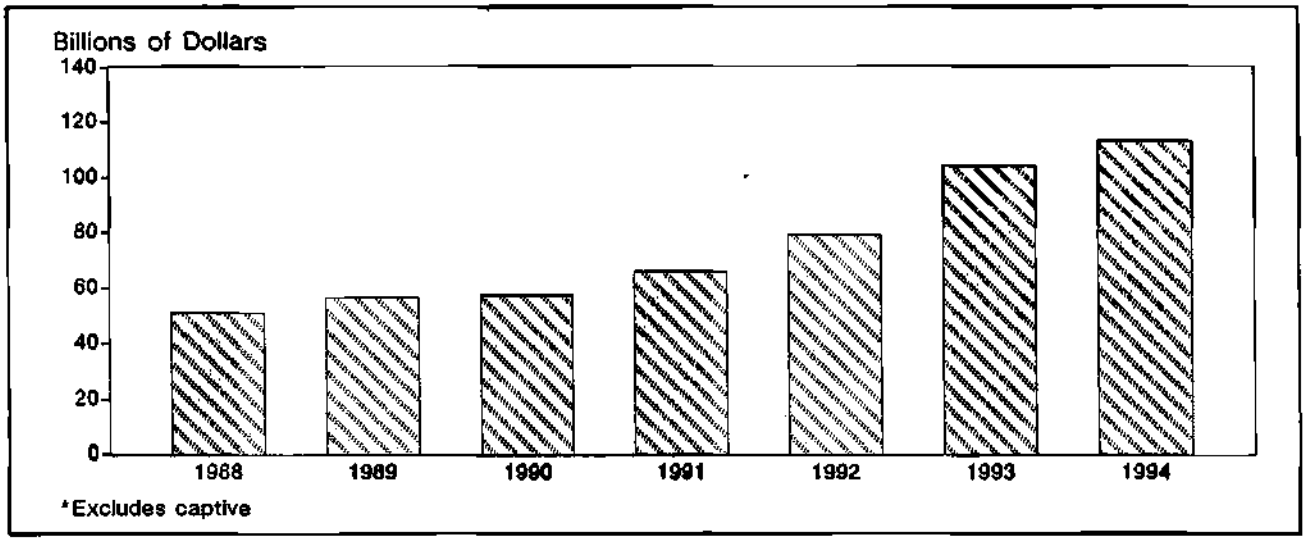
## Applications

Multimedia PCs are expected to have a major impact on semiconductor demand by 1994. Between now and then, however, semiconductor companies have to keep their lines filled with wafers if they want to remain in business. "Market drivers for 1990 include 386-based PCs, workstations, rigid drives, LANs, laser printers, and facsimile machines," explained Kevin Landis, industry analyst for Dataquest's Semiconductor User and Applications Group.

## Prices

The sticker shock of higher-priced, sole-sourced ICs is mitigated by high value. "Develop pricing and procurement strategies based on the system cost impact and keep close to manufacturers' activities and production plans," advised Greg Sheppard, senior industry analyst in Dataquest's Semiconductor User and Applications Group. Microprocessor, memory, and ASIC prices are expected to continue to decline in 1990 and 1991. (The estimated worldwide 1Mb DRAM

FIGURE 2
Worldwide Semiconductor Industry Revenue Forecast*

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Source: Dataquest
March 1990

pricing for 1987 to 1990 by quarter is presented in Figure 3.) "The crossover from 1Mb DRAMs to 4Mb DRAMs is expected to occur as early as the fourth quarter of 1990," predicted Ron Bohn, industry analyst for Dataquest's Semiconductor User and Applications Group.

## SEMICONDUCTOR SUPPLIER OF THE YEAR AWARD

For the second consecutive year, Motorola's Semiconductor Products Sector was the recipient of Dataquest's annual "Semiconductor Supplier of the Year" award. Charles Thompson, senior vice president and director of marketing for Motorola's Semiconductor Products Sector, accepted the award from Gene Norrett, corporate vice president and general manager of Dataquest's Technology Information Division and Hal Feeney, group vice president and director of Dataquest's Components Group (see Figure 4).

The award is based on an annual Dataquest survey of more than 800 procurement site personnel representing the top 200 U.S. electronics companies that use semiconductors. Those surveyed were asked to rate semiconductor suppliers in the following five areas: quality, on-time delivery, pricing, technical support, and customer service. Motorola received the highest overall rating, with Texas Instruments ranking second, National Semiconductor third, Hamilton-Avnet fourth, and Intel fifth.

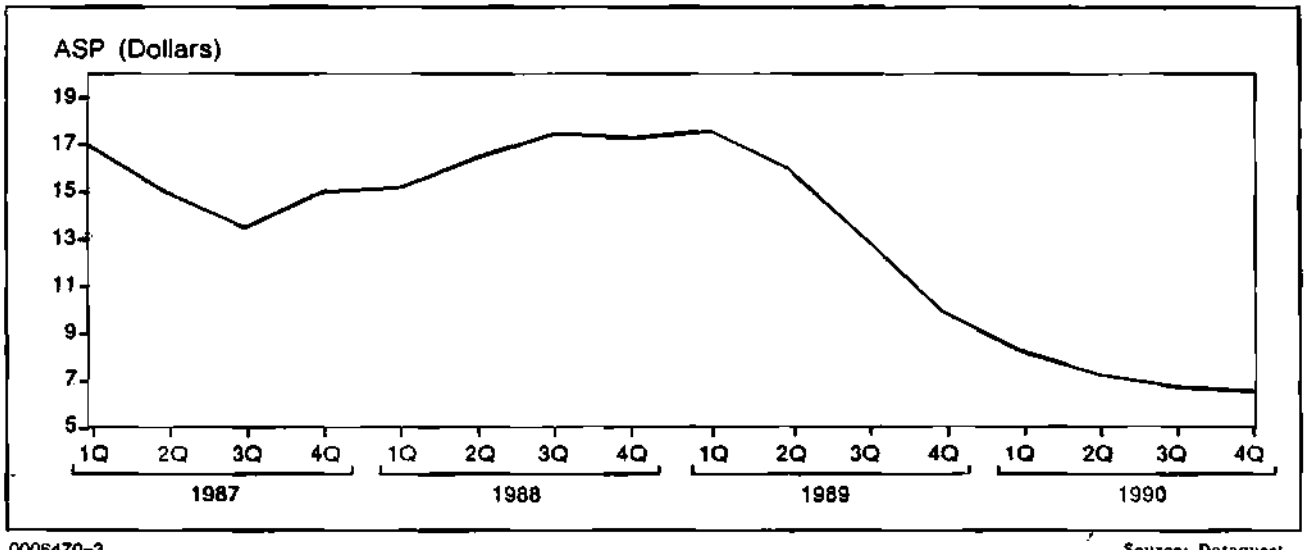
## DATAQUEST ANALYSIS

### Conclusions

Dataquest concludes that user-supplier relationships will indeed change for the better in the 1990s. We believe that the adversary attitudes of users and suppliers helped cause the wild swings experienced by the industry in the past 25 years (see Figure 1). Practices reflecting such attitudes as "they got us last time, so we'll get them this time" must give way to partnerlike cooperation because the fates of users and suppliers are becoming more tightly linked than ever before.

The conference did provide a forum to discuss changes that currently are under way in world regions and semiconductor technology, as well as how these changes are likely to affect users and suppliers. For example, the stakes in microelectronics are rising, with state-of-the-art fabs expected to cost as much as $1 billion by the year 2000. No supplier would ever make such an investment without first establishing that markets exist for the production, because the cost of an error is just too great—that is why users must share their technology and purchasing needs with suppliers. Likewise, no user would ever jeopardize its equipment business by depending on components that are inappropriate or unavailable for its needs—that is why suppliers must share their technology and capacity plans with users.

FIGURE 3
Estimated Worldwide 1Mb DRAM Pricing
Quarterly: 1987-1990

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Source: Dataquest
March 1990

FIGURE 4
**Second Annual Semiconductor Supplier of the Year Award (left to right) Gene Norrett, Charles Thompson, Hal Feeney**

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Source: Dataquest March 1990

## Recommendations

Dataquest recommends that clients watch component market developments closely if they want to stay ahead. For that purpose, Dataquest publishes monthly reports such as the following:

- *Market Watch*—A bulletin released after the SIA book-to-bill *Flash Report* to give deeper insight into the monthly trends in the semiconductor market and an analysis of what is expected during the following six months
- *OEM Monthly*—To provide insight into application markets so that Dataquest clients can make better strategic and technical marketing decisions
- *Procurement Pulse*—An update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers
- *SAMonitor*—An update that closely monitors changes in key electronic equipment markets

We also recommend that field and factory personnel have a basic understanding of electronics since this technology has become pervasive. For example, if a company has people who define CMOS (pronounced "SEA-moss") as green plants that grow on rocks at the beach rather than a semiconductor technology that offers high density and low power consumption, that company may consider implementing a training course at its facility.

*Roger Steciak*

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# Research Newsletter

## REGIONAL REPORT: ANNUAL SURVEY

### SUMMARY

Results of the Fifth Annual Dataquest Semiconductor User Survey were presented at Dataquest's Semiconductor User and Applications Conference held in San Francisco, California, on February 12 and 13. The three key findings were as follows:

- Respondents expect to increase their 1990 semiconductor purchases by 9.6 percent.
- Medium-size semiconductor users are the most optimistic about growth opportunities in 1990.
- The top three issues are on-time delivery, price, and cost control.

This newsletter summarizes the presentation and highlights the key findings of this survey.

### METHODOLOGY

As in the past, Dataquest used the *Electronic Business* Top 200 company listings as a basis for the survey. We removed the sample companies that made or distributed semiconductors or software to ensure that we dealt with potential semiconductor users. This reduction brought our sample down to 188 companies. From this base, we surveyed by telephone 882 procurement sites of these companies and received 324 responses (37 percent). As seen in Figure 1, the majority (53.7 percent) of the respondents were from the Pacific and Northeast regions because of the larger concentration of technology manufacturing in those areas.

Table 1 shows the total respondent breakdown by application segment.

The military/areospace segment had the highest percentage in terms of response, partly because of the higher average selling prices (ASPs) relative to commercially priced semiconductors. The purchasing power of the 1989 sample represented 26.4 percent of total U.S. merchant shipments and is forecast to rise to 28.8 percent of the U.S. total in 1990.

### SEMICONDUCTOR USER OUTLOOK

#### User Expectations

More than one-half (51.5 percent) of the respondents expect to have higher system sales in 1990. This figure, combined with 33.6 percent of those expecting flat sales, adds to a healthy total of 85.1 percent of the respondents that expect steady-to-increased sales this year. Mirroring this optimism in system sales, the respondents expect to purchase 9.6 percent more semiconductors in 1990 than in 1989. Relative to the past forecasts, this less-than-10 percent increase is historically conservative. Compared with semiconductor supplier forecasts that we have seen, this is an optimistic forecast in an otherwise flat market. Since the survey was taken, many large system companies have announced lower growth expectations, but our monthly survey data to date still show steady growth outlooks from the purchasing managers and mixed outlooks from the supplier community.

The brightest outlook for procurement growth is coming from midsize data processing and military/aerospace companies. The data processing respondents foresee higher growth opportunities in the high-end PC/workstation market and positive growth in the high-density storage and add-on memory board sectors of the industry. Countering common wisdom, midsize military/aerospace companies expect to see higher-than-average purchases this year due to the clear status of many key programs. Last year, these programs had uncertain futures because of budget cuts. The programs that


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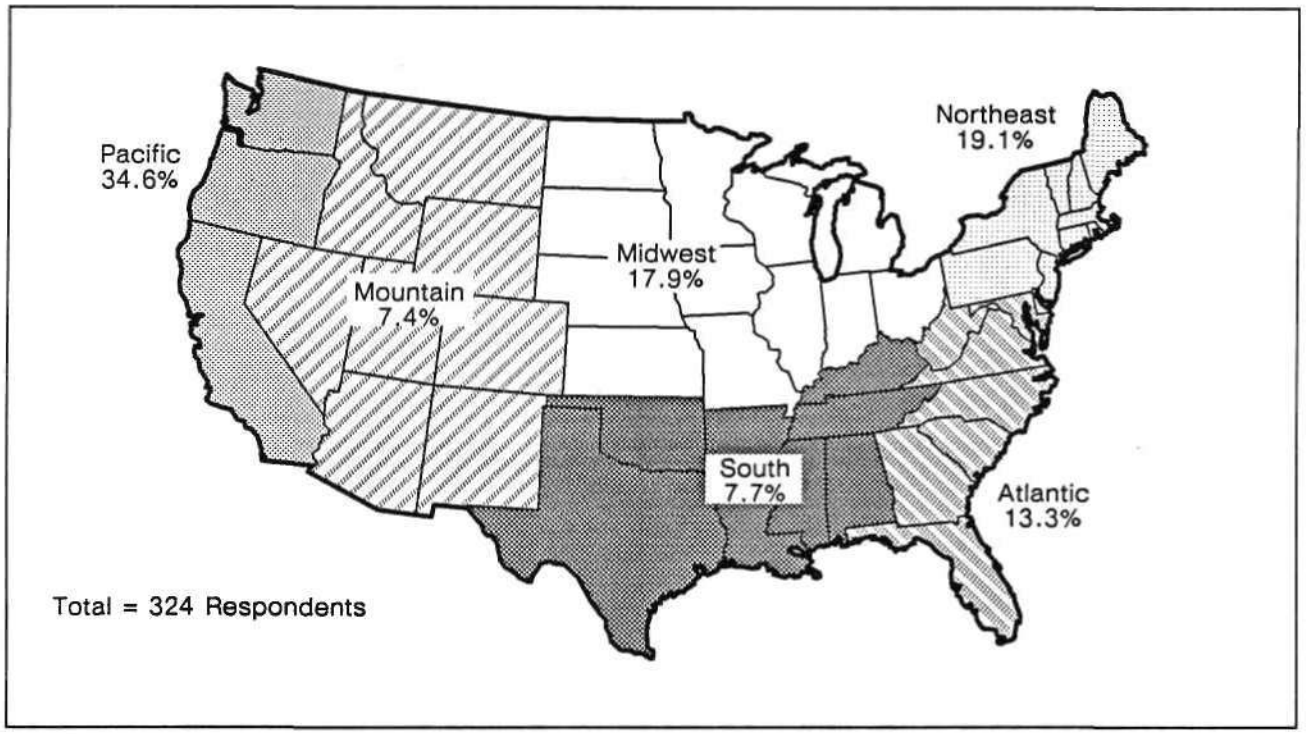
FIGURE 1
**Procurement Survey Audience**

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Source: Dataquest
March 1990

TABLE 1
**1989 Survey Respondents' Purchasing Dollars**

| | |
|---|---|
| Military/Aerospace | 35.6% |
| Industrial | 23.9 |
| Communications | 17.9 |
| Data Processing | 12.8 |
| Consumer | 8.1 |
| Transportation | 1.7 |
| Total | 100.0% |

Source: Dataquest
March 1990

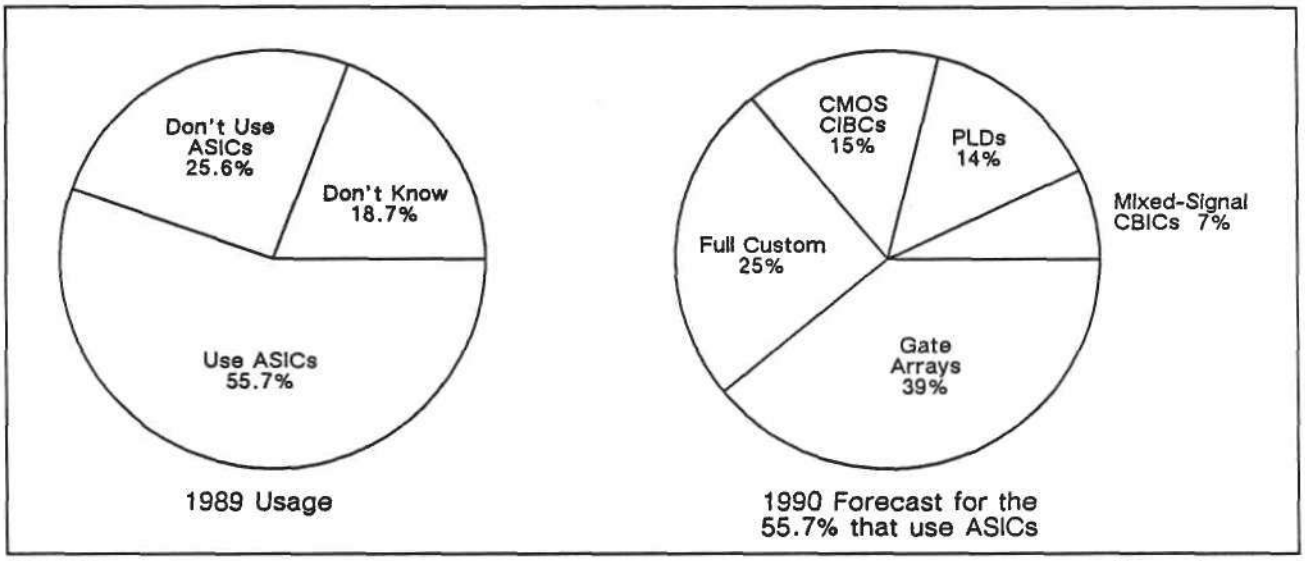
remain are comparatively secure and will receive a higher portion of funding than in 1989. More than one-half (55.7 percent) of the respondents used ASIC devices last year. A potentially larger marketing opportunity still remains for ASIC suppliers because 44.3 percent of the respondents either don't know if they use ASICs or simply don't use them at this time. The 1989 expenditure and forecast for 1990 are shown in Figure 2.

## User Plans

The U.S. supply base for this year's respondents gained market share in 1989 at the expense of Japanese suppliers as a result of the improved availability of DRAMs relative to 1988. The 17.4 percent Japanese market share for the sample now reflects pre-1988 levels of market support. The trend toward manufacturing sites to offshore locations has abated, and 84.5 percent of the respondents plan not to move at all. Those that have facilities overseas now are beginning to use them to supply the local markets in addition to their traditional use as a source of low-cost production.

Last year's plans to reduce inventory levels have occurred, as seen in Figure 3. More than three-fourths (81 percent) of the respondents plan on either reducing or stabilizing their inventory

**FIGURE 2**
**ASIC Usage**

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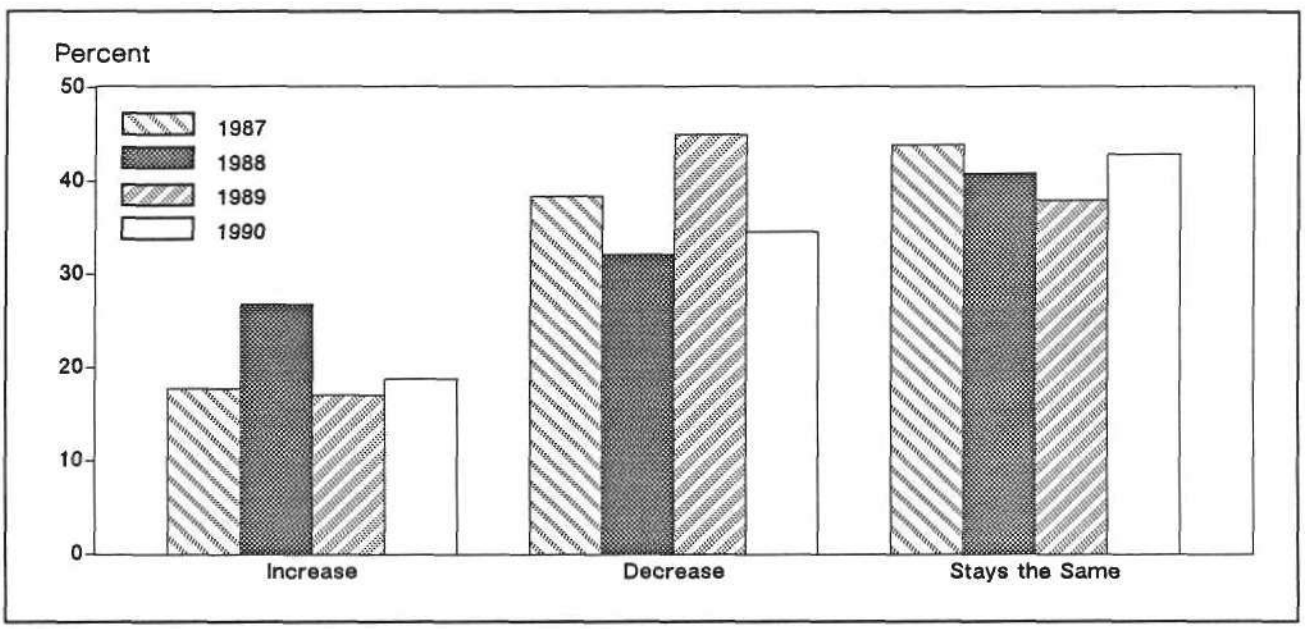
Source: Dataquest March 1990

**FIGURE 3**
**Expected Change in Target Inventory Levels (Percent of Total Respondents)**

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Source: Dataquest March 1990

levels this year. The respondent-targeted inventory level averaged out to 47 days. This relatively high target level is partly due to the inclusion of the military inventory requirement to have, on average, 180 days of inventory on hand. Our monthly survey reflects a target level for February of 19 days, which is more representative of the overall commercial market.

## Top User Issues—The Focus Now Is on Supplier Performance

The biggest change in this year's survey was noting the shift of key issues away from product-related to supplier-related problems (see Table 2). For instance, the fifth-ranked problem for both 1988 and 1989 was memory. This year, memory availability was not even ranked as a top 20 issue! Focus has shifted to how well a given supplier performs on its commitments in terms of delivery, price, and meeting forecast needs. The number three issue, cost control, is the subtheme this year with all of the issues revolving around it. All semiconductor suppliers should take note that now, more than ever, meeting customer needs will be *the* determining factor in supplier loyalty this year. As mentioned in the Dataquest newsletter entitled "True or False: User-Supplier Relationships to Change in the 1990s," that chronicled the conference, Motorola again won the Semiconductor Supplier of the Year Award as voted by this year's respondents. In the buyers' eyes, Motorola met these needs by being perceived as the best in overall delivery, price, quality, technical support, and customer service. Next year's winner would be wise to address this new list of issues.

## DATAQUEST CONCLUSIONS

This year's survey confirmed many trends that Dataquest had previously noted and also provided new insights as to what the user community is planning for 1990. The relatively conservative procurement estimates for this year reflect the uncertain outlook for system sales, yet most of the respondents were optimistic about the end markets at the time of the survey. Current surveys still show a steady undercurrent of semiconductor sales that is keeping low growth forecasts on track. It is important to note that the most growth in semiconductor procurement will be coming from

TABLE 2
User Issues

| 1990 Ranking | | 1989 Ranking | 1988 Ranking |
|---|---|---|---|
| 1 | On-time delivery | 3 | 3 |
| 2 | Pricing | 2 | 2 |
| 3 | Cost control | 7 | 4 |
| 4 | Availability | 1 | 1 |
| 5 | JIT/inventory control | 6 | 9 |
| 6 | Quality/reliability | 4 | 6 |
| 7 | New products/obsolescence | 8 | 8 |
| 8 | Reducing vendor base | — | 7 |
| 9 | Forecasting | — | — |
| 10 | Government regulation | — | — |

Source: Dataquest
March 1990

midsize companies, primarily in the data processing and military/aerospace industries. These two markets have the largest potential for higher sales for the following reasons:

- New products in the workstation and high-end PC markets as well as for more powerful peripherals
- Completed military budget cuts, resulting in steady procurement plans for surviving programs

Dataquest believes that the overall change of theme from availability issues to supplier performance underlines the efforts to reduce overall costs from every angle. Those companies that excel in supporting their customers will differentiate themselves and grow accordingly.

*Penny Sur*
*Mark Giudici*
*Carolyn Doles*

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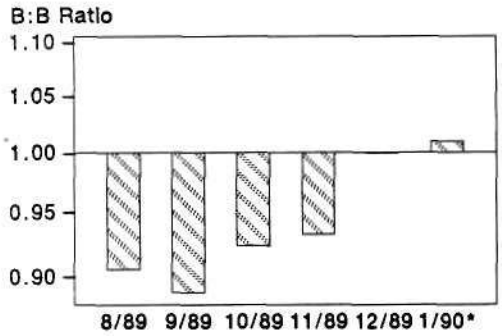
# Research *Bulletin*

## FEBRUARY MARKET WATCH: MARKET STILL GROWING, BUT MIXED SIGNALS APPEAR

### INDUSTRY BOOK-TO-BILL EXPECTED TO RISE ABOVE PARITY

Dataquest expects the January book-to-bill ratio to rise above parity to approximately 1.01 because of convincing indications of improved bookings by major semiconductor manufacturers and a jump in semiconductor orders (see the January *Procurement Pulse*). It is mostly non-memory manufacturers that are seeing the order improvements. Despite the continuing severe price drops in all DRAM densities, even memory manufacturers see some users beginning to order two to three months in advance because of rumors of potential shortages in 1990.

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**




*Estimate

**Figure 2**
**DOC Computer Demand**

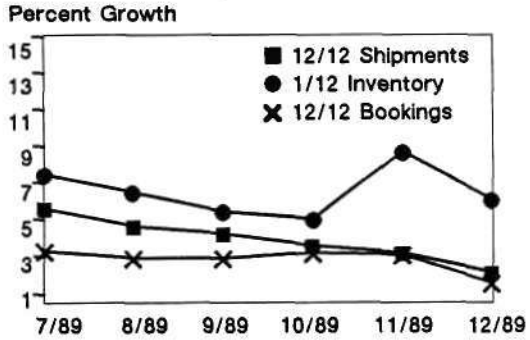



**Figure 3**
**Semiconductor Inventory Level**

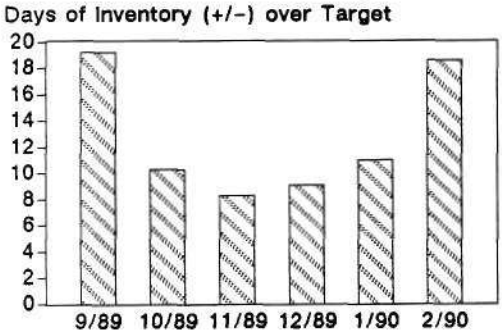



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**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Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
February 1990


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## DECEMBER COMPUTER ORDERS SLOW DOWN

The December computer order growth rate slowed, reflecting typical December performance, while shipment growth rose to use up part of the inventory that built up heavily during November. These year-end patterns offer little conclusions other than the fact that inventories have risen and did not decline enough in December to alleviate semiconductor industry concerns. What will matter will be the results of the upcoming months: will the computer industry bounce back from its woes? Again, the trend in the past four months would suggest so, with order rates stabilizing and the computer industry book-to-bill reaching parity since September.

## OEM SEMICONDUCTOR INVENTORY LEVELS RISE

Although January order rates were inspiring, OEM semiconductor inventory levels have risen dramatically in February, suggesting a slower usage of purchased products. Surveyed users have revised their target inventory levels downward by 14 percent as a result, while actual inventory levels rose by 14 percent. Semiconductor manufacturers should cautiously watch this trend in inventory buildup.

## PRICE TRENDS ARE ENCOURAGING

Dataquest's price index of a basket of key semiconductor products has returned to its original rate of decline after a worrisome December drop. Memory prices still are rapidly declining, but the index is being held up by firming prices in microprocessors that are the result of spotty shortages of the 80386 and 80386SX and stable prices of logic devices.

## DATAQUEST CONCLUSIONS

Dataquest still expects the first quarter of 1990 to be a mild improvement over the the last quarter of 1989 despite the return of mixed market signals. It is becoming increasingly difficult to characterize the improvement because, as in any weak market, some companies will feel it and some will not. Microcomponent and logic-based suppliers should see shipment and order improvements, while memory manufacturers should see continued price-driven revenue declines. Large users may see inventory buildup and mild order rates, but Dataquest's surveys show that midsize OEMs are likely to carry most of the semiconductor purchasing growth in the first half of 1990.

*Victor de Dios*
*Mark Giudici*

Dataquest
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# Research *Bulletin*

## SAMONITOR: MODEST RECOVERY STAYS ON TRACK

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

### Computers and Office Equipment

The computer market took a turn for the worse in December. As shown in Figure 1, the orders-to-shipments ratio fell from 1.02 in

**Figure 1**
**Computers and Office Equipment**

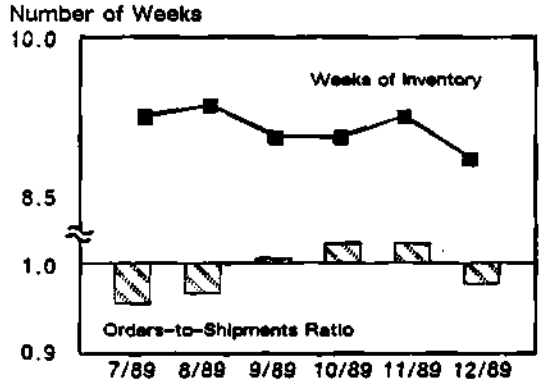


**Figure 2**
**Communications Equipment**

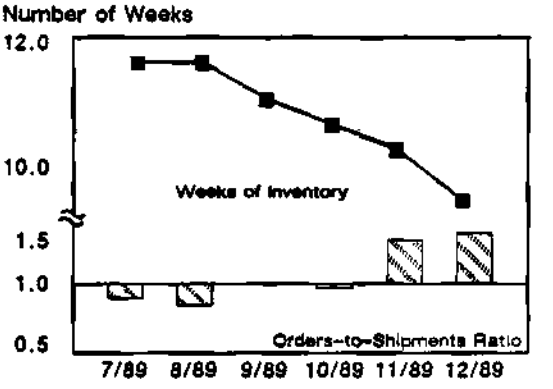


**Figure 3**
**U.S. Instruments**

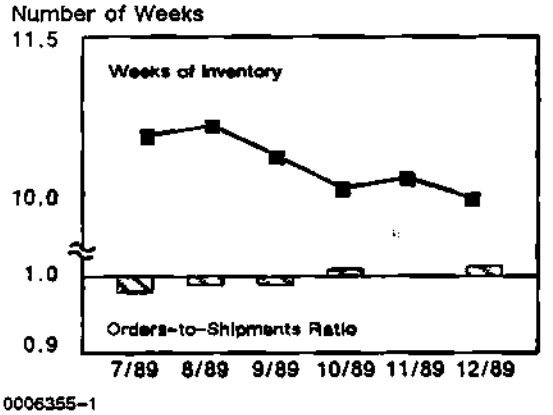


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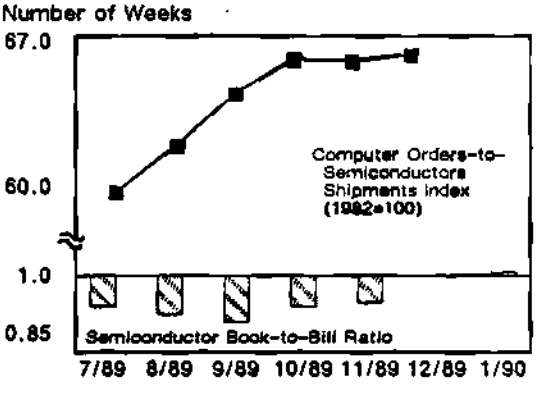
**Figure 4**
**Semiconductors and Computers**




Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
January 1990


NASM Newsletters 1990: January-March 1990-7

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November to 0.98 in December. *This is the first month since August that the ratio has fallen below parity and the first month since June that the ratio has fallen from the previous month.* Orders growth for the three-month period ending in December was only 1.7 percent above year-earlier orders, whereas November growth was 11.1 percent. This abrupt change comes on the heels of an accelerating orders-growth trend that began last September. In retrospect, however, given the unusual strength since September, a correction in orders growth was probably due. Shipments growth for the three-month period ending in December was 0.3 percent below year-earlier shipments. *This is the first month of negative shipments growth since mid-1987.* If there is a silver lining, it is that manufacturers continue to keep a tight rein on their equipment inventories: Inventory fell to 8.9 weeks in December from 9.3 weeks in November. Despite December's lackluster showing, recent months' rebound in orders growth should help reverse the slowing growth trend in shipments and help bolster the market in the coming months.

### Communications Equipment

Indicators show that business conditions in the communications market continue to improve. As shown in Figure 2, the orders-to-shipments ratio continues the upward trend that began last May, reaching 1.15 in December. Orders growth for the three-month period ending in December was 16.9 percent above year-earlier orders compared with 15.9 percent in November. In December, manufacturers further tightened inventories down to 9.5 weeks. Despite a sluggish economy, recent activity signals little change in the coming months.

### Instruments

The orders-to-shipments ratio (see Figure 3) has been above parity since October and on a positive trend since April. But the road to improved business has been a bumpy one for the instruments market. Orders growth for the three-month period ending in December decelerated for the second consecutive month—to 2.0 percent from year-earlier orders—down from 6.3 percent in November and from the recent peak of 7.9 percent in October. Furthermore, three-month-ended shipments growth also slowed during the same period from 8.5 percent in November to 7.2 percent in December. Like the other equipment markets, inventories are well managed and fell slightly in December to 10.0 weeks. Dataquest does not believe that the recent activity portends continued slowing growth. Instead, orders growth probably is being buffeted by recent sluggishness in overall economic activity and business' cautious capital spending.

## SEMICONDUCTOR DEMAND

Dataquest estimates that the U.S. semiconductor market book-to-bill ratio increased to 1.01 in January from December's 1.00, indicating that chip recovery is proceeding at a modest pace (see Figure 4).

For the three-month period ending in December, average computer orders fell 2.5 percent from November, while average semiconductor shipments for the same period declined 2.9 percent. As a result, the computer-orders-to-semiconductor-shipments index, a leading indicator of chip orders and shipments, remained relatively stationary at 66.4 in December (see Figure 4). As we said in last month's *SAMonitor,* Dataquest believes that this standstill is only temporary: Except for an insignificant decrease in July, the index has risen continuously since March, indicating that an improvement in the overall semiconductor market climate was due. Furthermore, Dataquest's estimate of the chip book-to-bill ratio confirms that the semiconductor market has passed its cyclical trough during the summer.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Dataquest believes that the North American semiconductor market will continue to recover, albeit at a modest pace. Furthermore, most of the market fundamentals of a sustained recovery are in place: Systems orders growth and shipments growth (save computers) is positive; system inventories are lean; and U.S. capital spending growth—a proxy of the business' demand for electronic systems—is forecast to accelerate from 3.5 percent in 1989 to 4.0 percent in 1990.

As reported last month, we maintain that North American chip shipments growth will be positive in 1990, but probably will be only fractionally ahead of 1989 shipments. Therefore, as the market expands this year, chip manufacturers can be expected to fight tooth and nail for every bit of market share. Manufacturers that view the world digitally—that is, either feast or famine—are most likely to think that we are in the midst of a famine. Bet on it that these companies are likely to be the ones that will miss this year's opportunities.

*Terrance A. Birkholz*

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# Research *Bulletin*

## WILL THERE BE ANOTHER DRAM SHORTAGE IN 1990?

### SUMMARY

Dataquest has not eliminated the possibility of a DRAM shortage in 1990, considering recent events that are similar to those that sparked the two-year DRAM shortage that began in 1987. However, other factors make this situation different, leading us to conclude that a shortage, if it *does* occur, should be short and temporary.

### THE FIRST SHORTAGE SCENARIO: DEMAND VERSUS SUPPLY

DRAM shortages cost the computer industry billions of dollars in revenue each time they occur. Today, rumors of an impending shortage are rushing through the market despite the fact that we just emerged from one six months ago. Can we possibly have another shortage so soon? Some facts, listed as follows, seem to indicate so:

- The computer industry has been improving, reaching book-to-bill parity in September 1989 and experiencing accelerating order growth rates since then. Dataquest's surveys indicate a high level of optimism among semiconductor purchasers since January, with purchases forecast to grow by 9.6 percent from 1989. Already, the market sees spot shortages of key advanced microprocessors.
- As in early 1987, DRAM manufacturers do not share the same opinion. Most major Japanese manufacturers have cut production in the past six months after seeing a rush of cancellations, increasing turns business, and plunging prices. Many companies are losing sight of their customers' future requirements. In 1987, this shortsightedness led to a DRAM shortage that lasted two years.
- OEM inventory levels are low, especially for DRAMs, because of the abundance of product and very short lead times. Any sudden increase in computer demand will require sudden DRAM purchases.
- DRAM manufacturers may not be able to respond quickly to a sudden increase in demand because their production rates have been reduced, their inventory levels are high but not exceedingly so, and they would need at least three months to increase production rates.
- In any transition period from excessive to deficient DRAM supply, gray market channels tend to play a significant role. The channels compete in the buying of products for resale, thereby exacerbating the shortage.

*Dataquest believes that if a shortage occurs, however, it will be short and temporary, lasting less than six months.* There are major differences between the 1987 shortage and a potential 1990 shortage. Manufacturers have learned to manage the FMV system, unlike in 1987. South Korean and other suppliers have gained a more significant role in the DRAM market, minimizing the impact of Japanese production cuts. Although demand may suddenly increase, it is not expected to be as strong as it was in 1987 and 1988.

### THE SECOND SCENARIO: DUMPING PENALTIES AGAIN?

The obvious market share gains of South Korean manufacturers may tempt their competitors to push for dumping penalties. Although South Korean manufacturers have observed and hopefully have learned from the misfortunes of their Japanese counterparts, the investigation alone may prove disruptive to South Korean DRAM availability.


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*If penalties are imposed, an immediate shortage would take effect that would certainly not be short in duration.*

The likelihood of dumping penalties against South Korean companies seems remote today. The purchasing community would probably not take this action lightly. As a definitive move to ensure survival, U.S. computer companies have effectively opened the door to South Korean DRAM manufacturers as a safeguard against increasing Japanese company control over the DRAM market. There appears to be a weaker and less united front among semiconductor manufacturers in pushing for South Korean dumping penalties, what with Texas Instruments' reliance on Hyundai for 256K DRAMs and Intel's DRAM sales agreement with Samsung.

## DATAQUEST RECOMMENDATIONS

Knowledge of a potential shortage can help prevent one. DRAM purchasers should continually give their suppliers a true and accurate forecast of their future requirements and not rely excessively on spot buys. Accurate forecasts and closer communications will be invaluable in preventing a severe and extended DRAM shortage.

*Victor de Dios*

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# Research *Bulletin*

## FEBRUARY PROCUREMENT PULSE: BILLINGS, LEAD TIMES, ORDERS FLAT WHILE INVENTORIES AND SALES EXPECTATIONS REMAIN UP

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

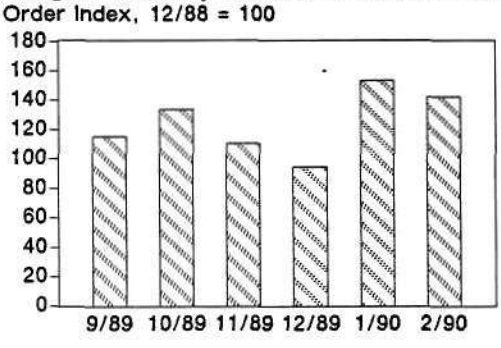



**Figure 2**
**Averaged Semiconductor Lead Times**

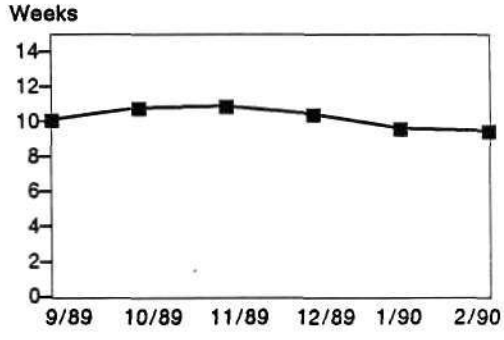



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

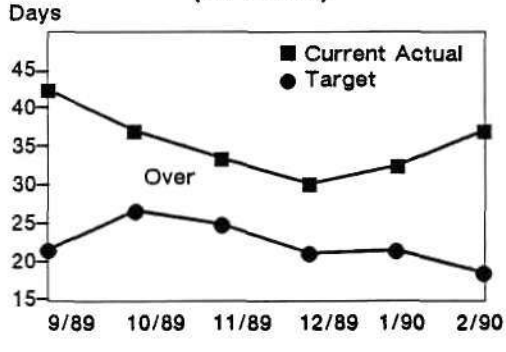
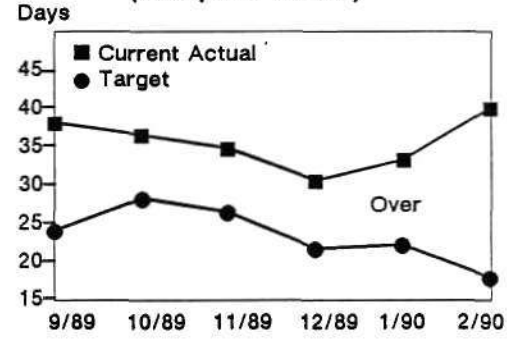



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**

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Source: Dataquest February 1990


NASM Newsletters 1990: January-March 1990-5

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## SEMICONDUCTOR ORDER RATES STABILIZE, MIRROR BILLINGS

This month's respondents maintained their overall order rates, with slight downward adjustments made to account for inventory growth trends. As shown in Figure 1, the relative increases in semiconductor orders that began in January have been maintained, while optimistic system sales expectations promise to keep the current semiconductor pipeline flowing. Compared with last month's 6.0 percent growth forecast, the next six-month outlook is for an average of 7.2 percent overall growth, while computer companies expect an 8.2 percent increase in sales versus their 5.8 percent outlook last month. Another bright sign is that, for the first time in six months, no negative sales expectations appear in this month's responses (the range is from flat to positive 20 percent). This rosy outlook, combined with higher current sales relative to the last six months (2.8 percent versus 1.1 percent), shows a steady, moderate growth pattern that has become very manageable.

## CURRENT AVAILABILITY GOOD, OUTLOOK MURKY—LEAD TIMES DIP TO 9.6 WEEKS

Another drop in the average semiconductor lead time, as shown in Figure 2, is evidence that overall semiconductor availability is good. What is clouding an otherwise fine picture are continued spot shortages of SOIC standard logic parts and some 32-bit microprocessors, and the threat of Japanese DRAM supplies being controlled to the point of undershooting lowered demand forecasts. Lead times currently range from four to eight weeks for mature commodity DIP logic, 8- and 16-bit microprocessors, most EPROMs, and 120ns DRAMs. The high-speed RAM and 32-bit microprocessors, along with SOIC logic, are currently keeping overall lead times up.

## INVENTORY TARGETS DROP AGAIN, BUT ACTUAL LEVELS RISE—JANUARY SEMICONDUCTOR BOOKINGS COME HOME TO ROOST

*Ready availability* of devices and last month's *higher order rate* have translated into a *slight inventory bulge* versus targeted levels. This increase in component inventory in users' hands points out how important accurate forecasting is in balancing system demand with component order rates. For example, a slight change in inventory level has developed between the computer OEMs and the overall sample, with targets of 18.0 days and 18.7 days, respectively, being fairly consistent. The actual levels show the main difference, with computer OEMs showing an average of 40.2 days of inventory while the overall sample is now 37.3 days. Although this apparent relaxation of component forecasting reflects only two months of data (see Figures 3 and 4), ongoing cost-control programs will not allow this minitrend to continue. We expect to see contractions in specific component booking rates in order to balance inventory levels within targeted ranges.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Dataquest believes that stable semiconductor order rates and lowering lead times, combined with an upbeat system sales outlook, set the stage for a moderate growth scenario that hinges on accurate forecasting. As seen this month, dependent component inventories will rise quickly due to the ready availability of products on the market if system sales levels are not realized. The effects of memory production cutbacks have not been seen yet; commodity prices and lead times still are very reasonable. There still are some spot delays for orders of SOIC standard logic and in some areas of 80386SX products. We expect the standard logic situation to ease within the next one or two months, as some suppliers fear that they have put in too much SMT capacity to meet current market needs. Again, accurate forecasts are critical. Specific 32-bit microprocessor availability/shortages have been seen sporadically and appear to have been caused by a combination of forecast error and a shift of production capacity from the 16-MHz device to the newly announced 20-MHz 386SX part. Aside from these current minor annoyances, semiconductor availability, pricing, and service levels are very good and should continue to be for the next three months. Memory production levels and how well they are controlled will determine if any spot shortages occur beyond three months.

*Mark Giudici*
*Victor de Dios*

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# Research *Bulletin*

## JANUARY MARKET WATCH: THE MARKET PICKUP MAY BE A FALSE START

*Market Watch* is a monthly bulletin that is released after the SIA book-to-bill *Flash Report*. It is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

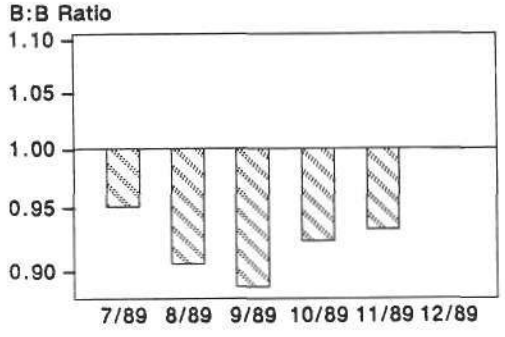


**Figure 2**
**DOC Computer Demand**

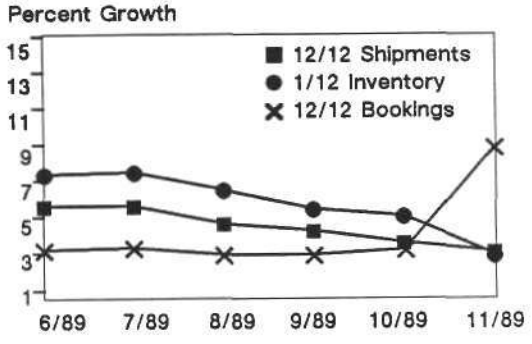


**Figure 3**
**Semiconductor Inventory Level**

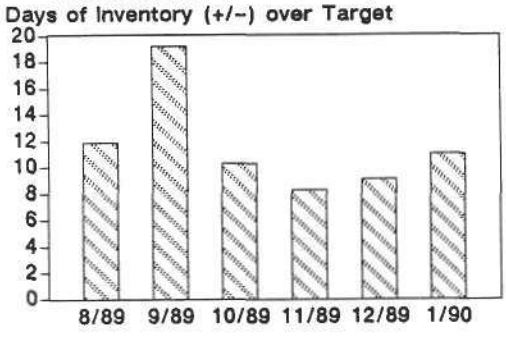


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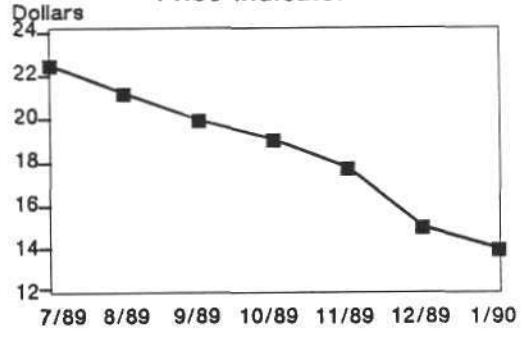
**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
January 1990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## THE BOOK-TO-BILL JUMPS TO PARITY

December's book-to-bill ratio of 1.00 (see Figure 1) can be attributed to a combination of two forces; orders for replenishment stock of key component inventories being run down for year-end financials and the oblique optimism for system sales that also has shown up in past monthly surveys. The December increases of 4.2 percent for bookings and 6.7 percent for billings over November are other positive signs that order rates of systems and components are close together. Another positive indicator is the month of December's 1989-over-1988 growth rates of 6.5 percent in bookings and 3.7 percent in billings that reflect the steady system demand that is pulling the market. Dataquest does not expect to see large gains in the book-to-bill ratio in the near future, but rather, foresees a replacement order scenario until system sales move higher.

## COMPUTERS: DEMAND STABILIZES WHILE INVENTORIES RISE

Bookings and shipments of computers have remained relatively flat, but system inventories have risen substantially (see Figure 2). The 3/12 booking rate-of-change indicator has again risen for the third consecutive month. As mentioned in last month's *Market Watch*, this rise is an early indicator of where the 12/12 rate of change is headed. The recent inventory buildup appears to be the result of slower-than-normal year-end system sales combined with selected increases of new systems for 1990 introduction. Continued pressure on system companies' profit margins is forcing retrenchment in selected areas and increased demands on supplier flexibility.

## USERS' SEMICONDUCTOR INVENTORIES ALSO RISE

The gap in actual versus targeted inventory levels rose this month (see Figure 3) due to unchanged average target levels and an increase in the number of parts being shipped early to users. Even with the increase, the actual level of inventories is a relatively low 32.7 days. One healthy sign is the users' continued confidence in suppliers to meet demand as evidenced in steady, low inventory targets (currently 21.7 days or 11.4 turns/year). In the face of sluggish system demand, efforts to adjust inventory levels to the bare essentials is an ongoing task at most user sites and will continue to force suppliers to excel in delivery commitments.

## PRICES SLIP BUT NOT BY MUCH

The semiconductor supply juggernaut continues to overshoot demand, resulting in a continued decline in prices (see Figure 4). Most price competition continues to be in the commodity memory (DRAMs, SRAMs, and EPROMs) and microprocessor areas, mirroring the fierce computer market competition currently under way. Although most of the major Japanese and South Korean DRAM suppliers have formally announced scaled back production levels to better match demand, we do not expect availability and price trend changes to be noticeable in the market until the latter half of the second quarter. The availability/market delay is due to suppliers' high inventory levels and bureaucratic inertia that will need to be altered. We believe that spot and distribution pricing for these parts will be affected first, with long-term contracts the best hedge for consistent cost control.

## DATAQUEST CONCLUSIONS

Optimism in the systems markets remains muted but still exists. Semiconductor suppliers are doing an excellent job of supporting their customers through these highly competitive times. Although the current inventory hiccup will be addressed, the forecasting mechanisms should ensure quick correction. The combination of the short-term DOC data and the mildly upbeat outlook from our surveys leads us to believe that although boom times may not be ahead, at least they won't be bust times. As mentioned in earlier reports, Dataquest expects the first quarter of this year to be relatively strong in semiconductor shipments (compared with the rest of 1990) as evidenced by the latest book-to-bill ratio. Until a definite change in the end markets takes shape, we expect this static shipment/demand/inventory situation to continue.

*Mark Giudici*
*Victor de Dios*

Dataquest
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# Research *Bulletin*

## JANUARY PROCUREMENT PULSE: ORDERS AND INVENTORIES REBOUND UP, PRICES AND LEAD TIMES FALL

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

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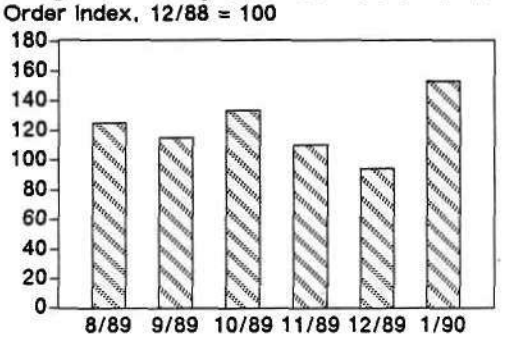



**Figure 2**
**Averaged Semiconductor Lead Times**

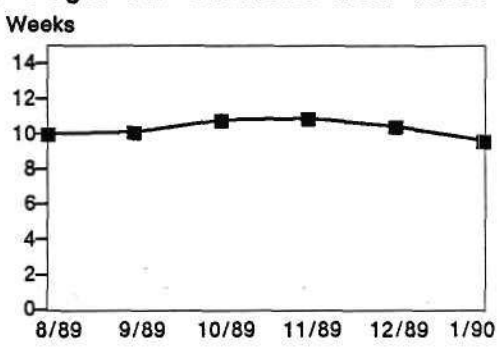
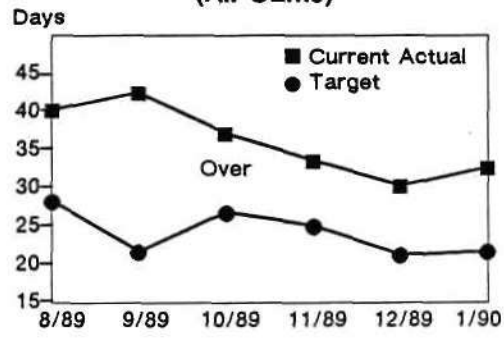



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

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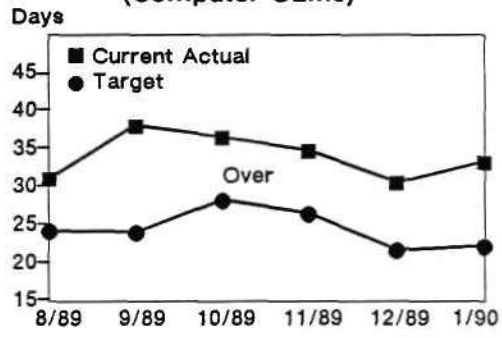


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Source: Dataquest
January 1990


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## SEMICONDUCTOR ORDERS JUMP UP, PREPARING FOR HIGHER SYSTEM SALE EXPECTATIONS

Order rates for semiconductors are expected to rise above levels set in October 1989 as companies return to "normal" buying patterns (see Figure 1). Year-end financial austerity programs have pared operations to the bone and buyers now are purchasing components needed for anticipated new system sales in the upcoming six months. This renewed optimism appears to take off from where we left it last November, as system companies are expecting an average of 6 percent sales growth during the next two quarters (individual estimates range from negative 5 percent to positive 20 percent). It is important to note that the lone negative forecast originated from a defense systems company and that the other companies in the sample expect flat to higher growth in the next six months. Availability of key semiconductors at predictable prices is allowing procurement managers to better match their buying patterns with system sales movement.

## LEAD TIMES DIP SLIGHTLY, BREAKING THE AVERAGE 10-WEEK BARRIER

Semiconductor lead times have declined one full week since our last survey and are now down to 9.7 weeks, as seen in Figure 2. The only parts that are keeping this average up are SOIC-packaged standard logic devices, which are adding a four- to eight-week delivery delay due to lead frame shortages. Most other parts, from DRAMs to microprocessors, have lead times ranging from four weeks (stock) to eight weeks, depending on the supplier.

## INVENTORY TARGETS STABLE, ACTUAL LEVELS UP SLIGHTLY

Another indicator of good inventory control is how the movement of inventory levels matches forecast system sales movements. As seen in Figures 3 and 4, both overall OEM target and actual inventory levels (21.1 and 32.7 days, respectively) and computer OEM target and actual inventory levels (22.3 and 33.4 days, respectively) are still within one day of each other. If DRAMs are taken out of the equation, inventory levels remain relatively unchanged, with all OEMs at 20.9/32.3 days and computer OEMs at 21.4/33.3 days target versus actual, respectively. This relative stability of inventory levels is primarily because of the ready availability of DRAMs. Production cutbacks of up to 10 percent by major Japanese and South Korean DRAM suppliers targeted at stabilizing prices will test the forecasting accuracy of users. Now is the time to ensure the commitment of adequate supplies of products through the next six months.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Order rates have picked up appreciably, primarily in anticipation of new system sales and partially to refill key inventory levels. Dataquest believes that the next six-month system sales outlook is moderately optimistic and that component availability (based on prices and lead times) is at a 12-month high. Major memory suppliers are attempting to avert a price debacle similar to the one in 1984 and 1985 by matching supplies with forecast demand. It is key that all major IC users accurately forecast their component requirements for the next six months because it takes that long for any shift in demand to be felt in IC market availability. As mentioned in previous bulletins, the current cutbacks that began late last year will not be noticed in the market until February or March. Predictable, not dramatic, price declines are a result of the combination of good forecasting, good price negotiations, and good inventory control. Ensuring the first allows for the rest.

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*Victor de Dios*

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# Research *Bulletin*

## SAMONITOR: CHIP INDUSTRY RECOVERY ON SCHEDULE

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

### Computers and Office Equipment

Recent indicators suggest that the computers and office equipment market is entering a new stage of growth. New orders growth for the

Figure 1
Computers and Office Equipment

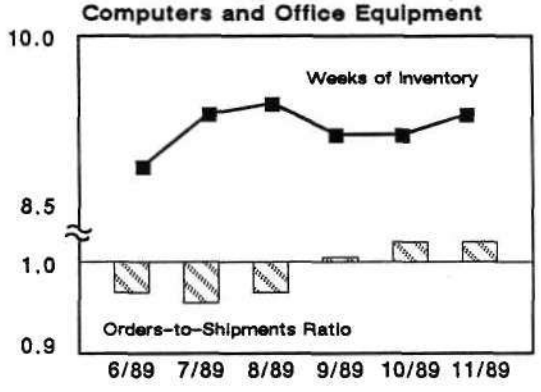



Figure 2
Communications Equipment

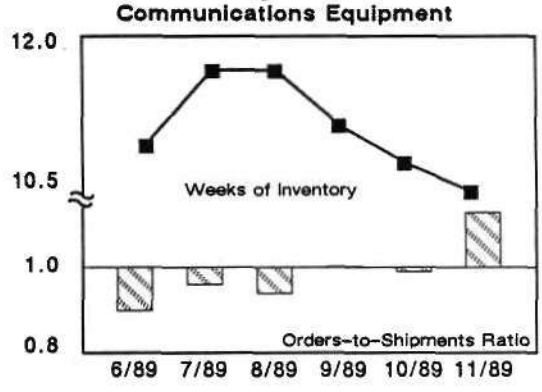



Figure 3
U.S. Instructments

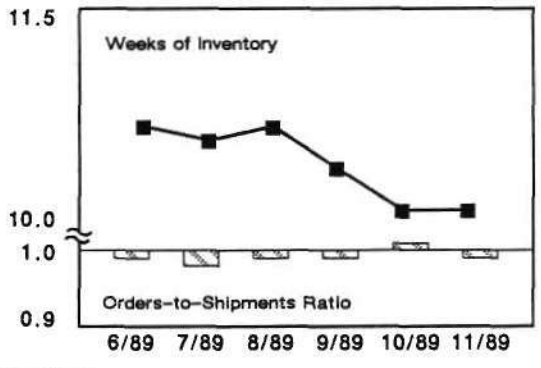
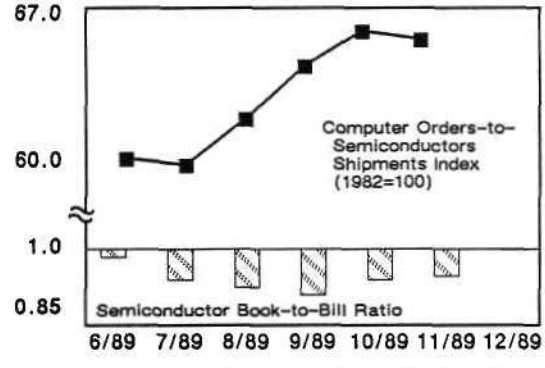



Figure 4
Semiconductors and Computers

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Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
January 1990


NASM Newsletters 1990: January-March 1990-2

0005984



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three-month period ended in November was 10.6 percent above year-earlier orders. *Not only is this the third consecutive month of positive orders growth, but it is also the second consecutive month of accelerating growth.* Shipments growth remains positive and continues to decelerate, *but at a slowing rate:* Shipments growth for the three-month period ended in November was 2.2 percent above year-earlier shipments, while October and September growth were 2.4 percent and 3.5 percent, respectively. The orders-to-shipments ratio (see Figure 1) remained steady in November at 1.01, while inventory levels rose slightly to 9.3 weeks in November. Dataquest believes that the recent pattern in orders and shipments growth indicates that this market is on schedule to enter a period of stable and sustained growth beginning in the first quarter of 1990. This growth should lead to a recovery in chip orders and shipments growth in the second quarter.

### Communications Equipment

The communications market continues to improve. Orders and shipments growth for the three-month period ended in November accelerated from their respective October growth rates: Orders growth quickened to 15.5 percent from 8.9 percent, and the pace of shipments growth picked up to 7.5 percent from 7.2 percent. *This is the fastest three-month-ended orders and shipments growth since March and February 1988, respectively.* The orders-to-shipments ratio (see Figure 2) rose dramatically to 1.13 in November. *This is the highest the ratio has been since March 1986.* Manufacturers drew down their inventories to 10.4 weeks, their lowest level since December 1988. Dataquest believes that the market is in the midst of a period of improved growth that is likely to extend at least through early 1990.

### Instruments

Instruments orders grew 6.1 percent for the three-month period ended in November, down slightly from the 7.9 percent growth in October, while shipments were up 9.4 percent. *This represents the third consecutive month of accelerating shipments growth since September.* The orders-to-shipments ratio (Figure 3) slipped back below parity in November to 0.99. However, in light of the positive situation in orders and shipments growth, the ratio's slippage is likely insignificant, and at this point can be dismissed as random noise. November inventory levels held constant at 10.1 weeks. The continuing upswing in orders and shipments growth, and lean inventory levels are laying a good foundation for stable future growth. Dataquest believes that orders and shipments growth will remain positive, but could likely be buffeted about in the coming months.

## SEMICONDUCTOR DEMAND

The U.S. semiconductor market book-to-bill ratio increased to 1.00 in December from November's 0.93, indicating a recovery from the summer slowdown (see Figure 4).

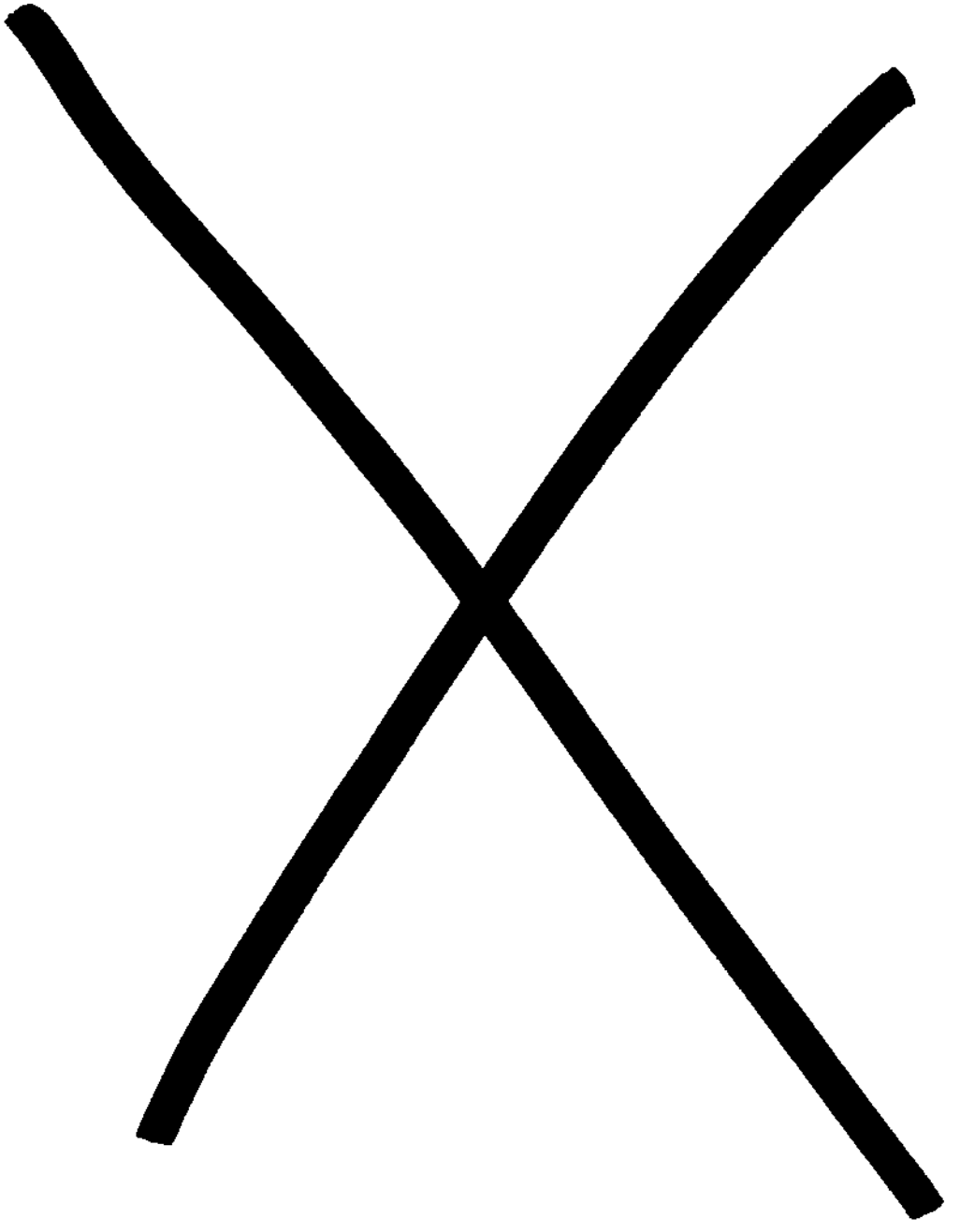
For the three-month period ended in November, average computer orders rose 1.0 percent from October, while average semiconductor shipments for the same period advanced 1.7 percent over October. As a result, the computer-orders-to-semiconductor-shipments index (see Figure 4), a leading indicator of chip orders and shipments, fell slightly to 65.8 in November from 66.2 in October. Dataquest believes this is only a transitory aberration: Except for an insignificant decrease in July, the index has risen continuously since March, indicating that an improvement in the overall semiconductor market climate was due. The chip book-to-bill ratio confirms that the semiconductor market has passed its cyclical trough during the summer. Further, recent computers orders and shipments growth trends indicate that the chip market's recovery should be sustained for the next several months. Dataquest believes that the North American semiconductor market is on schedule for a peak in growth during the second quarter of 1990.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Dataquest believes that the North American semiconductor market has entered a new phase of growth. Improvement in system shipments and orders growth should provide the fuel to sustain improved chip market conditions through at least the first half of 1990.

Make no mistake that chip shipments growth will likely only be fractionally ahead of shipments in 1989. On the other hand, chip manufacturers that are unable to turn their operations "on a dime" will likely sacrifice any possible increment in market share attendant with the expected business upswing. True, these aren't the best of times; but they aren't the worst of times either. As the new year unfolds, manufacturers that stay forward-looking and do not become unduly preoccupied with the present (or recent past) misfortune stand the best chance of harvesting this year's limited crop.

*Terrance Birkholz*



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# Research *Bulletin*

## SAMONITOR: SYSTEM MARKETS MARKED BY CONTINUED IMPROVEMENT

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

#### Computers and Office Equipment

New orders growth in October in this market was 3.0 percent above year-earlier orders. *This is the second consecutive month since March that*

Figure 1
Computers and Office Equipment

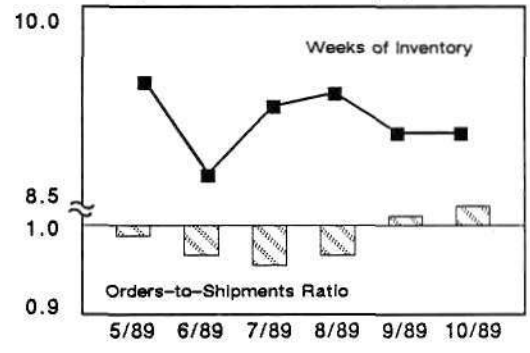



Figure 2
Communications Equipment

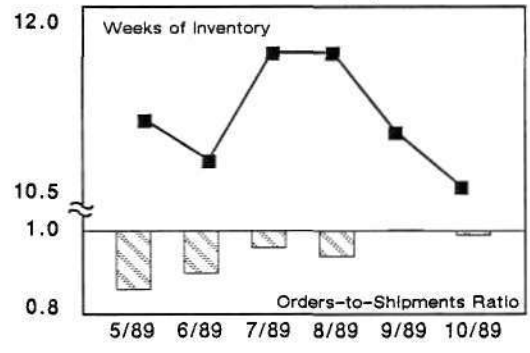



Figure 3
U.S. Instruments

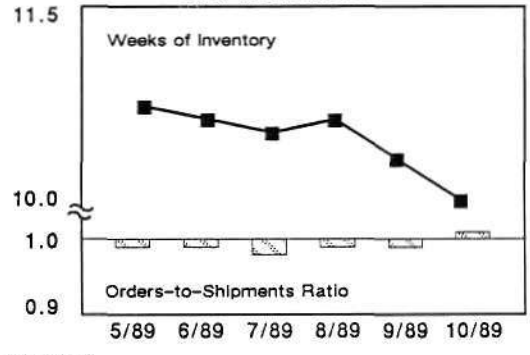
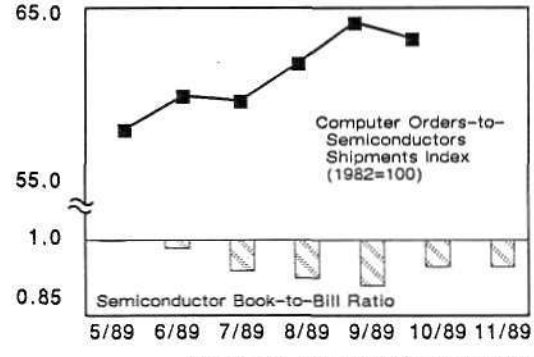



Figure 4
Semiconductors and Computers




0005907-1

Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
December 1989


NASM Newsletters 1989: October-December 1989-29

0005907



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*monthly growth of new orders from year-earlier levels has been positive.* Unfortunately, shipments growth continues to decelerate: For the three-month period ended in October, shipments were up 2.5 percent from the same period last year, compared with 3.5 percent in September. As shown in Figure 1, the orders-to-shipments ratio rose slightly to 1.02 in October from 1.01 in September. *This is the highest it has been since August 1988, when the ratio was 1.03.* Inventory levels are well managed and remained unchanged in October, at 9.1 weeks. Dataquest believes that recent trends in orders and inventory activity have helped solidify the computer market's fundamentals. We continue to forecast a period of stable and sustained systems orders and shipments growth during the first quarter of 1990, leading to a recovery in chip orders and shipments growth in the second quarter.

### Communications Equipment

Resurgence in order growth in this equipment segment has stimulated acceleration in shipments growth. For the three-month period ending in October, shipments growth was 7.1 percent from the same period last year, compared with 5.1 percent growth in September. *This is the fastest three-month shipments growth since February 1988.* Three-month orders growth slowed to 8.9 percent in October. Although this growth is down from (an unsustainable) 13.2 percent growth in September, *it is second only to September in terms of orders growth in 1989.* As a result of October's slowdown in orders growth, the communications orders-to-shipments ratio fell slightly to 0.99 in October (see Figure 2), from parity in September. Manufacturers drew inventory levels down for the second consecutive month to 10.7 weeks. Recent activity in orders, shipments, and inventory bode well for the industry's performance during the next few months. Dataquest believes that improved growth is likely to extend through early next year.

### Instruments

Instruments orders and shipments growth improved in October. For the three-month period ended in October, orders growth rose 7.9 percent. Shipments growth increased 6.0 percent for the same period. As a result, the orders-to-shipments ratio rose to 1.01 in October, from 0.99 in September, as shown in Figure 3. *This is the first time since February that the ratio has been above parity.* Manufacturers kept a tight reign on inventories: October levels fell for the second consecutive month to 10.1 weeks. The continuing upswing in orders and shipments growth and the lean inventory levels are laying a good foundation for future growth. Dataquest believes that both orders and shipments growth will remain positive but could be buffeted about as year-end approaches. We continue to expect a period of moderately accelerating shipments growth to begin about the first quarter of 1990, being driven by (and coinciding with the outlook of) faster capital spending growth.

## SEMICONDUCTOR DEMAND

The semiconductor book-to-bill ratio remained unchanged in October at 0.93. As stated in last month's *SAMonitor,* however, although the semiconductor market is slow, it is not as soft as it seems. Prices of 1Mb DRAMs have fallen significantly since the beginning of the year, making the book-to-bill ratio look worse than the fundamentals otherwise would indicate.

While semiconductor shipments advanced 5.1 percent in October over September, October computer orders rose only 3.5 percent from September. As a result, the computer-orders-to-semiconductor-shipments index, a leading indicator of chip orders and shipments, fell slightly to 63.5 in October from 64.5 in September (see Figure 4). We believe that this is only a transitory aberration; except for October and an insignificant decrease in July, the index has risen continuously since March. Further computer orders and inventory fundamentals improved in October. We continue to believe that this trend indicates growth of both semiconductor orders and shipments nearing a cyclical trough. We also believe that computer orders and shipments growth will be on a path of sustained and stable positive growth by first quarter of 1990, with chip orders and shipments following suit in second quarter.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Dataquest believes that the faint light at the end of the tunnel is beginning to grow brighter. We believe that the past few months' indicators show a solid foundation being laid for next year's growth. If systems orders and shipments growth picks up in the first quarter of 1990, as expected, semiconductor business conditions are likely to follow suit in the second quarter of 1990. Dataquest encourages semiconductor manufacturers to be patient during the next few months while the foundation solidifies, and to be prepared for business conditions to improve by early next year.

*Terrance A. Birkholz*

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# Research *Bulletin*

## DECEMBER MARKET WATCH: THE MARKET EXITS THE YEAR GRACEFULLY WITHOUT A STUMBLE

*Market Watch* is a monthly bulletin that is released after the SIA book-to-bill *Flash Report* and is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

Figure 1
U.S. Semiconductor Book-to-Bill Ratio

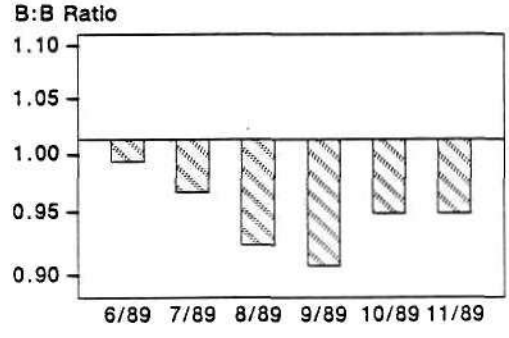



Figure 2
DOC Computer Demand

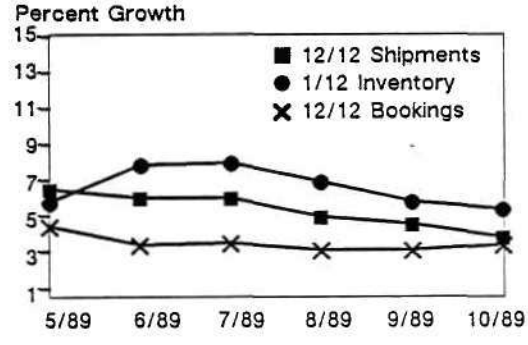



Figure 3
Semiconductor Inventory Level

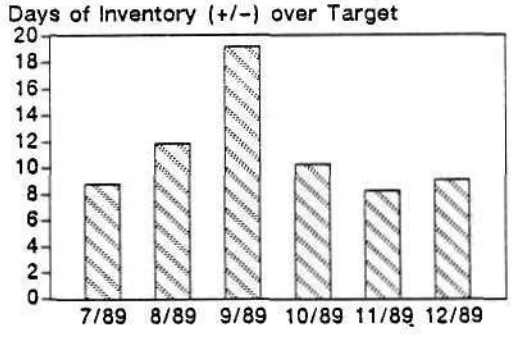
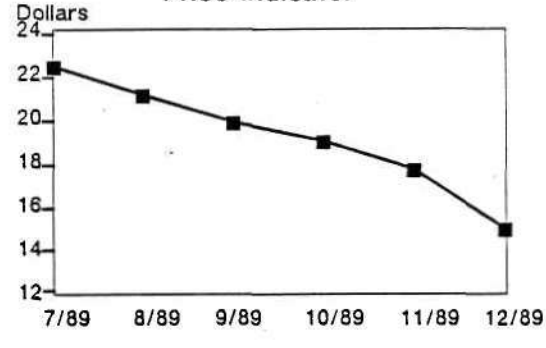



Figure 4
U.S. Weighted Semiconductor Price Indicator




0005835-1

Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
December 1989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0005835



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## BOOK-TO-BILL STABILIZES AT 0.93

The steady book-to-bill ratio confirms what we have been noting in the market for the past six months; steady demand and lower ASPs are combining to stabilize the market. Although November bookings are 1.8 percent off of October's average, this is a 2.2 percent increase over November 1988. As of this November, total *year-to-date (YTD) semiconductor billings are 12 percent above those of the same time period one year ago* in spite of the recent price erosion of MOS memory. Because of the ASP declines, Dataquest expects the book-to-bill ratio to remain below parity for the next few months, even with steady unit shipments.

## COMPUTER DEMAND ALSO STABILIZES, WITH SHORT-TERM SIGNALS IMPROVING

Although the long-term trend lines show steady booking, shipment, and inventory activity in the computer market (see Figure 2), the short-term picture is brighter. *Both computer bookings and shipments have increased over last month's levels* as new computer offerings begin to grow in sales. The 3/12 booking rate-of-change indicator has risen for the second consecutive month (7.8 percent versus 6.4 percent). Continued growth in this index is a preview of the annualized growth rates shown in Figure 2. Computer industry competition remains fierce, however, with many companies expecting lower earnings in the near future. This situation of steady, slowly growing system sales tempered with strong competition is forcing cost controls on all aspects of the system business. Lower semiconductor inventories and price declines are integral parts of this cost-cutting environment.

## INVENTORY LEVELS CONTINUE TO DROP—GOOD NEWS!

Although the gap between actual and targeted inventory levels appears to have widened, both targeted and actual levels declined according to our latest monthly procurement manager survey. The good news is that with actual inventory levels averaging 30.4 days, any end-market demand fluctuation will be readily picked up by component suppliers. Another good news item is that targeted inventory levels also have dropped, reflecting continued confidence in the ability of semiconductor suppliers to meet user needs. As mentioned earlier, the steady incremental pickup of computer business is being absorbed quickly by an abundant semiconductor market. While system demand continues to chug along, we expect semiconductor suppliers to receive constant feedback on user requirements in order to keep inventories under control.

## PRICES SLIP FURTHER

Although system demand is constant, the supply of semiconductors continues to exceed current needs; this situation results in steady price declines. Most of the ASP erosion is in the DRAM, SRAM, and microprocessor markets, where demand has not kept pace with semiconductor capacity increases. *The current memory production cutback program by major suppliers will not be felt until late in January or early in February—if at all.* The only market perturbation may come in higher spot market prices, leaving contract pricing untouched and short lead times intact.

## DATAQUEST CONCLUSIONS

The optimistic signs that we have seen for the past two months are tempered somewhat by our most recent survey data forecasting a mixed short-term future. What is evident is that the semiconductor and end-use electronics industries are more in lockstep with each other now than at any time in the past five years. Although currently not a boom period by any means, we believe that buyers will react quickly to any increase in system demand because inventories currently are so low and any incremental business will require new orders.

Dataquest continues to see signs that the first quarter of 1990 will be stronger than this quarter in terms of semiconductor shipments. Nevertheless, continued stability and growth of the electronics market in 1990 is still dependent upon the overall health of the economy and of the end user—both of which are sending mixed signals.

*Mark Giudici*
*Victor G. de Dios*

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# Research *Bulletin*

## DECEMBER PROCUREMENT PULSE: ORDER RATES, INVENTORIES, PRICES, AND MARKET OUTLOOK ALL DECLINE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

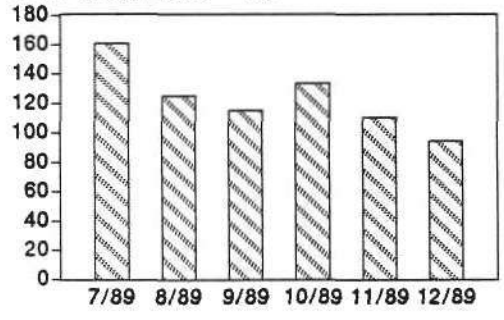



**Figure 2**
**Averaged Semiconductor Lead Times**

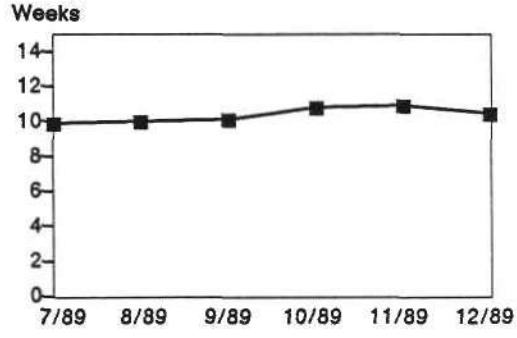



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

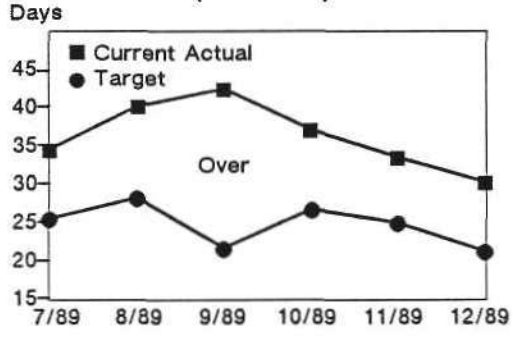
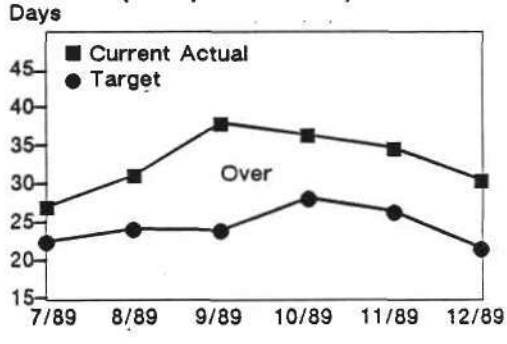



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




0005759-1

Source: Dataquest December 1989


NASM Newsletters 1989: October-December 1989-27

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## THE SEMICONDUCTOR ORDER RATE SEESAW TURNS INTO A DOWNWARD SLIDE

The respondents to this month's survey *expect to order 32.4 percent fewer semiconductors in December* compared with November, as shown in Figure 1. Continued emphasis on cost controls and end-of-year financial housekeeping combined with the benefits of readily available components have *reduced order levels below those of a year ago* (12/88) for the first time this year. Compared with last month's optimistic outlook, this month's responses to the next six months of system sales ranges from a negative 20 percent to a high of 20 percent with a mean of 4 percent. It is important to note that only 18 percent of those surveyed expect to see negative growth; this decline would be primarily in the defense industry. As mentioned in earlier bulletins, components availability allows users to cut order rates and still supply their production lines with sufficient material while simultaneously reducing inventory costs.

## LEAD TIMES DIP BUT STILL HIGHER THAN EXPECTED

Lead times took an effective two-day decline over last month's levels, coming in at 10.6 weeks as seen in Figure 2. The cumulative effects of long-term contracts and spot allocations of specific surface-mount logic devices have effectively countered the abundance of memory and other commodity logic devices. Standard logic (DIP) and standard speed (100 to 120ns) DRAM lead times still average four to eight weeks and will remain low for the next few months as demand appears to decline.

## MIRRORING ORDERS, BOTH TARGET AND ACTUAL INVENTORY LEVELS DROP

Figures 3 and 4 reflect how inventory control measures have become ingrained so that inventory levels match order rates. Interestingly, for the first time, the computer and overall OEM inventory levels are within a half-day difference of each other (overall OEM target/actual equals 21.3/30.4 days and computer OEMs target/actual equals 21.8/30.7 days, respectively). Because of the abundance of DRAMs, the inventory target versus actual situation without DRAMs is within one day of the total inventory levels. Overall OEMs target/actual without DRAMs is 19.9/29.8 days and computer OEMs target/actual without DRAMs is 20.0/30.0 days, respectively). Although order rates are declining, an inventory pad of approximately one month ensures that steady, but possibly smaller, order levels will continue.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Dataquest predicts that the trend of lower order rates and inventory levels will continue. Although the outlook for the next six months is not expected to be extraordinary, steady growth is expected and should be complemented by readily accessible ICs. In the current buyers' market, strategic procurement planners must continue to focus on long-term supplier relationships. At this time, production cutbacks of Japanese DRAMs are not being felt because of high supplier inventories that are being run down. A possible spot market increase in DRAM prices may occur by February because of the production controls now implemented. Contract buyers will not experience any perturbation and will continue to see good availability through the first half of 1990. Dataquest notes that the ability to remain flexible to customer needs is what differentiates suppliers in the current market, and close user-supplier communications make flexibility easier to cope with.

*Mark Giudici*
*Victor de Dios*

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# Research *Bulletin*

## MARKET WATCH: MORE POSITIVE SIGNS AS THE YEAR WINDS DOWN

*Market Watch* is a monthly bulletin that is released after the SIA book-to-bill *Flash Report* and is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

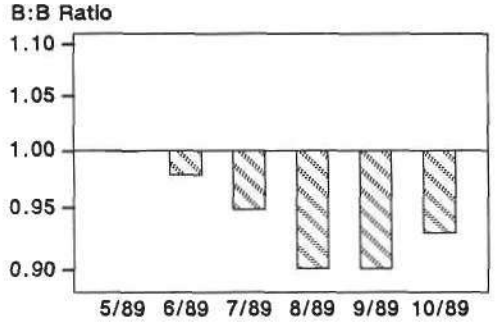



**Figure 2**
**DOC Computer Demand**

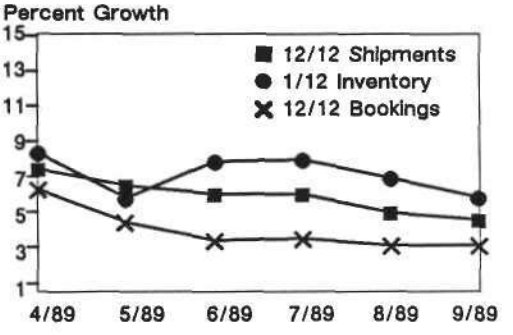



**Figure 3**
**Semiconductor Inventory Level**

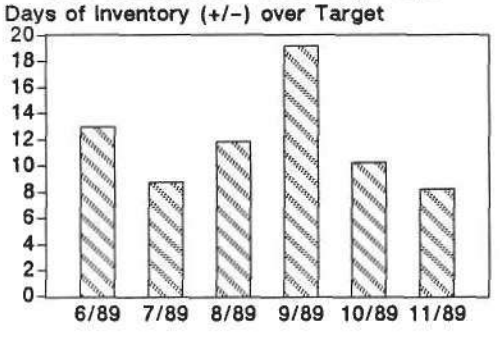
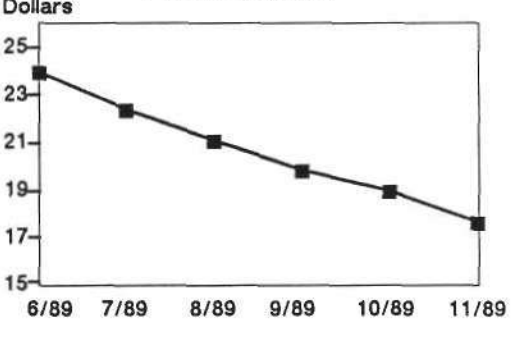



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




0005662-1

Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
November 1989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0005662



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## BOOK-TO-BILL BOUNCES BACK TO 0.93

For the first time in at least six months, the SIA book-to-bill ratio improved to 0.93 in October from 0.90 in September. Shipments fell 10 percent from September, which is slightly better than the 11-year average 12.5 percent decline in October revenue. What is encouraging is that orders grew well despite the ongoing rapid descent of MOS memory prices; this growth implies strength in other product areas.

Important questions beg for answers: What is causing these market developments? Will this pickup be sustained?

## COMPUTER DEMAND IMPROVING

Part of the change is driven by end-use demand. Computer orders, the premier leading indicators of the semiconductor industry, have stopped declining in growth. Computer shipments now are pacing orders in growth, suggesting a more stable demand for semiconductors. *But what is most significant is that the computer book-to-bill ratio achieved parity in September.*

New computer introductions contribute heavily to the improvement in computer orders. Many of these machines were announced even prior to Comdex. Computer manufacturers inevitably will spur more semiconductor demand as they build these new products to fill their distribution channels, but new products do not necessarily mean increased revenue. How well and how quickly these new products are accepted in the market will determine how long the improvement in semiconductor demand will be sustained.

These new products also have raised buyer optimism, measured in terms of system sales outlook for the next six months, as well as increasing target inventory levels. Details are in the November *Procurement Pulse.*

## LOW INVENTORY HELPS SEMICONDUCTOR INDUSTRY

Since April, we have described the slowdown as being less severe because inventory levels will be kept low. The benefits of that now are becoming apparent. The semiconductor industry will reflect improvements in the computer market with very brief lags because of dropping inventory levels of computer manufacturers.

Our surveys show that the gap between actual and target semiconductor inventory levels in user shelves has dropped even more—to about 8 days in November—which is characteristic as the year winds down. With inventory levels lower and orders increasing at the end of 1989, the first quarter of 1990 should show an improvement over this quarter.

## PRICES CONTINUE TO SLIDE

So far, prices have not reflected the mild market improvements. Prices dropped another 7 percent in November, primarily because of continued dips in DRAM and 16-bit microprocessor prices. MOS memory prices have declined by 7 percent since October, while microprocessor prices on the whole fell by 8 percent.

## DATAQUEST CONCLUSIONS

Last month, Dataquest glimpsed some positive signs, but we suggested waiting until the results of November and December supported the trend. So far, November has reinforced that trend and has added more optimism to the industry with improvements in computer orders, semiconductor orders, and inventory levels.

Dataquest believes that the first quarter of 1990 will be stronger than this quarter in terms of semiconductor shipments, but the forecast strength of the second quarter and the second half of the year will depend greatly on the U.S. economy's continuing health and the success of new computer products in the resale market.

*Victor G. de Dios*
*Mark Giudici*

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# Research *Bulletin*

## SAMONITOR: LIGHT AT THE END OF THE TUNNEL

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

### THE EQUIPMENT MARKETS

### Computers and Office Equipment

Great news: *Growth of new orders in September was a dramatic 18.2 percent above year-earlier orders! For the first time since March,*

Figure 1
Computers and Office Equipment

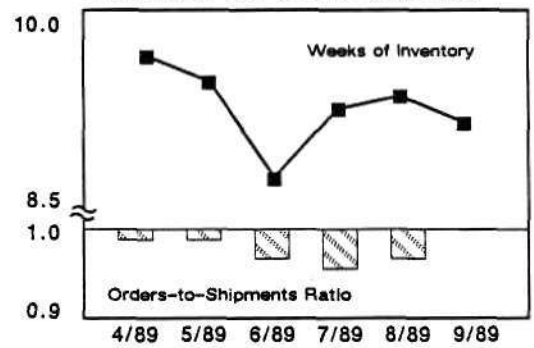



Figure 2
Communications Equipment

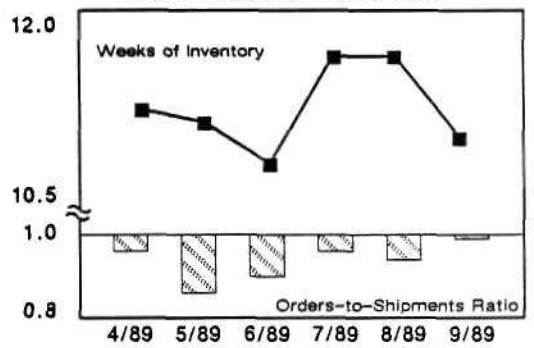



Figure 3
U.S. Instruments

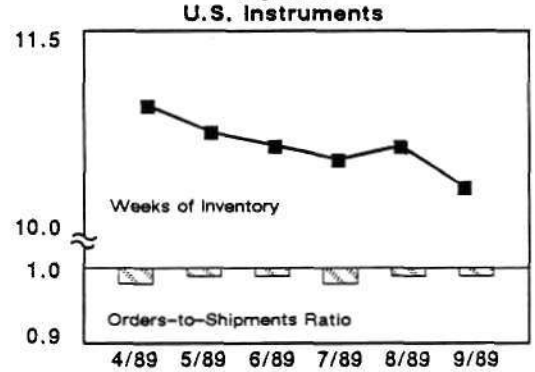
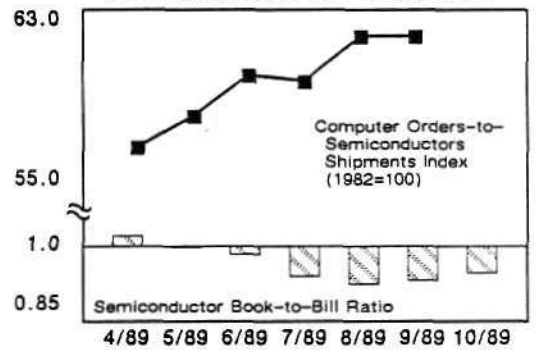



Figure 4
Semiconductors and Computers

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Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
November 1989


NASM Newsletters 1989: October-December 1989-25

0005624



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*monthly growth of new orders has been positive when compared with year-earlier levels.* Unfortunately, shipment growth continues to decelerate. For the three-month period ended in September, shipments were up 2.5 percent from the same period last year, compared with 3.6 percent in August. However, the strong showing in orders should translate into faster shipment growth in the coming months. As shown in Figure 1, the orders-to-shipments ratio rose to 1.0 in September from 0.97 in August, *the first month the ratio has been at least at parity since August 1988.* Also welcome news: Inventory levels fell slightly in September to 9.2 weeks from 9.4 weeks in August. September's exceptional order and shipment growth may not be repeated in the coming months, but Dataquest believes that solid market fundamentals for improved business growth will be in place by year-end. We still forecast a period of stable and sustained system order and shipment growth to begin in the first quarter of 1990, leading to a recovery in chip orders and shipments in the second quarter. Improved capital spending growth, combined with seasonal acceleration in order growth in the first half of 1990 should drive next year's recovery.

### Communications Equipment

Communications order and shipment growth improved significantly in September. *New orders in September grew an impressive 24.5 percent above year-earlier orders, while shipments were up 11.0 percent. These percentages represent the fastest monthly growth for orders and shipments since November 1985 and January 1988, respectively.* The orders-to-shipments ratio (see Figure 2) also improved in September and achieved parity for the first time since March. Inventories are in good shape, too. Levels fell by 0.6 weeks in September. The resurgence in order growth should yield faster shipment growth through the end of the year. We believe that the market is in the initial stage of a sustained period of improved growth. A solid base for next year's growth should be in place by the first quarter of 1990.

### Instruments

Instrument order and shipment growth improved in September. For the three-month period ended in September, order growth rose 3.7 percent, compared with a decline of 0.2 percent in August; shipment growth increased by 3.6 percent for the same period, compared with 1.8 percent in August. As shown in Figure 3, the orders-to-shipments ratio remained steady at 0.99 in September. September inventory levels fell from 10.7 weeks in August to 10.4 weeks; excess is not a problem. The upswing in order and shipment growth helps lay a foundation for future growth. We forecast a period of moderately accelerating shipment growth to begin about the first quarter of 1990, driven by (and coinciding with the expectation of) faster capital spending growth.

## SEMICONDUCTOR DEMAND

For several months, decelerating system order growth and shipment growth have resulted in declining semiconductor orders and shipments. The semiconductor book-to-bill ratio has reflected this deceleration recently, declining from its February peak of 1.07 to 0.92 in August. This trend may be in the initial stage of a reversal, however. In October, the ratio increased for the second consecutive month to 0.93 from 0.91 in September (see Figure 4). Yet the semiconductor market, although slow, is not as soft as it seems. The prices of 1Mb DRAMs have fallen significantly since the beginning of the year, making the book-to-bill ratio look worse than the fundamentals otherwise would indicate.

Nevertheless, a dim light shines at the end of the tunnel. The computer-orders-to-semiconductor-shipments index, a leading indicator of chip orders and shipments, remained stationary in September at 60.7. Except for an insignificant decrease in July, the index has risen continuously since March. Dataquest continues to interpret this trend as a sign that growth of semiconductor orders and shipments is near its cyclical trough. We also believe that computer order and shipment growth will turn upward during the first quarter of 1990, with chip orders and shipments following suit in the second quarter.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

As reported last month, Dataquest expects no significant and *sustained* improvement in computer order and shipment growth rates through the end of the year. Furthermore, we continue to note a semiconductor buyers' market, although we think we see a ray of hope. First, the rapid decline in 1Mb DRAM prices taints the semiconductor book-to-bill, making things appear worse than they really are. Second, the computer-orders-to-semiconductor-shipments index continued to look positive in October. If system order and shipment growth picks up in the first quarter of 1990, as expected, semiconductor business conditions are likely to follow suit in the second quarter of 1990. Dataquest encourages semiconductor manufacturers not to be unduly preoccupied with current market conditions, but to be light on their feet and ready to spring into action during the coming year.

*Terrance A. Birkholz*

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# Research *Bulletin*

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## NOVEMBER PROCUREMENT PULSE: MARKET OPTIMISM SPREADS ALTHOUGH ORDERS AND INVENTORIES SHRINK

The Procurement Pulse is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

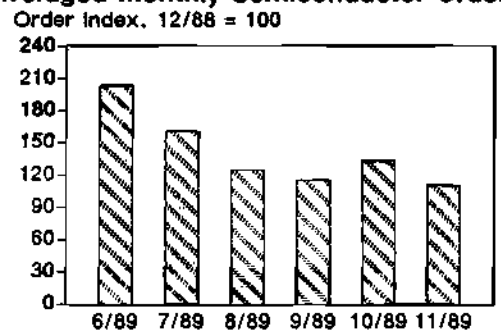



**Figure 2**
**Averaged Semiconductor Lead Times**

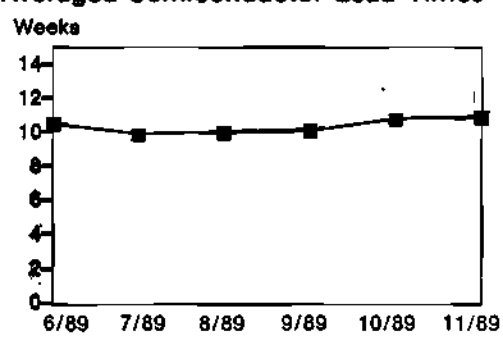



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

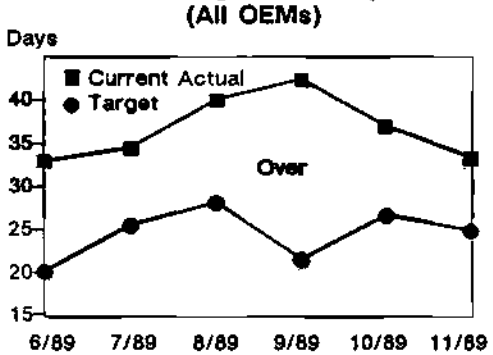
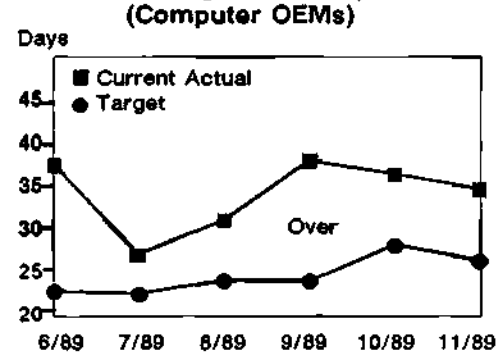



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**

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Source: Dataquest November 1989



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## THE SEMICONDUCTOR ORDER SEESAW DIPS ONCE AGAIN

This month's survey respondents expect to order 17.3 percent fewer semiconductors in November than in October, as shown in Figure 1. End-of-year financial housekeeping and continued concern over above-target inventory levels have kept order rates in check. The outlook for the next six months continues to brighten as purchasing managers expect to see system sales grow an average of 8.2 percent over October's six-month estimate of 5.4 percent. The range of negative 5 percent to positive 20 percent growth has not changed, but one-half of the respondents now expect growth of 8 percent or more during the next two quarters. Adequate semiconductor supplies allow users to trim costs and respond quickly to changing system demand. Dataquest expects this order behavior to continue through the next six months as suppliers continue to adjust to the demand slowdown.

## LEAD TIMES SLIGHTLY HIGHER—SMT LOGIC STILL A BOTTLENECK

Figure 2 shows how lead times have increased an average of one day over last month's 2.5-day increase for the same reason as last month—the stretch-out of surface-mount standard logic lead times. Lead times now have lengthened to as long as 18 weeks for certain SMT parts from some suppliers. Besides the SMT logic situation, all other semiconductor lead times are reasonable (an average of four to eight weeks) and can be expected to remain so. DRAM and SRAM lead times continue to improve as supplies increase, in contrast to flat demand.

## GOOD NEWS! INVENTORY TARGETS REMAIN FLAT WHILE ACTUAL LEVELS FALL

Figures 3 and 4 show that computer manufacturers and all OEMs generally have kept their inventory targets flat and have reduced inventory levels in response to slow but steady system sales and seasonal end-of-year accounting cost cutting. The targeted inventory level has been kept to within a 20- to 28-day guardband for the past six months, reflecting corporate concern over inventory costs. The target-to-actual inventory difference overall and for computer OEMs now is practically the same, at 8.5 and 8.3 days, respectively. Actual inventory levels (including DRAM/WIP) dropped to 34.9 days for computer OEMs and 33.6 days for the overall sample.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

Dataquest observes that both order rates and inventory levels are down. Overall semiconductor availability is good and dependable. System sales are not growing at hyper rates; rather, they are chugging along in steady, low, single-figure percentages. Aside from an isolated product-specific problem, this dependability is the correct way for strategic supply base management to work. Price declines have become a given, with many users having monthly price reviews. By looking at the total cost of supply, however, a lower price is but one variable that has to be examined. The increased optimism for system sales in the next six months combined with the supply controls now in place should allow for quick upward adjustment to demand (when it occurs) for users who retain their strategic supplier base. With the current spate of computer company financial woes in the news, the question is whether or not the increased optimism is centered around new product offerings that will sustain growth. We believe that the aggressive pricing now seen in the DRAM area will fuel new product offerings faster than we thought six months ago. We recommend that users and suppliers continue to foster close communications now so that any change in demand can be relayed quickly and accurately, thus avoiding future availability problems.

Mark Giudici
Victor de Dios

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# Research *Bulletin*

## SAMONITOR: THE LAZY DAYS OF SUMMER TURN TO FALL

The *SAMonitor* is a monthly update that closely monitors changes in key electronic equipment markets. It presents important tactical leading indicators of semiconductor business activity and discusses the potential impact of equipment market fluctuations on chip orders and shipments.

**Figure 1**
**Computers and Office Equipment**

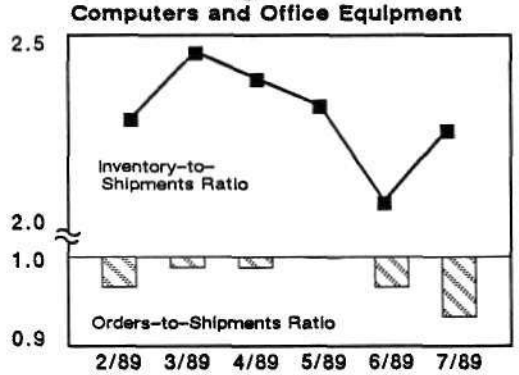


**Figure 2**
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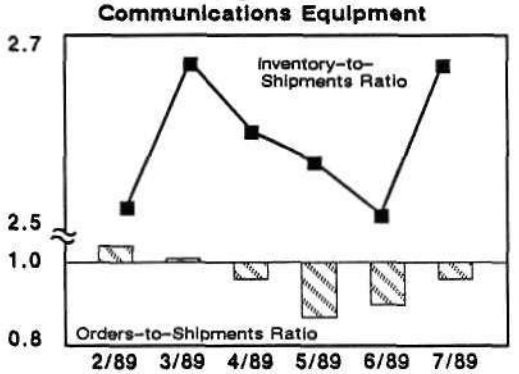



**Figure 3**
**U.S. Instruments**

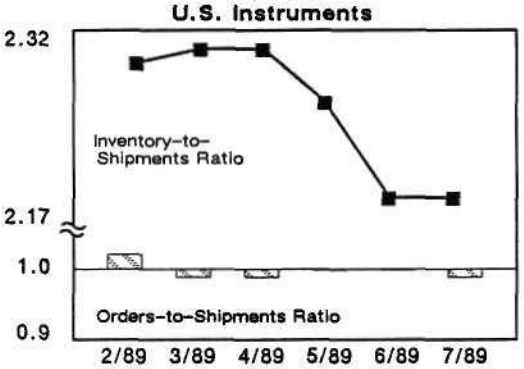
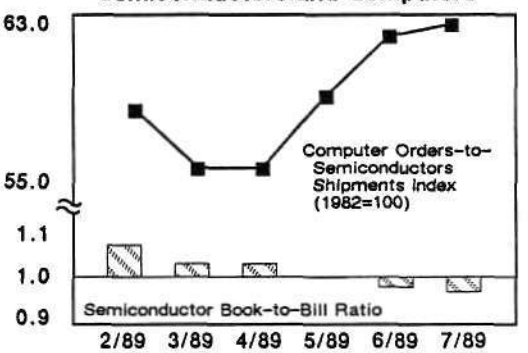



**Figure 4**
**Semiconductors and Computers**

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*Source:* U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
October 1989


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## THE MARKETS

### Computers and Office Equipment

The combination of inventory overhang and continued decelerating growth in orders and shipments indicates that the slowing shipments growth that began late last year is likely to continue through the end of 1989. As shown in Figure 1, the computer and office equipment orders-to-shipments ratio fell for the second consecutive month in July to 0.94, from 0.97 in June. Order growth rates are running slower than shipment growth rates, and both have been slipping since January. For the three-month period that ended in July, orders were down 2.8 percent from the same period last year, compared with a decline of 1.3 percent in June. Shipments were up 3.9 percent from the same period last year, compared with 5.0 percent in June. The inventory-to-shipments ratio shows typical seasonality with one important exception: So far this year, the ratio averages 2.17, or 0.11 above the same period last year, indicating that actual inventories are above desired inventories. In light of this and the slowing growth in orders and shipments, Dataquest expects new systems growth to continue to slip for the remainder of this year, not turning around until the first quarter of 1990. In turn, semiconductor shipments growth is not likely to turn around until the second quarter of 1990.

### Communications Equipment

The gradually slowing growth that began early last year may be coming to an end. As shown in Figure 2, the July orders-to-shipments ratio rose for the second consecutive month to 0.96. For the three-month period that ended in July, orders were up 6.9 percent from the same period last year, compared with 2.5 percent in June. The inventory-to-shipments ratio jumped up unexpectedly in July, but excessive inventories should not pose an immediate problem. Through July, this year's ratio is 0.06 below last year's ratio. In view of this situation, if the recent pickup in orders growth continues, a pickup in system shipments growth is likely before year-end. Compared with the computer market, the communications market represents a relatively safe haven for chip manufacturers during the next six months.

### Instruments

Instrument production may be taking a turn for the worse. As shown in Figure 3, the orders-to-shipments ratio fell slightly in July to 0.99 from 1.0 in June. More important, however, new orders and shipments in July fell 6.5 percent and 0.5 percent, respectively, from year-earlier levels. *This is the first time in more than two years that either shipments or orders have contracted, and seldom does a contraction last only a month. If history repeats itself, we're likely to face at least a few more months of shrinking orders and shipments.* Fortunately, inventory levels are appropriate for the current level of shipments.

## SEMICONDUCTOR DEMAND

Since the beginning of the year, decelerating systems orders and shipments growth have translated into declining semiconductor orders and shipments. The semiconductor book-to-bill ratio peaked at 1.07 in February and has declined continuously to 0.94 in August (see Figure 4). As grim as this situation looks, there may be some light at the end of the tunnel: Dataquest's index of computer orders to semiconductor shipments, a leading indicator of semiconductor orders and shipments, rose strongly in May and June and edged up slightly in July. If this trend continues, semiconductor orders and shipments are probably near their cyclical trough. Assuming that computer orders and shipments growth begins to accelerate in the first quarter of 1990, semiconductor shipments growth also could begin to accelerate during the second quarter of 1990.

## DATAQUEST CONCLUSIONS AND RECOMMENDATIONS

Dataquest expects no significant immediate improvement in computer order and shipment rates through the end of the year. With the semiconductor book-to-bill ratio falling since February and reaching 0.94 in August, there are a whole lot of chips out there chasing a pretty slow equipment market. Perhaps the only relief in sight is the computer orders-to-semiconductor shipments index that turned up for the third consecutive month, after falling continuously since December 1988. If the index continues to rise, semiconductor business conditions are likely to improve during the first quarter of 1990. To be competitive in this chip buyer's market, we recommend that semiconductor manufacturers be vigilant in their commitment to running a lean and nimble operation and competing on intangibles, such as customer service and satisfaction. Dedication to these matters is the best insurance for catching the next business upswing and the attendant market share.

*Terrance A. Birkholz*

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# Research *Bulletin*

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0005292

## OCTOBER MARKET WATCH:
## A WORSE FOURTH QUARTER BUT POSITIVE SIGNS EMERGE

Market Watch is a monthly bulletin that is released after the SIA book-to-bill Flash Report and is designed to give a deeper insight into the monthly trends in the semiconductor market and an analysis of what to expect in the next six months (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

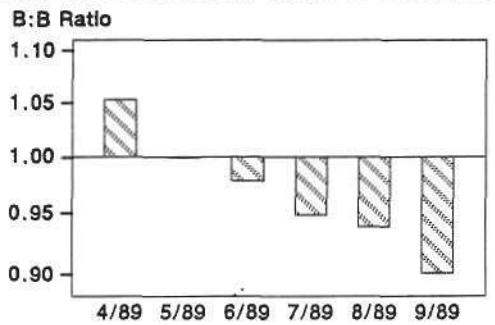



**Figure 2**
**DOC Computer Demand**

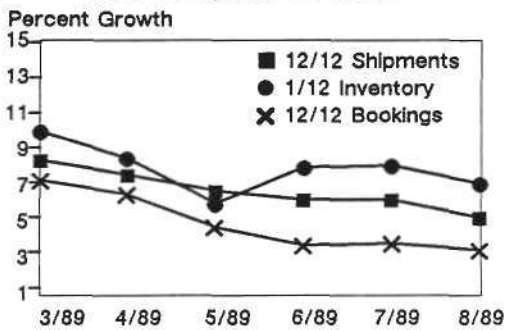



**Figure 3**
**Semiconductor Inventory Level**

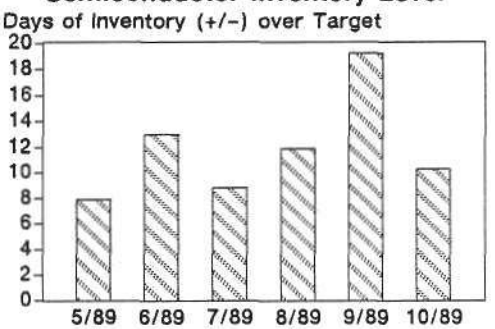
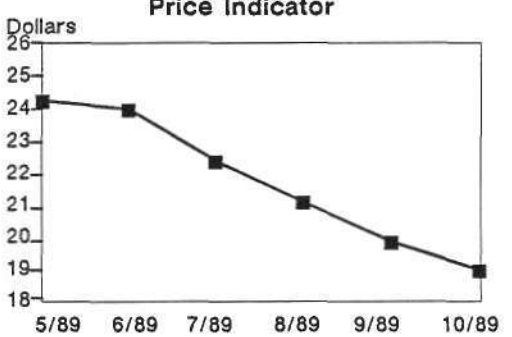



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**

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Source: U.S. Department of Commerce
World Semiconductor
Trade Statistics
Dataquest
October 1989

## BRACE YOURSELF FOR A WORSE FOURTH QUARTER

The fourth quarter promises to be even weaker because of poor orders in the third quarter. The September SIA book-to-bill of 0.90 made the final statement of a market that has indeed "gone south" and will continue to do so for at least the next two quarters. MOS memory, accounting for 37 percent of the North American market, exacerbates the situation with rapid price drops in DRAMs and SRAMs.

On a positive note, semiconductor revenue stayed flat in the third quarter, declining by only 0.5 percent (Dataquest estimates) or 0.1 percent (WSTS estimates). With the third-quarter price-driven decline in MOS memory revenue, other IC products appear to be more resilient than in the second quarter. MOS memory market ASPs are making the aggregate market numbers worse just as they made them look better early in the year.

## DEMAND CONTINUES TO DECLINE; SOME HOPEFUL SIGNS APPEAR

Computer order and shipment growth continues to weaken, signaling continuing poor demand. However, for the first time in five months, computer order growth dropped only slightly compared with shipment drops, indicating that the computer book-to-bill ratio has reversed its downward trend. This ratio is still below unity, but the change in direction is a welcome sign. (See the October SAMonitor for more details.) On the negative side, computer inventories have continued to outgrow orders and shipments since June. Inventories are about twice shipment levels, still bordering on being manageable.

## INVENTORY LEVELS STILL UNDER CONTROL; PRICES STILL SLIDING

OEM semiconductor inventory levels over target have dropped slightly since September. Again, these swings in inventory levels will continue as OEMs continue to implement just-in-time and inventory control systems. DRAM inventory levels continue to grow faster than non-DRAM. With computer order growth starting to stabilize, Dataquest foresees increased OEM target inventory levels and improved buyer optimism about system sales in the next six months. (Consult the October Procurement Pulse for more inventory analysis.)

Prices of Dataquest's basket of 25 key products dropped by 4.0 percent in October compared with 5.7 percent in September. Although DRAM and SRAM prices continue to fall quickly, we see more stable pricing in microprocessors and EPROMs. We will add a list of new products to our basket next month, having tracked their prices since September. Amazingly, microprocessor prices actually increased in October compared with last month—another healthy sign of a possible market turn.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

When Dataquest began Market Watch in April, we saw several hints of a rapidly approaching slowdown, despite the strong market at that time. We appear to be at the crossroads again as we begin to see subtle clues of a stronger market that may bounce back mildly by the second quarter of 1990.

Dataquest believes that several factors are buoying up the North American market. European and Japanese markets remain strong and are fueling continued U.S. electronic equipment production. The U.S. economy is sound; economic forecasts have wiped out the possibility of a 1990 recession. During the next two months, we will explore the leading indicators to determine if we can anticipate a recovery in the first half of 1990.

Victor de Dios
Mark Giudici

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# Research *Bulletin*

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## OCTOBER PROCUREMENT PULSE: ORDER PICKUP + INVENTORY CONTROL = INDUSTRY OPTIMISM

The Procurement Pulse is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

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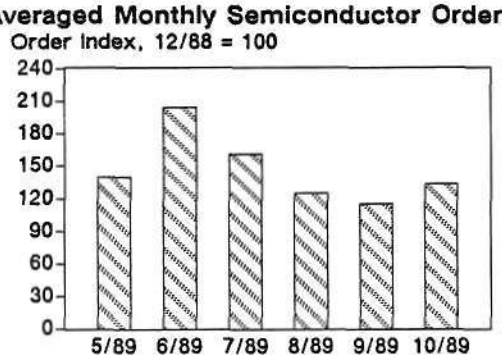



**Figure 2**
**Averaged Semiconductor Lead Times**

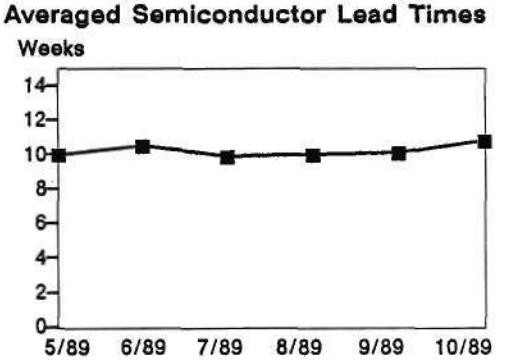
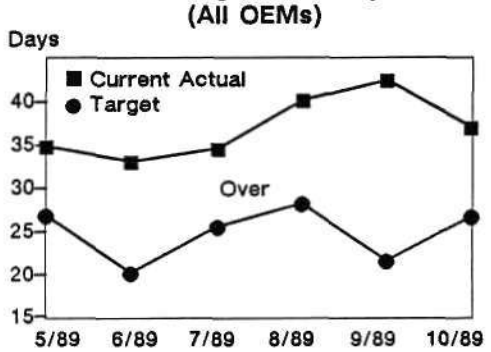



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

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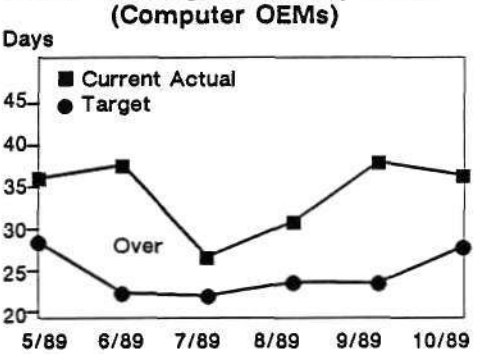


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Source: Dataquest October 1989

## SEMICONDUCTOR ORDERS RISE TO MATCH SYSTEM GROWTH EXPECTATIONS

Figure 1 shows that this month's respondents expect to order 16 percent more semiconductors in October than in September in anticipation of new system sales and a perceived need for safety stock to support the new products. This turnaround in order levels after three months of consecutive decline indicates a higher level of optimism regarding system sales in the next six months. Last month, procurement managers expected six-month growth to average an increase of 4.5 percent (ranging from a decline of negative 2 percent to an increase of positive 10 percent). This month, they expect an average increase of 5.4 percent (ranging from negative 5 percent to positive 20 percent). As a result of tight system and component inventory controls, it appears that upticks in system demand will be felt quickly in semiconductor order rates.

## LEAD TIMES INCH UPWARD—SMT STANDARD LOGIC THE CULPRIT

Lead times have risen by 2.5 days on the average since our last survey, as seen in Figure 2, primarily due to the rapid increase in surface-mount standard logic lead times that have stretched out as long as 10 to 12 weeks. Because of unanticipated demand and little or no reserve SOIC manufacturing capacity, lead times for these parts have jumped by 4 to 6 weeks from bookings made as recently as a month and a half ago. Prices for these parts currently are unchanged but expected to rise slightly by the end of the year because additional SMT capacity is not planned to come on-line for the next six months. Other product lead times remain stable or are falling—especially for SRAMs and some specialty DRAMs.

## INVENTORY TARGET LEVELS RISE AS INDUSTRY OPTIMISM EMERGES

Figures 3 and 4 show that both computer manufacturers and all OEMs in general have raised their inventory targets and lowered their actual inventory levels. As new systems gear up for production, anticipated needs of safety stock are being reflected now in overall raised targeted inventory levels. Procurement managers continue to cut inventories and have slashed the target-to-actual difference for overall and computer OEMs to 10.3 and 8.2 days, respectively. Non-DRAM inventory is below 5 percent of actual inventory levels of both the computer and overall OEM respondents, reflecting the current nonissue of memory availability. Actual inventory levels (including DRAM/WIP) dropped to 36.6 days from 38.2 days for computer OEMs and to 37.2 days from 42.6 days for overall OEMs.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

The order-rate/inventory-level seesaw continues. The current outlook appears to have a rosy tint of optimism as the procurement community expects the next six months to grow at rates higher than forecast relative to the past three months. Dataquest expects the semiconductor industry to bottom out by the first quarter of next year. Aside from SMT standard logic, semiconductor availability is excellent and prices continue to decline predictably. The current supply-demand situation may lead some buyers to demand short-sighted unrealistic price cuts that could sour long-term supplier-user relationships. Buyers need to forecast their six-month needs accurately now. If the industry turns around in the late first or early second quarter of next year as it appears that it will, availability (or the lack of it) and benefits of good supplier relations again will be issues that take top priority.

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Victor de Dios

  

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# Research Newsletter

## U.S. ALLIANCES AND AGREEMENTS: SURVIVING IN A RESOURCE-LIMITED WORLD

### SUMMARY

No single semiconductor company can satisfy all the diverse requirements of the $300 billion North American electronic equipment market. In fact, the financial investment in resources necessary just to continue to survive in the semiconductor industry is overwhelming. Many manufacturers resort to more innovative and focused marketing strategies. Many more enter into alliances and agreements with others to accumulate the needed resources. Unfortunately, alliances exact a price.

Dataquest recommends that semiconductor companies approach alliances strategically and avoid trading vital, long-term resources to achieve short-term gains. We also recommend that companies adopt a competitive, not just financial, attitude in entering alliances because these concords will determine their future competitive postures.

### OVERVIEW OF U.S. AGREEMENTS AND ALLIANCES

From 1980 through 1988, U.S. companies entered into 432 significant and publicly known agreements, one-half of which were with foreign-based manufacturers. Table 1 shows an historical summary of U.S. agreements, and Figure 1 shows the yearly magnitude in that period.

The magnitude of agreements has increased dramatically since 1984. More companies realize that they cannot muster all the resources that they need on their own or develop all technologies in-house. The "not invented here" or "NIH" syndrome has succumbed to the realities of the marketplace. Dataquest anticipates that alliances will continue to grow at a high rate.

*From 1980 through 1988, U.S. companies entered into agreements with other U.S. companies 50 percent of the time, with Japanese companies 29 percent of the time, with European companies 14 percent of the time, and with Asia/Pacific and ROW companies 7 percent of the time.*

### Microcomponents, ASICs, and Memories Dominate Agreements

The nature of these agreements differs from year to year. Figure 2 presents the products involved in agreements since 1980. From 1982 through 1984, there was tremendous interest in the declining fortunes of the U.S. industry in the memory market. Most activity centered around SRAMs, EPROMs, and DRAMs. It was also during this period that South Korean manufacturers began to take an active role in the memory market. After 1984, attention shifted to ASICs and, more recently, to microcomponents as more companies design processing chips that are dedicated to intelligent peripherals.

*From 1980 through 1988, microcomponents (microprocessors, microcontrollers, and microperipherals) accounted for 25 percent of all agreements. ASICs and memories followed closely with 24 percent each of all agreements during the same period.*

Dataquest predicts that future agreements will center around U.S. companies' needs to utilize 0.5-micron processes, 8-inch wafer procedures, BiCMOS technology, and advanced packaging techniques, all of which will be crucial to future semiconductor applications. Japanese companies are recognized leaders in these fields. Although U.S. companies have the expertise to develop these


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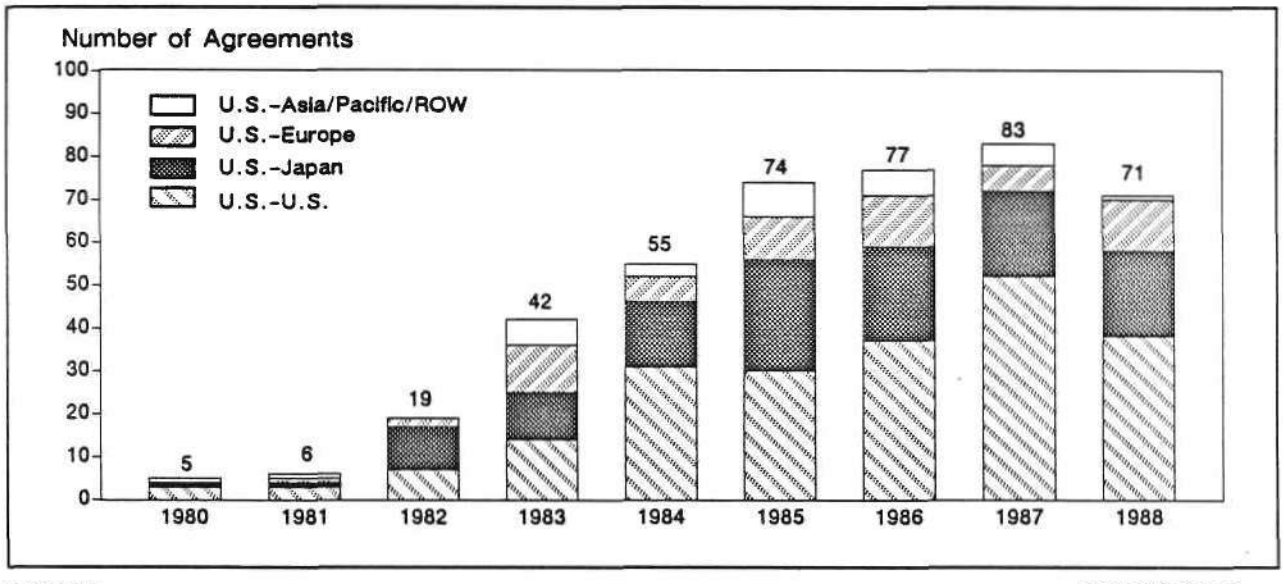
TABLE 1
**Summary of U.S. Agreements and Alliances**

| Year | Major Relationships | Major Agreement Type | Major Product |
|---|---|---|---|
| 1980 | U.S.-U.S. | Second-sourcing | None |
| 1982 | U.S.-Japan | Technology exchange | Memory |
| 1984 | U.S.-U.S. | Joint development, technology exchange, second-sourcing | Memory, micro, ASIC |
| 1986 | U.S.-U.S. | Joint development | ASIC |
| 1988 | U.S.-U.S. | Joint development | Micro |

Source: Dataquest
October 1989

FIGURE 1
**U.S. Agreements with Other Regions**

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Source: Dataquest
October 1989

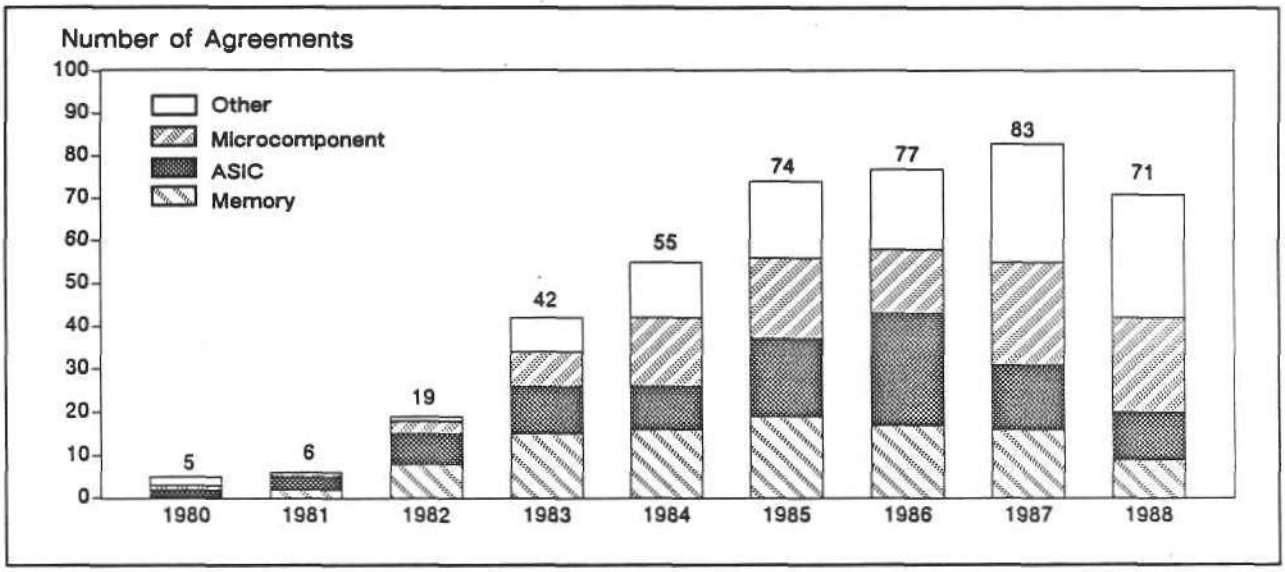
leading-edge areas, their domestic industrial structure does not foster development as quickly as does Japan's.

## Technology- versus Manufacturing-Related Agreements

Most U.S. agreements involved the development of more and better technology (as shown in Figure 3) through joint development, technology exchange, and second-sourcing agreements. Since 1986, however, agreements have expanded to areas that reduce manufacturing risk, capital investment, and time to market. These agreement types include foundry arrangements, sales agreements, and joint ventures.

*Joint development agreements accounted for 31 percent of agreements made from 1980 through 1988, second-sourcing amounted to 27 percent, and technology exchanges 17 percent. Manufacturing-related agreements made up 17 percent of the total from 1980 through 1988 but were more heavily concentrated from 1986 through 1988. From 1986 through 1988, manufacturing-related agreements accounted for 24 percent of the total.*

FIGURE 2
U.S. Agreements by Product Family

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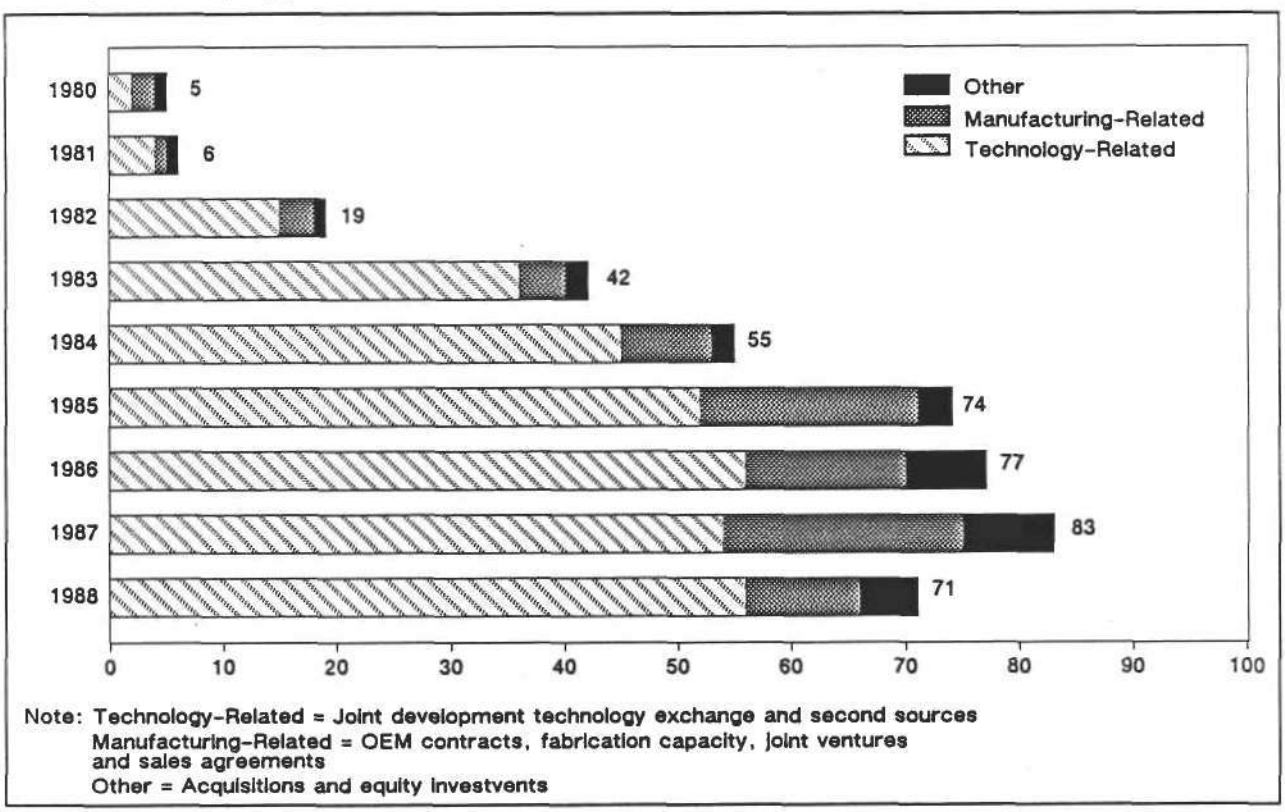
Source: Dataquest
October 1989

FIGURE 3
U.S. Agreements by Type

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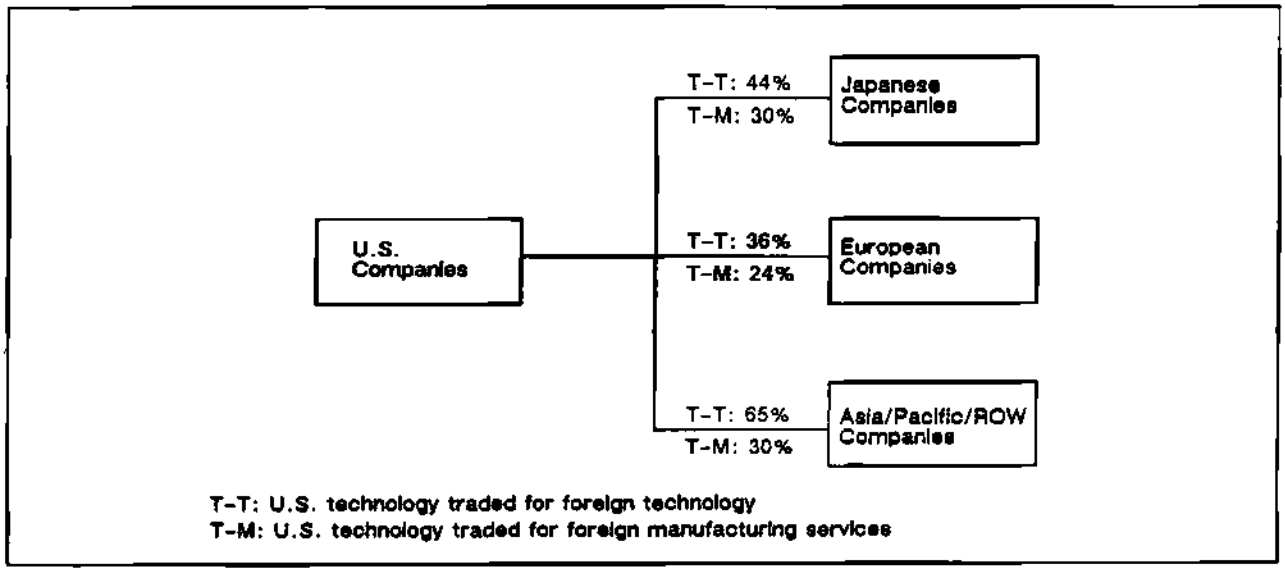
Source: Dataquest
October 1989

FIGURE 4
Technology for Manufacturing Services

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Source: Dataquest October 1989

Start-up companies that have their products built by offshore foundries have needed less capital, gained access to more advanced CMOS processes, and introduced their products much earlier than if they had built the devices themselves. Large semiconductor companies have benefited by farming out production of declining products to foundries or by reselling complementary products of other companies to reduce manufacturing risk and capital requirements and to increase revenue beyond their physical manufacturing capabilities.

## The Price of Agreements

Although agreements have benefits, they also have long-term disadvantages, depending on the nature of the agreement. Technology-related agreements have little downside; however, companies still need to implement these technologies in the marketplace. It is the implementation, not the technology, that eventually determines success or failure.

On the other hand, manufacturing-related agreements meld the fates of contracting parties more closely. A foundry essentially becomes a "hollow" start-up company's manufacturing arm. Delays in manufacturing, priority changes, or process revisions are beyond the start-up company's control. A foundry typically is a semiconductor company that builds and sells its own products. It learns from its foundry business. Large companies that use contract manufacturing facilities may be breeding and nurturing future competitors.

A manufacturing service fulfills a short-term need. Technology, on the other hand, is a long-term strategic resource. To trade technology for manufacturing service in the long haul undermines the competitive ability of the technology giver. Unfortunately, U.S. companies, particularly start-ups, have given a large proportion of their technology in exchange for manufacturing services, as shown in Figure 4.

## DATAQUEST RECOMMENDATIONS

The more succesful U.S. semiconductor companies have learned to focus their resources on the development and manufacture of a defined set of products and have expanded into other areas through alliances and agreements. They subscribe to basic business sense by concentrating on their own strengths and using others' resources to improve their weaknesses. Semiconductor companies will need to pursue this approach as the investment requirements and technology scope of this industry continue to increase dramatically.

What is important is not to lose sight of the fact that alliances and agreements are long-term arrangements and must be treated with a strategic and competitive attitude. Alliances are a competitive and strategic tool. Semiconductor companies must measure how long they will have to trade long-term technology resources for short-term manufacturing and financial gains. Semiconductor companies must accumulate their alliances and resources to arrive at a significantly improved competitive posture several years from now.

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# Research Newsletter

## NORTH AMERICAN MARKET DEVELOPMENTS QUARTERLY EVENTS NEWSLETTER OCTOBER 1989

This is the fourth quarterly events newsletter issued by Dataquest's North American Semiconductor Markets (NASM) service. It contains a synopsis of news events gathered from the trade press during the past quarter.

The following is a key to the publications reviewed during research for this issue:

| | | | |
|---|---|---|---|
| *Electronic News* | EN | *Electronic Buyer's News* | EBN |
| *Business Journal* | BJ | *San Francisco Chronicle* | SFC |

Contents



The contents of this newsletter were gathered from information generally available to the public or released by responsible individuals in the subject companies, but are not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients.

## TECHNOLOGY

### VHS Tape Library from Honeywell

Honeywell's Test Instruments Division has developed a 3-terabyte, 600-cartridge robot tape library. The $500,000 unit will be marketed in the medical imaging and geophysical industries. (EN, July 17, 1989)

### Unisys Switches to Motorola's 88000

Unisys has selected Motorola's 88000 RISC processor for fault-tolerant, on-line transaction processing systems to be introduced in 1991. The company also has plans to market the 68000-based S/Series multiuser systems developed by its Network Computing group. (EN, July 17, 1989)

### Digital to Recast VAX Line

Digital Equipment Corporation announced major changes to its VAX/VMS computer line. The company plans to recast the platform as a RISC series by the 1990s. (EN, July 17, 1989)

### IBM's Microcode Pack

IBM has developed a hardware/microcode package for its mainframe tape drive storage subsystems. The system allows for 70 percent improvement in performance and uses fewer bits for each datum recorded. The package should be available at the end of September. (EN, July 31, 1989)

### New Tape Drive from Honeywell

A new tape drive for data recording has been developed by Honeywell. The drives will record on tape cartridges of a helical-scan format as used in broadcasting. Also announced was a jukebox archive system based on the company's very large data store (VLDS) drives. This system can handle up to 600 cassettes, has a retrieval speed of 70 seconds, and will cost $525,000 to $599,000. (EBN, July 24, 1989)


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### SCSI Host Adapter from NCR

NCR Microelectronics Products Division has developed an SCSI host adapter with a 32-bit DMA core and a 2-mips reduced-instruction-set I/O processor (#53C700). The price will be $48.70 per unit in quantities of 1,000. (EN, September 7, 1989)

### Harris' High-Speed Op Amp

Available from Harris Semiconductor is the HA-2548 monolithic operational amplifier. The device is suitable for applications such as precision high-speed signal conditioning, instrumentation, video/pulse amplifiers, and buffers. (EBN, September 11, 1989)

## PROFITS AND LOSSES

### Second Quarter Ups and Downs

Table 1 compares the second quarter earnings gains and losses between the years 1989 and 1988.

## ORGANIZATIONS AND REORGANIZATIONS

### Honeywell Job Cuts

Honeywell is planning a threefold restructuring to make itself less attractive to corporate raiders. The company will cut 4,000 jobs, back off from its weapons business, and provide more cash to shareholders. Honeywell will continue to focus on controls such as home thermostats and automation equipment for paper mills and chemical plants. (SFC, July 25, 1989)

### Rockwell's Reorganization

Rockwell International has appointed three senior executives as chief operating officers: Kent M. Black, Sam F. Jacobellis, and J. Tracy O'Rourke. The reorganization stems from the corporation's need to improve efficiency in its aerospace, electronics, automotive, industrial automation, and graphics businesses. (EN, July 17, 1989)

### Harris' New Marketing Division

Harris Semiconductor has merged its U.S. and international sales and marketing operations into a new marketing division. Raymond Oglethorpe was named its vice president and general manager. (EN, July 17, 1989)

### Unisys Resignation/Appointments

Paul Ely, executive vice president of Unisys Corporation, has resigned. His replacement is Cyril Yansouni, corporate vice president and Unisys'

TABLE 1
**Second Quarter Earnings Gains and Losses**

| | 1988 | 1989 | Percent Change |
|---|---|---|---|
| AT&T | $594M | $699M | 18% |
| General Electric | $835M | $972M | 16% |
| GTE | $299M | $329M | 10% |
| IBM | $964M | $ 1.3B | 39% |
| Motorola | $120M | $154M | 28% |
| Amdahl | $ 53M | $ 33M | (38%) |
| Digital Equipment | $401M | $313M | (22%) |
| Intel | $130M | $ 99M | (24%) |
| Lockheed | $102M | $ 77M | (24%) |
| Unisys | $162M | $ 54M | (67%) |

M = Million; B = Billion

Source: Electronic News

Network Computing group vice president of products and systems. (EN, July 17, 1989)

James A. Unruh was appointed president and chief operating officer of Unisys Corporation. Also announced were cost-cutting moves that included the elimination of approximately 7,000 jobs. (EN, September 4, 1989)

### Pink Slips for Unisys Employees

A recent contract suspension by the navy (since lifted) and cutbacks in overall military spending have forced Unisys to hand out pink slips to 160 employees from its Shipboard and Ground Systems group, based in Great Neck, New York. Those affected included engineers and support staff. (EN, July 24, 1989)

### AT&T Job Cuts

AT&T plans to lay off 650 workers at its Merrimack Valley, Massachusetts, facility by the end of the year due to declining orders for transmission equipment. The cutbacks will affect executives, plant engineers, and office workers. (EN, July 24, 1989)

### IBM/Kodak Data Center

In a recent agreement with Eastman Kodak, IBM will build, equip, own, and manage a data processing center for Eastman Kodak. IBM will hire 300 Kodak employees, consolidate four data centers into one central site, and control future hardware procurements at Kodak. (EN, July 31, 1989)

### Electronic Operations Dropped by Rockwell

A reorganization of its top management led Rockwell International to eliminate its Electronic Operations. A new layer of senior executives was created, a three-member office of the chief operating officer. However, Rockwell has stated that the company is strongly committed to its electronics-related business units and that there will be no changes in the company's operations, particularly at its Newport Beach, California, facility. (EBN, July 24, 1989)

### Northern Telecom Changes

The new purchasing/planning manager for Northern Telecom's Meridian Communications Systems Division is Brian Lawrence. Mr. Lawrence formerly was based in Northern Telecom's Nashville, Tennessee, facility; plans to cease manufacturing of business terminals at this plant were made recently. Northern's digital terminals now will be made in Santa Clara, California. (EBN, July 24, 1989)

### Northern Telecom Withdraws Networking System

Weak sales caused Northern Telecom to withdraw its Meridian data networking system from the market. The withdrawal affects approximately 450 manufacturing and support employees. (EN, September 4, 1989)

### Harris Execs Elevated

Three senior vice presidents were elevated to the new post of president of their respective sectors: Jon Cornell, Semiconductor Sector; Philip Farmer, Electronic Systems Sector; and Guy Numann, Communications Sector. (EN, September 4, 1989)

## CONTRACTS, PACTS, AND ALLIANCES

### Satellite Pact for GE

General Electric's Astrospace Division was awarded a $228.2 million air force contract for five new Defense Meteorological Satellites. (EN, July 17, 1989)

### ATT/Intel Agreement

A joint-development agreement between AT&T Computer Systems and Intel Corporation has been disclosed. As part of the agreement, AT&T and Intel engineers plan to develop computers that would be sold, but not manufactured, by AT&T. (EN, July 17, 1989)

### Northrop Contract Suspension

Northrop's Precision Products Division was suspended from receiving government contracts pending the review of a criminal indictment. (EN, July 17, 1989)

### HP/Hitachi/Cray Agreements

Through an agreement with Hewlett-Packard, Hitachi, Ltd., of Japan will make HP's Precision Architecture microprocessor, which is based on reduced-instruction-set computing (RISC).

It was also announced that Cray Research would cross-license its patents with Hitachi, thus allowing both companies to use each other's patents in designing computer hardware. (SFC, August 1989)

### Data General/Hewlett-Packard License

Data General has licensed Hewlett-Packard's NewWave windowing software. DG plans to use the package in an office automation offering. The company is the first U.S. systems vendor to license NewWave. (EN, September 4, 1989)

### DOD Cuts Projects

Cutbacks in various programs by the Department of Defense hit the following companies: McDonnell Douglas F-15 and AH-64 attack helicopters (78 aircraft deleted), Hughes Phoenix Missile (873 missiles cut), Northrop Tacit Rainbow drone (11,762 vehicles deleted), and Bell OH-58D helicopter (168 helicopters cut). These cutbacks are the result of a $19.7 billion reduction in major projects by the Pentagon. (EN, September 4, 1989)

## PLANTS—NEW LOCATIONS, EXPANSIONS, AND CLOSINGS

### Lockheed Consolidation

Lockheed Electronics plans to consolidate facilities at its main plant in Plainfield, New Jersey, and sell a 320,000-square-foot building. The company will phase out its hybrid microelectronics design and production work and later will increase its purchases of manufacturing services from outside suppliers. (EN, July 24, 1989)

### Control Data Leasing Facility

Control Data may lease its 425,000-square-foot facility in Santa Clara, California, to two or three smaller companies. Although Control Data ceased its own operations there in late 1987, the facility has been costing the company $250,000 per year. (BJ, September 11, 1989)

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# Research *Bulletin*

## SEPTEMBER MARKET WATCH: BUYERS PUT ON THE BRAKES AS MARKET CONTINUES TO SLIDE

*Market Watch* is a monthly bulletin that is released after the SIA book-to-bill *Flash Report* and is designed to give a deeper insight into the monthly trends in the semiconductor market (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

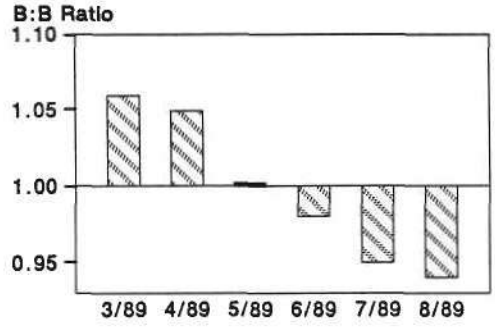



**Figure 2**
**DOC Computer Demand**

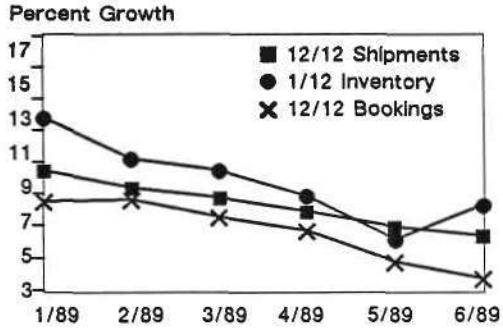



**Figure 3**
**Semiconductor Inventory Level**

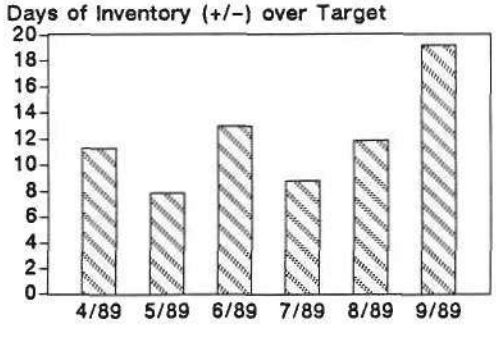
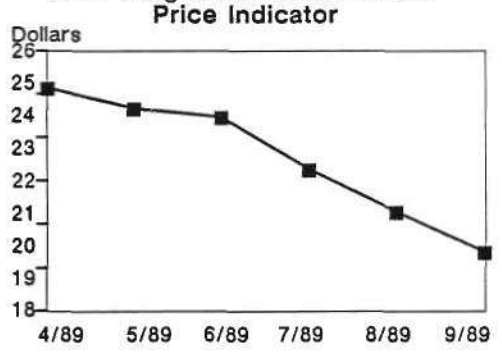



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**

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Source: U.S. Department of Commerce
World Semiconductor
Trade Statistics
Dataquest
September 1989


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## BOOK-TO-BILL SLIPS FURTHER TO 0.94

The summer slump in semiconductor bookings and billings continues, but this seasonal slowdown is compounded by users experiencing comparably declining system sales growth. Dataquest believes that the current softness in the semiconductor market will continue for the next six months as a result of the fundamental decrease in electronic system demand.

## COMPUTER BOOKINGS DOWN, SYSTEM INVENTORIES UP

*System inventory levels have begun to rise again in the face of booking and shipment declines.* The slowing system shipments, the rapidly falling booking rates, and an increase in system inventories all indicate that the computer industry will continue to cut costs. *At the current rate, the largest user of semiconductors in the United States—the computer industry—will barely show positive growth for 1989.* What this fact means for semiconductor suppliers is that there is no near-term relief from the current semiconductor booking decline.

## OEM SEMICONDUCTOR INVENTORIES CONTINUE TO SPROUT UP

Semiconductor inventories dramatically rose above targeted levels this month, primarily because of DRAM stockpiles. This inventory buildup in memory will cause fewer new orders to be cut in the near term, thus accelerating the price decline that has been led by DRAMs and SRAMs. With no large increase in system demand foreseen, OEM cost-cutting continues to focus on inventory control and dependable delivery schedules. Declining prices, good quality, and efficient manufacturing now are considered essential.

## SEMICONDUCTOR PRICES DIP TO NEW LOWS

Increased supplies of DRAMs and SRAMs and corresponding lower prices for these parts in the face of static demand were the main causes for the *5.7 percent price dive in September's price indicator.* Producers are trying to match supplies with fluctuations in demand, but the fab juggernaut cannot turn on a dime. Prices will decline; to keep costs down, inventories also must decline. Ideally, this adjustment will not be at either the supplier's or the user's expense. At this time, both users and suppliers have excess inventory, especially in memories. Users must continue to forecast their six-month needs accurately on a rolling monthly schedule in order to best avoid supply irregularities that lead to gluts and shortages that do not benefit anyone.

## DATAQUEST ANALYSIS

September's indicators all point out that the current slowdown is more than a seasonal blip for both semiconductor suppliers and users. Dataquest expects the fourth quarter to be worse for suppliers than the third as backlog built in the first half finally erodes. With orders down, inventories up, and system demand shaky, we do not foresee a recovery to occur earlier than second quarter 1990. System OEMs will continue to focus heavily on cost-cutting measures (i.e., pricing, inventories, quality) that will negatively impact suppliers without their own cost-reduction plans in place. Dataquest believes that semiconductor suppliers must match the belt tightening now going on in their customer bases.

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# Research *Bulletin*

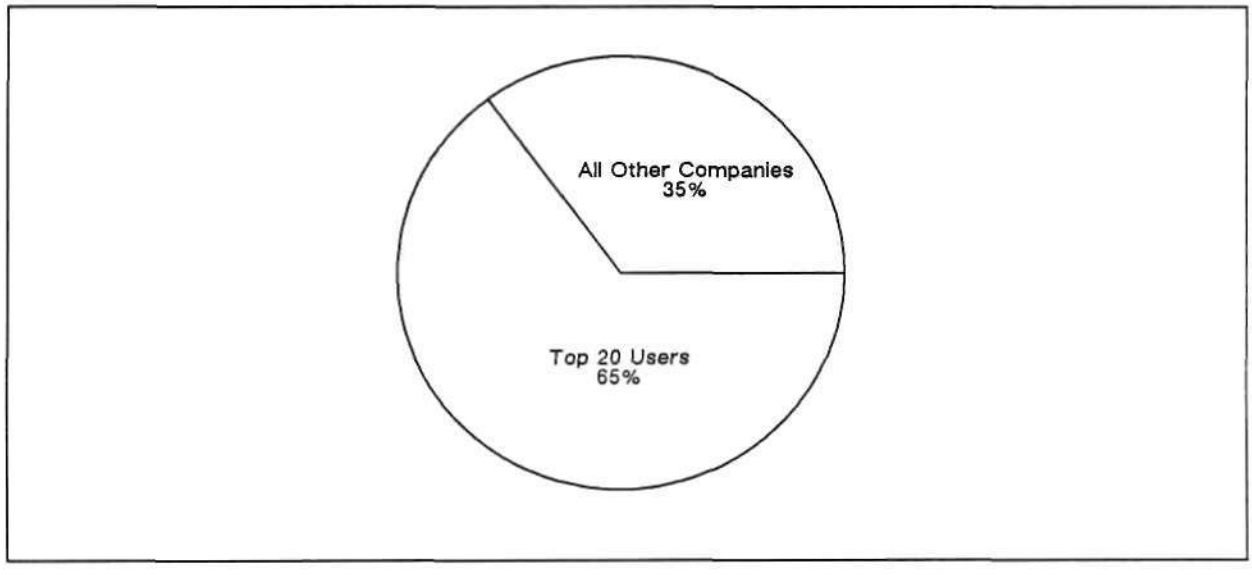
## REGIONAL REPORT: 20 OEMs DOMINATE DATA PROCESSING IC CONSUMPTION

Dataquest's North American Semiconductor Markets (NASM) service's *Regional Report* offers monthly insights into the opportunities and nature of the North American semiconductor market that will influence the actions and decisions of tactical marketing and sales managers. A new topic will be highlighted each month, based on recent findings in the market or updates in the NASM data base.

### FOCUS ON TOP 20 USERS

How much of the data processing application market is dominated by the top 20 semiconductor users? As illustrated by Figure 1, these 20 users consume 65 percent of the value of semiconductors for data processing applications. Major semiconductor manufacturers concentrate on attracting, selling to, and servicing the top 20 companies through specialized support programs. These top 20 companies are Amdahl, Apple Computer, Compaq, Control Data, Cray Research, Digital Equipment, General Electric, Harris, Hewlett-Packard, Honeywell, IBM, Intergraph, Kodak, Motorola, NCR, Prime Computer, Sun Microsystems, Texas Instruments, Unisys, and Xerox.

FIGURE 1
**Top 20 Users' Share of North American Semiconductor Consumption in Data Processing Applications**

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Source: Dataquest
September 1989


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TABLE 1
Top 20 Users' Market Share by North American Region—1988 (Millions of Dollars)

| | Equipment | | Semiconductor | |
|---|---|---|---|---|
| Region | Regional Production | Share of Top 20 Companies | Regional Consumption | Share of Top 20 Companies |
| Northeast | $ 38,023 | 69% | $2,358 | 69% |
| Pacific | 26,644 | 48% | 1,658 | 47% |
| Midwest | 13,363 | 69% | 837 | 68% |
| South | 12,852 | 80% | 807 | 82% |
| Atlantic | 11,651 | 64% | 730 | 67% |
| Mountain | 9,050 | 80% | 547 | 79% |
| Canada | 5,849 | 61% | 359 | 62% |
| Total | $117,432 | | $7,296 | |

Source: Dataquest
September 1989

## Top 20 Usage Concentrated in Northeast, Pacific, and South

Major account managers specializing in data processing may confine their efforts primarily to three regions. The top 20 users consume 64 percent of their semiconductor needs in the Northeast, Pacific, and Southern regions. In fact, 34 percent actually is consumed in the Northeast by such large companies as Digital Equipment, IBM, and Prime Computers. In the Pacific region, 17 percent is consumed by Apple Computer, Hewlett-Packard, Sun Microsystems, and Xerox. Another 13 percent is absorbed in the South by Compaq, IBM, and Texas Instruments.

### *Top 20 Users Dominate Each Region*

Table 1 shows that the top users have a substantial market share in each region in both electronic equipment production and semiconductor consumption. IBM easily dominates one-third of the semiconductor consumption in the Northeast. In fact, IBM dominates in all regions except the Pacific and Midwest. Apple Computer controls 16 percent of the semiconductors consumed in the Pacific region, followed by Xerox and Amdahl with 8 percent and 7 percent, respectively.

The top 20 users dominate each region with a semiconductor market share of more than 60 percent. The exception is the Pacific region, which has many small and start-up companies located in Silicon Valley and Orange County.

## DATAQUEST RECOMMENDATIONS

Major account organizations are an essential part of any successful semiconductor company's structure. *Dataquest recommends that those semiconductor manufacturers with product portfolios targeting the data processing market continue to stress major account programs.* Because of the large concentration of the market in a few users, semiconductor companies need to differentiate themselves through service: engineering support, regular sales calls, on-time delivery, superior product quality, responsiveness to changing demand, and quick reaction to related user problems that may arise suddenly.

*Dataquest further recommends that the care of large and important customers extend beyond these major account organizations.* These major accounts purchase products from distribution channels also, and they may well be the largest customers of distributors. In any event, the success of a semiconductor company targeting the data processing segment is closely linked to its relationship with a few major customers.

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# Research *Bulletin*

## SEPTEMBER PROCUREMENT PULSE: ORDERS CONTINUE TO SLIDE WHILE INVENTORIES RISE

The *Procurement Pulse* is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

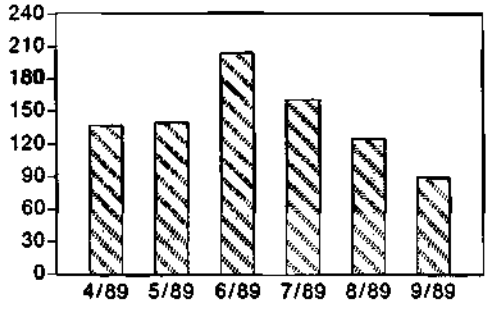



**Figure 2**
**Averaged Semiconductor Lead Times**

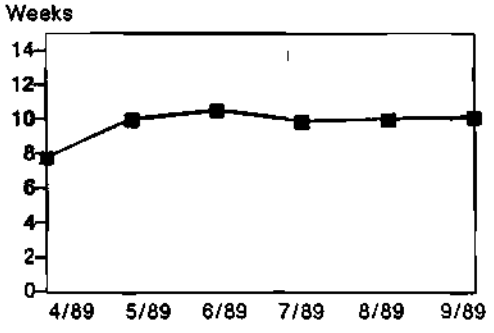



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

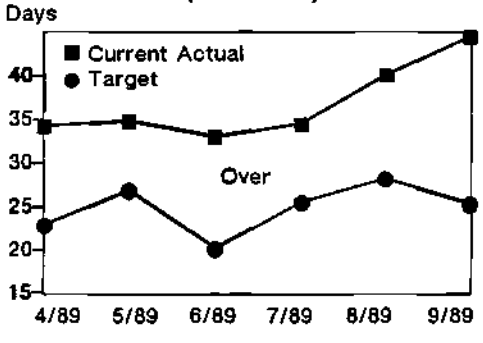
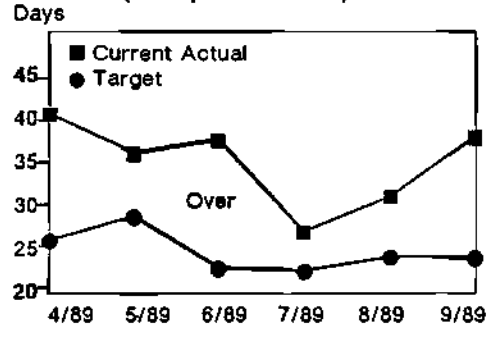



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**

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Source: Dataquest
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## SEMICONDUCTOR ORDERS SLIP FURTHER AS SYSTEM SALES DIP

*Respondents to this month's survey plan to lower their September orders by 29 percent* compared with last month's response (see Figure 1). This third straight month of order reductions directly correlates with the stagnation of overall electronic sales that has been reported in the last two months of Dataquest's monthly *Market Watch*. Current sales levels are about equal with those of last year, but expectations are mixed regarding the next six months. Last month, no negative growth was expected, and the highest forecast was 20 percent. Currently, the forecast for system sales ranges from a negative 2 percent to a positive 10 percent. Inventory-control measures are keeping semiconductor orders in line with system sales forecasts, which means lower orders for the near term.

## AVERAGE LEAD TIMES REMAIN THE SAME—2.5 MONTHS

As seen in Figure 2, overall lead times have risen by one day to 10.3 weeks over last month's 10.1 weeks. Purchasing managers expect more responsiveness to delivery schedules than they are getting at present in the current buyer's market. Although few respondents are having some difficulty in getting ASICs, some high-speed DRAM and SRAM devices, and surface-mount standard logic parts, 75 percent of respondents have no problems in procuring *any* semiconductors at this time. Supplies of all commodity ICs appear to be readily accessible, except for surface-mount standard logic parts; this situation is due to a combination of poor forecasting and lack of surface-mount capacity planning. This bottleneck is expected to continue for the next 3 to 4 months as schedules readjust to the current extended lead times of 8 to 10 weeks.

## INVENTORIES AGAIN RISE AS BUSINESS SLUMP OUTPACES ORDER REDUCTIONS

In spite of static inventory targets, actual levels of semiconductor inventories rose for the third straight month, as seen in Figures 3 and 4. The bright side of the picture is that non-DRAM inventory levels, both target and actual, have declined for all OEMs to 22.0 and 36.0 days, respectively, and to 22.6 and 35.2 days, respectively, for computer OEMs. This means that DRAM inventory levels are the primary cause of the current overstocked inventory situation. Since DRAM supplies are abundant, faster price declines can be expected as orders slow for devices that were on allocation early this year. Actual inventory levels (including DRAM/WIP) rose to 38.2 days from 31.3 days for computer OEMs and to 44.8 days from 40.3 days for overall OEMs.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

As inventory levels of DRAMs rise relative to system sales levels, Dataquest expects the current abundance of commodity memory to turn to overabundance as order rates are reduced. The current shortage of SOIC standard logic parts highlights what occurs when short- and long-range forecasts are inaccurate or not taken seriously. When availability, quality, and price are not the primary concerns, procurement often is determined by delivery and customer service. In this market, buyers need to communicate accurately their 6- to 12-month requirements while suppliers need to ensure timely delivery of parts as order levels decline. We expect the inventory-level/order-rate seesaw to remain unbalanced toward lower order rates for the next three months.

*Mark Giudici*
*Victor de Dios*

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# Research *Bulletin*

NASM Code: 1989 Newsletters, July–September
1989–16
0004820

## AUGUST MARKET WATCH: AS THE MARKET SLOWS, ADVANTAGE GOES TO THE LEVELHEADED

Market Watch is a monthly bulletin that is released after the SIA book–to–bill Flash Report and is designed to give a deeper insight into the monthly trends in the semiconductor market (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book–to–Bill Ratio**

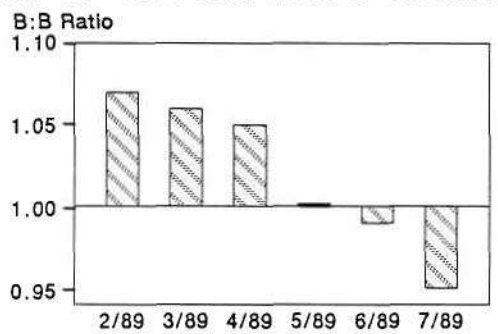



**Figure 2**
**DOC Computer Demand**

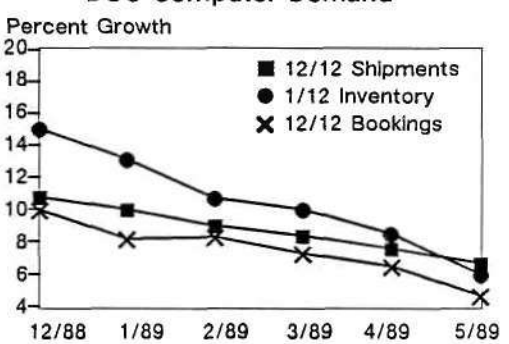



**Figure 3**
**Semiconductor Inventory Level**

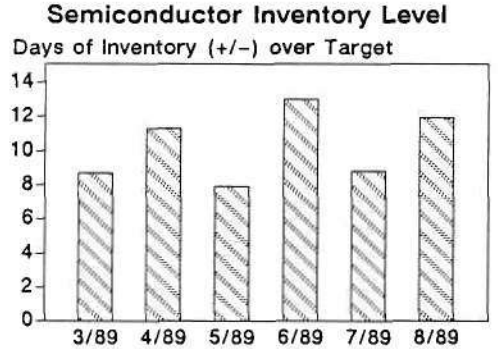
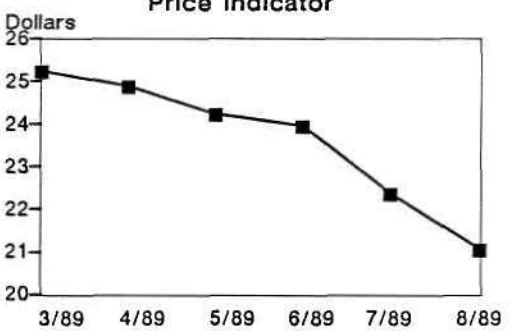



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




0004820–1

Source: U.S. Department of Commerce
World Semiconductor Trade Statistics
Dataquest
August 1989



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## BOOK–TO–BILL DROPS TO 0.95

The long–expected summer slowdown is upon us; the industry barometer, the SIA book–to–bill ratio, dropped to 0.95 for July. Dataquest believes that this slowdown is more than a seasonal pattern and will extend beyond the summer months, with definite signs of a weakening market ahead. Now the MOS memory market has followed, experiencing a slower sales growth and a more price–competitive market.

## COMPUTER INVENTORY GROWTH SLOWS FURTHER

The growth of computer orders and shipments continues to decelerate as computer makers focus on cutting costs and improving efficiencies. For the first time this year, the rolling 12–month growth of computer inventories dropped below shipment growth. Inventory typically has slower growth than orders and shipments. With the loosening up of product in Q4 1988, however, computer inventories rose dramatically and have maintained high growth for nine months. Dataquest expects computer inventory growth to drop further and fall below that of orders, which will mean a more constrained semiconductor market.

## OEM SEMICONDUCTOR INVENTORIES ARE ON AN UP–DOWN SEESAW, AND PRICES CONTINUE TO DIVE

As we observed in the July Market Watch, semiconductor users will rely more heavily on spot market buys and order product close to date of scheduled production to minimize holding costs. With the uncertainty in the systems markets, inventory control appears to be as important as acquiring lower prices. Orders and inventories over target are expected to resemble a sawtooth pattern in the coming months.

Spurred by the increasing competitiveness and loosened availability of MOS memories and DRAMs in particular, Dataquest's price indicator, based on a basket of 25 key products, plunged another 5 percent in August. The basket's price decline primarily was driven by DRAMs, SRAMs, and certain microprocessors. Manufacturers' inventories of these components are reported to be swelling. However, Dataquest cautions against speculations on a recurrence of the 1985 downward price spiral. Today's production levels, inventory levels, and nature of the demand slowdown are not similar to those of 1985, and we expect a milder and more orderly price decline.

## DATAQUEST ANALYSIS

August's indicators further confirm our expectations of the nature of the current semiconductor industry slowdown. Semiconductor users are pursuing rational actions in meeting the uncertainty in their markets. Semiconductor suppliers should do the same. Unlike 1985, 1989's weakened demand did not take anyone by surprise. Current capacity is not excessive, and OEM inventories are limited. Dataquest believes that semiconductor manufacturers should go back to business basics—stay efficient, stay lean, and provide better service.

Victor de Dios
Mark Giudici

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# Research Newsletter

## NORTH AMERICAN MARKET DEVELOPMENTS QUARTERLY EVENTS NEWSLETTER JULY 1989

This is the third quarterly events newsletter issued by the North American Semiconductor Markets (NASM) service. It contains a synopsis of news events gathered from the trade press during the past quarter.

The following is a key to the publications reviewed during research for this issue:

| | |
|---|---|
| *Electronic Engineering Times* | EET |
| *News Release* | NR |
| *San Francisco Chronicle* | SFC |

**Contents**



The contents of this newsletter were gathered from information generally available to the public or released by responsible individuals in the subject companies, but are not guaranteed as to accuracy or completeness. This newsletter does not contain material provided to us in confidence by our clients.

## TECHNOLOGY

### Apple's New Video Card

Apple Computer's newest peripheral card, the Video Overlay, works in both the 6-year-old Apple IIe and the 30-month-old II GS systems. The card allows the Apple II host to be operated as a miniature video production. The price is $599. (EET, April 17, 1989)

### Big Networking Strategy by Apple

A new suite of 16 products has been introduced by Apple Computer that makes the information not on desktops appear as it is on a desktop. (EET, June 12, 1989)

### Cray Broadens High-End Y-MP Line

Cray Research has broadened its high-end Y-MP line by producing three levels of machines. The three main configurations are equipped with two, four, or eight processors, ranging in price from $5.0 million to $23.7 million. (EET, April 3, 1989)

### IBM Produces Two New Portables

IBM introduced two new portable models in its PS/2 line. They are the desktop 55SX, which is based on the Intel 386SX microprocessor and is priced between $3,895 and $4,295; and the P70 386, a 21-pound luggable that is similar to the Model 70. (EET, May 15, 1989)

### Emerson's Surprise

Emerson's PC XT, AT, and 80386SX desktops were the PC-product surprise of the year at the Consumer Electronics Show. The PCs' technologies were sourced from desktop suppliers that included Advanced Micro Devices, Borland International, Microsoft, Seagate, Signetics, and UVC. (EET, June 12, 1989)






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### HP Expands Desk and Industrial Rack

The Hewlett-Packard 9000 Series 300 line has been expanded. The HP R/332 is a rack-mountable unit designed to be used in a 19-inch rack. The 332 has four expansion slots as well as a monitor and a standard keyboard. Prices begin at $9,900 for the R/332 and $5,200 for the 332. (EET, April 17, 1989)

### Kodak's 3-Mbps Tape Drive

Manufacturers are being lined up for Kodak's new tape drive/tape cartridge system that can transfer data five times faster than competitive cartridge-based drives. (EET, June 5, 1989)

### Tektronix's TriStar

Tektronix has developed Tristar, a processor forming the heart of a new group of instruments that can acquire and measure both one-shot and repetitive signals. (EET, June 5, 1989)

### Warranty Increases by Hewlett-Packard

Hewlett-Packard extended its MTBF to 150,000 hours, and it backed up that figure with a five-year warranty. With warranties and reliability a major concern of customers, HP believes that this move could provide a real edge over its competitors. (EET, June 12, 1989)

## PROFITS AND LOSSES

### Digital's Revenue Up

Third-quarter earnings for Digital Equipment Corporation showed an operating revenue of $3.3 billion, up 11 percent from the same quarter a year ago. (NR, April 20, 1989)

### TI's Flat First Quarter

Texas Instruments' quarterly revenue was $1.56 billion for the first quarter of 1989, compared with $1.47 billion last year. Net income was virtually unchanged from $85.5 million in 1988 to $84.6 million in 1989. (EET, May 1, 1989)

## ORGANIZATIONS AND REORGANIZATIONS

### Cray Turns Cray-3 into Start-Up

Anticipating a difficult year, Cray Research all but severed its ties with Seymour Cray, who now will be chairman of Cray Computer Corporation, his third company. Cray Computer will continue to develop Cray-3, and will also receive from Cray Research $100 million in funding and $50 million in facilities that are located in Colorado Springs, Colorado. (EET, May 22, 1989)

### Harris/GE Microelectronics Talks

Discussions are under way regarding the sale of GE's Microelectronics Center, located in Research Triangle Park, North Carolina, to Harris. The center has been the focus of GE's military ASIC business. (EET, May 15, 1989)

### Honeywell Fab Purchase by Atmel

Atmel plans to purchase Honeywell's Solid State Electronics Division in Colorado Springs, Colorado. The facility contains three semiconductor fabrication areas and assembly, testing, and engineering facilities totaling 250,000 square feet. (EET, June 5, 1989)

### HP Buys Apollo

With the purchase of Apollo Computer in Chelmsford, Maryland, Hewlett-Packard jumped to the top market share position in the engineering workstation business. The acquisition provides HP with a large ECAD customer base, five lines of platforms for engineering use, and important networking products. (EET, April 17, 1989)

### New President for IBM

Veering away from tradition, IBM has selected Jack D. Kuehler, an MSEE, to become the company's new president. In the past, the top-ranking executives have come from sales and marketing. IBM indicated that there would be no shift in the company's focus, however. (EET, June 5, 1989)

Other IBM management changes include the following: Leonard Liu resigned as general manager at the Santa Teresa Laboratory and now is president of the Acer Group and CEO of U.S. subsidiary Acer America; Thomas E. Furey, Jr. was named assistant general manager of IBM Programming Systems; Glenn H. Larnerd was appointed vice president of manufacturing and site general manager; Dale W. Pilgeram has become GPD vice president for development. (EET, May 8, 1989)

### Intel's Layoffs

Despite an upbeat annual meeting and boasts of great earnings, Intel has instituted cost reductions that could eliminate 600 positions, most of which will occur at the Chandler, Arizona, facility. (EET, May 1, 1989)

### Perkin-Elmer Restructuring

With a major restructuring, the Perkin-Elmer Corporation now will focus on its core scientific instruments and materials technology business. Perkin-Elmer plans to sell its semiconductor equipment, West German aerospace, and government systems units. The restructuring will include staff and facilities reductions. (NR, April 21, 1989)

## CONTRACTS, PACTS, AND ALLIANCES

### DOD Contract for Intel

Intel Corporation won a $7.6 million Department of Defense (DOD) contract called the Touchstone Project. It is a three-year, $27.5 million program and is part of the Defense Advanced Research Projects Agency's TeraOps high-performance parallel computing initiative. (EET, April 24, 1989)

### Harris/NASA Contract

Harris has received a NASA contract for $200 million to develop space-launch processing systems at the Kennedy Space Center. (EET, May 1, 1989)

### HP/McDonnell Douglas Agreement

According to a recent agreement, McDonnell Douglas will sell Hewlett-Packard's CAE/CAD solutions on HP 9000 workstations through its worldwide sales force, and HP will have access to two new accounts—General Motors and Raytheon. (EET, April 24, 1989)

### McDonnell Douglas Receives Military Contracts

McDonnell Douglas received several military contracts. These include $204.6 million for navy missiles and electronic test equipment and for army helicopter components, as well as $116.3 million for air force missiles and parts and for navy aircraft equipment. (EET, April 17, 1989)

### Motorola's Licensing Agreement with ACC

In an effort to gain a spot in the IBM PC market, Motorola has signed an agreement with ACC Microelectronics in Santa Clara, California, which gives Motorola rights to ACC's four-member floppy disk controller family and access to a worldwide market for PC-compatible chip sets. (EET, April 3, 1989)

### Rockwell's Air Force Contract

A $45 million air force contract for gunships and a $14 million army contract for missile warheads were awarded to Rockwell International. (EET, April 3, 1989)

### Superconductor Agreement

In a recent agreement, Microelectronics and Computer Technology Corporation (MCC) was linked with the Texas Center for Superconductivity at the University of Houston. Initial industrial members that will pay an annual fee of $150,000 for access to the superconductor research include Bell Communications Research, Boeing, Digital Equipment, DuPont, 3M, Motorola, and Westinghouse. (EET, April 3, 1989)

## TI-Xycom Deal

A deal signed by Texas Instruments and Xycom allows TI to market Xycom's AT-compatible 286-based terminals and its Operator Interface Language (OIL). (EET, June 12, 1989)

## TRW/SDI Pact

TRW has won a $12 million award to develop its Algorithmic Architecture Program. The company plans to use recent advances in strategic computing to solve Strategic Defense Initiative (SDI) battle management challenges. (EET, April 17, 1989)

# PLANTS—NEW LOCATIONS, EXPANSIONS, AND CLOSINGS

## Harris Consolidation

Harris plans to move the former GE Solid State IC assembly and test operation in Findlay, Ohio, to Palm Bay, Florida. Consolidation of all high-reliability operations at Palm Bay will help to eliminate overlay and duplication and also will increase operational effectiveness. (EET, May 15, 1989)

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# Research *Bulletin*

NASM Code: 1989 Newsletters, July–September
1989–14
0004741

## AUGUST PROCUREMENT PULSE: THE ORDERS–DOWN, INVENTORIES–UP SEESAW CONTINUES

The Procurement Pulse is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory and order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

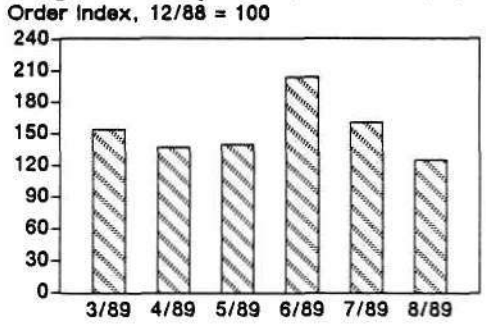



**Figure 2**
**Averaged Semiconductor Lead Times**

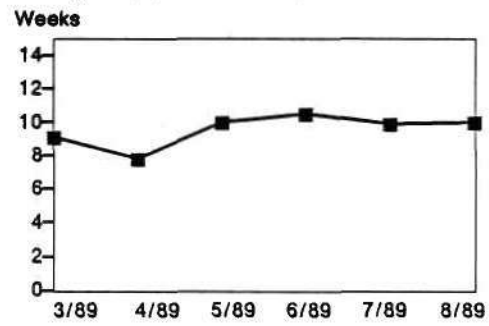
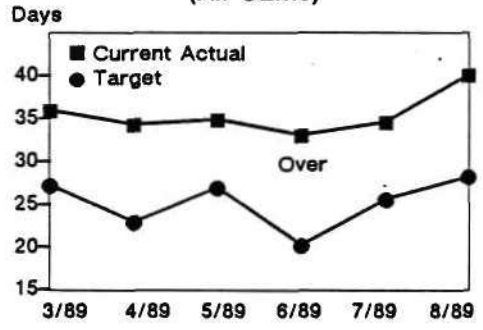



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

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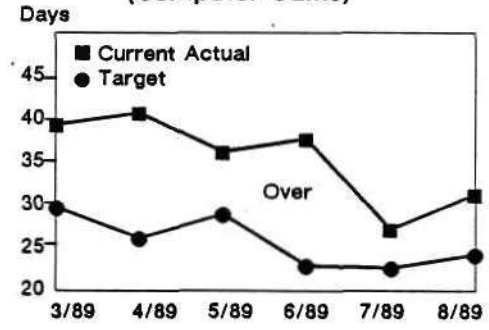


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Source: Dataquest
August 1989





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## SEMICONDUCTOR ORDERS AGAIN DROP, MATCHING SLOW SYSTEM SALES

This month's survey respondents plan to lower their August orders by 19 percent relative to last month's responses (see Figure 1). This drop and July's decline of 21 percent are the responses to the increased availability of semiconductors and the confirmation of a deceleration in system sales. Current sales levels are lower overall relative to last year, yet 61 percent of this month's sample respondents (66 percent last month) still see growth in sales ranging from 5 to 25 percent over the next six months. Buyers are keeping their component order rates in line with system sales. Component sales will continue to grow gradually, but in smaller increments and with increasing turns business due to improved semiconductor availability and slower system sales.

## LEAD TIMES ARE STABLE—BUT FOR HOW LONG?

The relative stability of lead times at 10.1 weeks (see Figure 2) reflects how, up to now, the managed memory market and sole-sourced microprocessor suppliers have kept average lead times at a predictable level. According to some respondents, the products that continue to have longer lead times are 32Kx8 SRAMs and high-speed ROMs. Dataquest notes that major Korean and some Japanese memory suppliers have begun to break rank with the market, resulting in lower lead times for slower DRAMs. As competition heats up in the DRAM market in the upcoming months, lead times for faster parts also will decline.

## LOWER ORDER LEVELS TRY TO CUT INVENTORY BULGE

Overall and computer inventory levels rose relative to last month's survey, as seen in Figures 3 and 4. Forecast lower order levels in August are expected to correct this situation. Computer OEMs are controlling inventories better than is the overall market, but non-DRAM/WIP inventory levels continue to keep target levels unreachable (computer non-DRAM/WIP inventory target is 32.7 days versus 44.5 days for current inventory). Dataquest expects users to continue focusing on cost cutting by lowering inventories and demanding lower component prices. Improvements in communicating user forecast requirements to semiconductor suppliers now are needed. Actual inventory levels (including DRAM/WIP) rose to 31.3 days from 27.3 days for computer OEMs and to 40.3 days from 34.7 days for overall OEMs.

## DATAQUEST ANALYSIS AND RECOMMENDATIONS

The seesaw made of inventory levels and order rates continues to balance. Until accurate forecasting becomes universal, either the buyer or the seller will continue to hold the excess-inventory bag. On the positive side, inventories are still at historically low levels and should remain there. Slow systems sales growth will force buyers to balance their component mix with low inventory levels. Buyers should continue to review pricing and availability of key components with their suppliers on a quarterly basis in order to ensure the best price and delivery. Suppliers should continue to see relatively smaller but steady orders due to inventory control requirements and easy availability of parts. This seesaw balancing act should continue through the end of this year.

Mark Giudici

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# Research *Bulletin*

NASM Code: Newsletters 1989: July–September
1989–13
0004544

## JULY PROCUREMENT PULSE: INVENTORIES/ORDERS DOWN, MEMORIES ON A SEESAW

The Procurement Pulse is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin explains what inventory order rate corrections mean to both semiconductor users and manufacturers.

**Figure 1**
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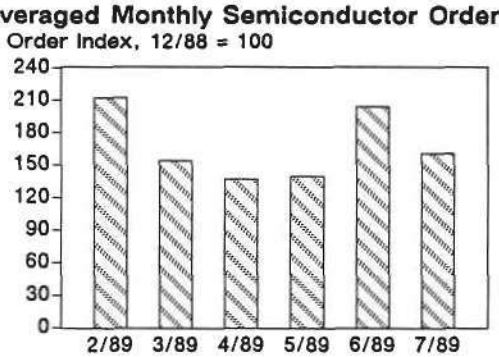


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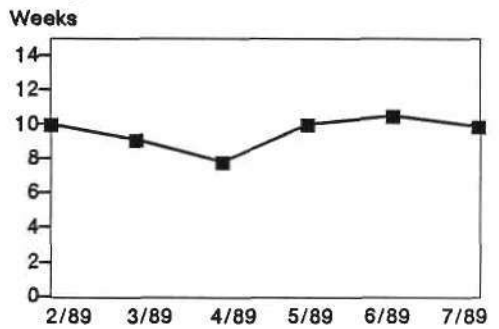


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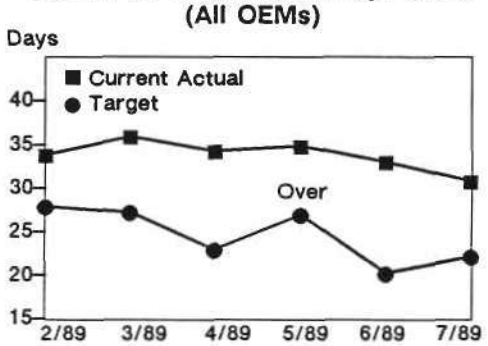


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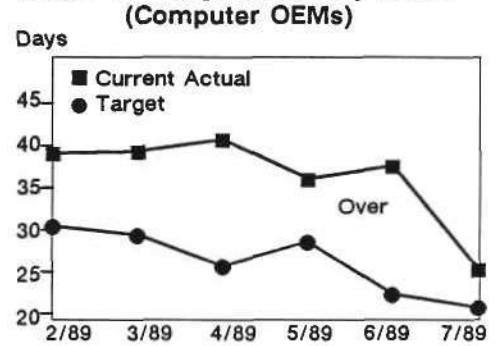


0004544–1

Source: Dataquest
July 1989



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## SEMICONDUCTOR ORDER LEVELS DROP TO CUT INVENTORIES

Semiconductor buyers in this month's survey expect to lower their July orders by 21 percent relative to last month's levels, as shown in Figure 1. Two-thirds of all respondents still see their systems sales growing from 5 to 30 percent in the next six months, with the remaining one-third expecting flat sales. As mentioned in last month's bulletin, the high order rate in June was an anomaly that resulted from a poor inventory mix that is now being corrected.

## UNCHANGED LEAD TIMES HIGHLIGHT STEADY DEMAND

The average lead time of 10 weeks (see Figure 2) illustrates today's semiconductor market balance. DRAM purchases increasingly reflect a spot-market mentality. Short shipment windows and frequent but low orders are methods buyers currently are using to control costs. The availability of 80ns DRAMs and 32Kx8 SRAMs continues to be an issue for some buyers, but the situation is improving, with only 22 percent of our respondents noting any memory availability problems. Other semiconductor lead times remain at manageable levels for both users and suppliers.

## OVERALL INVENTORY LEVELS FALL AS NON-DRAM INVENTORIES GET SLASHED

As Dataquest predicted, reductions in non-DRAM inventory have lowered the actual inventory levels of this month's respondents (see Figures 3 and 4). Non-DRAM/WIP actual inventory of computer OEMs dramatically declined to 19.2 days, down from 37.0 days! The overall OEM non-DRAM/WIP actual inventory levels also dropped from 36.7 days down to 27.0 days. Within the background of slower-growing system sales and easing of DRAM availability, Dataquest expects buyers to continue to focus on lower inventory levels and reductions in component prices. Actual inventory levels (including DRAM/WIP) fell from 37.7 to 26.0 days for computer OEMs and 33.2 days to 31.1 days for overall OEMs.

## DATAQUEST ANALYSIS

Dataquest expects low inventory levels (especially for non-DRAMs) to continue and to cause more spot orders, or at least more orders requiring deliveries within three months. It is now a buyer's market. System sales are still growing, buyers need to watch their component mix as they maintain lower inventory levels to reduce dependence on large spot-market buys. Suppliers should expect fluctuating orders from month to month, an increased percentage of turns business, and therefore, more intense competition and price pressure. On a positive note, the low inventory levels should make this slowdown period shorter. When system sales pick up once again, semiconductor sales should quickly follow.

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Victor de Dios

  

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# Research *Bulletin*

NASM Code: Newsletters 1989: July–September
1989–12
0004557

## JULY MARKET WATCH: MOS MEMORY JOINS SLOWDOWN, TURNS BUSINESS INCREASES

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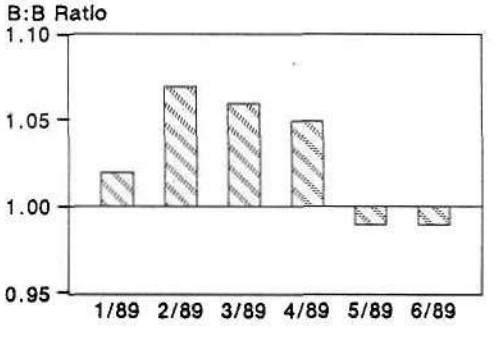


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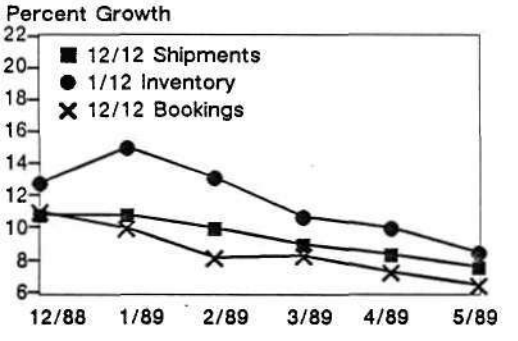


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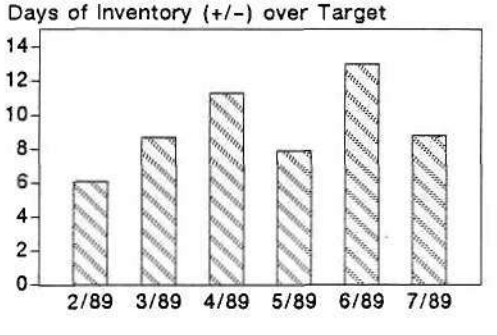


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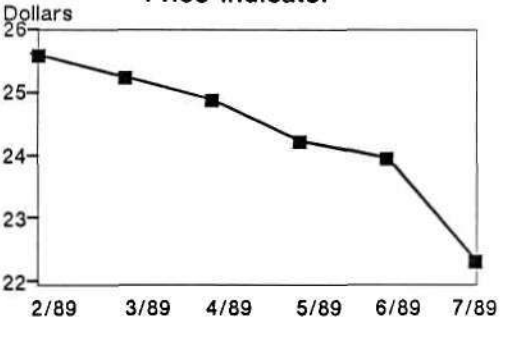


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## JUNE RESULTS ARE UP; BOOK-TO-BILL STILL AT 0.99

Despite the SIA book-to-bill of 0.99 (see Figure 1), June bookings and billings increased. Dataquest's June Procurement Pulse survey foresaw the bookings increase. Because billings rose at a much higher rate (13.6 percent) than bookings, Dataquest suspects that the following are occurring: semiconductor manufacturers' order backlog is decreasing rapidly; turns business--orders placed and filled in the same month—is increasing as a percentage of total billings; and distributor inventory is growing.

## SYSTEM DEMAND AND INVENTORY GROWTH STILL DECREASING

Computer order and shipment growth has dropped for the fifth consecutive month (see Figure 2). Computer shipment growth from June 1988 to May 1989 has increased by only 7.7 percent compared with the previous 12 months. Computer inventory growth again has decreased along with orders and shipments, indicating that OEMs are not being taken by surprise but are making prudent but gradual adjustments to lower growth expectations. This, in turn, has minimized sudden movements in semiconductor orders.

## ACTUAL INVENTORIES DROPPING TO LOWER TARGET LEVELS

After 1989's first quarter, most OEMs have adjusted to their lower sales growth forecasts by reducing target inventory levels and reviving their just-in-time (JIT) programs. Generally, the semiconductor industry is now feeling the effects. Actual inventory levels, especially for non-DRAM products, have dropped dramatically in July and have approached target levels (Figure 3). Therefore, users will rely more on the spot market or on last minute orders against contracts that require quick delivery. Semiconductor manufacturers should expect turns business to increase as a percentage of total sales as users endeavor to keep inventories low.

## PRICE INDICATOR PLUNGES

Dataquest's price indicator, based on a basket of key semiconductor products, has plunged significantly for the first time this year. The price indicator now is close to 7 percent below January levels. Certain products--1Mb DRAM, 80286, and 32Kx8 SRAM--were primarily responsible for the decrease. This indicator shows that MOS memory producers, once untouched by the woes of the rest of the industry, have begun to feel the bite of a competitive and weakening market.

## DATAQUEST ANALYSIS

Dataquest recognizes the following trends: turns business is increasing as a percentage of sales; suppliers' order backlog is decreasing quickly; and distributor shelves probably are filling rapidly. MOS memory producers, still fairly well off, are no longer exempt from these trends--time for them to put away the caviar and bring on the hamburgers. However, because system sales still are growing and OEM inventory levels are low, Dataquest believes that the industry will see fluctuating, rather than continuously declining order patterns from month to month as buyers adjust their inventory mix or respond to sudden production demands. The market definitely is in a slowdown, but with low OEM inventory levels, it will hopefully be a short one.

Victor de Dios
Mark Giudici

  

Dataquest
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# Research Newsletter

NASM Code: Newsletters 1989: July–September
1989–11
0004449

## CANADA—SEMICONDUCTOR MARKET PROSPECTS

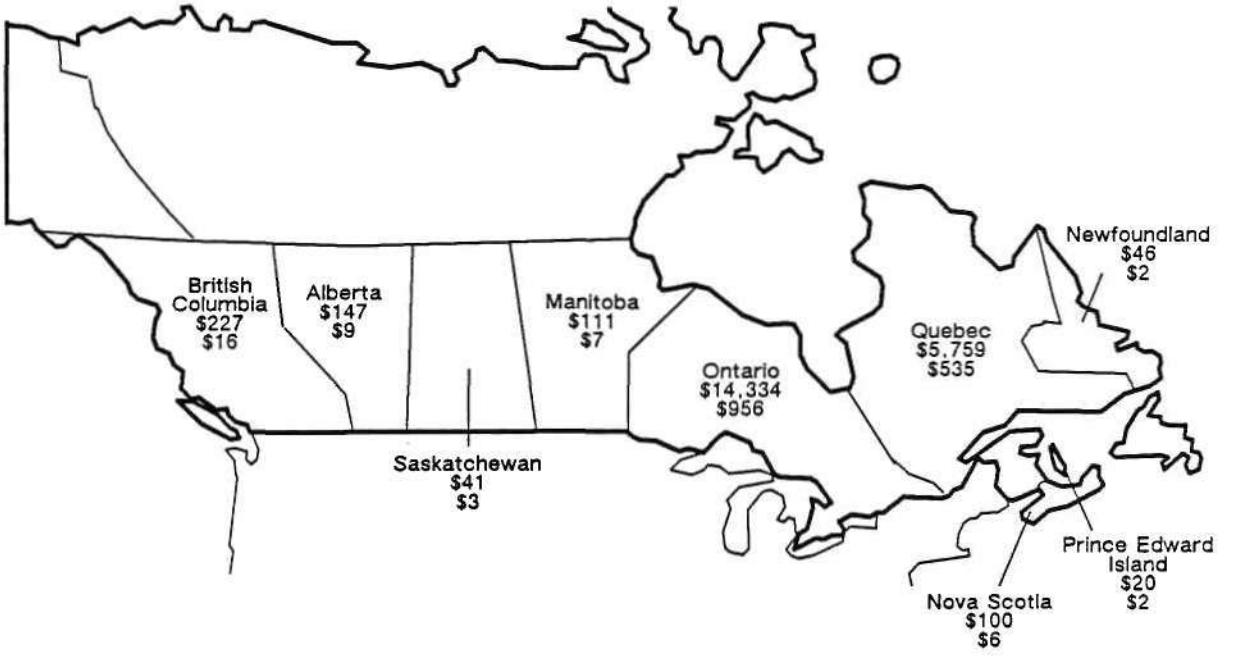
### SUMMARY

Canada has many opportunities for both commodity and specialty semiconductor suppliers. Many multinational companies have established plants in Canada that produce a wide array of equipment types. Canada-based companies offer a unique opportunity for specialty suppliers because of niche product strategies.

Canada's $20.8 billion electronic equipment industry is concentrated in Ontario and Quebec, as shown in Figure 1. Electronic equipment companies consume approximately $1.5 billion of all semiconductors.

**Figure 1**

Electronic Equipment Industry by Province—1988
(Millions of Dollars)




Note: Data in figure represents electronic equipment production and semiconductor consumption, respectively.

0004449-1

Source: Dataquest
July 1989

## COMPANIES

Overall, Canada is dominated by wholly owned subsidiaries of U.S. companies such as Digital Equipment Corporation, General Electric, IBM, and Xerox. Many companies in Canada have carved out significant niches in several areas; for instance, Canadian Marconi has more than one-half of the worldwide market for VHF/UHF tactical military radios, which are made in Montreal. Garrett Canada, with headquarters near Toronto, produces more than three-fourths of all aircraft temperature control systems in use. Other successes include the Canadian subsidiary of Litton Industries, which builds inertial navigational systems for the cruise missile, and CAE Electronics Limited, which supplies commercial jet flight simulators to U.S. airlines.

Most of the Canada-based electronics companies are small and provide products for highly specialized niches for domestic and U.S. consumption. Many of these companies are allied to the bedrock natural resource-based industries. One such example is HSA Reactors Limited, a Rexdale, Ontario, company that produces computer-based systems for the recovery of mined metals. More than 75 percent of all electronic equipment used to detect minerals is manufactured in Canada.

Northern Telecom, the largest manufacturer of electronics equipment in Canada, has become one of the world's largest suppliers of telecommunications equipment. In 1988, Northern Telecom earned 62 percent of its revenue from sales made in the United States, 34 percent from sales made in Canada, and 5 percent from sales made outside North America. Northern Telecom was one of the first companies to develop and market a digital central office switch that has become the practice of the industry today.

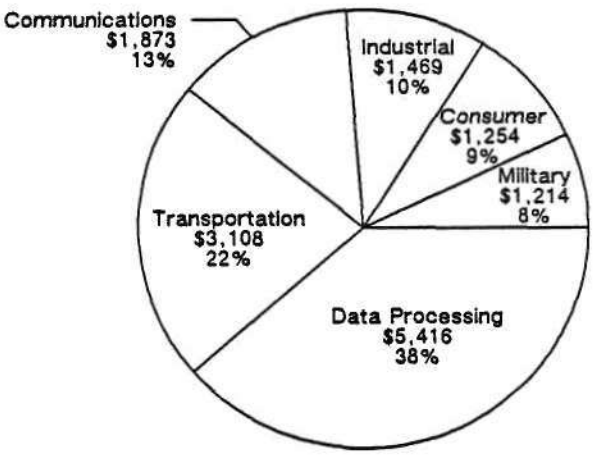
## CANADA'S PROVINCES

### Ontario

Central Canada is home to 97 percent of electronic equipment production in Canada and comprises Ontario and Quebec. Ontario is Canada's industrial heartland and depends more on manufacturing than any other province. The segments of electronic equipment production and semiconductor consumption for the province of Ontario are shown in Figures 2 and 3, respectively.

Figure 2

Electronic Equipment Production in Ontario
(Millions of Dollars)

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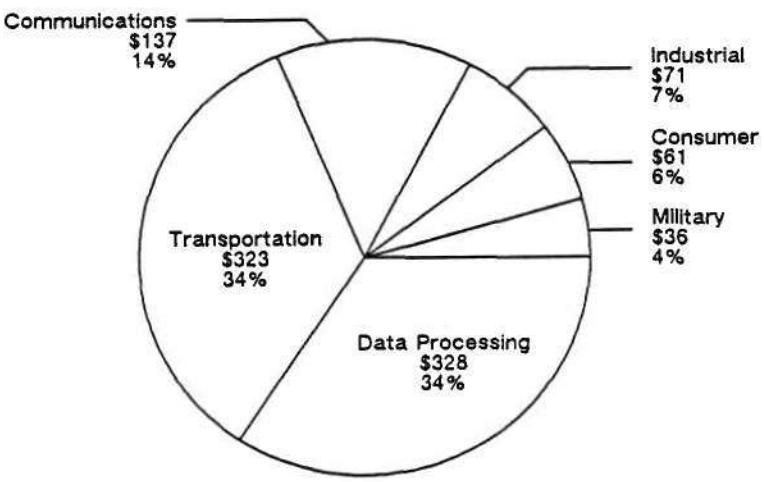
Source: Dataquest
July 1989

Figure 3

Semiconductor Consumption in Ontario
(Millions of Dollars)




0004449-3

Source: Dataquest
July 1989

### Data Processing

The largest segment of data processing production in Canada is in Ontario. Major data processing companies located in Ontario include Control Data, Digital Equipment, IBM Canada, Kodak, NCR Canada, Nixdorf Canada Systems, Pitney-Bowes, 3M Canada, and Xerox Canada. Products include mainframes, microcomputers, tape drives, and dedicated systems. Other smaller companies manufacture graphics terminals, optical scanning equipment, office automation equipment, and workstations.

According to a Canadian report, sales of computer and office equipment grew at a compound annual growth rate (CAGR) of 22 percent in all regions between 1980 and 1986. Dataquest estimates that this segment will grow at a CAGR of 10.2 percent from 1987 to 1992.

### Transportation

The major manufacturers of transportation equipment are located in Ontario. They include Chrysler Canada, Ex-Cello Corporation, Ford Electronics, and Stewart-Warner/Canada. Dataquest estimates show that this is the fastest-growing equipment segment in Canada; it will grow at a CAGR of 10.5 percent from 1987 to 1992.

### Industrial, Consumer, Military

The largest share of industrial, consumer, and military companies also are located in Ontario. Industrial companies include Hewlett-Packard, Leigh Instruments, Philips Electronics, Picker International, Robertshaw Controls, and Westinghouse Electric. These companies primarily produce instruments and medical equipment. Many of the smaller companies in Canada supply a broad range of computer-based control, automation, monitoring, and supervisory systems. The sector has demonstrated an expertise in the development of instruments for geophysical exploration, pollution control and detection, and energy management.

Companies in the consumer sector include Electrohome, Inglis (a subsidiary of Westinghouse Electric), Matsushita, Sanyo, Sony, and Zenith. Products, which include appliances, radios, and video equipment, are manufactured primarily to satisfy growing domestic demand.

Military companies include Garrett Manufacturing, Litton Industries, McDonnell Douglas, and Spar Industries. These companies produce computer and aircraft systems, navigation and communications equipment, and satellites and earth stations.

## Quebec

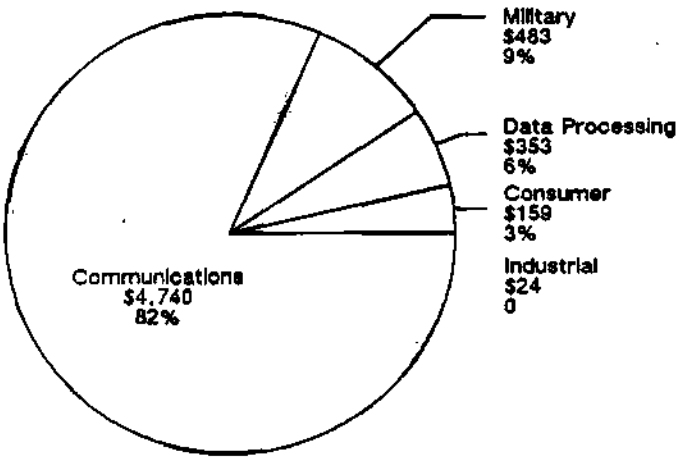
The communications industry provides the cornerstone of Canada's economy. In addition to the giant Northern Telecom, Canada has nurtured multinational players such as Mitel and Gandalf Technologies.

The largest segment of communications equipment production is in Quebec. Quebec's equipment production and semiconductor consumption are shown in Figures 4 and 5. In addition to Northern Telecom, which has locations in almost all provinces, communications companies located in Quebec include Bell Canada and Memotech Data.

According to a report published by the Department of Industry, Science, and Technology, total shipments of telecommunications equipment in Canada have been growing at a CAGR of 5 to 7 percent. Dataquest estimates show a CAGR of 8.1 percent from 1987 to 1992.

**Figure 4**

**Electronic Equipment Production in Quebec**
**(Millions of Dollars)**

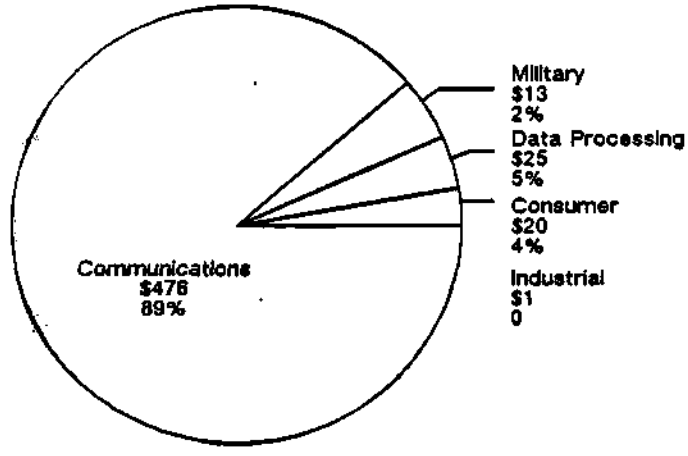



0004449-4

Source: Dataquest
July 1989

Figure 5

Semiconductor Consumption in Quebec
(Millions of Dollars)




0004449-5

Source: Dataquest
July 1989

## Other Provinces

In the Atlantic provinces, which include Newfoundland, Nova Scotia, and New Brunswick, ongoing research is centered on the challenge of harvesting and managing the natural resources located along the continental shelf. Electronics companies in this region are involved in the development of sophisticated instrumentation and equipment that the resource-managing industries require to accomplish this task, not only in traditional areas such as the fisheries, but in the rapidly developing petroleum industry.

The electronics companies in the Prairie provinces, which include Manitoba, Saskatchewan, and Alberta, are responding to three areas critical to this region: communications, resource development (such as metal mining), and agriculture. On the western coast of Canada, British Columbia's electronics companies, located mostly in the Vancouver area, are involved in telecommunications research. Ongoing research in the areas of mining, forestry, and oceanography applications is continuing.

## DATAQUEST CONCLUSIONS

Canada holds opportunities for both commodity and specialty semiconductor suppliers, particularly in Ontario and Quebec. Dataquest estimates that 97 percent of Canada's $20.8 billion electronic equipment industry is located in those two provinces. A large percentage of the semiconductor production in Canada is conducted by the large telecommunications equipment companies, such as Northern Telecom, for captive use. Canada's semiconductor consumption is being driven not only by large multinational and Canada-based companies but also by many smaller local companies, many of which have gained recognition in niche areas such as instrumentation for geophysical exploration and energy management.

Penny Sur

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A new directory describing 30 Dataquest Research Publications is now available from Dataquest's Direct Marketing Group. The directory includes information on the following:

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# Research Newsletter

NASM Code: Newsletters 1989, July
1989-10
0004331

## DRAM-SUPPLY WILD CARD: SAMSUNG TO THE RESCUE?

### SUMMARY

First-tier Japanese DRAM suppliers have reaped high profits with their strategy of managing supply to control prices. As the threat of a market slowdown nears, several of these companies have indicated that they will continue to limit 1Mb DRAM production by shifting capacity to other scarce products, such as SRAMs or 4Mb DRAMs, in order to maintain the relatively high prices of 1Mb DRAMs. The question is whether or not the Japanese companies will succeed in this strategy. Dataquest believes that Korean and U.S. suppliers eventually may prove that Japanese manufacturers do not have as tight a control over the DRAM market as they think.

### MANAGING PRODUCTION, CONTROLLING PRICE

When MITI instituted production cuts in the first half of 1987, many Japanese companies learned the lesson of managing supply to control prices. The irony is that the 1986 U.S.-Japan Semiconductor Trade Arrangement prompted these moves by MITI. Since then, production has been fairly limited by MITI based on demand measurements.

Today, however, several Japanese DRAM manufacturers have indicated that they will shift capacity to other scarce products (such as SRAMs) or new products (such as 4Mb DRAMs) if the market softens, in order to preserve the relatively high prices of 1Mb DRAMs. MITI has since dropped its production guidelines. DRAM procurers in the United States see quoted prices and directions from different Japanese companies that are suspiciously close, leading to a feeling of helplessness in the buying community.

Will the Japanese DRAM manufacturers succeed in implementing this strategy?



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## ENTER THE WILD CARDS

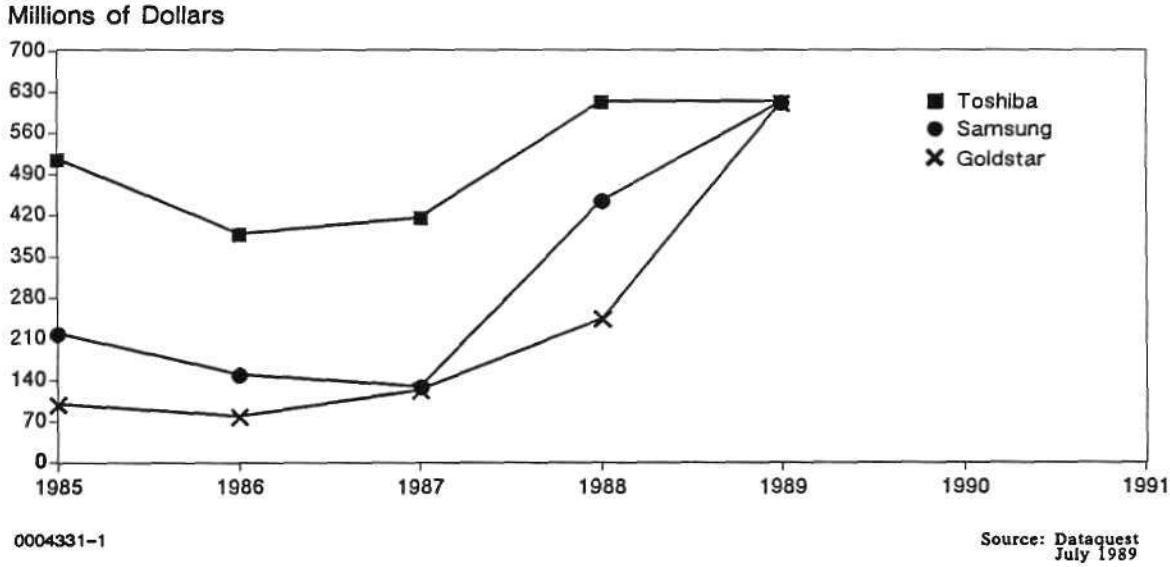
Toshiba has been in the forefront of the 1Mb DRAM market, outproducing others by two to one. Most Japanese companies have stopped trying to outpace Toshiba because of the dangers of excess capacity and the threat to 1Mb DRAM profits. Reports show that Toshiba plans to slow its production buildup in 1990.

The Japanese strategy's success depends on the level of control these companies exert over the 1Mb and 4Mb DRAM market and other factors.

As presented in Figure 1, Samsung's and Goldstar's capital spending have reached Toshiba's level. (Toshiba currently is the most aggressive Japanese manufacturer.) Reports predict that Samsung will have capacity up to 9 million units per month by the end of 1989, just a shade less than Toshiba, and has plans to increase production further while Toshiba slows its growth. Samsung's main challenge will be to increase production yield to 80ns parts and supply of product variations such as SIP/SIMM modules, and to qualify in a wider field of major OEMs.

**Figure 1**

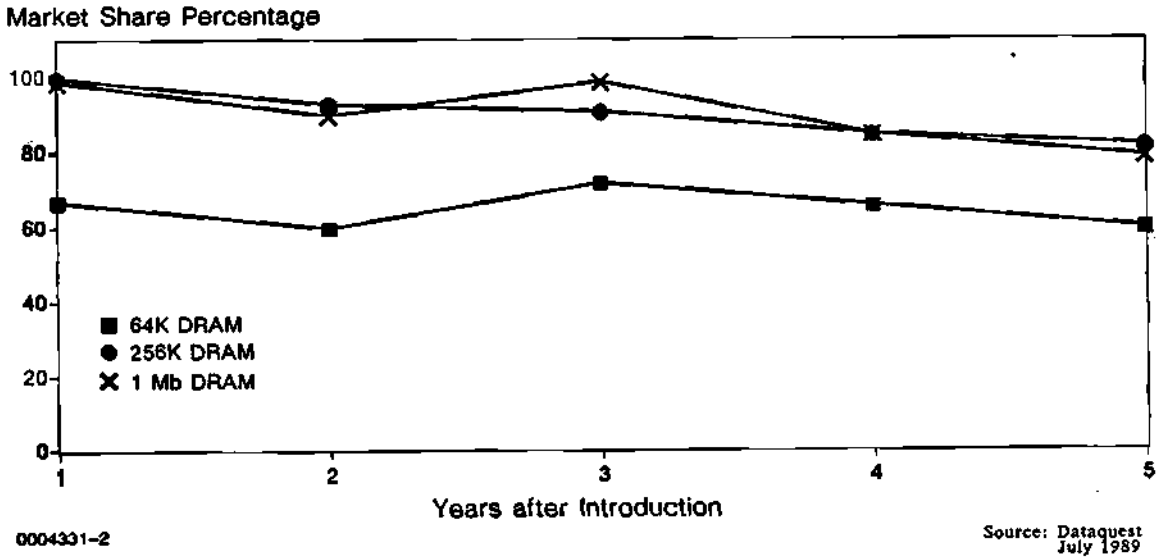
**Estimated Semiconductor Capital Spending**



With the entry of the Korean manufacturers, a wider field of 1Mb DRAM suppliers will exist in 1990. Estimates show that Japanese manufacturers as a group will have the same control over the market, in terms of market share, as they did with the 256K DRAM (see Figure 2). The 1Mb DRAM estimates assume greater participation by Goldstar, Hyundai, Micron Technology, Samsung, Siemens, and Texas Instruments.

**Figure 2**

**Estimated Japanese Companies' Worldwide Market Share**




With such aggressiveness displayed by other manufacturers, the top Japanese companies should be cautious about their strategic assumptions of market control. Although they are threatened in the 1Mb DRAM market, Japanese manufacturers will find good refuge in the profitability of the 4Mb DRAM, which they are ramping quickly.

Can the top–tier Japanese companies shift enough 1Mb DRAM capacity to other products? If these companies do maintain control over the 1Mb DRAM market, they can effectively reduce 1Mb DRAM production by shifting capacity to 32Kx8 SRAMs and 4Mb DRAMs. Dataquest estimates show that if Japanese companies increase the shipments of 32Kx8 SRAMs by 50 percent more in 1990 and use existing 1Mb DRAM capacity to build all 4Mb DRAMs, then they would have effectively cut 1Mb DRAM production by about 20 percent in 1990. Nevertheless, after successfully doing this, they would have reduced their market share in 1990 and their future control over the 1Mb DRAM market. By that time, however, we would hope that their emphasis would have shifted to the 4Mb DRAM.

In keeping the 1Mb DRAM prices up at the cost of market share, these leading Japanese companies also can keep the prices of 4Mb DRAMs, a market that they control, relatively high. The profits that could have been gained from the 1Mb DRAM will be reaped from the higher prices of the 4Mb DRAM.

## DATAQUEST ANALYSIS

Korean, European, and U.S. companies currently have the momentum to change the control over the 1Mb DRAM market held by the top-tier Japanese companies. However, they face challenges other than production ramps, such as improving 80ns yields, widening their product offerings, and meeting major OEMs' stringent qualifications.

The top-tier Japanese companies have a plausible profit-maximizing strategy, but it hinges on the assumption that other manufacturers' production plans will slip. In following their strategy, Japanese suppliers will have to trade market share for profits, which means that they need to successfully ramp the 4Mb DRAM in order to keep overall worldwide DRAM market dominance.

DRAM procurers that have had difficulty returning the 1Mb DRAM to its learning curve path will need to try to qualify a wider field of suppliers, especially knowing the aggressiveness of the production plans of Korean companies.

Victor de Dios
Mark Giudici
George Burns

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# Research *Bulletin*

NASM Code: Newsletters 1989: June
1989-9
0004332

## JUNE MARKET WATCH: CLEARER SLOWDOWN SIGNALS AS SYSTEM DEMAND WEAKENS

Market Watch is a monthly bulletin that is released after the SIA book-to-bill flash report and is designed to give a deeper insight into the monthly trends in the semiconductor market (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

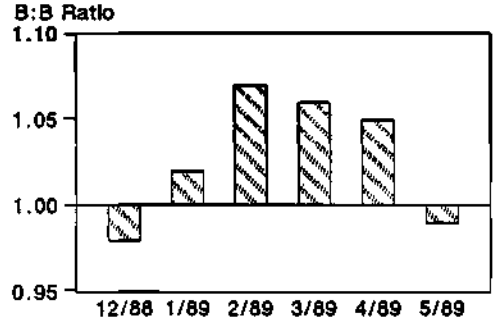



**Figure 2**
**DOC Computer Demand**

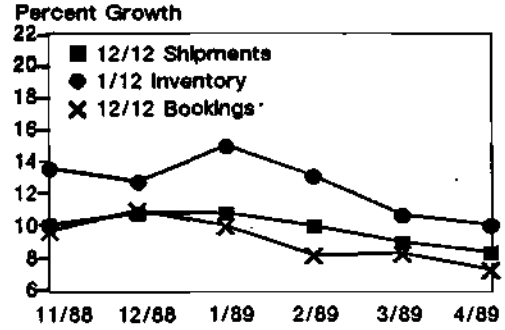



**Figure 3**
**Semiconductor Inventory Level**

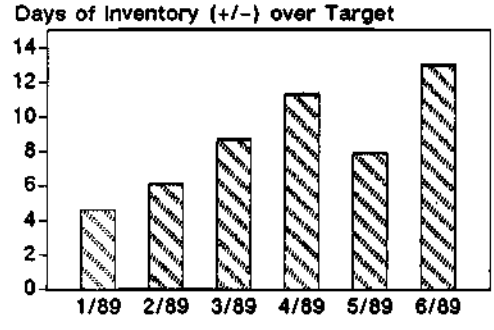
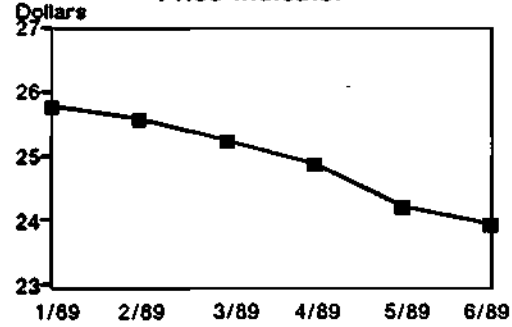



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




0004332-1

Source: U.S. Department of Commerce
World Semiconductor
Trade Statistics
Dataquest
June 1989



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## SIA BOOK-TO-BILL RATIO DROPS TO 0.99

The industry's leading health indicator, the SIA book-to-bill ratio, has dropped below unity—perhaps the first clear sign of the slowdown Dataquest has been predicting for the second half of 1989. Despite strong first quarter bookings, nonmemory product sales were flat from Q4 1988 to Q1 1989, indicating that the slowdown may already have occurred for this segment. MOS memory sales, on the other hand, grew by 14.8 percent during the same period. Several Japanese companies saw strong bookings in May, especially for MOS memory devices, which is likely to boost the flash report figures when finalized.

## SYSTEM DEMAND CONTINUES TO SLOW, BUT INVENTORY LEVELS ARE STILL WELL MANAGED

Computer demand is slowing down, as shown in Figure 2, with declining computer order growth threatening to slow further the already sluggish growth of computer shipments. A positive sign is that inventory growth is slowing even more rapidly than that of computer orders and shipments, reducing the possibility of severe price declines in the second half of 1989.

Despite the increase in inventory over target levels, actual inventory has remained fairly flat, as explained in the June Procurement Pulse newsletter. Semiconductor users have reduced target inventory levels, perhaps as a result of anticipated slowdowns in the system markets and easing of the DRAM shortage problem. The major emphasis of procurement managers today is to cut costs and return to just-in-time (JIT) schedules, which are standard in slow markets. Although actual inventories have remained flat, Dataquest's survey shows that non-DRAM inventory levels have risen dramatically. Non-DRAM manufacturers should be cautious of this trend.

## PRICES ARE STILL STEADY

The price of Dataquest's basket of key products has not dropped very much since the beginning of the year. Most of the price declines are in microcomponents and selected memories, but prices of standard logic and linear devices, as well as key memory products, have been firm. Although affected by demand, prices decline faster in periods of excess capacity or inventory. The semiconductor industry does not have excess capacity, and OEM inventories are still fairly low. Dataquest does not expect to see severe price declines in this slowdown period.

## DATAQUEST ANALYSIS

The MOS memory market has isolated itself from the patterns of the rest, persisting in its growth, while other product families are slowing down considerably. MOS memories, the major growth drivers in 1989, also will encounter a slowdown as computer demand weakens. Already, price pressures are increasing for the 1Mb DRAM. Semiconductor buyers are beginning to act with less optimism on future system sales growth. Despite the inevitability of a slowdown, we should be thankful that capacity and inventory are low and prices and profits will not plunge severely.

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Mark Giudici

  

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# Research *Bulletin*

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1989–8
0004240

## JUNE PROCUREMENT PULSE: ORDER RATES IMPROVING; INVENTORY MIX CHANGING

The Procurement Pulse is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin will present the results of the monthly survey and analyze what this information means to both semiconductor users and manufacturers.

**Figure 1**
**Averaged Monthly Semiconductor Orders**

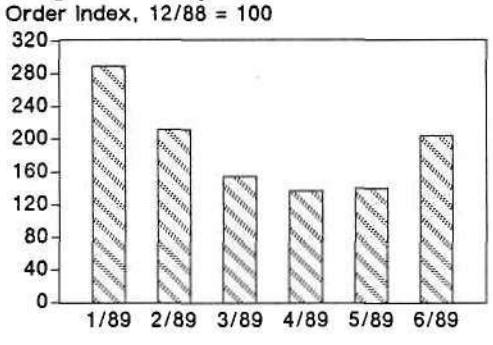



**Figure 2**
**Averaged Semiconductor Lead Times**

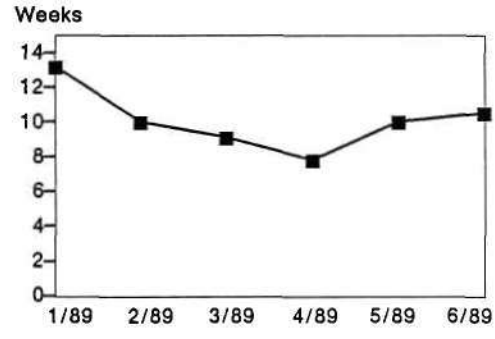



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

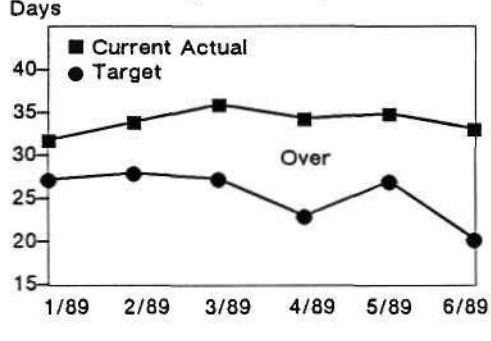
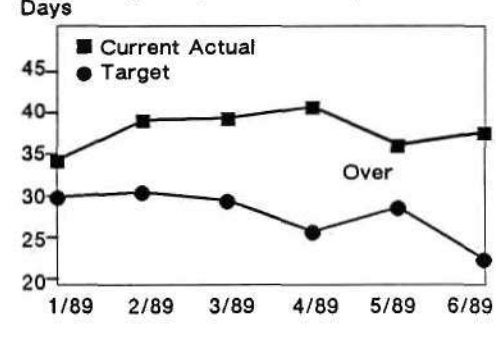



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




0004240–1

Source: Dataquest June 1899



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## INCREASED MARKET CONFIDENCE AS JUNE ORDERS RISE

Semiconductor purchasers in the Dataquest survey expect to increase their June orders sharply by 46 percent, as shown in Figure 1, paving the way for a possible rise in the June book-to-bill ratio. Two-thirds of these purchasers expect to have higher system shipments (of between 2 and 20 percent) in the second half of 1989, and the rest of the respondents expect flat sales. Although demand remains strong, Dataquest believes that the June order surge is not the beginning of a trend but rather a function of adjusting the poor mix of an already low inventory.

## LEAD TIMES REMAIN FLAT

DRAMs and associated products continue to keep the average lead time high at 10.6 weeks, as shown in Figure 2. Slower speed (100 and 120ns) 1Mb DRAMs have become more available; some manufacturers are rumored to have full shelves and to be accepting lower prices. However, 80ns 1Mb DRAMs and 32Kx8 SRAMs are still in short supply, and allocations still exist. Other semiconductor lead times are at comfortable levels for both users and manufacturers.

## OVERALL INVENTORY LEVELS DROP, BUT NON-DRAM LEVELS RISE SHARPLY

With easing of the DRAM shortage, many OEMs are reverting to traditional cost-cutting practices such as just-in-time shipments by cancelling delinquent orders and dramatically reducing targeted inventory levels, as illustrated in Figures 3 and 4. Actual inventories for all OEMs have dropped slightly from 35 to 33 days; those for computer OEMs rose slightly from 36 to 38 days.

However, non-DRAM inventory levels have risen dramatically. For all OEMs, actual inventory levels, less DRAM and work-in-process (WIP) inventory, have increased from 25.4 days in May to 33.7 days in June. For computer OEMS, actual inventory, less DRAM and WIP stock, jumped from 22 to 37 days. Target inventory levels of all OEMs increased from 21.6 days in May to 23.7 days in June, and those of computer OEMs also rose from 20.7 to 26.4 days.

## DATAQUEST ANALYSIS

Dataquest does not expect the surge in June orders to be the beginning of a trend but rather a result of inventory adjustments, especially in memories. Any bookings surge should be interpreted with caution, as inventory levels for non-DRAM products have risen significantly in June. Manufacturers of these products should be concerned that the pipeline for their devices is filling up. Purchasers should be aware of the potential inventory-mix problem that could lead to higher inventory levels overall.

Mark Giudici
Victor de Dios

  

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# Research *Bulletin*

NASM Code: Newsletters 1989: April–June
1989–7
0004130

## MAY PROCUREMENT PULSE: INVENTORY LEVELS IMPROVE, DRAM MARKET AMISS

The Procurement Pulse is a monthly update of critical issues and market trends based on Dataquest's monthly survey of major OEM semiconductor procurement managers. This bulletin will present the results of the monthly survey and analyze what this information means to both semiconductor users and manufacturers.

**Figure 1**
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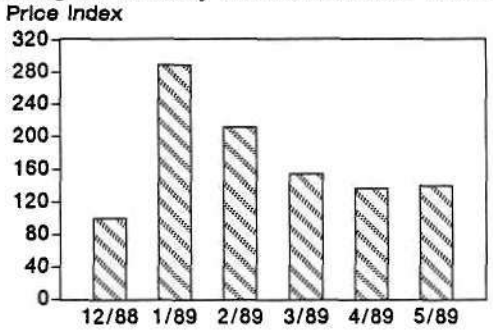



**Figure 2**
**Averaged Semiconductor Lead Times**

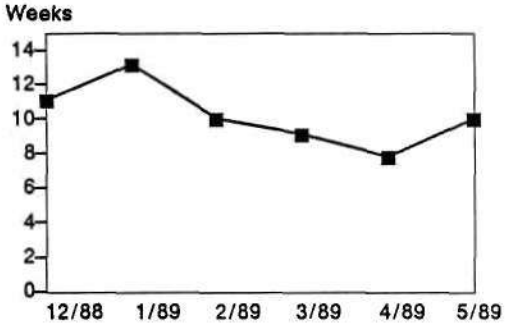



**Figure 3**
**Actual vs. Target Inventory Levels (All OEMs)**

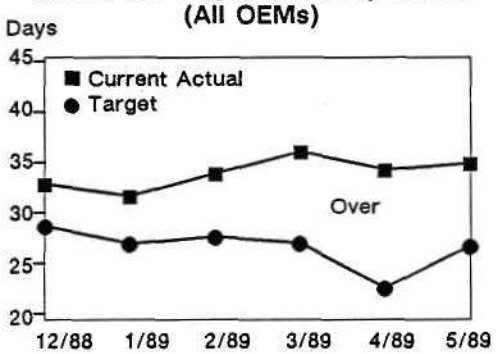
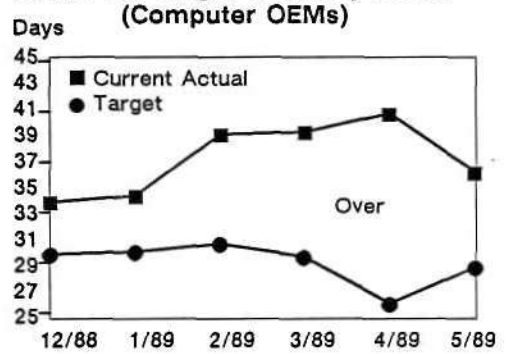



**Figure 4**
**Actual vs. Target Inventory Levels (Computer OEMs)**




0004130–1

Source: Dataquest
May 1989



Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

## SEMICONDUCTOR ORDER RATE STABILIZES; DITTO SYSTEM SALES OUTLOOK

The large increase in semiconductor orders in January and February is now hitting semiconductor suppliers' books as billings (Figure 1). The rosy situation that led to strong Q1 book-to-bill ratios will not last. Threatening to dampen the Q1 rally of suppliers, semiconductor order rates for the past three months dipped to just above Q4 1988 levels. Now that overall semiconductor availability is just a concern, not a crisis, procurement managers are trying to balance order rates with overall system sales, which are expected to grow 4 percent to 15 percent during the next six months.

## OVERALL SEMICONDUCTOR LEAD TIMES ARE MANAGEABLE

Except for DRAM-process-related semiconductors, the overall availability of devices continues to improve compared with earlier this year (10.1 weeks in May versus 13.3 weeks in January). The rebound in lead times this month (Figure 2) is due to SRAM and DRAM products refusing to become more available despite increased capacity levels. Korean memory products are the exception, being lower than average in price and lead time. Users of DRAMs and SRAMs should expect slower price declines this year relative to past supply/demand cycles, resulting from a seemingly concerted supplier strategy.

## INVENTORY LEVELS DECLINE; TARGET LEVELS AGAIN IN SIGHT

Overall target inventory levels rose this month to 27.1 days over last month's low level of 23.1 days (Figure 3). With memories relatively more available now, inventory target levels have risen; this reflects increased confidence that order rates can be balanced with system sales. The relative stability of actual inventory levels (35.0 over 34.4 days) also correlates with the flattened order rate, which the industry hopes will keep pace with system shipments. Without work in process (WIP) or DRAM constraints, overall actual levels were less than 4 days over target levels (25.4 and 21.6 days, respectively). While computer sales rolled on, eating inventory, specific semiconductor order reductions had their intended effect (Figure 4). Current target and actual levels of 29.0 and 36.3 days are a large improvement over the respective levels of 26.2 and 40.8 days seen last month. Without WIP and DRAM inventory noise, computer semiconductor inventories were less than 2 days over target (22.0 days actual, 20.7 days target)! Inventory controls in this volatile segment improve as memory supplies increase, lessening the need for insurance stock.

## DATAQUEST ANALYSIS

Improved availability of components for users is indicated by the following:

- Reduced semiconductor order levels
- Lead-time and price reductions (except for DRAMs/SRAMs)
- Historically low inventory levels
- A steady electronics market

Dataquest recommends that users closely match long-term contract levels to system sales rates. Semiconductor suppliers should not expect monthly billing levels to be the same in Q3 as in the first half of 1989. Suppliers should anticipate Q2 1989 booking levels comparable with those of Q3 1988. Accurate forecasting and inventory control by both users and vendors will be critical in preventing any slowdown from becoming a recession.

Mark Giudici

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# Research *Bulletin*

NASM Code: Newsletters 1989: April–June
1989–6
0004013

## MAY MARKET WATCH
## SYSTEM SHIPMENT RATES DECLINE, SEMICONDUCTORS TEMPORARILY STEADY

Market Watch is a monthly bulletin that is released after the SIA book-to-bill flash report and designed to give a deeper insight into the monthly trends in the semiconductor market (see Figures 1 through 4).

**Figure 1**
**U.S. Semiconductor Book-to-Bill Ratio**

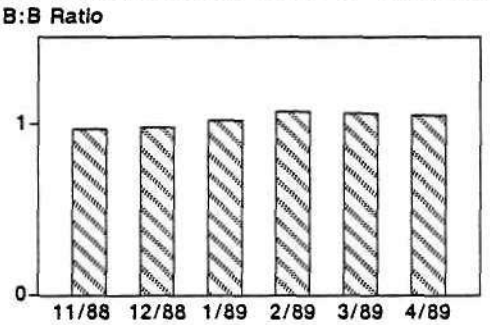



**Figure 2**
**DOC Computer Demand**

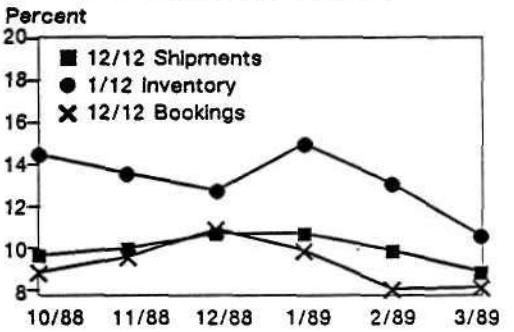



**Figure 3**
**Semiconductor Inventory Level**

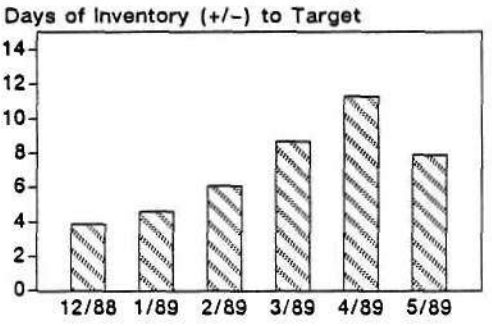
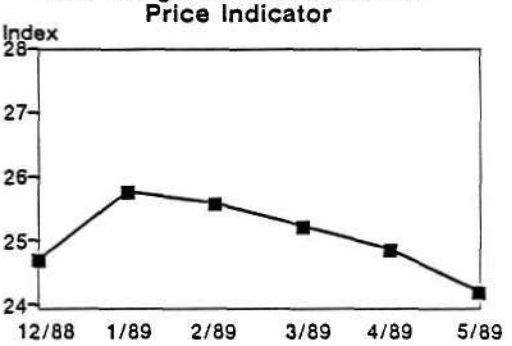



**Figure 4**
**U.S. Weighted Semiconductor Price Indicator**




0004013–1

Source: U.S. Department of Commerce
World Semiconductor
Trade Statistics
Dataquest
May 1989



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## SLOWDOWN IN BOOKINGS GROWTH

The SIA book-to-bill report (see Figure 1) shows slower bookings growth both for April and on a moving three-month average basis. Dataquest's May procurement survey agrees with this, showing major OEM order rates slowing down to Q3 1988 levels after phenomenal first quarter performance. MOS memory continues to heavily drive the high levels of bookings and billings. Semiconductor sales are still expected to remain strong through the second quarter and into part of the third. Bookings are no longer spurred by product shortages, but more closely reflect true system demand, as lead times, shown in our May Procurement Pulse report, decline gradually.

## SYSTEM SHIPMENT AND ORDER GROWTH RATES SLOW

The March 1989 computer shipment rate remains strong at about 9 percent above that of the previous year, but shipment growth is declining compared with last year (see Figure 2). Computer bookings show the same trend but are growing less than billings. Inventories are also decelerating. Although systems demand remains strong compared with last year, its growth is starting to slow. Declining growth in both inventory and computer orders shows a well-managed systems market, unlike that of 1985. This combination greatly reduces the possibility of severe order cuts, price declines, and a deep industry recession.

## LOW OEM SEMICONDUCTOR INVENTORIES

There is also a decline in general OEM semiconductor inventories. The variance of actual to targeted inventories shown in Figure 3 dropped in May, primarily due to major buyers increasing their target inventory levels after having dropped them too much in April. Current actual semiconductor inventory levels of 35 days should keep order rates steady for the next two to three months.

## DATAQUEST PRICE INDICATOR SHOWS CONTINUED GRADUAL DECLINE

The well-managed systems market combined with low inventory levels and improved semiconductor lead times are reflected in the continuing slow price decline in Dataquest's basket of products (Figure 4). Again it is unlikely that we will see severe price declines in 1989. Most of the price erosion comes from standard speed (120ns) 1Mb DRAMs and microprocessors. Prices of faster DRAMs remain very flat and high and will continue to make MOS memories the driving factor in overall semiconductor growth this year.

## DATAQUEST ANALYSIS

A slowdown in the second half of 1989 is likely to be demand driven and will not necessarily be a devastating development. The computer market has displayed a good balance of orders and inventory, reducing the possibility of a repeat of 1985's deep recession. Despite the projected slowdown in the second half of 1989, Dataquest believes that the systems and semiconductor markets will remain healthy and profitable with sales in those months to be at or above those seen in 1988.

Victor de Dios
Mark Giudici

  

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# Research Newsletter

NASM Code: Newsletters 1989: April
1989-5
0003727

## NORTH AMERICAN MARKET DEVELOPMENTS
## QUARTERLY EVENTS NEWSLETTER
## April 1989

This is the second quarterly events newsletter issued by the North American Semiconductor Markets (NASM) service. It contains a synopsis of news events gathered from the trade press during the past quarter.

The following is a key to the publications reviewed during research for this issue:

| | | | |
|---|---|---|---|
| Electronic News | EN | Electronic Engineering Times | EET |
| Newsletter Digest | ND | Electronic Buyers News | EBN |
| San Francisco Chronicle | SFC | Business Journal | BJ |

### Contents



The contents of this newsletter were gathered from information generally available to the public or released by responsible individuals in the subject companies, but are not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients.



Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

## TECHNOLOGY

### Digital's Impressive New Products

Several new products were introduced by Digital Equipment recently. Noteworthy is the company's $11,900 desktop computer that runs at 14 million instructions per second, making it one of the fastest desktop machines on the market. (SFC, January 11, 1989)

### Digital's 6300 Line

Digital Equipment has replaced its VAX 8800 series with a new VAX 6300 series that has a six-processor complex with 22 mips and faster iteration. (EN, January 30, 1989)

### DECwindows Introduced

A new software product, DECwindows, introduced by Digital Equipment, will confer X-windows color graphics and X.11 bit-image portability to almost every piece of equipment that the company produces. (EET, January 16, 1989)

### Government Grant Requested by Zenith

Zenith has asked for a $60 million government grant to develop its Flat Tension Mask (FTM) tube into a large-screen, low-cost tube for high-density television. The FTM tube, announced in 1986, would provide increased brightness, higher contrast and resolution, and would be developed for TV use. (ND, January 1989)

### HP's Aggressive Marketing Move

Hoping to catch Digital VAX users, Hewlett-Packard plans to provide hardware, software, and support to move VAX/VMS programs to its RISC-based systems. HP will provide customers with free consulting, hardware, and software. (EET, January 23, 1989)

### Storage Tech's Major Research Project

Storage Technology has launched Project Iceberg, a major research project that deals with minimizing the problem of head crash. Target date for its introduction is 1991. (EN, January 2, 1989)

### Sun Microsystems' New Workstations Compete with Digital Equipment and NeXT

Sun announced its campus computer and three other computers based on its SPARC chip. Digital Equipment and NeXT are both strong competitors. In fact, Digital Equipment has dubbed its new computer the "Sun Killer." (BJ, January 9, 1989)

### Unisys Introduces Desktop

Unisys has unveiled its Micro A, a 48–bit machine the size of a PC AT. With the requisite software, the system will cost $25,000. (EET, January 23, 1989)

## PROFITS AND LOSSES

### Twofold Increase for Cray

Revenue for Cray Research for the fourth quarter revealed a twofold increase. The company showed a net gain of $330,885,000, up 6 percent from 1987. (EN, January 30, 1989)

### Losses for Honeywell in Fourth Quarter

Losses of $483 million were experienced by Honeywell in the fourth quarter due to the sale of its merchant semiconductor business and deficits at its Space & Aviation Systems and Solid State Electronics businesses. (EN, February 20, 1989)

### McDonnell Douglas Profitable

For the fourth quarter of 1988, McDonnell Douglas showed a 56 percent jump over 1987, with earnings of $145 million. Attributable to the company's profitability were lower costs and improved performance in aircraft and space systems and missiles segments as well as increased deliveries of commercial jetliners. (EN, February 6, 1989)

### Record Fourth Quarter for Motorola

Motorola had net earnings of $124 million on $222.19 billion in sales for the fourth quarter of 1988. The company's strongest areas were in communications, cellular telephones, and semiconductor operations. (EBN, January 30, 1989)

### Northern Telecom's $81 Million Loss

Northern Telecom experienced a 34 percent decline in its 1988 fourth–quarter operating profit because of increases in product and market development costs and global competition. Company plans include reassigning or terminating 2,500 employees, closing six plants, and scaling back a seventh plant. (EN, January 30, 1989)

### Earnings Up for TRW

TRW earned $261 million for the year in 1988, an increase of 7 percent over 1987, despite losses in its information systems segment and declining margins in its defense and space unit. (EN, February 13, 1989)

  

### Xerox Loss in Fourth Quarter

A $77 million loss was sustained by Xerox Corporation during the fourth quarter of 1988. The company plans to focus on its core document processing business, combining worldwide marketing activities in its new Integrated Systems Operations. (EN, February 6, 1989)

## ORGANIZATIONS AND REORGANIZATIONS

### AT&T's Takeovers

AT&T began 1988 by acquiring a stake in Sun Microsystems; continued with its acquisitions by adding Eaton Financial Corporation; and closed out the year with the takeover of Paradyne Corporation. (EET, January 9, 1989)

### Honeywell Sells Off to Groupe Bull

Honeywell, Inc. has sold a 22.6 percent stake in Honeywell Bull to Groupe Bull, reducing its interest in the company to 19.9 percent and increasing Bull's position to 65.1 percent. The company name has been changed to Bull HN Information Systems Inc. (EN, January 2, 1989)

### Honeywell Layoffs

Honeywell Bull planned to cut 1,600 of its 11,000 U.S. employees by the middle of March through early retirements and layoffs. Production and administration workers were to be affected. (EN, January 9, 1989)

### New Chairman for Northern Telecom

The former president of Unisys, Paul G. Stern, has been selected as Northern Telecom's new chairman, effective next year. In preparing for the position, he became Unisys' vice chairman as of March 1. (EET, January 30, 1989)

### TI's Work Force Cut

Texas Instruments plans to reorganize and cut the work force in its money-losing computer and bipolar businesses during the next two months. The company will reorient its computer system business to place more emphasis on applications software and system level solutions. (EN, January 30, 1989)

### TRW Unloads LSI Products

TRW ended its 12-year effort to capture a chunk of the analog IC business when the company sold LSI Products to KDT Industries Inc. in Austin, Texas. (EET, January 2, 1989)

### UNIX Marketing Unit for AT&T

AT&T has established the UNIX Software Operation (USO) for the developing and marketing of the UNIX System V operating system software. The unit will be part of AT&T's Data Systems Group. (EET, January 23, 1989)

The former vice president for AT&T's Data Systems Group, Lawrence Dooling, was named president. (EN, January 9, 1989)

### Xerox Consolidates Engineering Operations

Xerox has established a new Engineering Systems Division. Affected by this consolidation are Xerox Engineering and Graphics Products group (Rochester, New Hampshire), Xerox Technigraphic Products (East Rochester, New York), and Versatec Inc. (Santa Clara, California). However, each group will operate as a separate P&L center and will retain its headquarters and name. (EET, January 23, 1989)

## CONTRACTS, PACTS, AND ALLIANCES

### AT&T's $4.5 Billion Contract

A $4.5 billion contract has been awarded to AT&T to deliver computer systems to the Air Force. The award is the largest contract received by AT&T since its entrance into the commercial computer market in the 1980s. (EET, February 6, 1989)

### Boeing Sells Jets

International Lease Finance Corporation has purchased five 767–300ER jetliners and seven 757–200 jets from Boeing for $730 million. (SFC, March 1, 1989)

### Digital and Apollo's NCS Licensing

Digital Equipment has licensed Apollo Computer's Network Computing System (NCS). NCS has been gaining acceptance as an industry standard for network computing among university, government, and industry users. (EET, January 16, 1989)

### General Dynamics Receives Navy Contract

General Dynamics recently received a $726 million navy contract for the first SSN–21 Seawolf submarine. (EET, January 23, 1989) The company also received a $292.5 million contract for aircraft for Israel. (EN, February 6, 1989)

### Group Develops Plan for HDTV

Several U.S. electronics companies have put together a business plan to ensure that a substantial part of the future U.S. HDTV market goes to American manufacturers. The group was formed by the American Electronics Association (AEA). Some of the

companies involved are Digital Equipment, Hewlett-Packard, IBM, Motorola, Tektronix, and Texas Instruments. (EET, January 16, 1989)

### Lockheed Awarded Missile Contract

A $320.7 million navy contract for Trident II submarine missiles has been awarded to Lockheed Corporation. The company also received a $31.8 million navy contract for aircraft modifications. (EET, January 2, 1989)

### Navy Contract for Texas Instruments

Texas Instruments received a $459.4 million navy contract for high-speed missiles. (EET, February 13, 1989)

### Unisys and Sequent Sign Minisupercomputer Pact

Sequent Computer Systems (Portland, Oregon) has signed a contract with Unisys that will allow Sequent to sell its minisupercomputer to Unisys. Unisys will add peripherals and customized features and sell it to its installed base. The contract is valued at $250 million. (EET, February 6, 1989)

## PLANTS—NEW LOCATIONS, EXPANSIONS, AND CLOSINGS

### Apple Expands into Campbell and San Jose

Apple Computer has leased office space in both Campbell and downtown San Jose, California. Approximately 300 employees will be phased into the San Jose area beginning in May, and 600 employees will be moved to the Campbell facility in August. Apple plans to hire approximately 2,000 more employees worldwide by midyear. (BJ, January 9, 1989)

### New MOS Wafer Fab for Motorola

A $250 million wafer fab is being built by Motorola in Austin, Texas. Completion is expected in late 1990 or early 1991. (EET, January 16, 1989)

### Sun to Add Newark Facility

Sun Microsystems of Mountain View, California, expects to build a 1.3-million-square-foot facility in Newark, California, with occupancy scheduled for 1991. The property will fill a substantial portion of the New Technology Park. (SFC, February 16, 1989)

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**Dataquest**

# Conference Schedule

## 1989

| | | |
|---|---|---|
| Semiconductor User/ Semiconductor Application Markets | February 27–28 | Le Meridien Hotel<br>San Francisco, California |
| Japanese Components | April 20–21 | Tokyo Bay Hilton International<br>Tokyo, Japan |
| Computer Storage | April 26–28 | The Doubletree Hotel<br>Santa Clara, California |
| Document Processing | May 16–18 | Monterey Sheraton Hotel<br>Monterey, California |
| Copiers | May 16–17 | |
| Printers | May 16–17 | |
| Electronic Publishing | May 18 | |
| Imaging Supplies | May 18 | |
| Color | May 18 | |
| SEMICON/West Seminar | May 24 | The Dunfey Hotel<br>San Mateo, California |
| Telecommunications | June 5–7 | Silverado Country Club<br>Napa, California |
| European Components | June 7–9 | Park Hilton<br>Munich, West Germany |
| Asian Semiconductor and Electronics Technology Seminar | June 28 | Radisson Hotel<br>San Jose, California |
| Financial Services | August 22–23 | The Doubletree Hotel<br>Santa Clara, California |
| Technical Computing and Applications | September 11–13 | The Doubletree Hotel<br>Santa Clara, California |
| European Copying and Duplicating | September 18–19 | Majestic Hotel<br>Cannes, France |
| Western European Printer | September 20–22 | Majestic Hotel<br>Cannes, France |
| Taiwan Conference | September 25–26 | Grand Hotel<br>Taipei, Taiwan |
| Distributed Processing | September 26–28 | The Doubletree Hotel<br>Santa Clara, California |
| SIA/Dataquest Joint Conference | September 27 | Santa Clara Marriott<br>Santa Clara, California |
| Information Systems | October 2–6 | Tokyo American Club<br>Tokyo, Japan |
| Semiconductor | October 16–18 | Monterey Sheraton Hotel<br>Monterey, California |
| Asian Semiconductor and Electronics Technology | November 2–3 | Kunlun Hotel<br>Beijing, China |
| European Telecommunications | November 8–10 | Grand Hotel<br>Paris, France |
| European Personal Computer | December 6–8 | Athens, Greece |

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# Research *Bulletin*

NASM Code: Newsletters 1989: April
1989-4
0003725

## NORTH AMERICAN MARKET WATCH, APRIL 1989: SIGNS OF A WEAKENING MARKET AHEAD

The North American Market Watch is a monthly bulletin, released after the SIA book-to-bill flash report, and is designed to give a deeper insight into the monthly trends in North American semiconductor consumption (see Figures 1 through 4).

**Figure 1**
**Semiconductor Book-to-Bill Ratio**

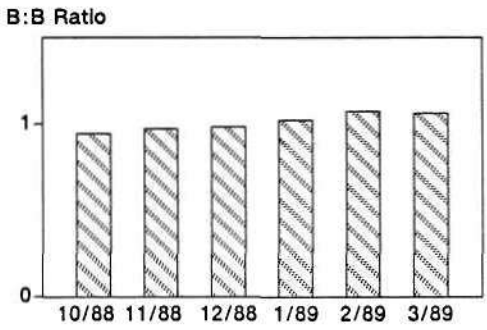



**Figure 2**
**DOC Computer Demand**

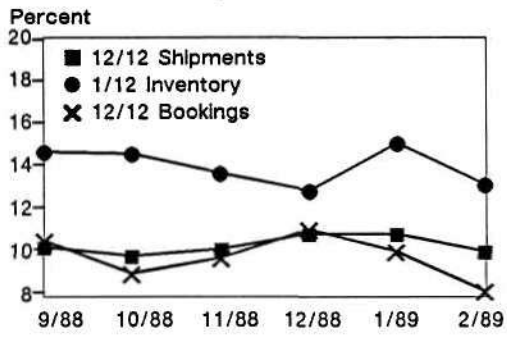



**Figure 3**
**Semiconductor Inventory Level**

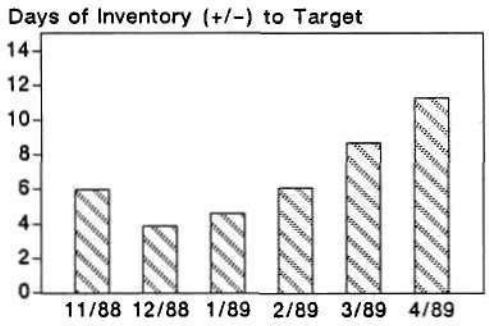
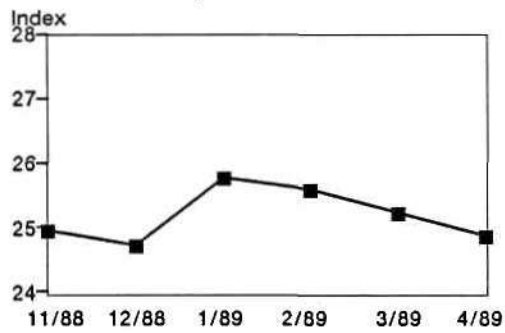



**Figure 4**
**U.S. Weighted Price Index**




0003725-1

Source: U.S. Department of Commerce
World Semiconductor
Trade Statistics



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## STRONG BOOK–TO–BILL, BUT MEMORY ACCOUNTS FOR MOST OF GROWTH

As shown in Figure 1, the April SIA flash report carries encouraging news as the semiconductor industry accomplishes a rebound in the first quarter of 1989 after the dismal final months of 1988. However, caution must be exercised in the interpretation of the strength of this upturn. Much of the growth is attributable to MOS memory. The latest WSTS blue book report shows an overall billings decline from December to January of 9.9 percent. MOS memory actually declined by only 0.1 percent, while non–MOS memory products dropped by 14.6 percent. Shipments of 1Mb DRAMs increased in the first quarter by about 30 percent, but prices dropped by only about 10 percent for the more available devices.

## SYSTEM ORDERS SHOW SIGNS OF WEAKENING

As presented in Figure 2, computer inventories, relative to last year, have declined, but computer shipments have remained at a steady growth, which verifies the strong first quarter for semiconductor shipments. However, the rate of computer bookings has been declining for three consecutive months, suggesting a possible slowdown in computer production rates by the end of the second quarter or the beginning of the third quarter. In fact, Dataquest's monthly survey of major OEM buyers indicates weaker 1989 system revenue growth projections in March compared with projections made in February.

## OEM INVENTORIES APPEAR TO BE GROWING

Dataquest's monthly survey of major OEM buyers, presented in Figure 3, shows actual inventories continuing to increase beyond target inventories. Actual inventories are now more than 11 days of sales above target compared with an excess of less than 5 days in January. OEMs also appear to be reducing target inventories in anticipation of slower revenue growth, but actual inventories still need to adjust to the drop in target inventories. However, actual inventory levels are still at 34 days of sales, which should not affect semiconductor order rates in the near term.

## DATAQUEST'S PRICE INDEX SHOWS STEADY PRICING

Dataquest compiles a monthly price index from a basket of 25 semiconductor products, as shown in Figure 4. The price index has dropped by only 3 percent since January. Generally, prices have been holding well since November, but the slight decline may be the signal for more price drops if computer demand indeed weakens and OEM inventories continue to increase.

## DATAQUEST ANALYSIS

The benefits of semiconductor shipment growth do not appear to be equally distributed. MOS memory manufacturers appear to be reaping most of the benefits. Despite the resurgence, signs of a weakening market prevail: OEM inventories are up; target inventories are down; system revenue growth forecasts are lower; and computer orders have been slowly declining. Until then, the semiconductor industry seems poised for a mildly healthy second quarter, since prices have not declined significantly in the first quarter and semiconductor bookings remain considerably strong. But the signs indicate that the second half of 1989 may not be as rosy.

Victor de Dios

Dataquest
a company of The Dun & Bradstreet Corporation

# Research Newsletter

NASM Code: 1989 Newsletter
1989-3
0003467

## DOLLAR DEVALUATION FAILS TO IMPROVE U.S. COMPETITIVENESS

### SUMMARY

Claims that the devaluing dollar will increase U.S. competitiveness in world markets still beg to be proven in the semiconductor industry. In fact, U.S. companies have gained little in market share after dropping prices, compared with the significant gains Japanese companies have realized after raising memory prices.

The devaluing dollar has not narrowed the difference between North American market semiconductor prices and those of other regions. The movement toward offshore production by U.S. electronic equipment companies has slowed, but there is little indication of strong movement back onto U.S. shores. Ironically, the trend toward onshore equipment production is being initiated primarily by foreign-based companies.

### Impact of Currency Exchange Rates

In two years, the world has moved from the era of the strong dollar to a period of the strong yen. The impact of changes in currency values is important because such changes theoretically affect the competitiveness of a company, depending on the location of its markets vis-à-vis its production facilities, and market sizes, depending on the migration of electronic equipment production as it attempts to find the lowest-cost location.

Normally, the devaluing dollar should lead to the following:

- U.S. semiconductor companies should become more competitive in price because their production costs are relatively lower, leading to market share gains.
- The North American prices of imported semiconductors should increase. The differences between North American prices and those of other regions should narrow.
- Electronic equipment manufacturing should move back to the United States to avert the higher relative costs of producing in other countries with stronger currencies.

The North American market for semiconductors has yet to experience these trends. The dollar devaluation has failed miserably in bringing these benefits to the market.

## COMPETITIVENESS AND THE WEAK DOLLAR: AN ILLUSION?

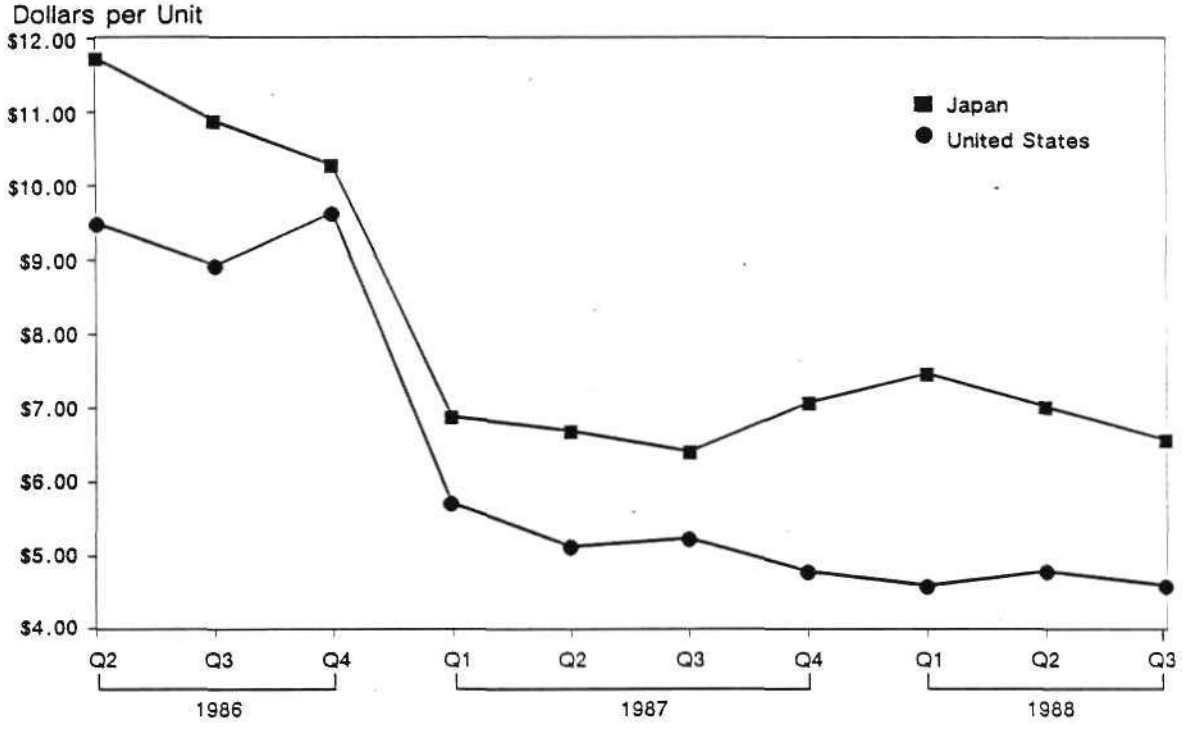
The word "competitiveness" is in danger of being overused, betraying the fact that competitiveness just isn't taking place. Armed with a weak dollar, U.S. companies are supposed to be more price competitive; however, market share reports show little gains. The question is: Are the U.S. companies taking advantage of the situation by lowering their prices to gain market share?

In an effort to answer this question, we examined two cases. In one case, we measured the contract prices of the 68000 microprocessor, a U.S.–dominated product; in the other, we monitored the contract prices of the 256K DRAM, a Japan–dominated product.

If the 68000 microprocessor is representative of their behavior, U.S. companies are more price aggressive. Figure 1 shows that the 68000 price dropped by as much as 45 percent from the middle of 1986 to the middle of 1988, faster even than the depreciation of the dollar. The 68000's prices in Japan were considerably higher than in the United States in order to maximize revenue for Motorola. However, Motorola did not gain market share in microprocessors as a result of the price drops.

**Figure 1**

**Surveyed Contract Prices for the 68000 Microprocessor**

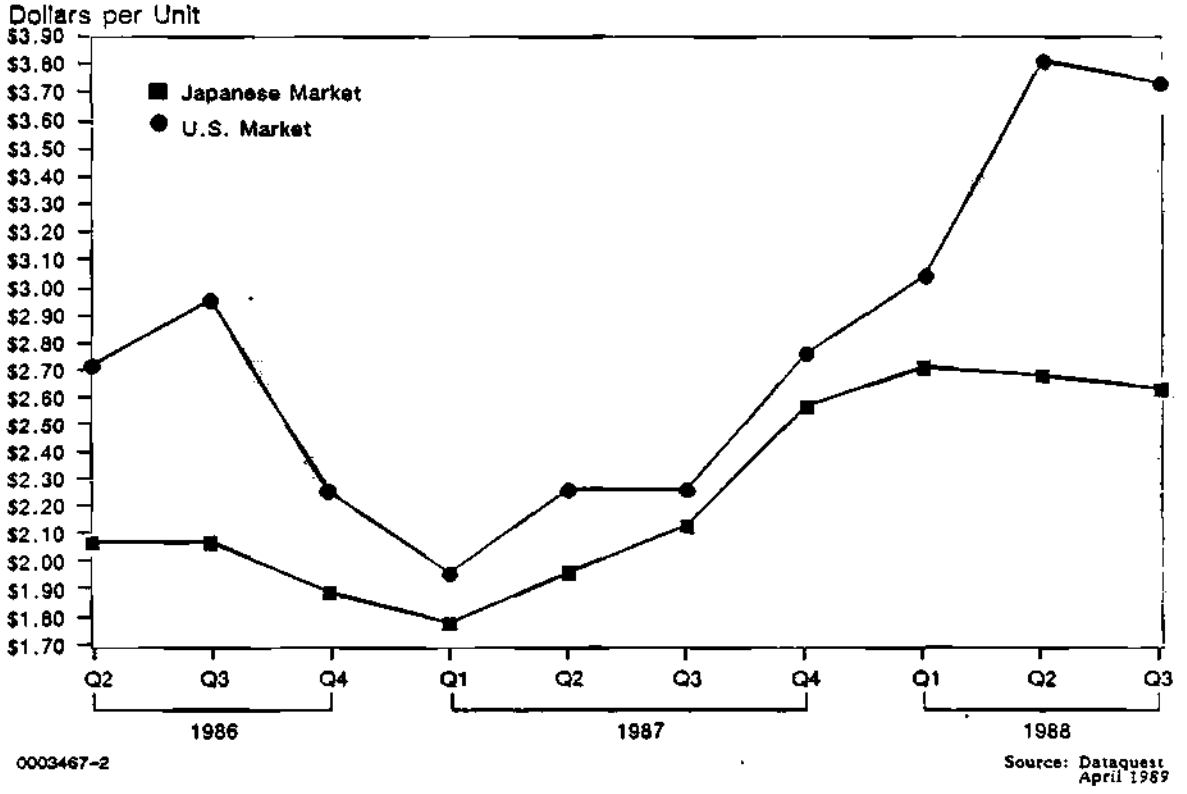


Despite their price aggressiveness and the devalued dollar, U.S. companies have been unable to reverse the declining share trend. U.S. companies went from a 41 percent share of the 1986 worldwide semiconductor market to 39 percent in 1987 and 37 percent in 1988.

Japanese companies, on the other hand, have raised the prices of their memory products, as shown in Figure 2. For most of 1987, "endaka" (the yen–to–dollar exchange rate) was considered a major issue in Japan because it severely limited the competitive pricing flexibility of Japanese companies in the United States and was constraining their profits.

**Figure 2**

**Surveyed Contract Prices for 256K DRAMs**



In Figure 2, the gap between the U.S. 256K DRAM price and that in Japan—the measure of pricing flexibility—narrowed in 1987. Japanese companies could not reduce their U.S. prices to the level of their Japan prices or lower for several reasons. For one thing, selling at prices lower than those in Japan would be "dumping" by definition and would make selling to the United States economically unattractive. In early 1987, U.S. and Korean companies significantly increased their revenue. By 1988, however, the Japanese companies regained their pricing flexibility at significantly higher levels.

Ironically, the Japanese continued to gain market share while raising prices, going from 46 percent of the 1986 worldwide semiconductor market to 48 percent in 1987 and to 50 percent in 1988. The Japanese companies increased their MOS memory market share in North America in 1987, despite the reduced pricing flexibility.

## REGIONAL PRICE DIFFERENCES

Conventional wisdom falters again with respect to regional price differences. Table 1 shows a sampling of memory contract prices from the United States, Japan, Western Europe, and Taiwan in the past two years. These products were chosen because they are heavily imported into the North American market. The prices in regions with appreciating currencies relative to the dollar were expected to come closer to the traditionally high prices in North America.

**Table 1**

**Regional Memory Prices Relative to U.S. Prices**

| | Surveyed Contract Prices ($/Unit) | | | | Percentage Difference from U.S. Price | | | |
|---|---|---|---|---|---|---|---|---|
| | U.S. | Japan | Europe | Taiwan | U.S. | Japan | Europe | Taiwan |
| 256K EPROM | | | | | | | | |
| Feb. 1987 | 3.90 | 2.81 | 3.75 | 3.50 | 0 | (28%) | (4%) | (10%) |
| Aug. 1987 | 5.00 | 3.16 | 5.10 | 3.30 | 0 | (37%) | 2% | (34%) |
| Feb. 1988 | 4.45 | 4.80 | 4.60 | 3.80 | 0 | 8% | 3% | (15%) |
| Aug. 1988 | 4.05 | 4.63 | 4.20 | 4.00 | 0 | 14% | 4% | (1%) |
| Feb. 1989 | 3.25 | 4.65 | 4.20 | 2.80 | 0 | 43% | 29% | (14%) |
| 256K DRAM | | | | | | | | |
| Feb. 1987 | 2.00 | 1.68 | 1.90 | 2.00 | 0 | (16%) | (5%) | 0 |
| Aug. 1987 | 2.55 | 2.15 | 2.50 | 2.50 | 0 | (16%) | (2%) | (2%) |
| Feb. 1988 | 3.25 | 2.60 | 3.60 | 4.00 | 0 | (20%) | 11% | 23% |
| Aug. 1988 | 3.80 | 2.69 | 5.10 | 8.00 | 0 | (29%) | 34% | 111% |
| Feb. 1989 | 4.50 | 3.10 | 6.00 | 4.50 | 0 | (31%) | 33% | 0 |
| 64K SRAM | | | | | | | | |
| Feb. 1987 | 2.10 | 1.90 | N/A | 2.50 | 0 | (10%) | (100%) | 19% |
| Aug. 1987 | 2.00 | 1.82 | 2.25 | 2.20 | 0 | (9%) | 13% | 10% |
| Feb. 1988 | 2.80 | 2.28 | 2.00 | 2.40 | 0 | (19%) | (29%) | (14%) |
| Aug. 1988 | 3.30 | 2.39 | 2.80 | 5.50 | 0 | (28%) | (15%) | 67% |
| Feb. 1989 | 4.00 | 2.79 | 7.00 | 4.20 | 0 | (30%) | 75% | 5% |

N/A = Not Available

Source: Dataquest
April 1989

The regional price differences were more of a function of product availability than currency exchange rates. In the end, electronic equipment production still enjoys better semiconductor prices in Japan and Taiwan than in the United States.

## OFFSHORE MANUFACTURING

A recent Dataquest survey shows that the momentum has slowed for companies moving production offshore. However, the devalued dollar has not encouraged them to return those facilities onshore, as depicted in Figure 3. One clear reason is that semiconductor prices are still better, even in Japan.

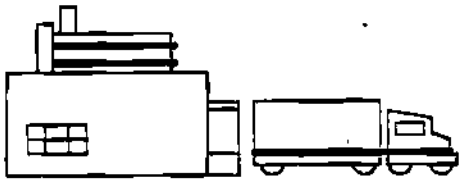
Ironically, electronic equipment manufacturers from Japan, South Korea, and Western Europe are moving or expanding production in the United States, prompted perhaps by the weak dollar as well as the threat of protectionist actions by the U.S. government.

**Figure 3**

**Offshore Production Survey**

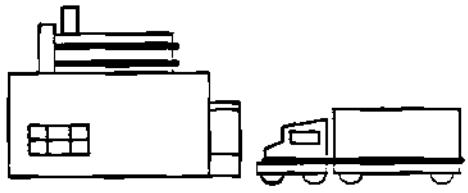
Anticipated Shift to Offshore Production

| | 1987 | 1988 | 1989 |
|---|---|---|---|
| A Great Deal | 10.1% | 3.3% | 2.7% |
| Some | 33.2% | 34.0% | 17.3% |
| Not at All | 56.7% | 62.7% | 80.0% |



Anticipated Shift of Offshore to Onshore Production

| | 1989 |
|---|---|
| A Great Deal | 1.9% |
| Some | 10.4% |
| Not at All | 87.7% |



0003467-3

Source: Dataquest April 1989

## DATAQUEST ANALYSIS

The North American semiconductor market and the U.S. semiconductor industry together represent a home that badly needs fixing. The tools that are needed go beyond macroeconomic moves, such as dollar devaluation, that are supposed to revitalize America's competitive vigor. And when these gains are not realized, U.S. industry is sadly criticized for being inefficient and noncompetitive.

The tools should extend to a microlevel. Policymakers have to understand the specific needs of the semiconductor industry. They have to realize that some economies outside the United States are not structured in the same way and need not follow the same motivations and reactions to such macroeconomic moves as devaluing the dollar.

In early 1987, the Japanese companies felt the greatest pressure from endaka. Their 256K DRAM prices in the United States could not go any lower. The U.S. and Korean companies jumped at the opportunity, pricing just below the Japanese. In a few months, U.S. and Korean factories were full and their market shares were maximized because they could sell no more. The market prices then rose to pay for Japanese products, and these prices have risen since. In Dataquest's opinion, an opportunity to gain more market share was lost because U.S. companies essentially ran out of gas.

Victor de Dios

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# Research Newsletter

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## 1988 PRELIMINARY NORTH AMERICAN MARKET SHARES: U.S. COMPANIES STILL SLIDING

### SUMMARY

In a high-growth market, U.S. companies lost market share in 1988 while Japanese and Asia/Pacific companies improved their competitive positions. The high prices of memories, products dominated by Japanese companies, contributed heavily to the loss of share for U.S. companies. A group of medium-size, U.S. companies performed admirably in 1988, however, suggesting a new breed of aggressive, focused, and innovative competitors threatening the old.

This newsletter will examine the 1988 North American semiconductor market and explore some of the reasons for this market share distribution. In addition, the North American Semiconductor Markets (NASM) service provides in-depth, preliminary 1988 North American market share data for approximately 120 companies in its reference binders.

### THE WINNERS AND THE LOSERS

Despite the constraints of the U.S.-Japan Semiconductor Trade Arrangement, the promise of Sematech, and an energetic concern for the declining position of the U.S. semiconductor industry, U.S. companies lost market share once again in 1988 in their home market. Growing by only 16 percent in a market that ballooned by 25 percent, U.S. companies took 70 percent of the market in 1988 versus 76 percent in 1987.

Who picked up the lost share? Japanese companies increased their share from 16 to 20 percent while the Asia/Pacific companies (most notably, Samsung) jumped from a 1 percent share in 1987 to a 3 percent share in 1988, as shown in Table 1. European companies maintained their 7 percent share in 1988.



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## Table 1

### North American Market Shares by Company Origin

| | 1987-1988 Growth | 1987 Share | 1988 Share |
|---|---|---|---|
| U.S. Companies | 16% | 76% | 70% |
| Japanese Companies | 57% | 16% | 20% |
| European Companies | 16% | 7% | 7% |
| Asia/Pacific Companies | 156% | 1% | 3% |

Source: Dataquest
March 1989

The ranking of the top ten semiconductor companies in North America changed significantly in 1988, as presented in Table 2. The winners were obviously the suppliers of memories and microprocessors. Intel, growing by 41 percent, displaced Texas Instruments in the number two slot. For the first time, a Japanese company, Toshiba, has broken into the ranks of the top five, with an impressive 70 percent growth and revenue bordering on $1 billion.

## Table 2

### 1988 Top Ten North American Semiconductor Companies

| 1988 Ranking | Company | 1987 Revenue ($M) | 1988 Revenue ($M) |
|---|---|---|---|
| 1 | Motorola | 1,530 | 1,770 |
| 2 | Intel | 980 | 1,387 |
| 3 | Texas Instruments | 1,036 | 1,203 |
| 4 | Toshiba | 568 | 968 |
| 5 | National Semiconductor | 851 | 915 |
| 6 | AT&T | 785 | 834 |
| 7 | AMD | 608 | 626 |
| 8 | NEC | 345 | 571 |
| 9 | Hitachi | 314 | 457 |
| 10 | Philips/Signetics | 392 | 422 |

Source: Dataquest
March 1989

The fastest-growing companies were Samsung and Micron Technology, increasing their 1988 North American revenue by approximately 219 percent and 201 percent, respectively, from 1987, as a result of the DRAM shortage.

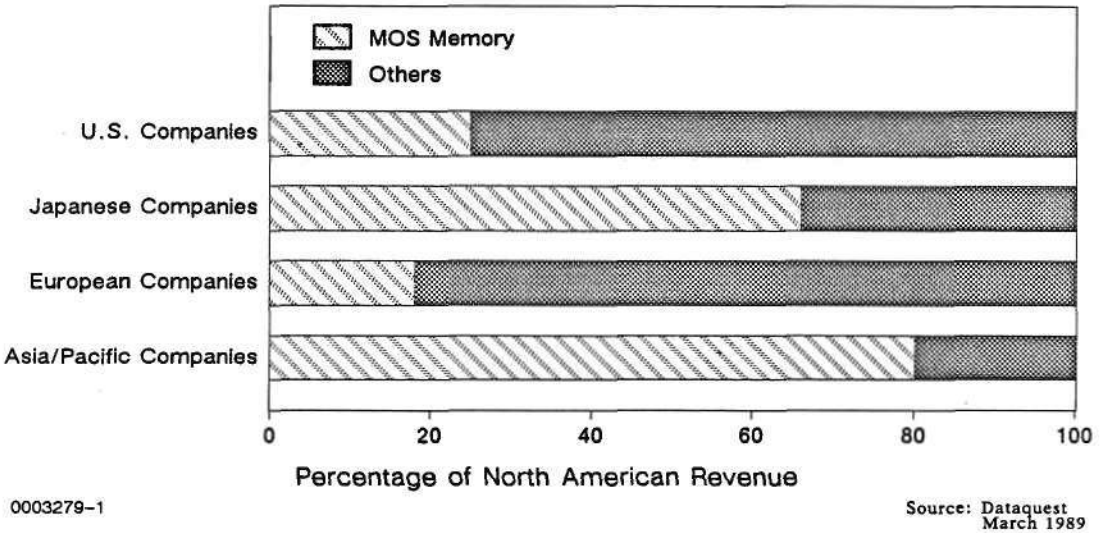
U.S. companies lost market share in every major product category except analog ICs. Japanese manufacturers gained market share in every major product category except discrete and analog devices. European companies made inroads into the discrete and optoelectronics markets while Korean and Taiwanese manufacturers penetrated the MOS memory market.

## RIDING ON THE WAVE OF HIGH PRICES

What caused the shift in market shares? The 1988 market was a familiar one; companies experienced revenue growth because of higher prices brought about by product shortages and a strong demand. Prices remained high for memories and for certain microprocessors such as the Intel 80386. Intel showed an impressive 1988 growth of 41 percent in North America. Japanese companies as a whole increased their 1988 North American revenue by 57 percent, with MOS memory accounting for 66 percent of their business, as presented in Figure 1. Asia/Pacific companies grew by 156 percent in 1988, driven primarily by Samsung, with 80 percent of their revenue in MOS memory.

Figure 1

MOS Memory in North American Product Portfolios

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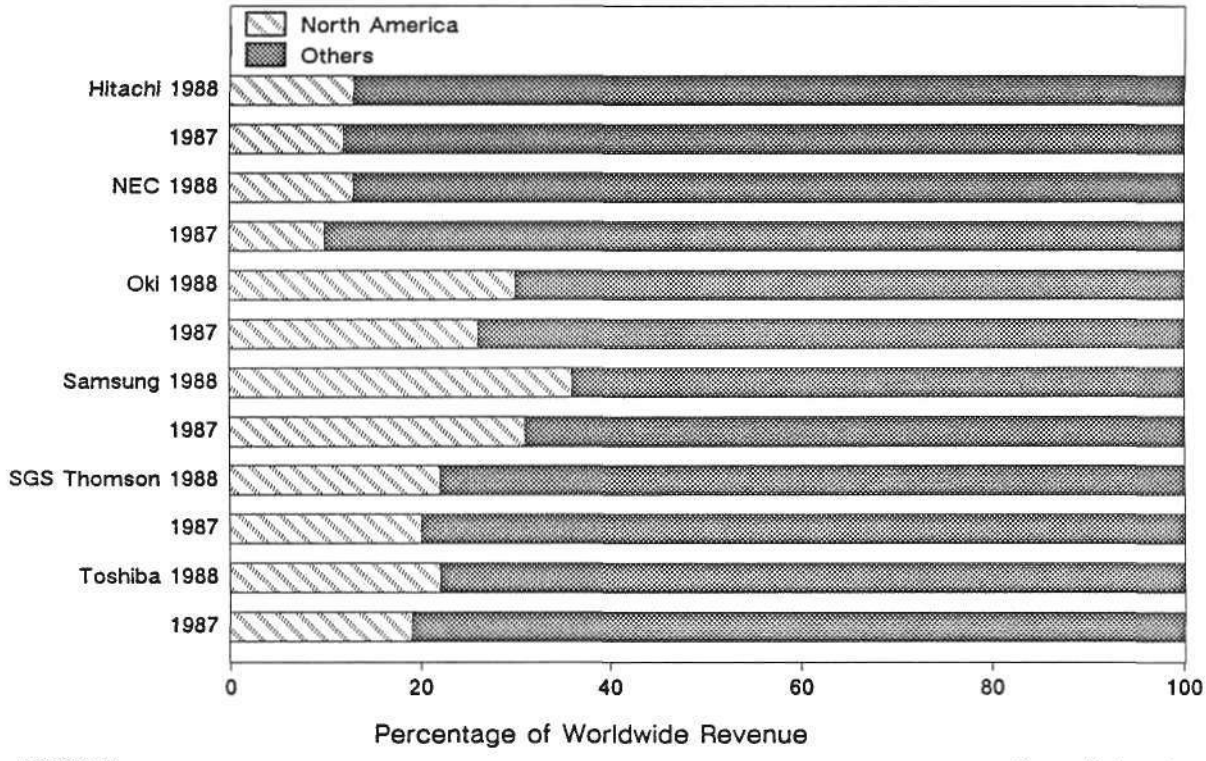
Source: Dataquest March 1989

A second reason for the shift in market shares is that Japanese companies increased their emphasis on the North American market, whereas U.S. companies focused more heavily on foreign markets. Of the top 20 companies doing business in North America, 6 companies increased the North American share of their worldwide revenue, as shown in Figure 2. All six are foreign–based entities: Toshiba, NEC, Hitachi, Samsung, Oki, and SGS Thomson. These foreign–based vendors were more likely to be lured by the high prices and strong demand in the North American market. On the other hand, because of the devalued dollar, U.S. companies were more likely to be attracted to foreign markets as a means to increasing their dollar revenue.

**Figure 2**

**Geographic Market Portfolios of Selected Companies**

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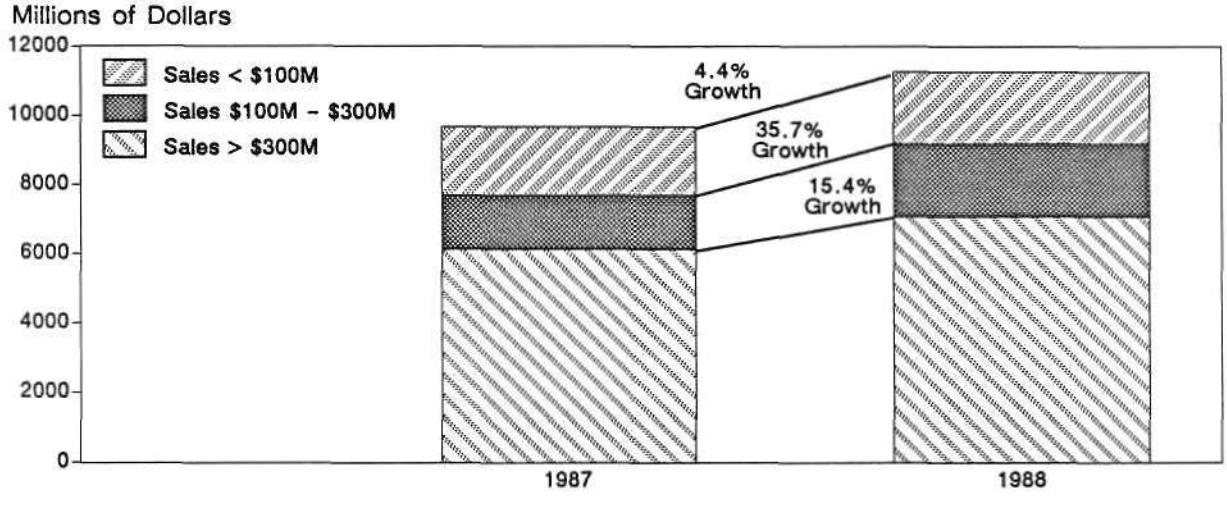
Source: Dataquest
March 1989

## FAST-GROWING U.S. COMPANIES

Although U.S. companies have lost market share as a whole, some performed exceptionally well in 1988. Much of the decline in U.S. market share comes from the largest (more than $300 million in sales) and smallest (less than $100 million in sales) companies. The largest companies grew by only 15 percent in 1988, compared with a North American semiconductor market growth of 25 percent, as shown in Figure 3. The performance of the smallest companies, as a group, was even more disappointing; they increased revenue by only 4.4 percent in 1988.

**Figure 3**

**U.S. Company Revenue in North America**




0003279-3

Source: Dataquest March 1989

The upcoming companies, with 1988 revenue between $100 million and $300 million, are proving to be the next large companies, with their focused markets, aggressiveness, and innovation. In this category, 7 out of 12 companies outpaced the growth of the North American market, as shown in Table 3. They compare in growth with the best Japanese companies. Although these companies have been increasing their influence among all U.S. companies, they accounted for only 10 percent of total U.S. company revenue in 1988.

The only large U.S. company that showed impressive growth in 1988 was Intel. Intel grew its North American revenue by 41 percent from 1987 to 1988 and increased its market share from 7.6 percent in 1987 to 8.7 percent in 1988, with the success of the company's proprietary 80386.

Table 3

Fastest-Growing Companies in North America

| | 1987-1988 Growth |
|---|---|
| U.S. Companies | |
| Intel | 41.5% |
| LSI Logic | 36.2% |
| Micron Technology | 201.1% |
| Cypress Semiconductor | 70.3% |
| Integrated Device Technology | 67.6% |
| International Rectifier | 35.6% |
| Microchip Technology | 52.7% |
| NCR | 27.3% |
| Non-U.S. Companies | |
| Toshiba | 70.4% |
| NEC | 65.5% |
| Hitachi | 45.5% |
| Samsung | 218.6% |
| Oki | 69.6% |
| SGS Thomson | 39.9% |

Source: Dataquest
March 1989

## DATAQUEST ANALYSIS

The wisest competitors never underestimate the benefits of a home-court advantage. Japan has continually been accused of domestic barriers and is constantly pressured to widen its doors. Western Europe is preparing for the walls that will be set up by 1992 and recently announced restrictive policies on semiconductors not fabricated within the European Community. On the other hand, the United States has kept its position as a proponent of free international trade and an opponent of protectionism as it has watched its grip on its own markets slowly slipping.

Although protectionism is not the answer, Dataquest believes that U.S. companies need to preserve that home-court advantage, especially when other regions of the world do. Plans to internationalize should not come at the expense of a deeper, closer working relationship between U.S. semiconductor companies and U.S. electronic equipment producers or the prospects of virtual, vertical integration. Companies should choose carefully the products that will drive future market growth, especially in ASICs and selected MOS memory and MOS microprocessor products. The efforts of fast-growing medium-size manufacturers, possibly the next billion-dollar companies, should be encouraged. Obviously, the task is not easy. Furthermore, improved and renewed U.S. competitiveness may need to begin with the proper governmental policies. The seriousness and urgency of the situation remain, however.

Dataquest believes that market share gains as a result of higher prices differ from market share gains as a result of unit shipment increases. The advantage to Japanese and other Asian companies is that it fills their coffers with profits to reinvest in advanced technology and plants. Nevertheless, the next slowdown in demand could very easily tip the distribution of market share toward a U.S. advantage as prices of shortage products come down to normal levels.

Victor de Dios

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# Research Newsletter

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## NORTH AMERICAN MARKET DEVELOPMENTS
## QUARTERLY EVENTS NEWSLETTER
**January 1989**

This is the first quarterly events newsletter issued by the North American Semiconductor Markets (NASM) service. It contains a synopsis of news events gathered from the trade press over the past quarter.

The following is a key to the publications reviewed during research for this issue:

| | |
|---|---|
| Business Journal | BJ |
| Electronic Buyers' News | EBN |
| Electronic Engineering Times | EET |
| Electronic News | EN |

### Contents



The content of this newsletter was gathered from information generally available to the public or released by responsible individuals in the subject companies, but it is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients.



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## TECHNOLOGY

### Oregon Develops Parallel-Processing Technology

The state of Oregon has begun a $25 million project to develop parallel-processing technology in its universities and industry. So far, $11 million has been derived from state lottery funds, the Defense Advanced Research Projects Agency, and local industry contributions. (EET, December 19, 1988)

### AT&T Changes Its Focus

AT&T is no longer marketing its 32200 series CPU, nor is it competing in the DRAM business. The company's focus will be in communications, ICs (specifically, ISDN), digital signal processing, and custom and semicustom ASICs. (EET, September 12, 1988)

### Cray 3 Uses GaAs Chips

Cray is planning to ship its 16-processor GaAs-rich Cray 3 at the end of 1989, replacing its 12-year-old part. (EET, November 21, 1988)

### Ada and Lisp Produced at Cray

Cray has come out with an Ada compiler that runs on a supercomputer. The company also has introduced the Allegro Common Lisp, which has features needed for artificial intelligence applications. (EET, September 26, 1988)

### Data General Adds Coupled CPUs

Introduced by Data General are a series of multiprocessor machines using a four-CPU system specified to perform at 54 mips. The company hopes to bolster the sagging high end of its 32-bit Eclipse MV computer line. (EN, October 10, 1988)

### Data General Halts R&D on 14-Inch Drives

Data General has halted its 14-inch Winchester disk drive developments. Instead, the company is focusing on R&D work on 8-inch models. (EN, January 2, 1989)

### Digital Cancels Aquarius Program

Digital Equipment has canceled its Aquarius program. Aquarius is a water-cooled computer system. The company has decided to complete only Aridus, an air-cooled version of the Aquarius design. (EN, November 14, 1988)

### Emulex Ports Disk to Sun Microsystems

Emulex has developed its removable disk subsystem to be ported to Sun Microsystems workstations. (EN, October 24, 1988)

### New HP Workstations

Hewlett-Packard (HP) has introduced its 2-D, HP 9000 workstations, an upgrade from its low-end 300 series. The product is aimed at entry-level buyers in the computer-aided design (CAD) market and is priced below $6,000. (EET, November 28, 1988)

## PROFITS AND LOSSES

### Amdahl's Profits Surge

Amdahl reported a 45 percent surge in profits and higher-than-expected revenue for its third fiscal quarter. During the fourth quarter, the company planned to begin shipping its mainframe, the 5990 model 1400, and its advanced storage subsystem, model 6100. Amdahl also may sell its unprofitable communications unit. (BJ, October 31, 1988)

### Atari's Income Drops in Third Quarter

Atari's operating income dropped 20 percent to $11.9 million in the third quarter, mainly because of higher DRAM costs. The company's income from the computer and games division also suffered because of memory chip shortages. (BJ, December 12, 1988)

### Losses for CDC in Fourth Quarter

Control Data Corporation (CDC) experienced fourth quarter losses due to delays in shipments of its Computer Products' 960 mainframe. Other causes for the company's problems stem from the difficulty of getting large machines to work, software shortages, corporate reorganizations, and rumors of the possible resignation of Carl Ledbetter, vice president of sales and marketing. (EET, November 28, 1988)

### Cray Experiences $10 Million Loss

Cray Research hit snags in the development of its Cray 3, resulting in a $10 million charge against earnings for the year. The company still plans to introduce the Cray 3 by the end of 1989. (EN, October 31, 1988)

### Profitable Year for HP

Hewlett-Packard (HP) had 1988 net income of $816 million, up 27 percent from 1987. Revenue was $9.83 billion, up $644 million from the previous year. (EET, November 28, 1988)

  

## ORGANIZATIONS AND REORGANIZATIONS

### Apollo Makes Executive Changes

Apollo Computer's reorganization included changes in its R&D organization. By naming William Cunningham vice president of manufacturing and head of R&D, the company intends to regain its momentum and ensure long-term growth. (EN, October 10, 1988)

### New Tech Chief at Chrysler

Chrysler has named former Fairchild Industries president and CEO, Paul E. Wright, to serve as chairman of Chrysler Technologies, which is composed of Gulfstream Aerospace and Electrospace Systems. (EN, September 12, 1988)

### CDC Reorganizes Management

Control Data Corporation's (CDC's) Aerospace division has shifted its management in an effort to streamline its operations. Currently, there are only two major groups—Computer Systems and Business Services. Previously, the Corporation emphasized aerospace and defense work. (EN, October 24, 1988)

### CDC Changes Its Data Storage Group

Control Data in Minneapolis, Minnesota, has renamed and reincorporated its Data Storage Products group. The operation, renamed Imprimis Technology Inc., planned to move to Minnetonka, Minnesota, in November 1988. (EN, September 12, 1988)

### Grumman Layoffs

Grumman Aerospace has planned layoffs for a major part of its 1,800 workers because of the Pentagon veto of the navy's A-6G upgrading program. Later in 1989, another 1,300 jobs are expected to be eliminated. (EN, December 26, 1988)

### Seagate Layoffs

Seagate Technology laid off 1,000 workers in order to cut back its Winchester disk drive operations. The layoff trimmed 20 percent of the company's domestic work force, affecting all layers of management. (EN, December 5, 1988)

### Two New Divisions for HP

In its latest reorganization, Hewlett-Packard (HP) has formed two new divisions and an operational unit within the new Computer Systems group. The Computer Systems group now includes the General Systems and Data & Languages division, and the Data Systems operation. (EN, December 5, 1988)

### Optical Storage Group for Sony

Sony announced the creation of a new division to deliver optical storage solutions to OEMs. This division will offer a series of high-capacity write-once data drives and CD-ROM drives. (EET, November 7, 1988)

## CONTRACTS, PACTS, AND ALLIANCES

### Allied Signal Bendix/Raytheon Win Bid for IFF

Allied Signal Bendix/Raytheon won the $4 billion Mark XV Joint Services Identification Friend or Foe (IFF) bid. This identification system is slated to be used by all U.S. military aircraft and a wide range of missile systems. NATO is also considering its use on military aircraft of European member countries. (EN, December 5, 1988)

### AT&T Wins Air Force CPU Pact

AT&T Technologies was the winner of the $929 million contract for the Air Force Small Computer Multi-User AFCAC-251 program. The contract will be used by the air force, navy, and other military agencies to order AT&T host computers for supporting 64 users per system, connecting various workstations under UNIX V operating system. (EN, October 31, 1988)

### Digital's Agreement with Rockwell

Digital Equipment has licensed the Allen-Bradley division of Rockwell International to build its VAX computers for use in industrial automation systems. (EET, October 10, 1988)

### Ericsson Signs Mexican Pact

Ericsson has signed a $230 million contract with Telefonos de Mexico, covering AXE digital and analog switching systems. The company also signed an agreement with Beijing Wire Communications Plant to manufacture its digital switching system in the People's Republic of China. (EN, September 19, 1988)

### Figgie Plans Merger

Figgie International announced that it plans to merge two of its holdings: Hartman Systems (which makes cathode-ray tubes) and Interstate Electronics (which makes telemetry, detection, and display systems). (EBN, November 14, 1988)

  

### Floating Point's New Name and Pact with Stellar

Floating Point Systems has changed its name to FSP Computing. FSP also has signed an agreement with Stellar Computers, bringing out its UNIX-based systems. (EET, November 7, 1988)

### GTE Gets Army Contract

The army has awarded GTE Government Systems a $948 million contract for the third production option of its Multiple Subscriber Equipment (MSE) battlefield communication system. (EN, December 12, 1988)

### HP Wins McDonnell Contract

Hewlett-Packard (HP) won a $5 million contract from McDonnell Douglas for 216 HP workstations, beating out Silicon Graphics. (EN, November 28, 1988)

## PLANTS—NEW LOCATIONS, EXPANSIONS, AND CLOSINGS

### AT&T Forms Five P&L Centers

AT&T Microelectronics has combined its seven business groups into five autonomous P&L centers in order to meet more competitive profitability objectives. Each of these "Strategic Business Units," as they are called, has its own R&D, manufacturing, marketing, and bottom-line responsibility. (EN, November 28, 1988)

### Bendix's New Location

Siemens will establish a world headquarters in Dearborn, Michigan, for its newly acquired Bendix automotive operation. Siemens indicated that part of the $1 billion investment would be devoted to "hard core electronics." (EN, October 24, 1988)

### Chrysler Opens Huntsville Plant

Acustar, a Chrysler subsidiary, located in Huntsville, Alabama, was dedicated recently. The state-of-the-art plant features a just-in-time inventory system; automatic guided-conveyor systems; and computers to control inventory, coordinate schedules, and monitor quality and performance. (EBN, December 26, 1988)

### Data General Closes Two Plants

Data General is closing two plants, one in Portsmouth, New Hampshire, and the other in Fountain, Colorado. The company is planning to lay off 800 manufacturing, distribution, and repair workers, and it is taking a $45 million charge against fourth quarter earnings. (EN, October 3, 1988)

### McCandless Buys Control Data Building

Property in Sunnyvale, California, owned by Control Data Corporation for 20 years was sold to McCandless Development, which will give it a face-lift. Control Data plans to lease the building for up to eight months before moving to smaller quarters. (BJ, December 26, 1988)

### Digital May Locate in Coyote Valley

Digital Equipment is considering locating a campus in Coyote Valley, California. (BJ, October 31, 1988)

### HP Buys Building Complex

Hewlett-Packard (HP) recently purchased a three-building complex in Sunnyvale, California. The company had leased the site previously. (BJ, November 28, 1988)

### Zycad Moves to California

Zycad has closed its corporate headquarters in Cleveland, Ohio, and is moving all operations to Menlo Park, California. With the move, total employment will decrease by 20 percent. (EN, September 19, 1988)

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# Research Newsletter

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Contents



## THE NORTH AMERICAN MARKET: KEY TO THE 21st CENTURY

### INTRODUCTION

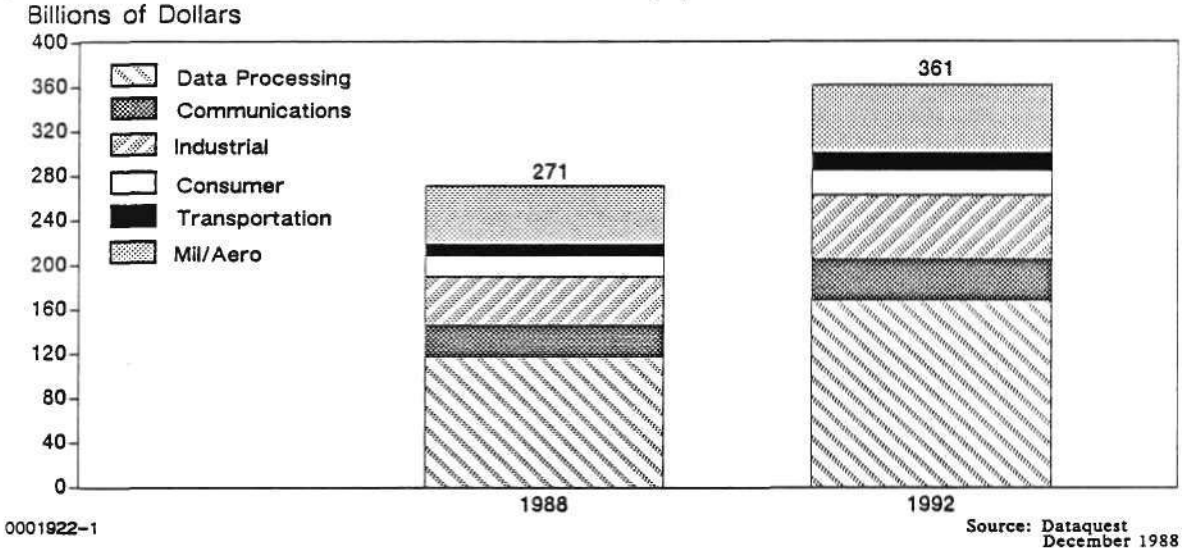
North America, long a sheltered isle for domestic competitors, has become the world's newest—and largest—battleground for business success. Ironically, those companies that one might assume to be best equipped to compete in this market—large and established U.S. companies—may turn out to be the least prepared to cope with the changing order of battle. And their failure, in turn, may have a profound effect upon America's economic strength, quality of life, and national security.

As the heartland of the electronics revolution, and the country with the world's largest economy, the United States has, not surprisingly, developed the world's biggest and most complex market for high-technology products. Combine this situation with a smaller but still huge (by international measure) electronics industry in Canada existing in symbiotic relationship with the United States, and the North American market remains the world's high-technology powerhouse.

Consider the numbers shown in Figure 1: In 1988, the North American electronic equipment market is forecast to reach $271.3 billion, increasing at a compound annual growth rate (CAGR) of approximately 8 percent. Data processing alone (a $117.4 billion market in 1988) is growing at more than 11 percent CAGR. In the consumer sector, the personal electronics market is growing by more than 15 percent per year.

Figure 1

North American Electronic Equipment Market Forecast




Dataquest believes that all of these factors will combine to push the North American electronics market to one-third of a trillion dollars by 1991. Add to this heady mix the changing laws on international investment, strong overseas economies, and new trade agreements, and suddenly the North American market becomes the decisive factor in any company's long-term business strategy. Needless to say, North America has always been an attractive market. For domestic companies, that market has been so enormous that many could spend decades just servicing it without even considering international trade. Furthermore, although foreign companies have made many inroads in North America, most have been constrained by such obstacles as adapting to Western culture, expanding their own national economies, catching up with technology, and emplacing North American distribution networks. But all of this has changed forever.

Ironically, although the strong dollar attracted many importers, it nevertheless had the advantage of keeping manufacturing by foreign competitors offshore. This was particularly true with the giant Japanese manufacturers. Now, faced with a falling dollar driving the price of Japanese-manufactured goods up and a growing protectionist sentiment in North America, these Japanese companies have raced to build onshore plants in the United States and Canada. Employing domestic workers, paying taxes, and hiring lobbyists to back key legislation, these manufacturers are not only playing by North American rules but also not actively revising them.

## THE NORTH AMERICAN ELECTRONICS MARKET

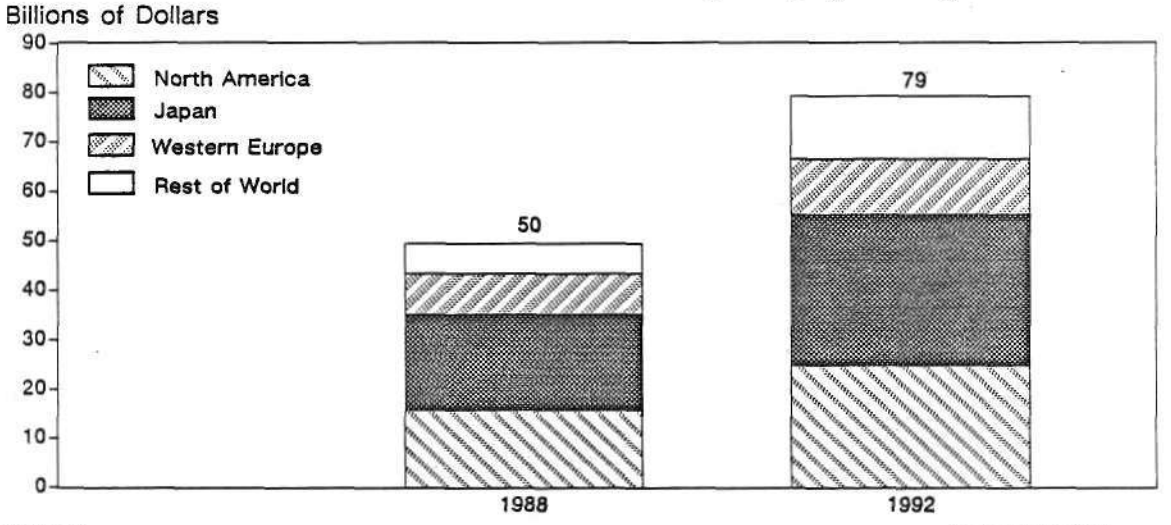
### An Unspared U.S. Semiconductor Industry

A major impetus behind the growing importance of the North American electronics market to long-term success can be found in that most volatile of businesses: semiconductors. With book-to-bill ratios following a 20-year pattern and starting to fall, the worldwide semiconductor boom appears to be nearing its end. In dollar terms,

the North American market has dropped to being the second largest semiconductor market ($14.5 billion in 1988) behind Japan ($19.5 billion), as shown in Figure 2. Dataquest predicts that both will grow at approximately the same rate (11.2 percent and 11.3 percent, respectively) through 1993. Europe will be left far behind (8.8 percent from a market size of $8.2 billion in 1988).

**Figure 2**

**Worldwide Semiconductor Market by Geographic Region**




The size of the Japanese semiconductor market is propped up, however, by the strength of the yen and unquestionably by the country's dominance in (or dependence on) exports of electronic equipment. A huge bulk of semiconductors consumed in Japan end up in electronic equipment eventually consumed in North America. With the weakened dollar, Japanese equipment manufacturers are moving into the United States, perhaps not only to supply the North American market but to supply Europe as well. This suggests that, with the Japanese semiconductor market all but inaccessible and the fast-growing Third World difficult to reach, North America becomes the safe harbor for chipmakers during the impending slowdown. In other words, desperate and hungry chip companies throughout the world are going to be eyeing the North American market longingly.

## Meeting the Challenge

Meeting this across-the-board challenge from newly entrenched foreign companies of every stripe will not be easy for North American electronics companies. Most at risk are those that never developed a strong international sales and distribution program, ignoring this maxim: "If you don't fight your competitors in their backyard, you'll fight them in your own."

The efforts of the U.S. Department of Commerce and the Semiconductor Industry Association (SIA) to program the widening of market access to Japan are commendable and hopefully not too late. With U.S. GNP growth expected to slip to 2.8 percent in 1989 (compared with 4.0 percent in 1988), the North American market cannot be expected to

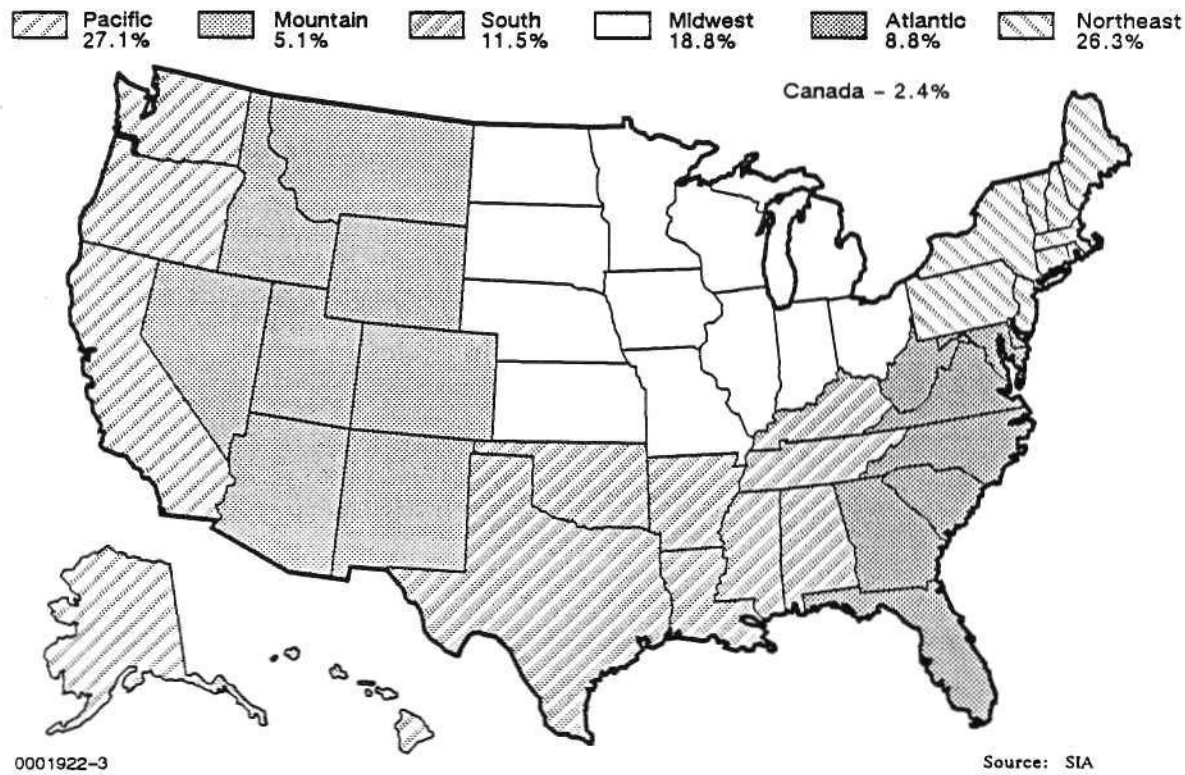
  

hold much more market expansion. But even big North American companies with established international businesses will face a serious challenge at home. With the average North American consumer now not only accustomed to foreign goods but actively seeking them out, the days of domestic business security are long past. Furthermore, with a low dollar and high deficits, the percentage of foreign ownership of the U.S. capital base can only increase, making competition with foreign companies that much more difficult.

North America, long a sanctuary for the world's displaced people seeking refuge, is about to become a target for giant international companies also seeking shelter—in this case, either from the storms of recession or in order to fatten up before taking on the rest of the world. Which of those companies succeed—and which North American ones survive the onslaught—will depend on how well they understand the rapidly changing nature of doing business here. The North American market then becomes a tactical battleground where competitors need to understand in greater detail the wide differences between one geographical region and another with respect to demand, applications, and distribution channels. Competitors also need to know how they can best muster and allocate their resources to maximize their share of this prized market. Figure 3 shows the wide market differences in each region.

**Figure 3**

**North American Semiconductor Market by Sales Region**

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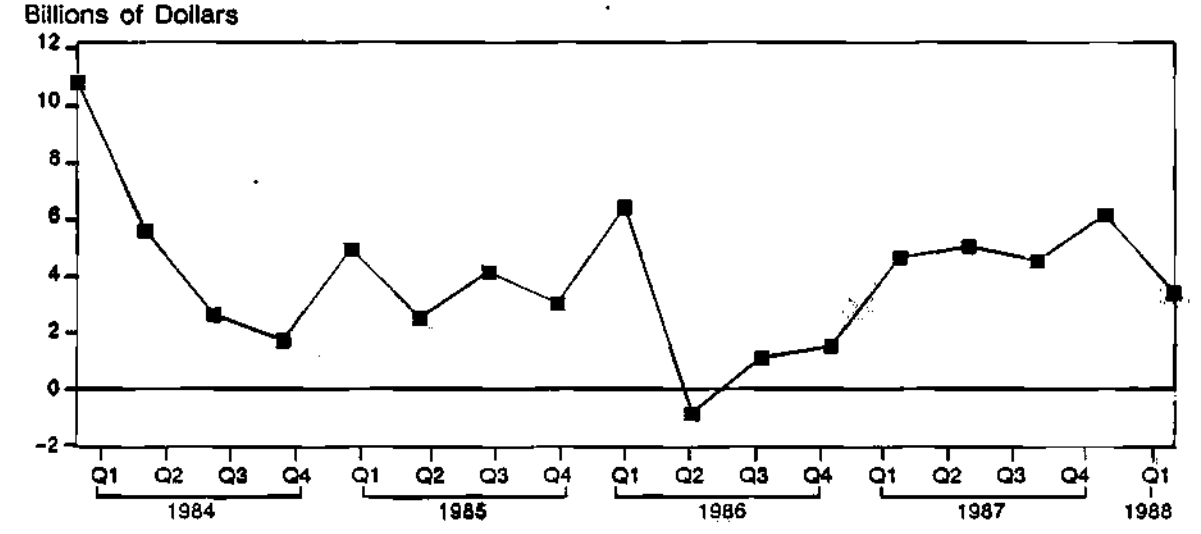
## THE REVISED RULEBOOK

Even if you have spent your entire life in North America and think you know how business works here, you probably don't. The rules are changing around you. North America, especially the United States, is enjoying its longest sustained economic boom in this century, but the nature of that expansion is often misread as being consumption driven. In fact, only the early years of that recovery period (1982 to 1986) were driven by consumer demand. The latest, revised GNP figures (see Figure 4) suggest that the U.S. economy almost went into a recession in 1986, dipping momentarily before heading into a second expansion phase—this time driven by exports.

**Figure 4**

**Revised Quarterly U.S. GNP Growth (Seasonally Adjusted Annual Rate)**




There is more than a little irony here. After all, this is the same period when the United States suffered some of the worst trade deficits in its history. The silver lining is that the experience seems to have finally converted some U.S. and Canadian companies from their parochial attitudes into thinking and acting like serious international traders. Nevertheless, as in any economic situation, there are always two sides to the issue. While U.S. semiconductor manufacturers have increased their exports, the overall trade balance has not improved significantly because of the overwhelming rise in dynamic RAM (DRAM) imports into the United States. Past losses continue to haunt us. (Subsequent newsletters will investigate in more detail the changing rules of doing business in North America.)

## ACCEPTING AND WORKING IN A DEFICIT-RIDDLED ECONOMY

Most North American companies continue to operate as if they were still within a surplus economy, i.e., an economy that exports more than it imports by virtue of its manufacturing strength (trade surplus) and that has substantial, affordable capital for domestic private investment (budget surplus). In reality, the U.S. economy has slumped into record budget and trade deficits and a record national debt. U.S. companies should adapt and learn to view themselves as existing in a deficit-ridden economy, and they should be forever looking for new export markets to replace declining sales at home.

This situation, in turn, argues for a change in attitude by North American firms when dealing with foreign competitors. Whereas U.S. companies can operate from a position of strength in a surplus economy, battering their competition overseas with the support of domestic profits, in a deficit economy, these companies must face the fact that they haven't the resources for such aggressive tactics. Rather, they must look toward mutually beneficial relationships—partnerships, joint ventures, and reciprocal agreements—with foreign competitors until they have recovered and can vie for the lead once more.

This idea frequently provokes skepticism about giving away our precious, leading-edge technology to foreigners. It may be too late to worry about giving away technology. The reality is that these foreign competitors now control the technology of silicon wafer production and submicron production equipment and processes. Studies show that the United States holds approximately 1 percent of silicon wafer production. Many start-up companies, unable to find leading-edge foundry opportunities, are transferring valuable, innovative design technology to Asian foundries.

## THE OMNIBUS TRADE BILL

Needless to say, until recently, pursuing a relationship strategy was unlikely—not just because of the attitudes of North American companies, but also because of the predatory trade policies of other countries. Thus, the new Omnibus Trade and Competitiveness Act of 1988 represents something of a watershed.

The Omnibus Trade Bill does not have as many teeth as some early proponents desired. For example, it still leaves certain loopholes for foreign dumping in the United States and, some say, doesn't go far enough in decoupling trade from national security issues. Nevertheless, the Omnibus Trade Bill does create the most "level playing field" in international trade for U.S. companies to date. In particular, it tightens most antidumping regulations (and allows for speeded-up deliberations for short-life-cycle products such as semiconductors), strengthens key intellectual property rights (especially in regard to countries without patent or copyright protection), restricts foreign takeovers of U.S. companies, and relaxes export regulations on high-technology products.

In all, the Omnibus Trade Bill offers the best chance that U.S. companies have had to raise their horizons to the international marketplace. In fact, they may have no choice. After all, at the same time that the world is opening up to U.S. manufacturers, North America is becoming the target of business opportunity for the rest of the world.

## "COMING TO AMERICA"—SEMICONDUCTOR STYLE

One only has to watch the slick ads for Japanese car makers on television or note the scores of Asian–owned factories with "America Inc." in their names scattered around areas such as Silicon Valley to appreciate not only that foreign companies are here to stay in North America but that they are making effective use of the domestic infrastructure. A fundamental and obvious difference exists between a foreign manufacturer shipping products to North America to be sold via a low–key domestic distributor and an onshore foreign company hiring North American workers, advertising agencies, public relations firms, lawyers, and consultants, as well as donating to local charities, schools, and political action committees (PACs). These latter firms escape the "otherness" that is often the only edge domestic manufacturers have over foreign competition.

It would be all well and good if these foreign "North American" companies were operating from the same financial and legal constraints as their domestic competitors, but most are not. Many enjoy heavy government subsidization at home—or, at a minimum, rules of doing business that would be illegal in North America. Almost all are backed by multibillion–dollar business conglomerates, many of which are willing to absorb short–term losses (and press the envelope of antidumping laws) to gain North American market share.

## DATAQUEST ANALYSIS

What does all this mean? In Dataquest's opinion, it means that the nature of doing business in North America, even for the most isolated and parochial manufacturer, is being fundamentally changed. And there is no going back. The only way to survive is to adapt to the change, recognize the philosophical difference between existing in a deficit–based economy and a surplus–based economy, and take full advantage of new laws protecting international trade.

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## CHIP DISTRIBUTION: PARADISE LOST?

Throughout the often violent history of the North American electronics industry, there has always been one hideaway from the international trade war: semiconductor distributors. From the very beginning, U.S. distributors have not only dominated the North American market but essentially owned it. For one thing, these relationships were, for the most part, created before the rest of the world even had a semiconductor industry. Just as importantly, distribution has always been among the most culturally dependent of all industries; after all, it is a sales function demanding a close rapport between supplier, distributor, and customer. Confusion of the often–subtle signals is disastrous.

  

But the sheltered cove that U.S. semiconductor distributors have long enjoyed is threatened by a tidal wave from Japan. The five largest Japanese electronics distributors have now set up shop in the United States, with a goal of becoming major players in the North American market; and they have the muscle to do it. As Table 1 illustrates, these companies have an enormous revenue base at home in Japan. The largest of these, Ryosan, matches the largest North American distributor, Hamilton/Avnet.

Table 1

Top Five Japanese Distributors' 1987 Semiconductor Revenue
(Millions of Dollars)

| Distributor | Revenue |
|---|---|
| Ryosan | $460 |
| Ryoyo Electro | $376 |
| Sanshin Electric | $270 |
| Satori Electric | $247 |
| Ryoden Shoji | $221 |

Source: Dataquest
December 1988

Why are these Japanese distributors making their move into the North American market now? And why do they think they can succeed? Dataquest sees the following three reasons:

- Keeping their customers happy—As noted, Japanese electronic equipment firms are, by necessity, moving much of their manufacturing operations to North America.
  - In the past, these operations were based entirely in Japan and were monopolized by Japanese distributors.
  - Now these distributors see the handwriting on the wall. They must either move with the Japanese manufacturers to North America or risk losing an increasing amount of market base.
- The culture club—Whereas North American distributors have been singularly successful at representing domestic chipmakers, they have all but excluded the Japanese semiconductor houses. Needless to say, this has not gone over well with the Japanese, who now are the world's largest manufacturers and dominate a number of North American markets.

- Reversing the flow—The Japanese distributors also recognize that, as long as they are here, there is no reason why they cannot pick up some U.S. chipmakers' product lines and offer them back in Japan as well. And, of course, that would give them their first entry into companies here.

Thus, by combining their own business push with a pull from both U.S. and Japanese chipmakers, the Japanese distributors may make their assault on the North American market. Can they overcome the cultural clash? Perhaps not. Nevertheless, if the history of electronics suggests anything, it is that good products and strong demand can jump almost any obstacle. The Japanese distributors believe that they have both.

Victor de Dios