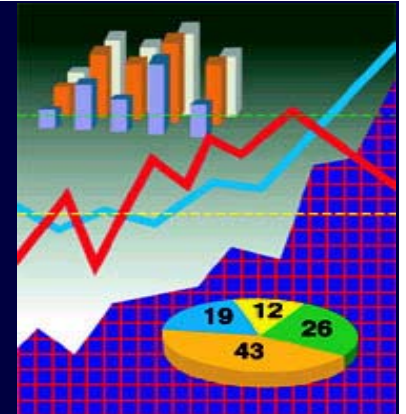


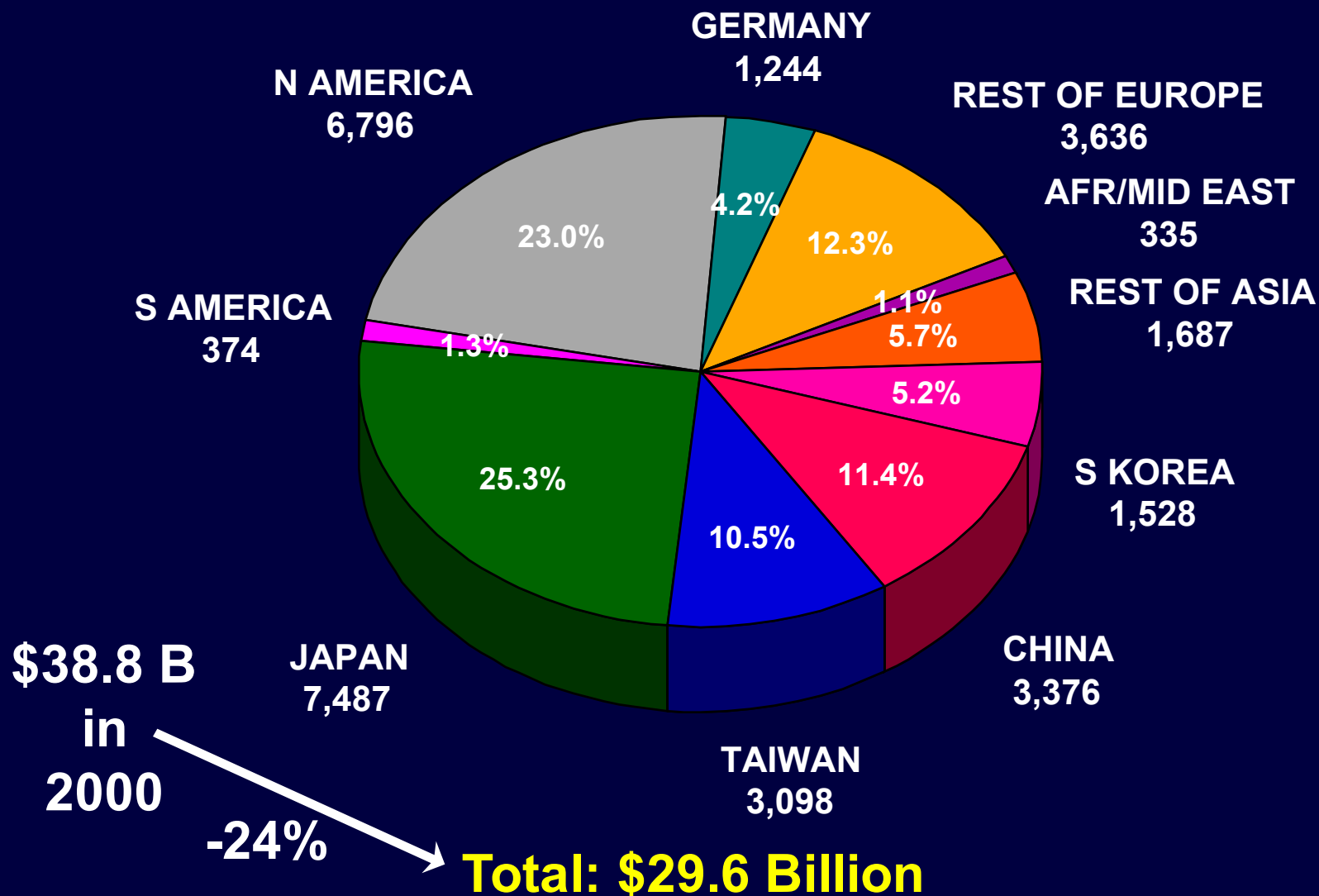
# GLOBAL BUSINESS OUTLOOK

## Timing & Magnitude of the Current Recovery

**WALT CUSTER**  
**CUSTER CONSULTING GROUP**  
*[www.custerconsulting.com](http://www.custerconsulting.com)*  
**May 2002**



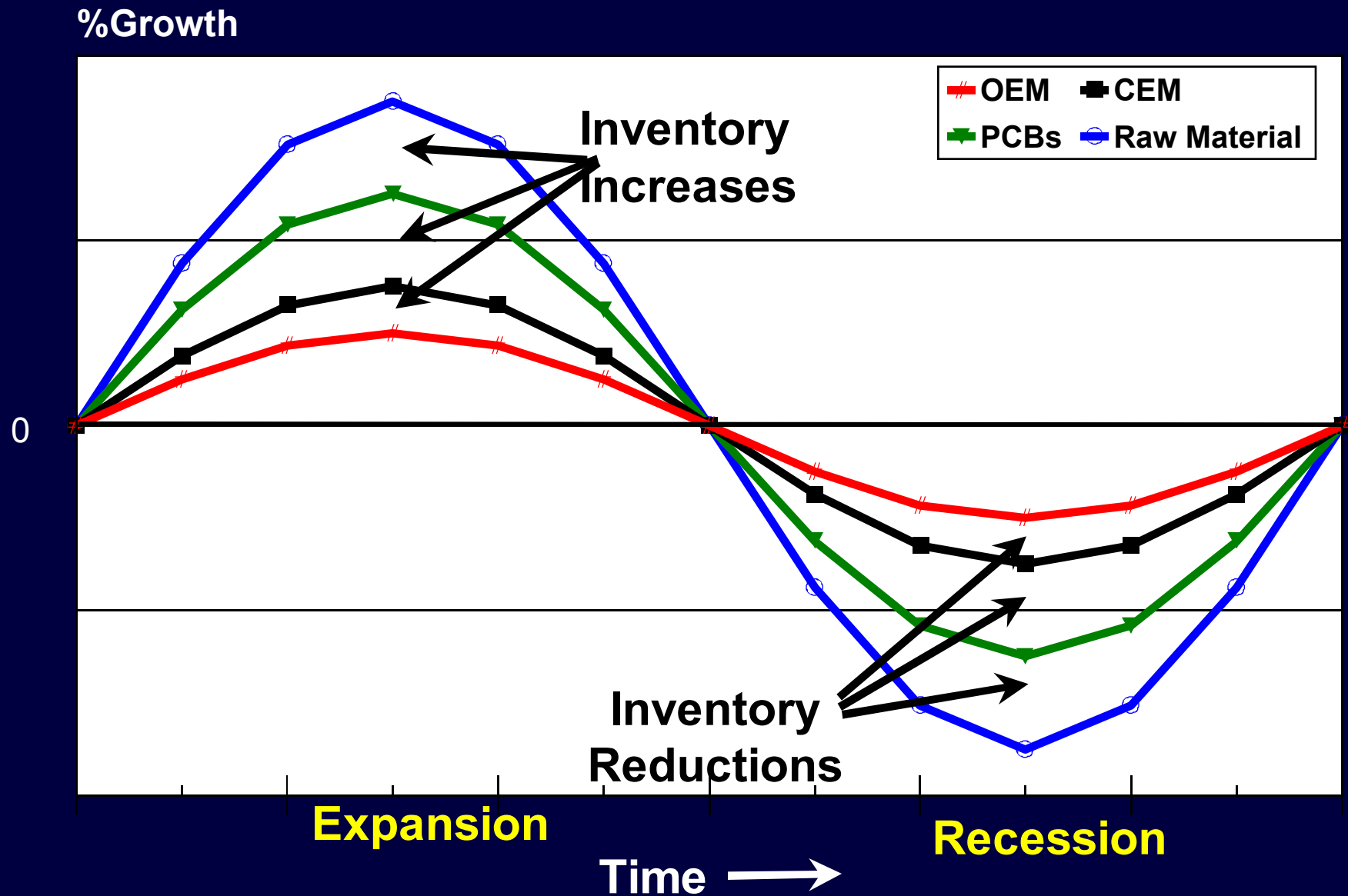
# 2001 WORLD RIGID PCB PRODUCTION BY GEOGRAPHICAL AREA (\$M)



IPC TMRC 5/2002 (includes Microvia PCBs & chip packaging substrates)

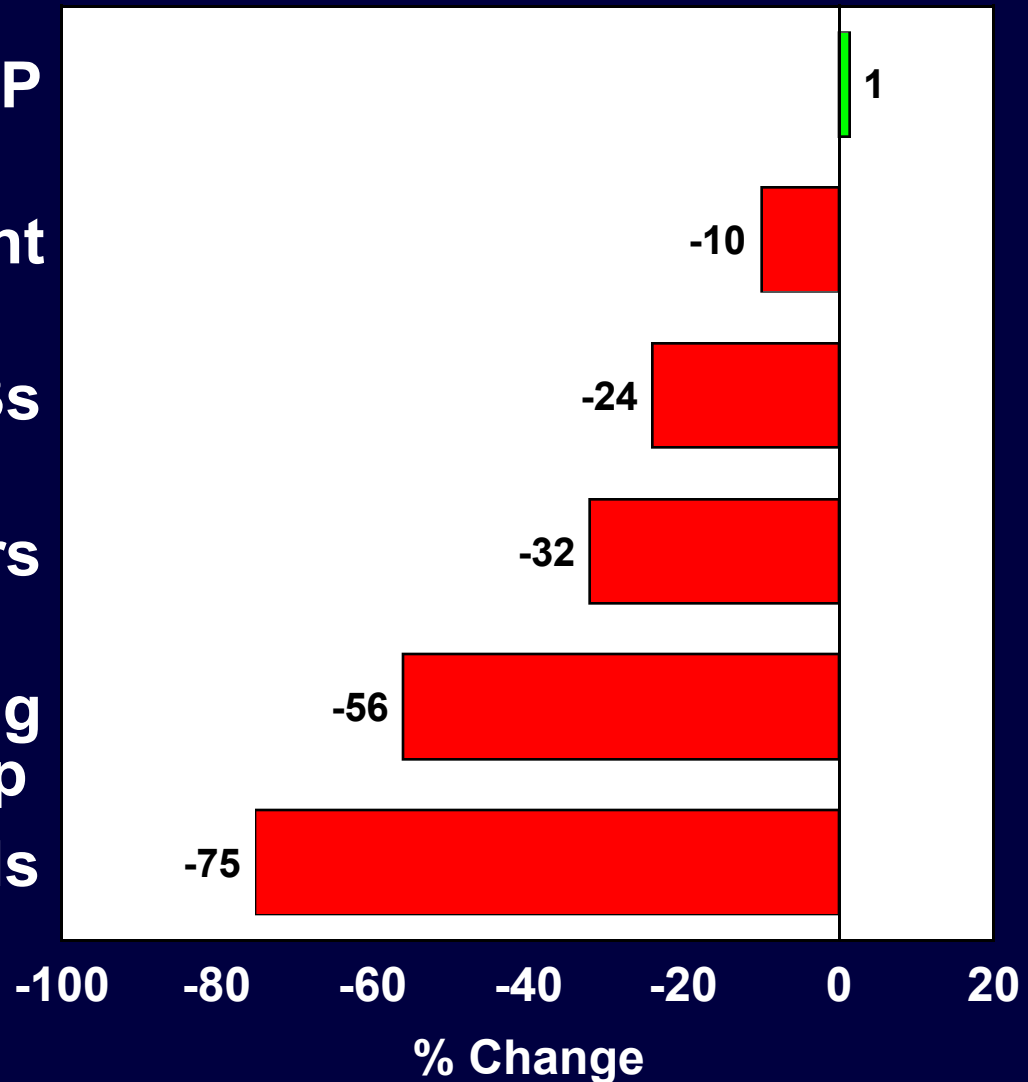
# BUSINESS CYCLE

## SUPPLY CHAIN EFFECT



# Global Impact 2001 vs 2000

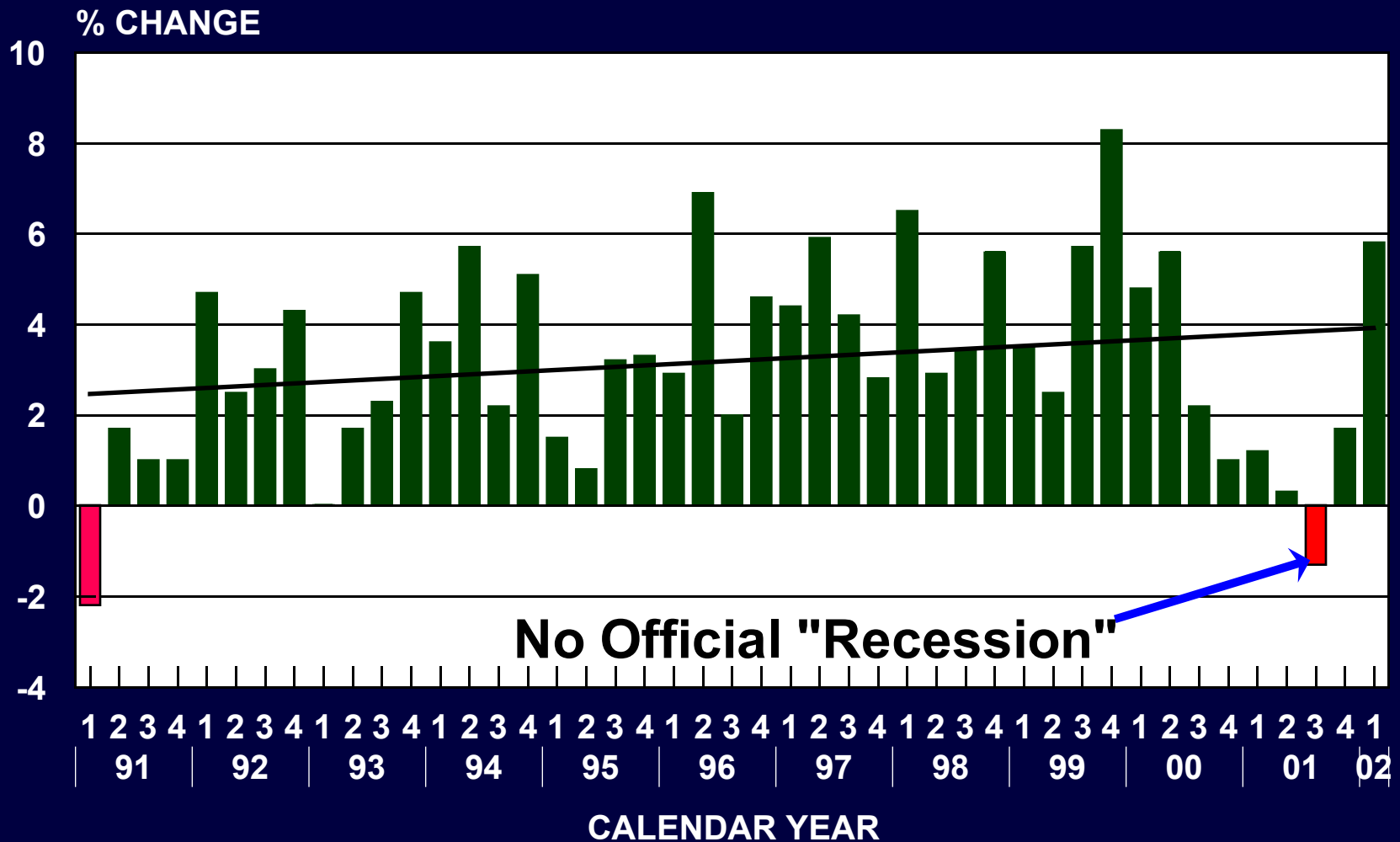
Combined GDP  
Electronic Equipment  
Rigid PCBs  
Semiconductors  
Semi Packaging  
& Assembly Equip  
DRAMs



# Current Situation

# U.S. GROSS DOMESTIC PRODUCT

## QUARTERLY CHANGE (1987 \$)

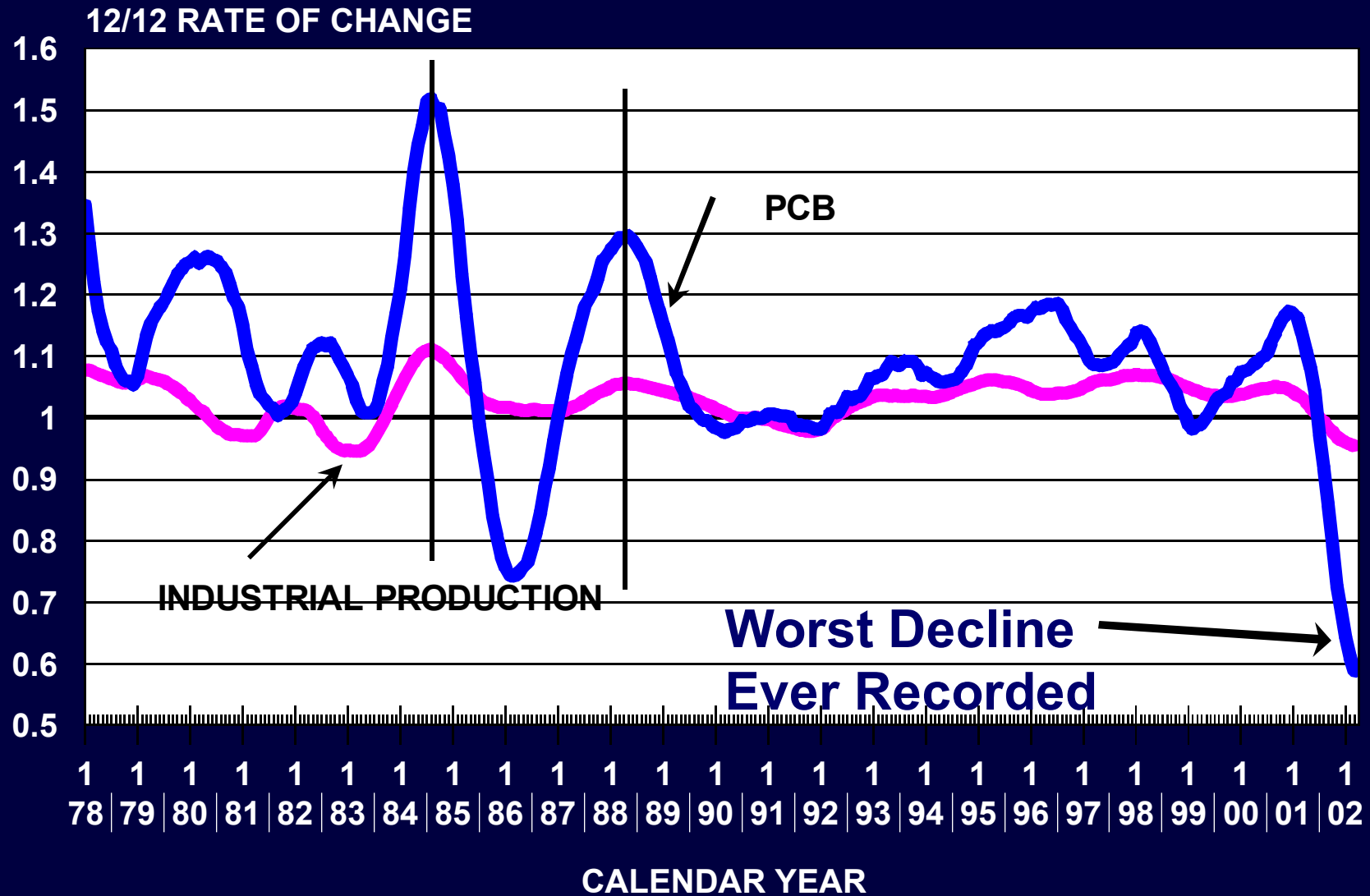


# INDUSTRIAL PRODUCTION - WORLD

% CHANGE vs ONE YEAR EARLIER

BRITAIN	-5.9 Mar
FRANCE	-0.6 Feb
GERMANY	-3.8 Mar
ITALY	-3.0 Feb
NETHERLANDS	-2.0 Mar
SPAIN	-9.3 Mar
EURO area	-3.3 Feb
RUSSIA	+3.7 Mar
CANADA	-0.8 Feb
USA	-2.9 Mar
CHINA	+10.9 Mar
MALAYSIA	-3.5 Mar
PHILLIPPINES	+2.2 Feb
SINGAPORE	-2.9 Mar
S KOREA	-2.6 Feb
TAIWAN	+0.4 Mar
THAILAND	+8.4 Mar
JAPAN	-10.0 Mar

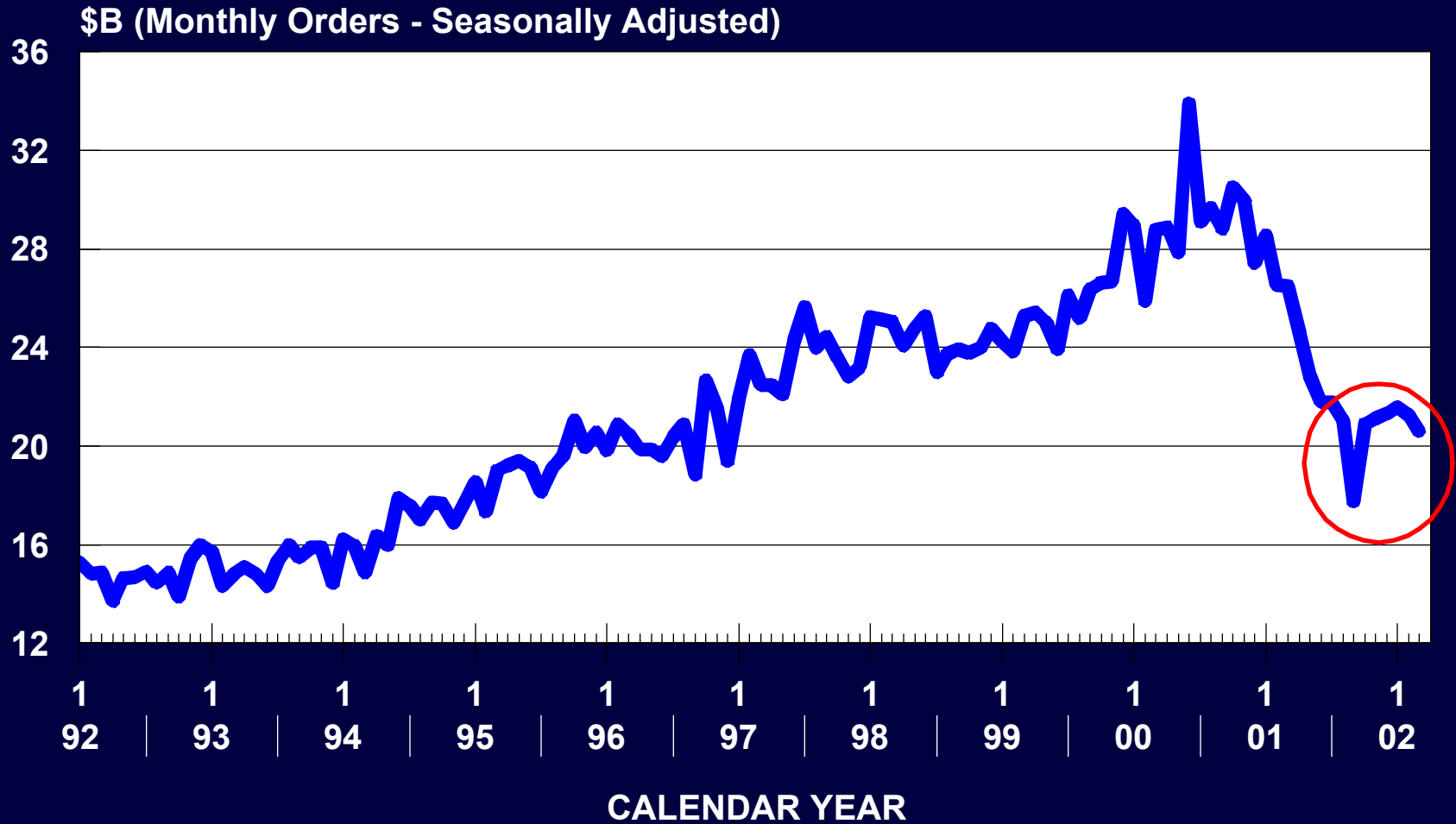
# N American PCB Shipments & US Industrial Production



Data: IPC T/MRC & U.S. Dept of Commerce

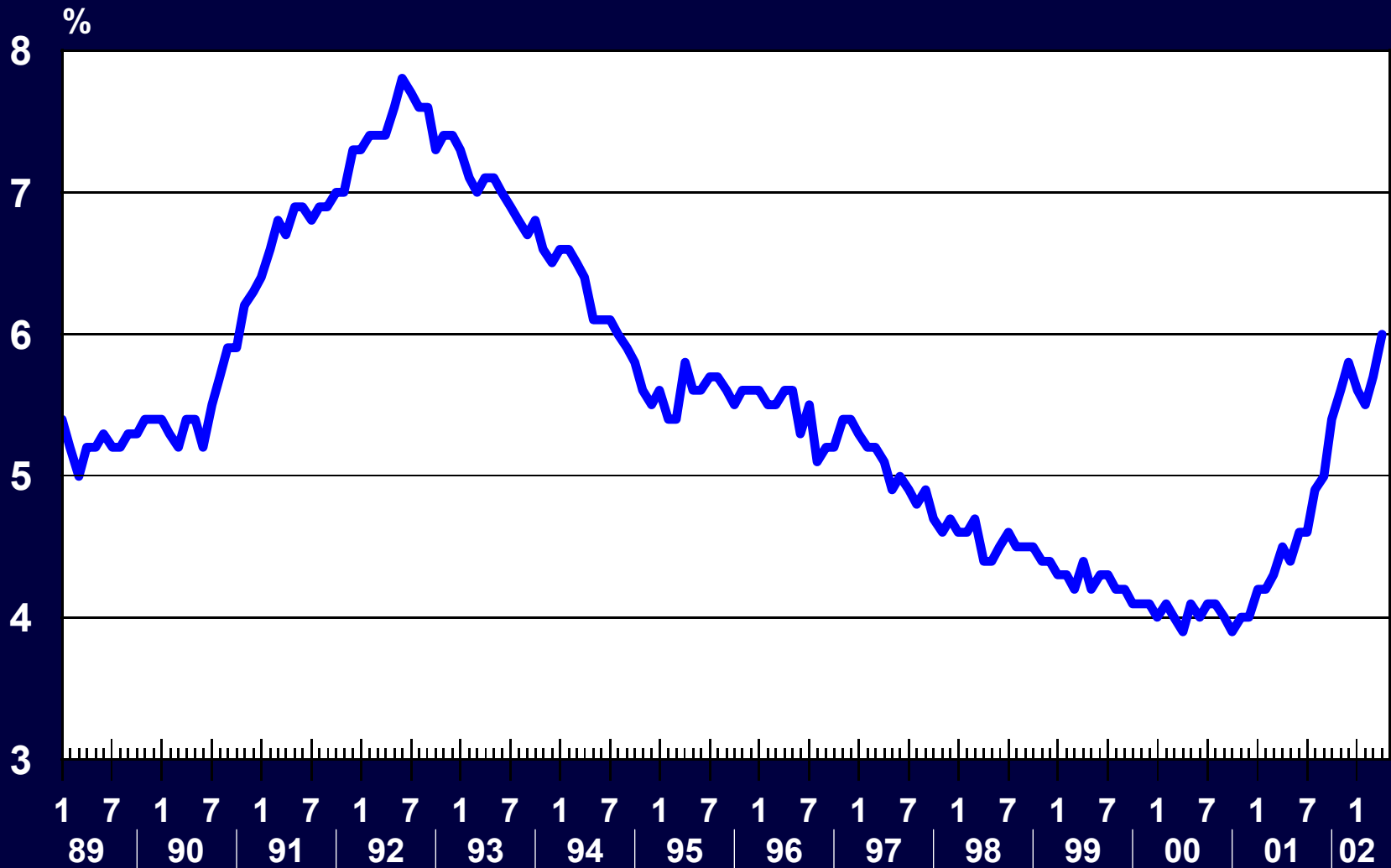
# US ELECTRONIC EQUIPMENT ORDERS

COMMUNICATION, COMPUTER & OFFICE,  
MILITARY, INSTRUMENTS



<http://www.census.gov/indicator/www/m3/>

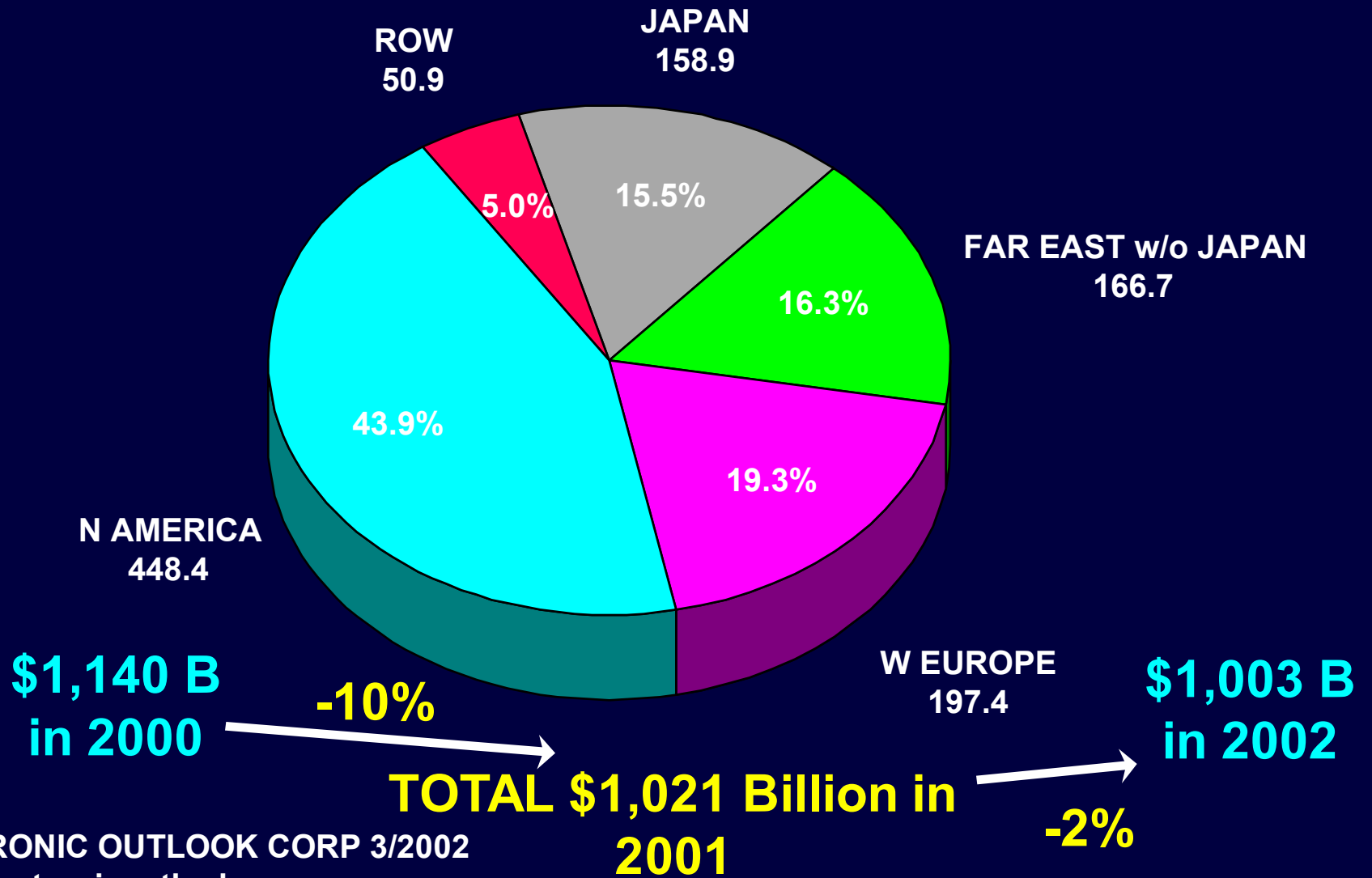
# Civilian Unemployment Rate



# Electronic Equipment

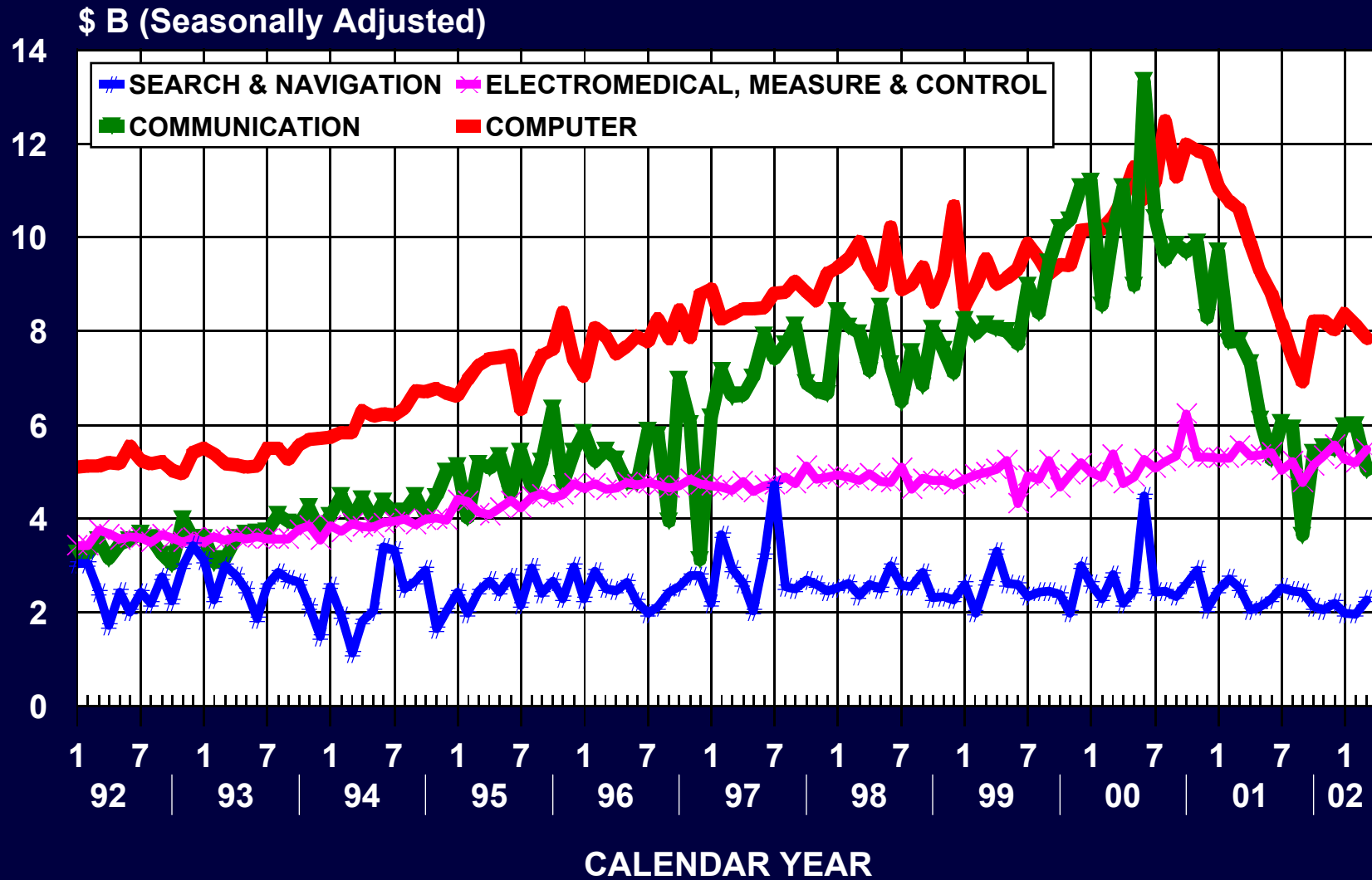
# WORLD ELECTRONIC EQUIPMENT PRODUCTION

## 2001



# US ELECTRONIC EQUIPMENT ORDERS

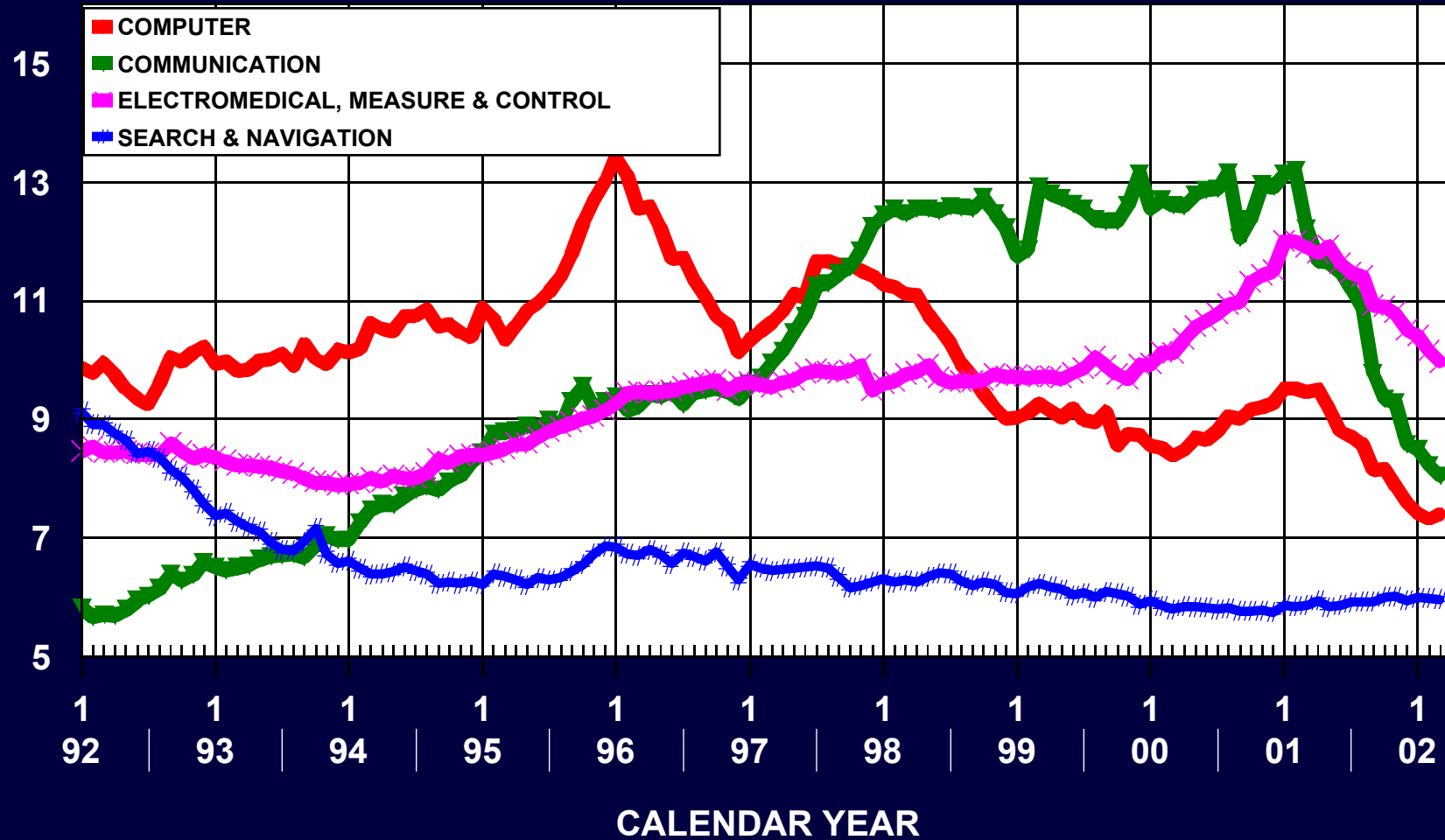
## Monthly Data



# US ELECTRONIC EQUIPMENT INVENTORIES

## Monthly Data

\$ B (Seasonally Adjusted)

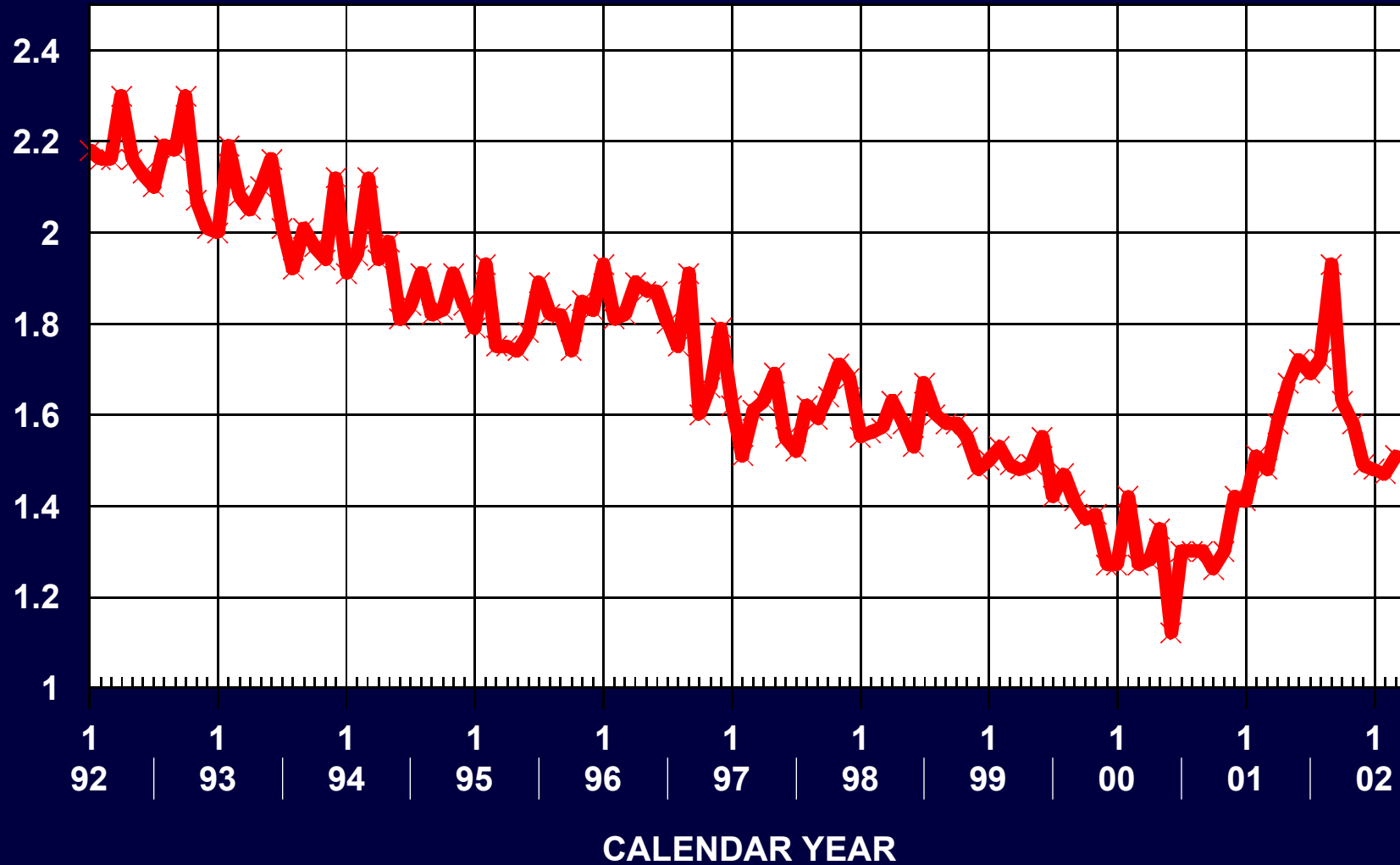


<http://www.census.gov/indicator/www/m3/>

5/02

# US TOTAL ELECTRONIC EQUIPMENT INVENTORIES

## Inventories vs. Orders



<http://www.census.gov/indicator/www/m3/>

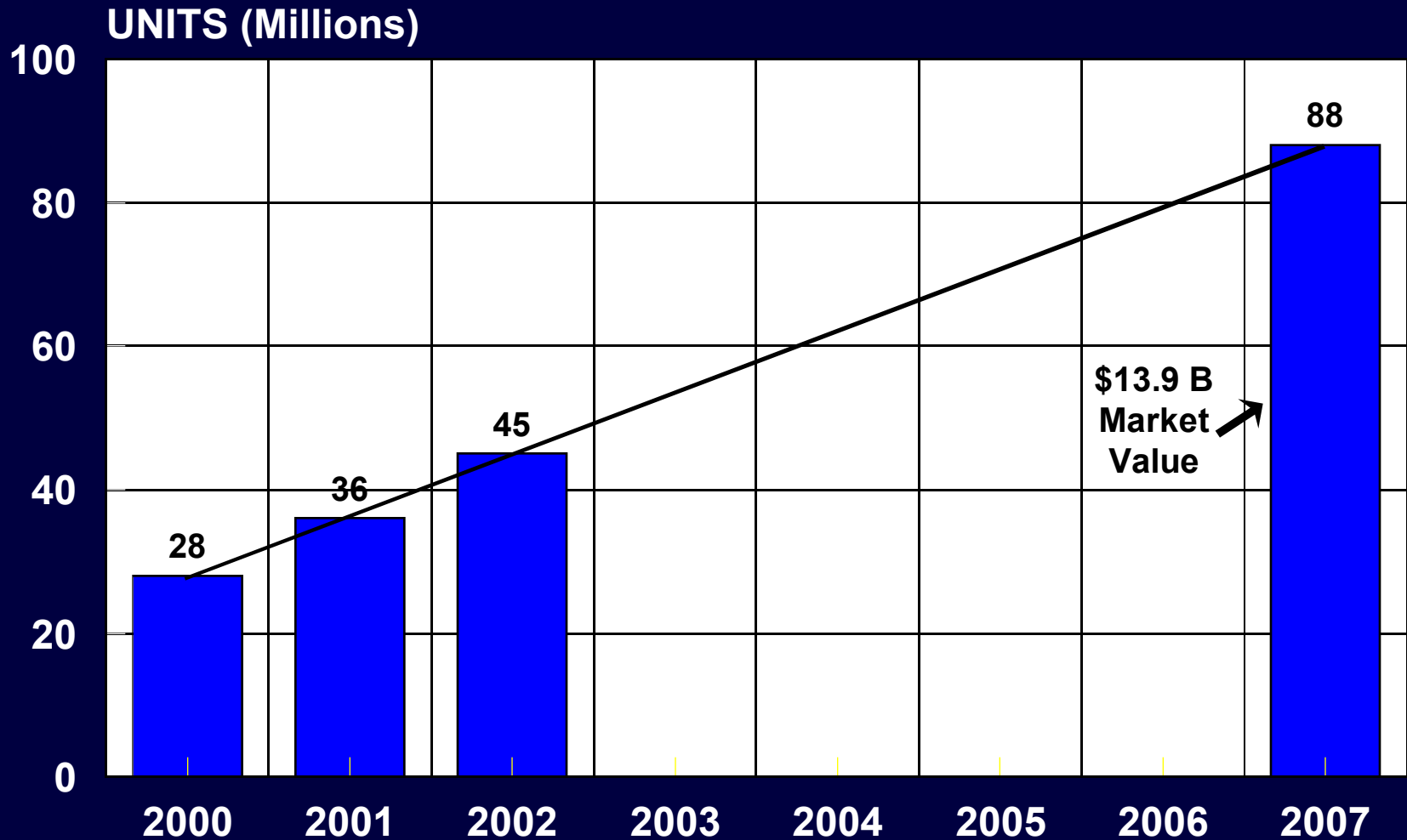
5/02

# Consumer Electronics

# DIGITAL CABLE SET-TOP BOX

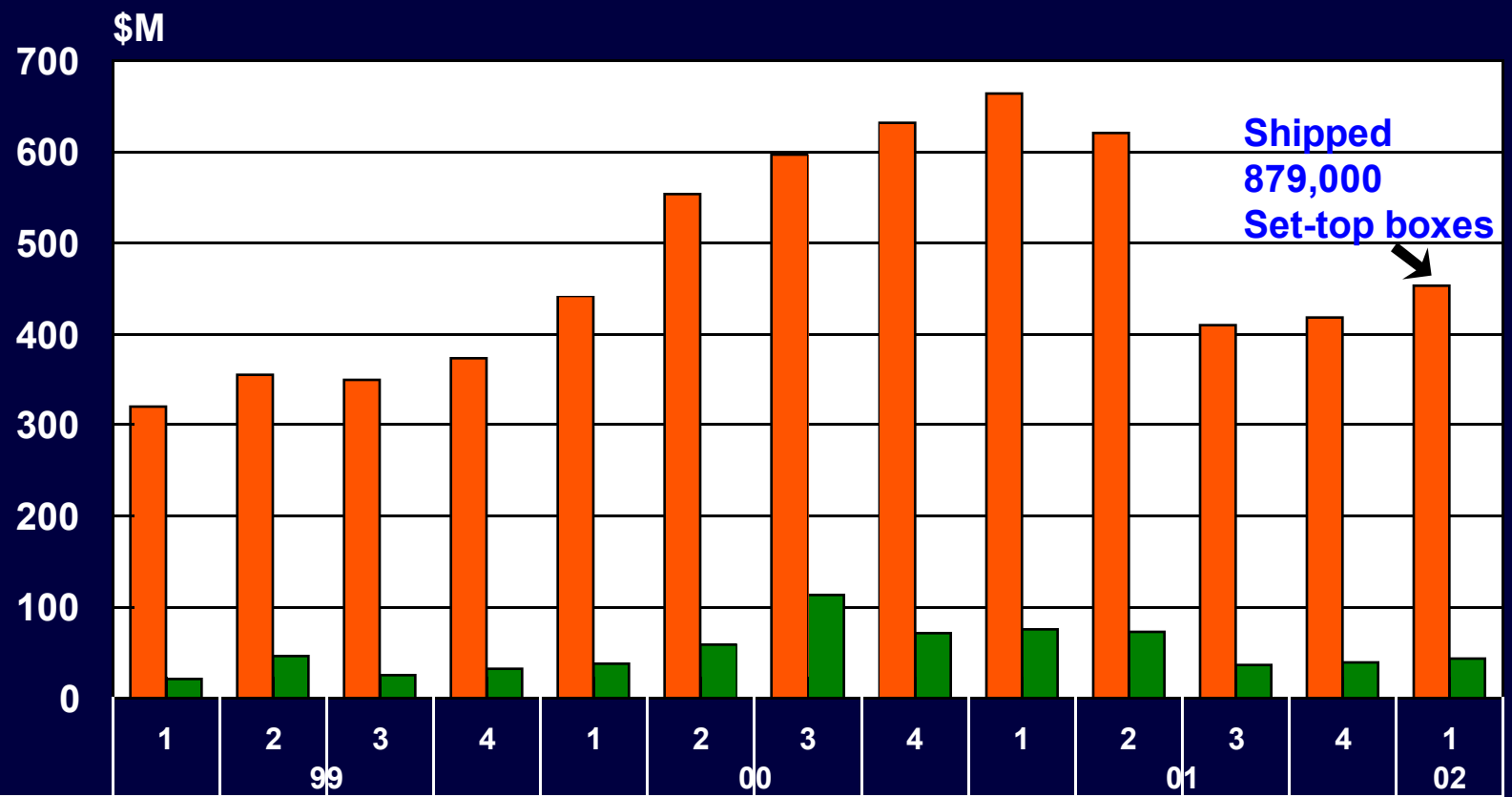
## WORLD SHIPMENTS

### Cable, Satellite & Terrestrial Platforms



Allied Business Intelligence 1/2002

# Scientific-Atlanta Revenue & Net Income

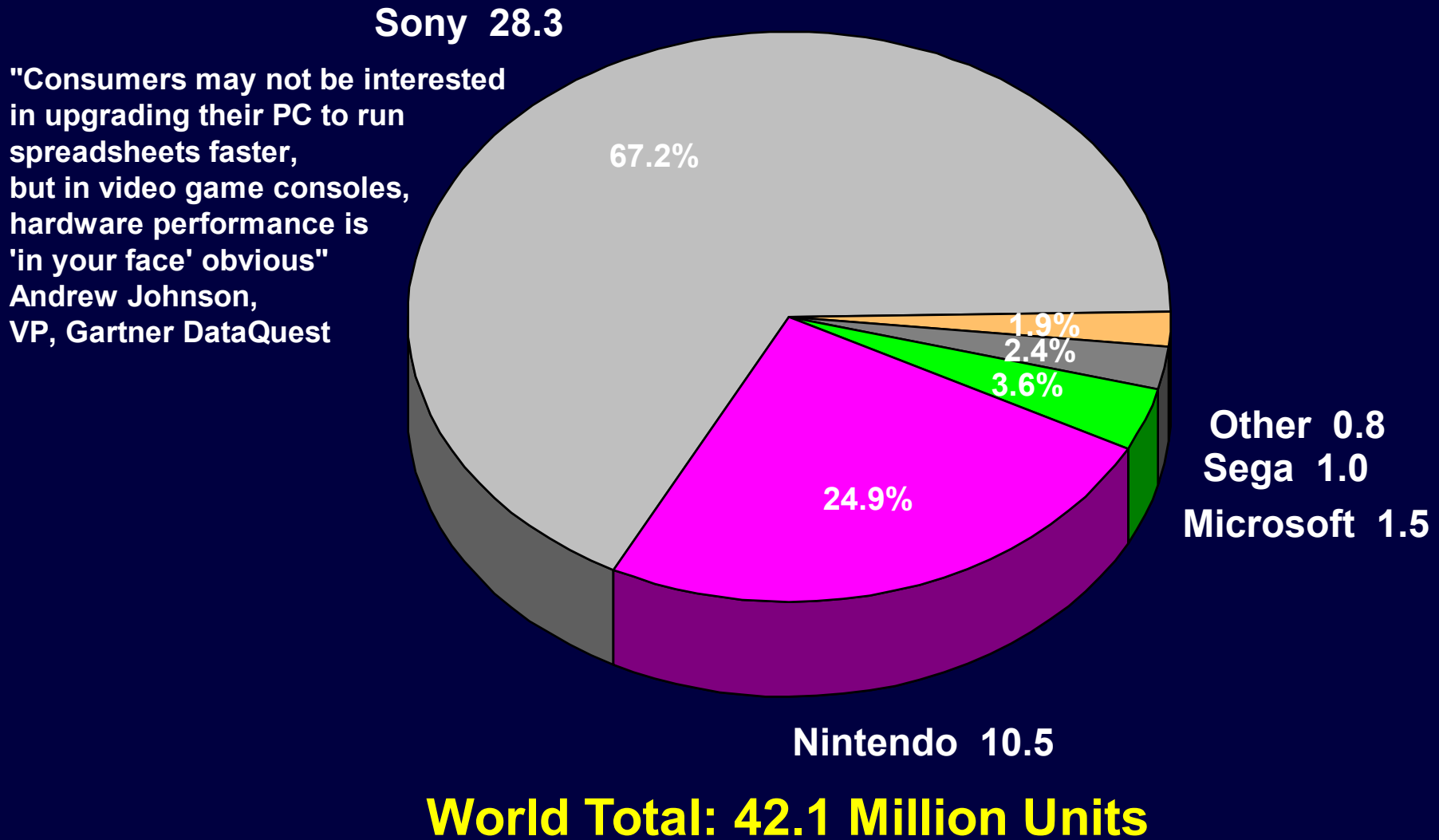


Revenue	320	355	349	373	441	553	597	631	664	620	410	418	453
Income	21	47	25	33	38	59	113	71	76	73	37	39	44

CY

SFA

# World Video Game Console 2001

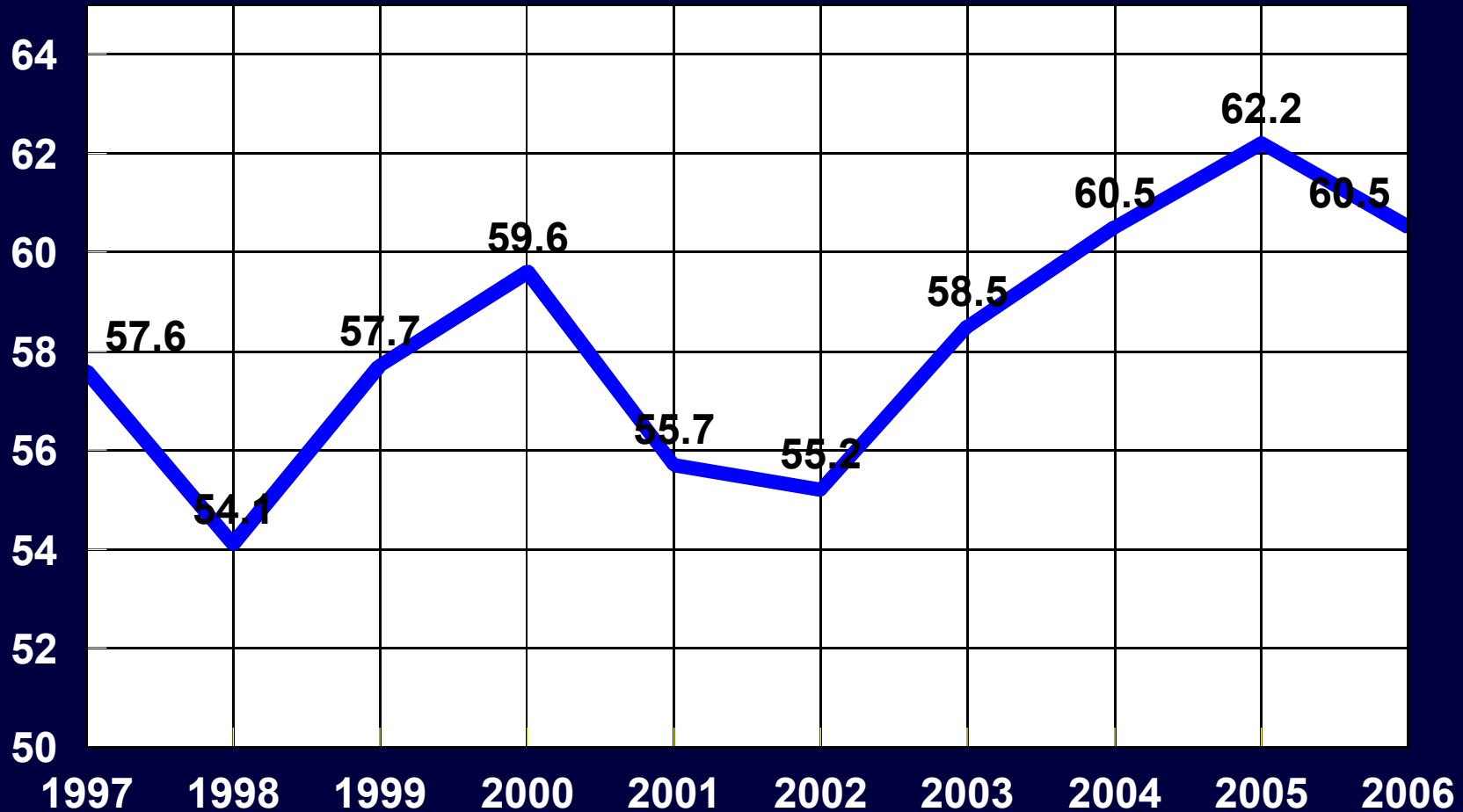


"Consumers may not be interested in upgrading their PC to run spreadsheets faster, but in video game consoles, hardware performance is 'in your face' obvious"  
Andrew Johnson,  
VP, Gartner DataQuest

# **Automotive Electronics**

# World Motor Vehicle & Automotive Electronics Production

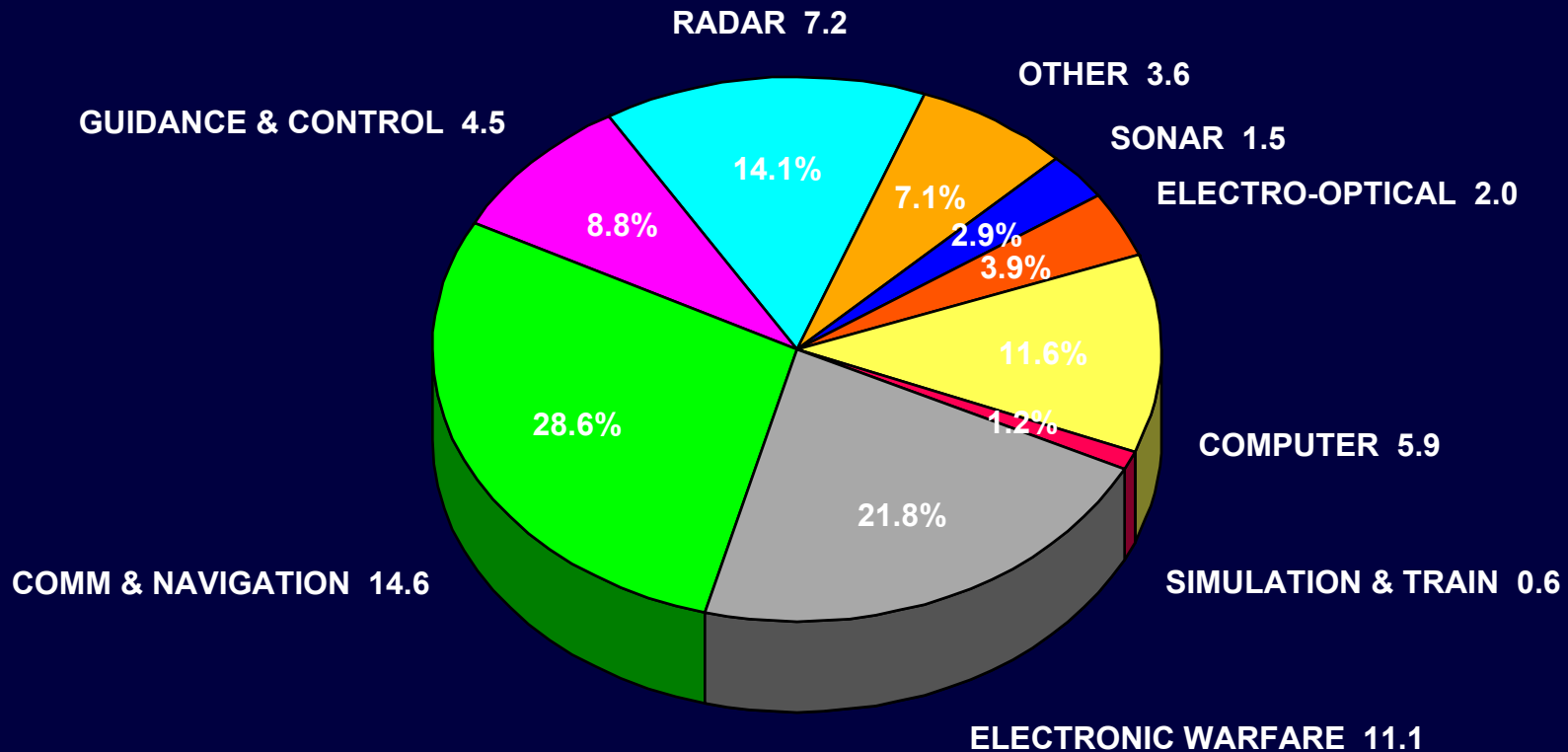
UNITS (Millions)



# **Government & Military Electronics**

# GOVERNMENT & MILITARY ELECTRONICS PRODUCTION

## U.S. - 2001



**TOTAL: \$51.0 Billion**

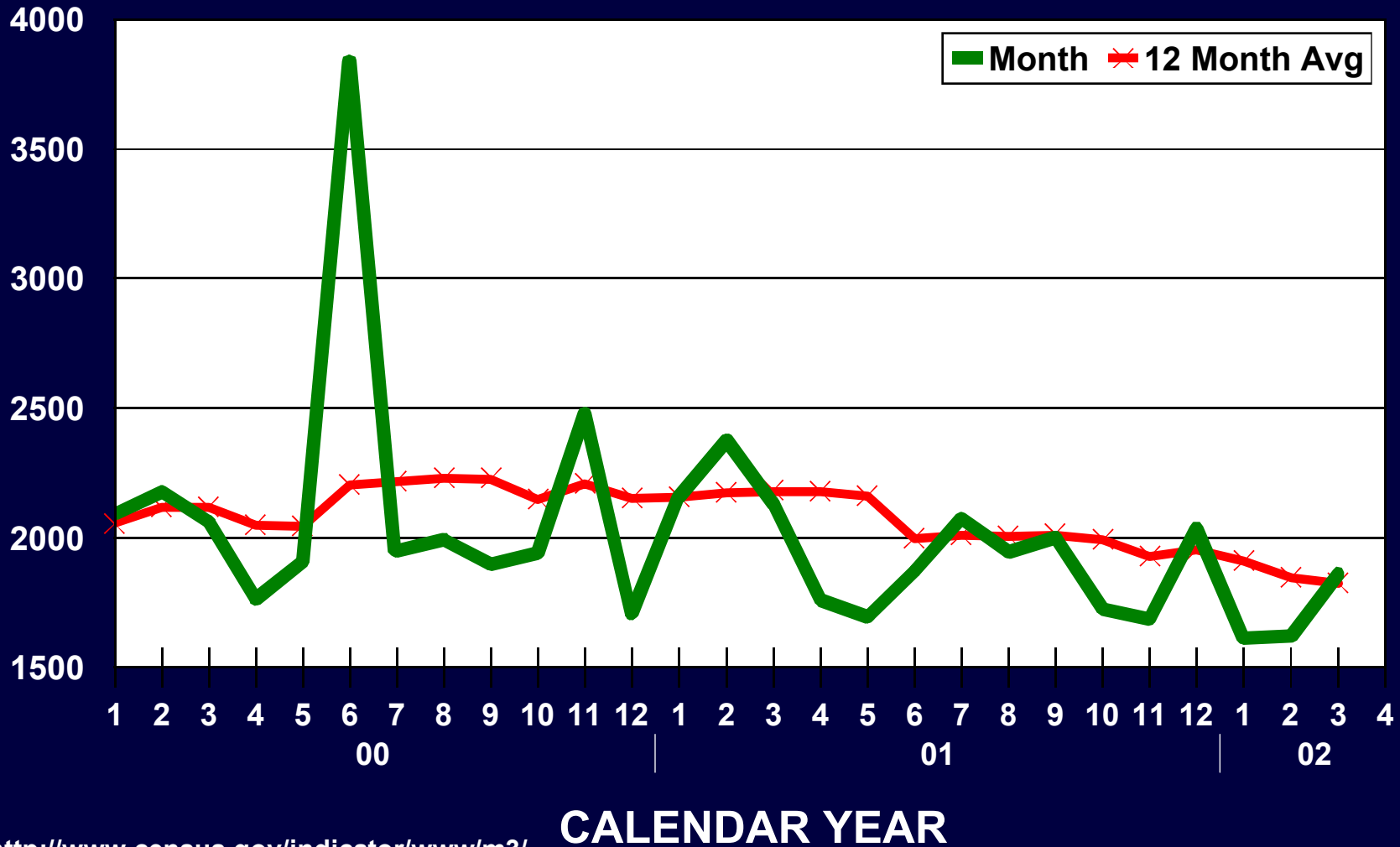
Electronic Outlook 3/2002

Note: Similar data available for other electronic equipment sectors

# MILITARY ELECTRONICS

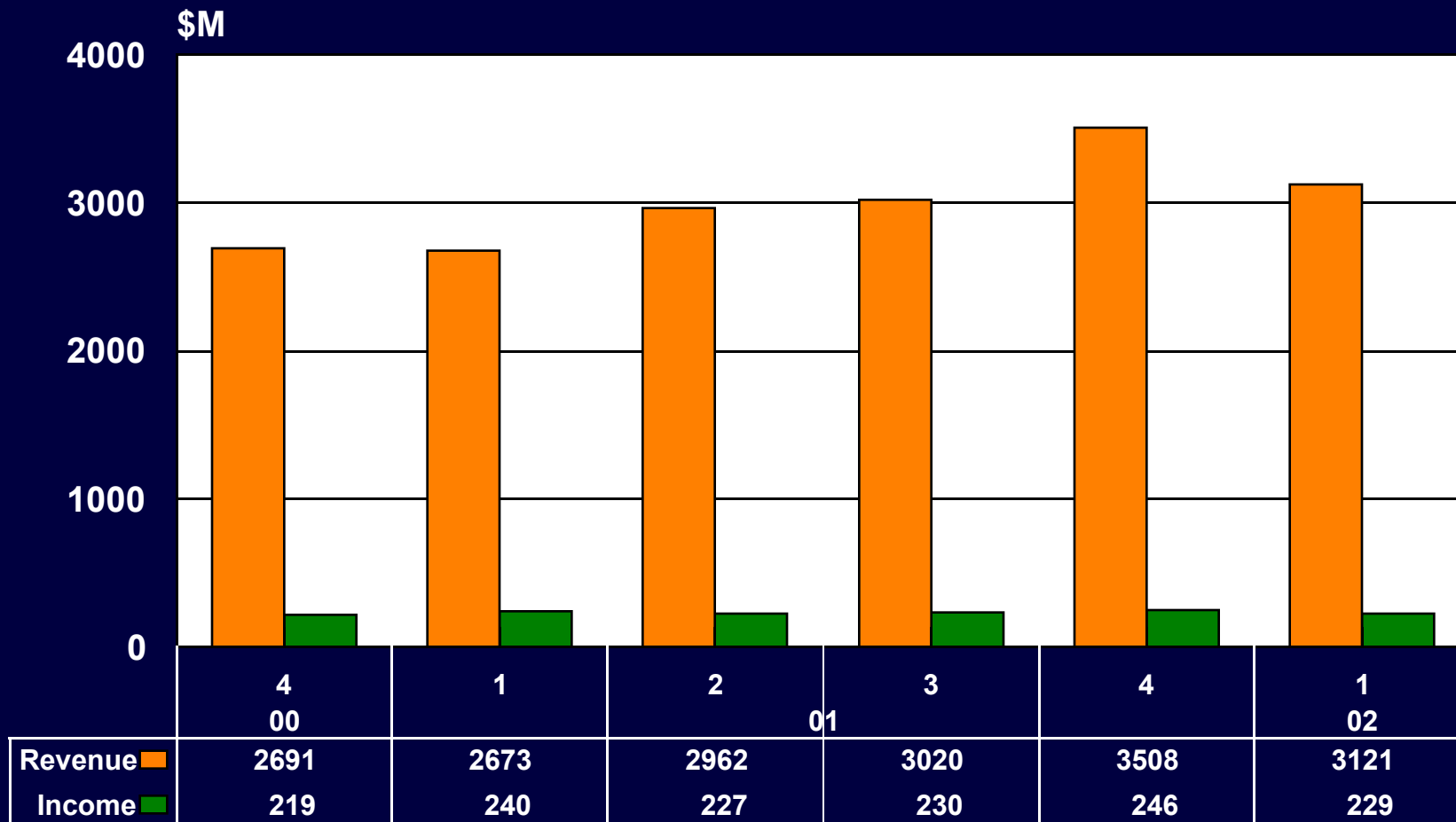
## BOOKINGS

### Defense Search & Navigation and Communications Equipment



# General Dynamics

## Revenue & Net Income

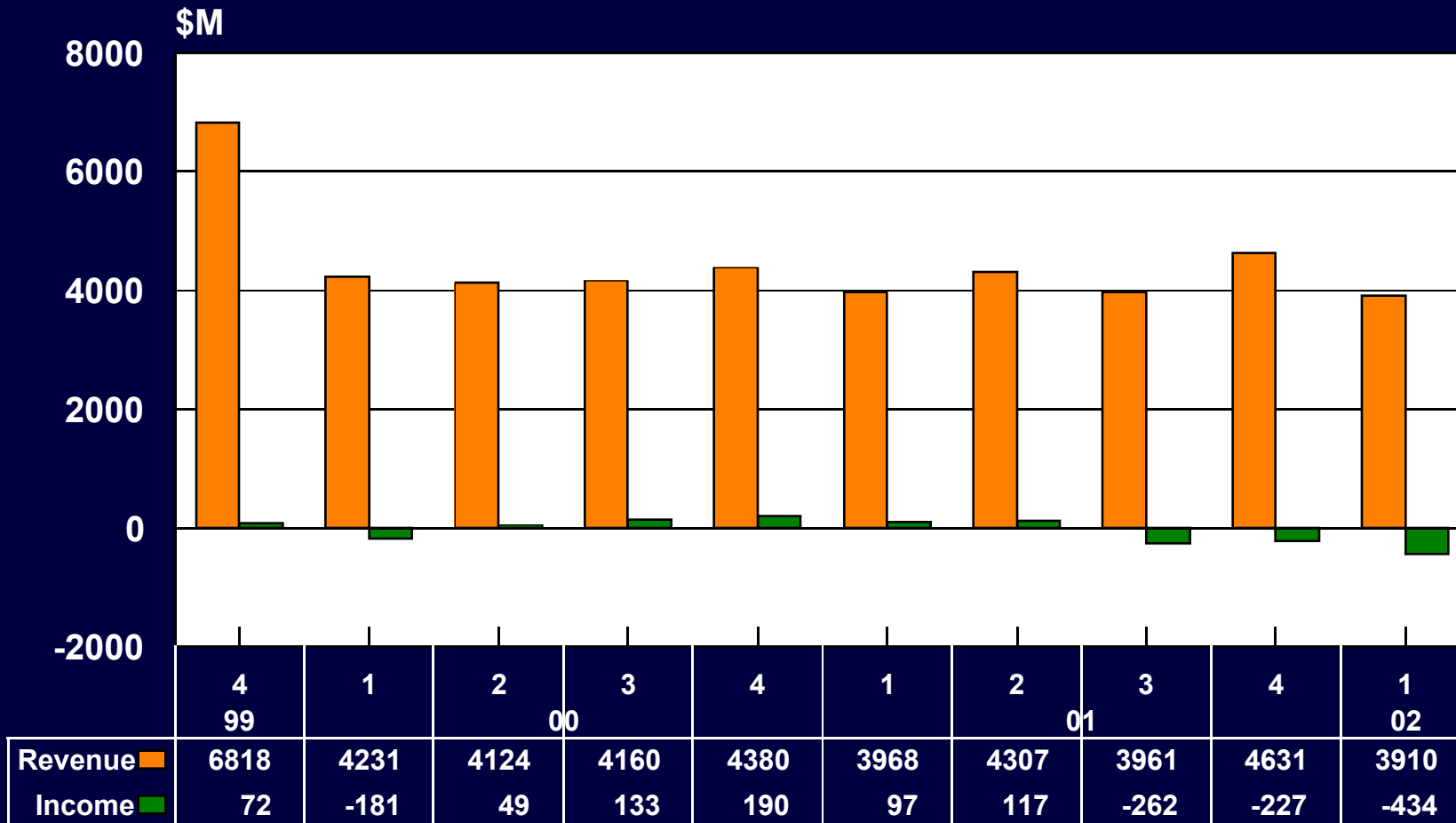


CY

GD

# Raytheon

## Revenue & Net Income



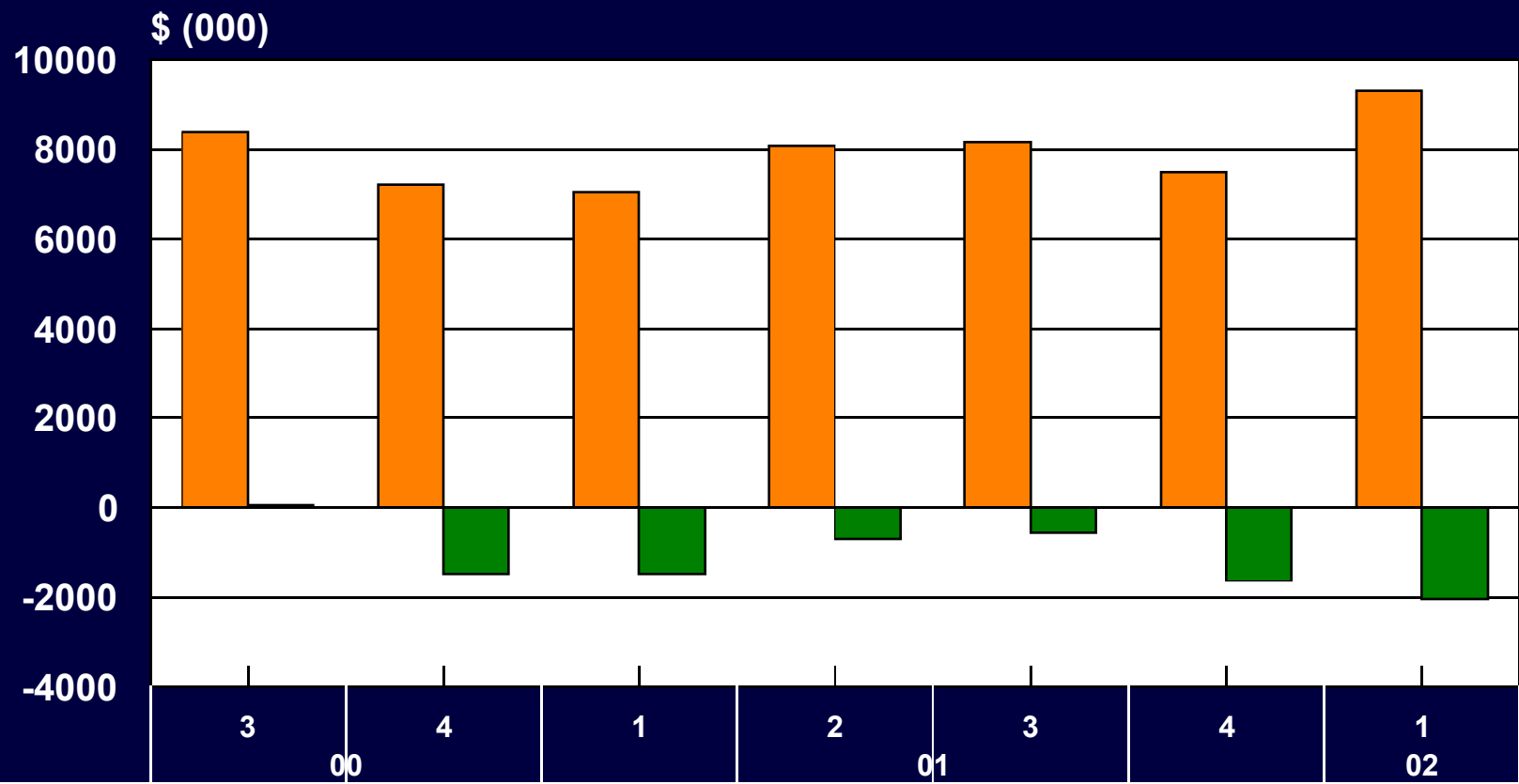
CY

RTN

# **Safety & Security**

# Visionics Corp

## Revenue & Net Income



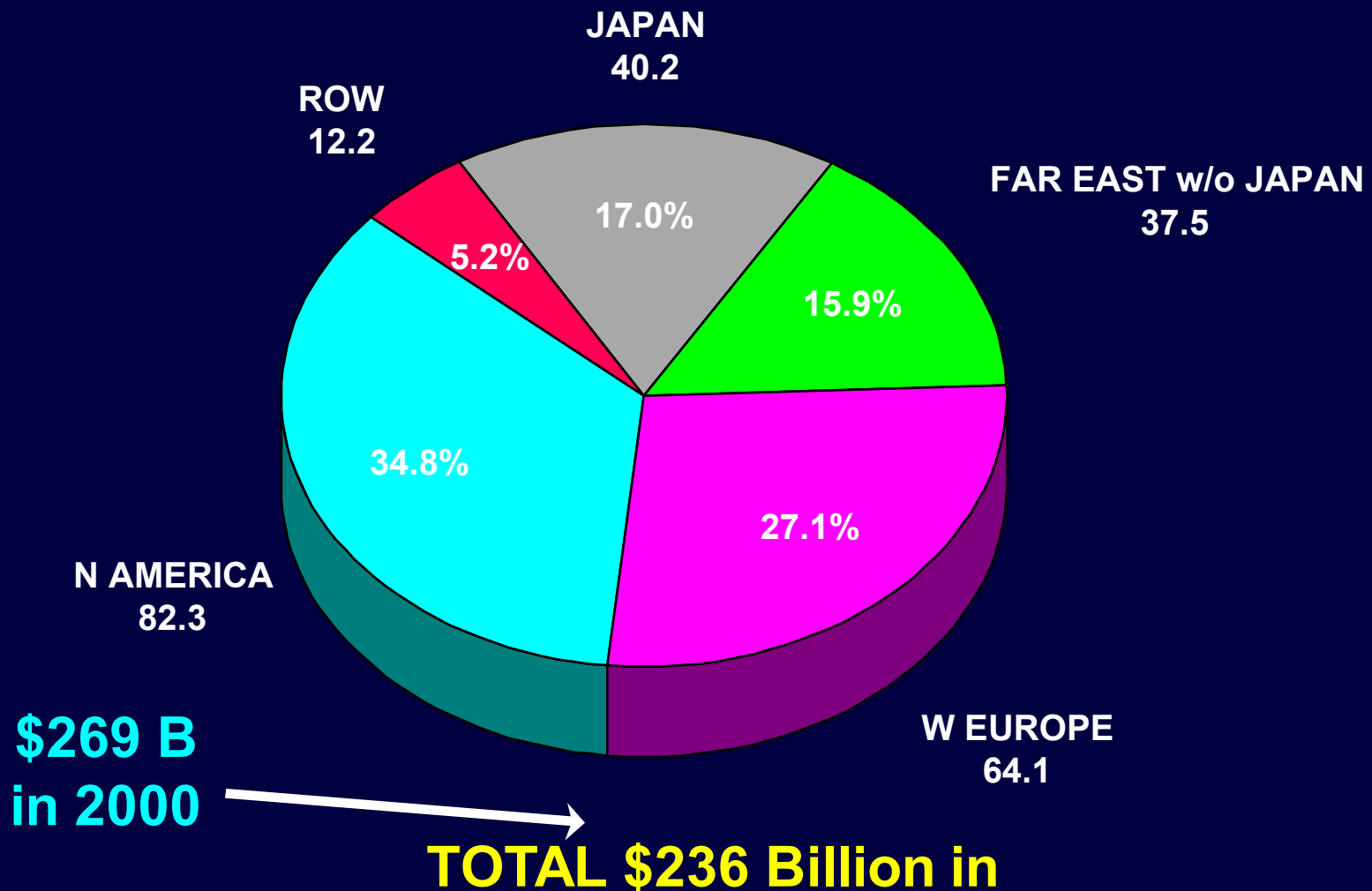
Revenue	8377	7197	7044	8071	8160	7479	9296
Income	45	-1470	-1485	-710	-569	-1633	-2047

CY

# Communications Equipment

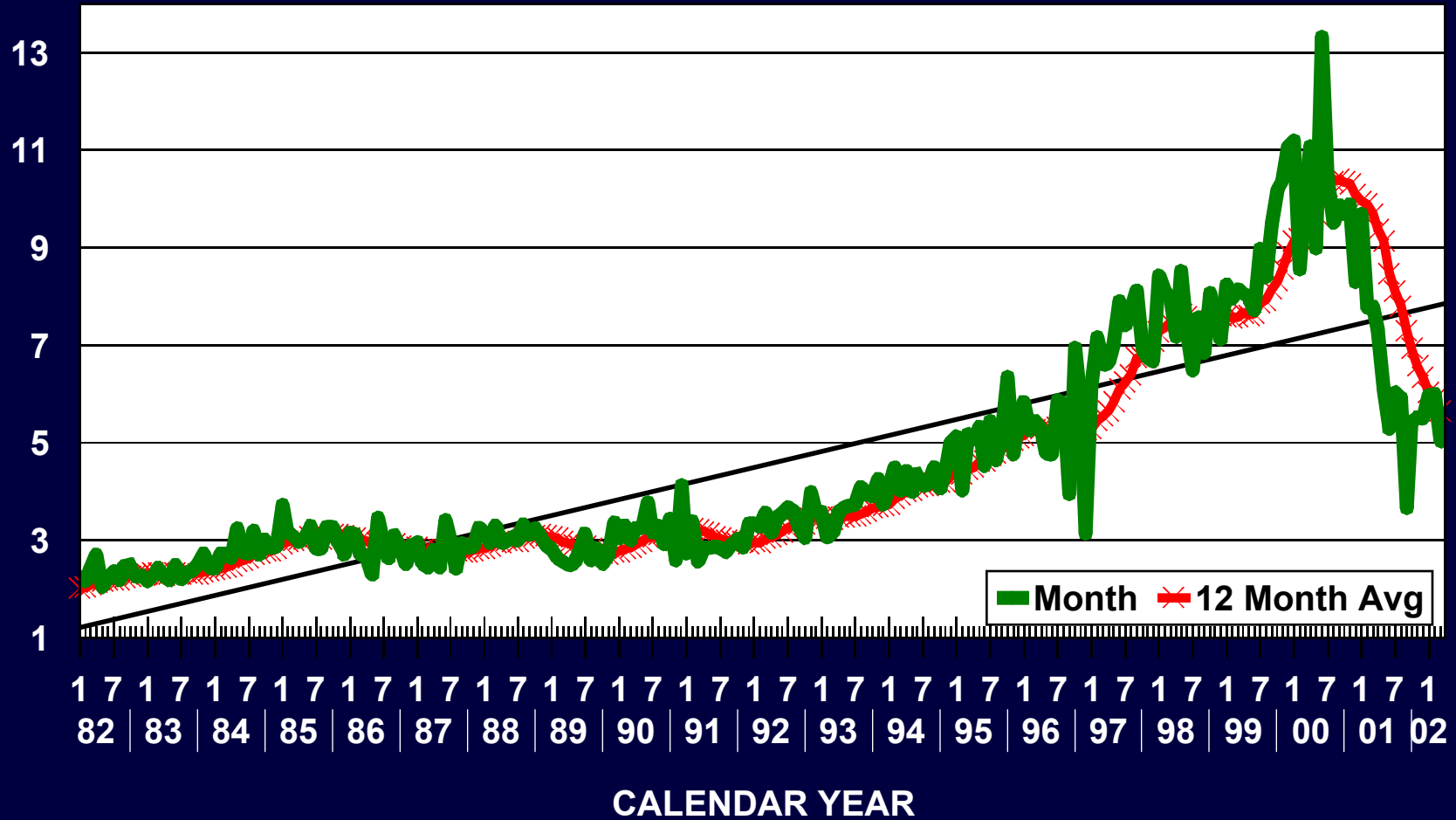
# WORLD COMMUNICATIONS EQUIPMENT PRODUCTION

2001



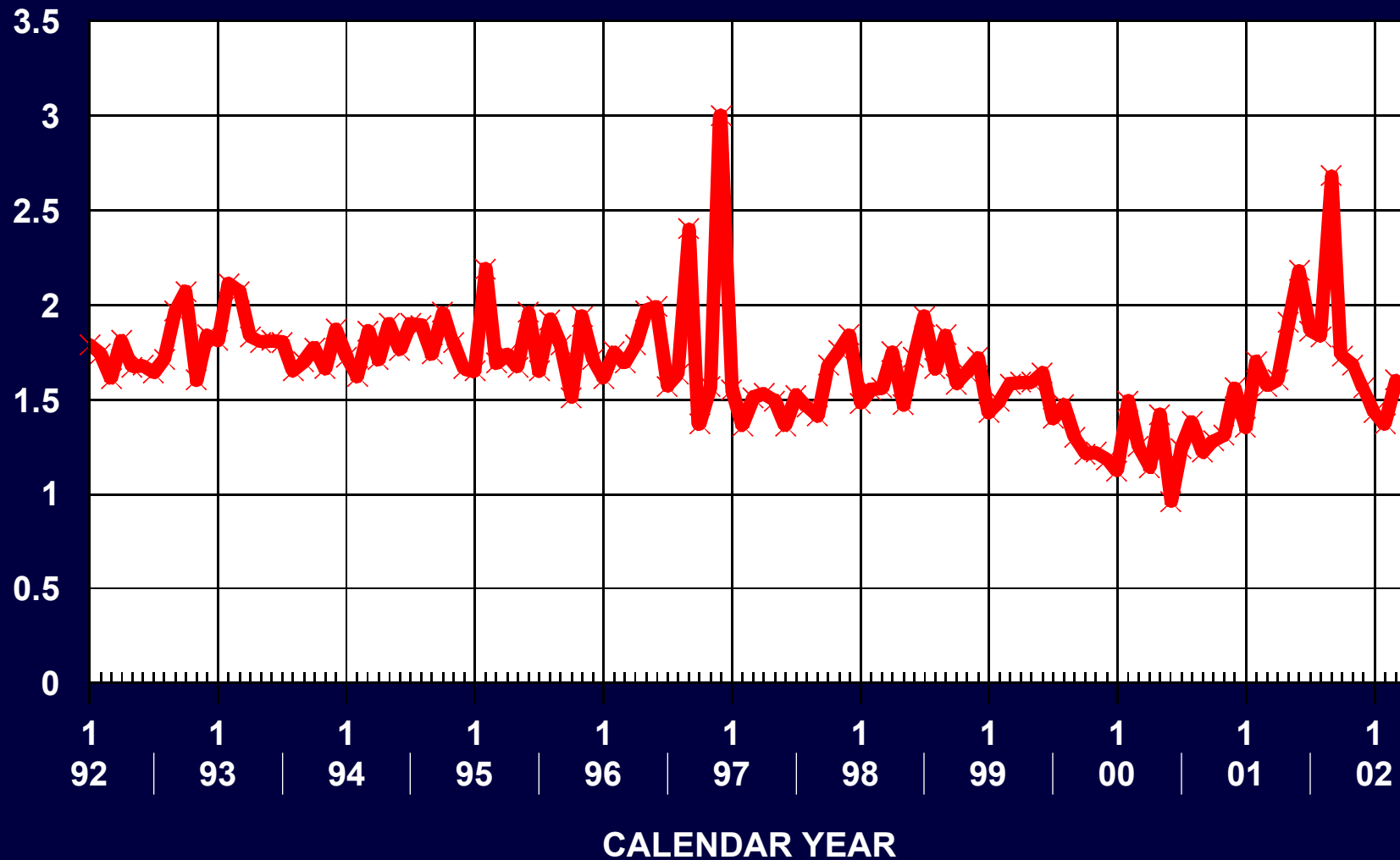
# COMMUNICATIONS EQUIPMENT BOOKINGS

\$ B (Seasonally Adjusted)



<http://www.census.gov/indicator/www/m3/>  
5/2002

# US Communication Equipment Inventories vs. Orders



<http://www.census.gov/indicator/www/m3/>

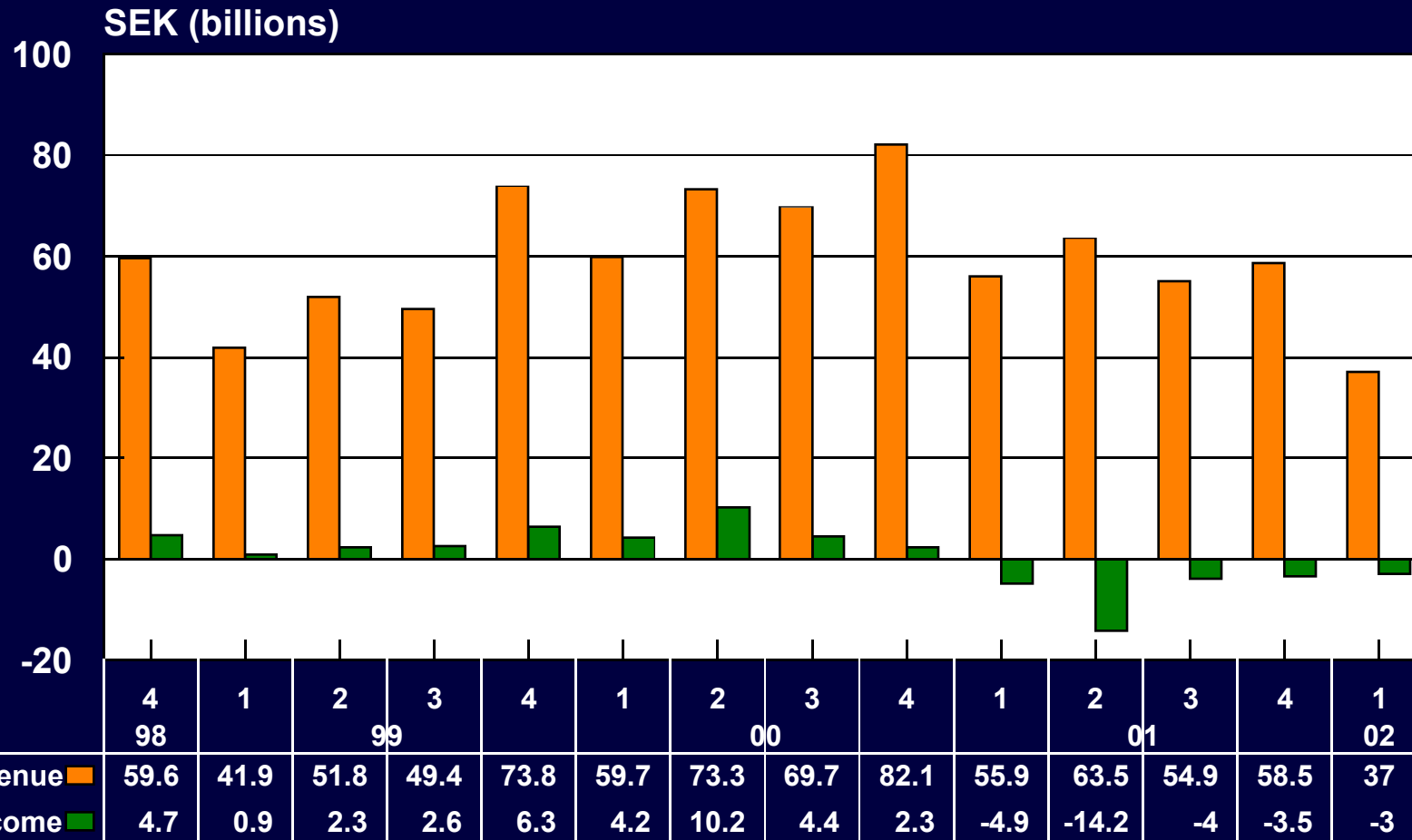
5/02

# Worldwide Telecommunications Market Shares

	<u>Q4 2001</u>	<u>YE 2001</u>
<b>Ericsson</b>	<b>13.7%</b>	<b>11.9%</b>
<b>Alcatel</b>	<b>12.8%</b>	<b>11.8%</b>
<b>Cisco</b>	<b>11.0%</b>	<b>10.1%</b>
<b>Siemens</b>	<b>10.7%</b>	<b>9.9%</b>
<b>Nortel</b>	<b>9.1%</b>	<b>11.2%</b>
<b>Lucent</b>	<b>9.0%</b>	<b>9.1%</b>

# L.M. Ericsson

## Revenue & Net Income



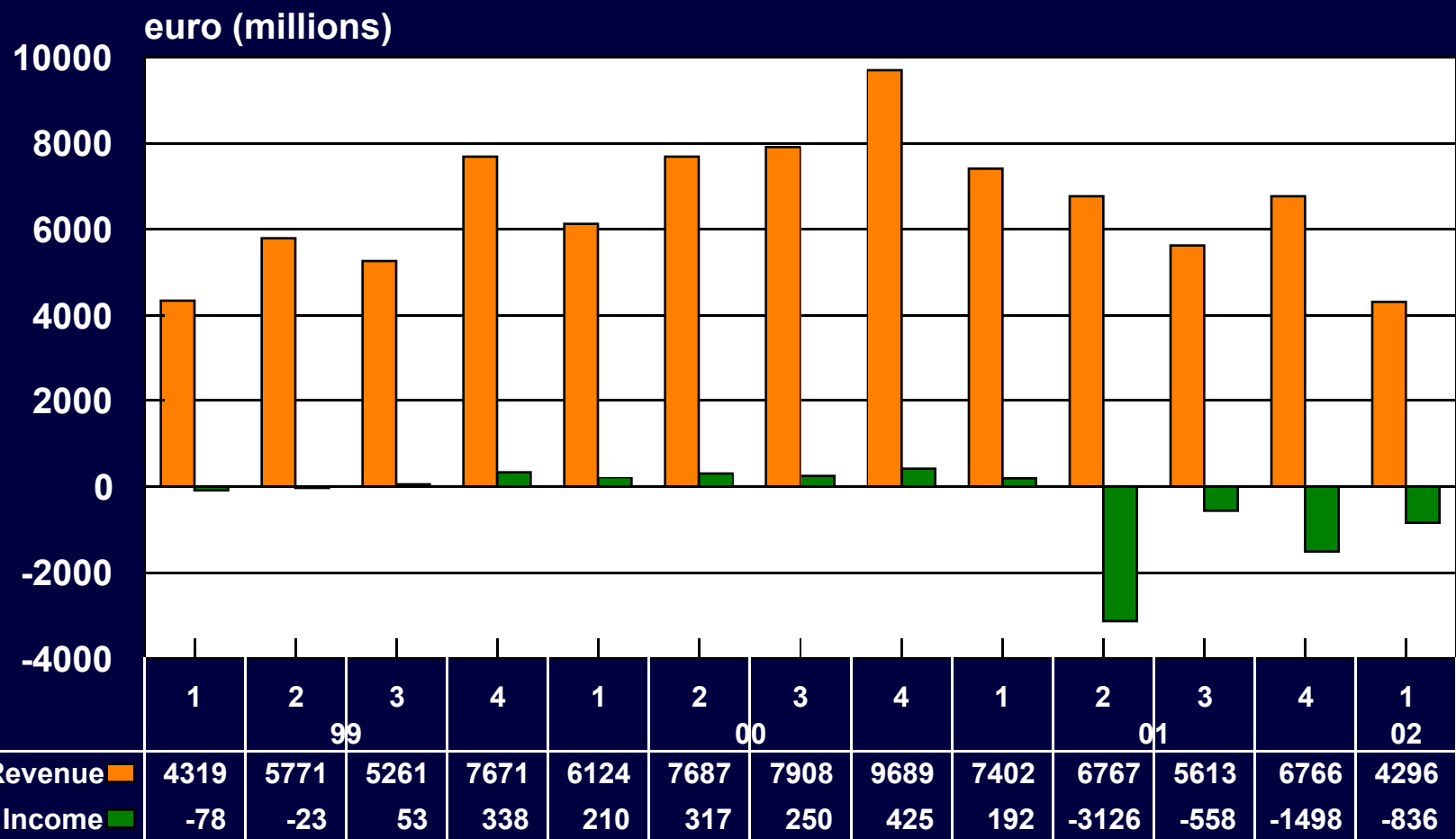
CY

ERICSSON

FY=CY

# Alcatel Alsthom

## Revenue & Net Income



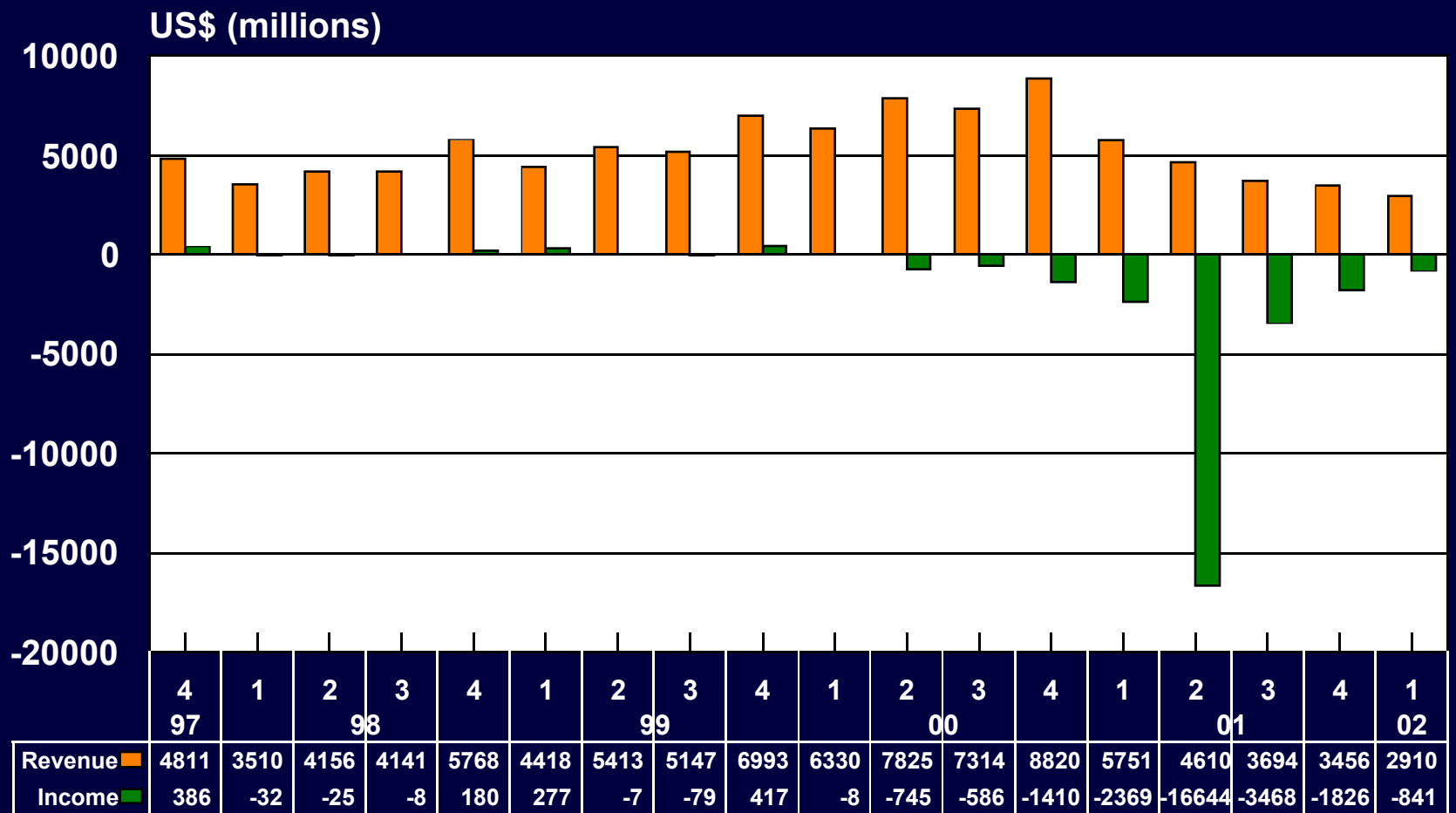
CY

ALA

FY=CY

# Nortel Networks

## Revenue & Net Income



CY

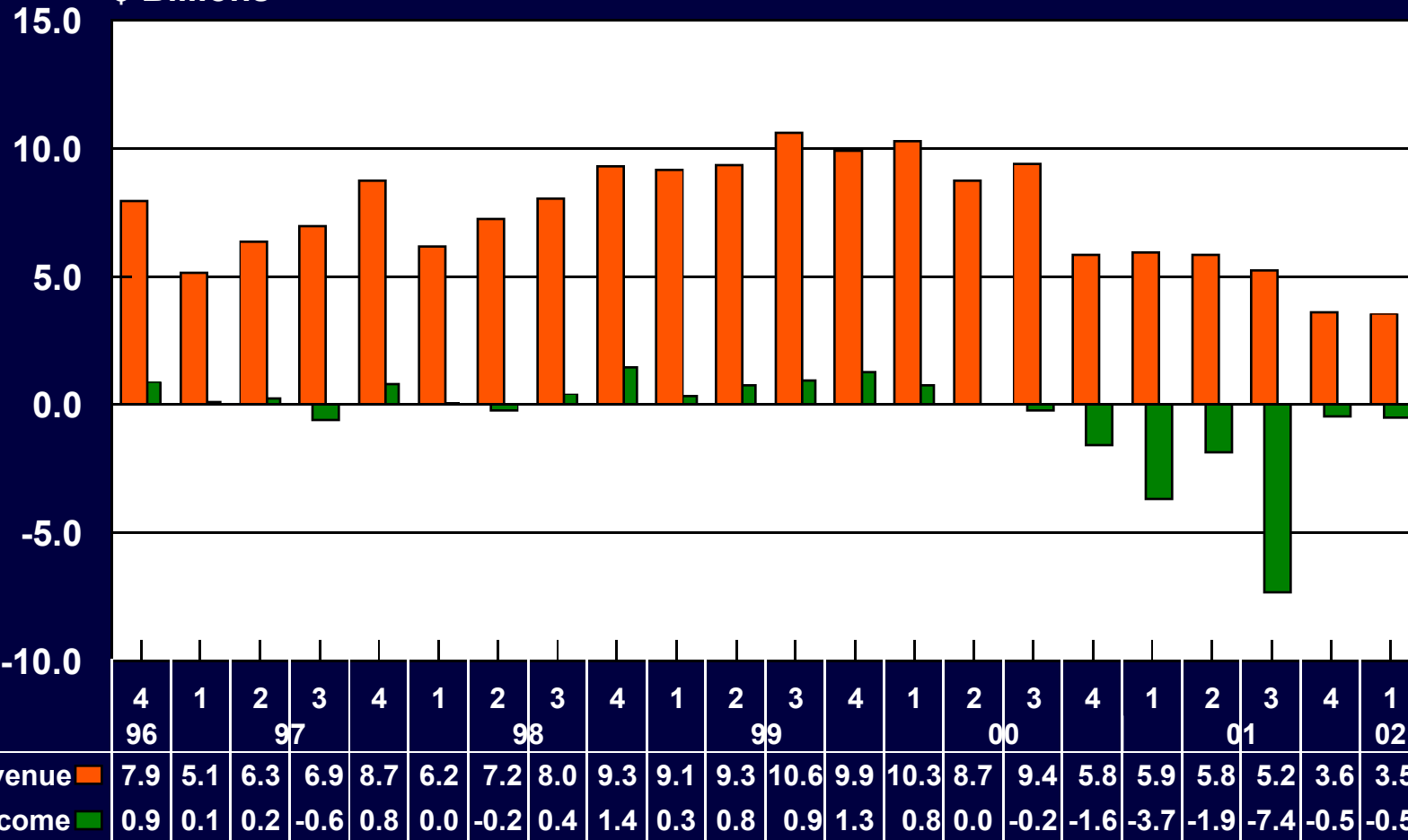
NT

FY=CY

# Lucent Technologies

## Revenue & Net Income

\$ Billions



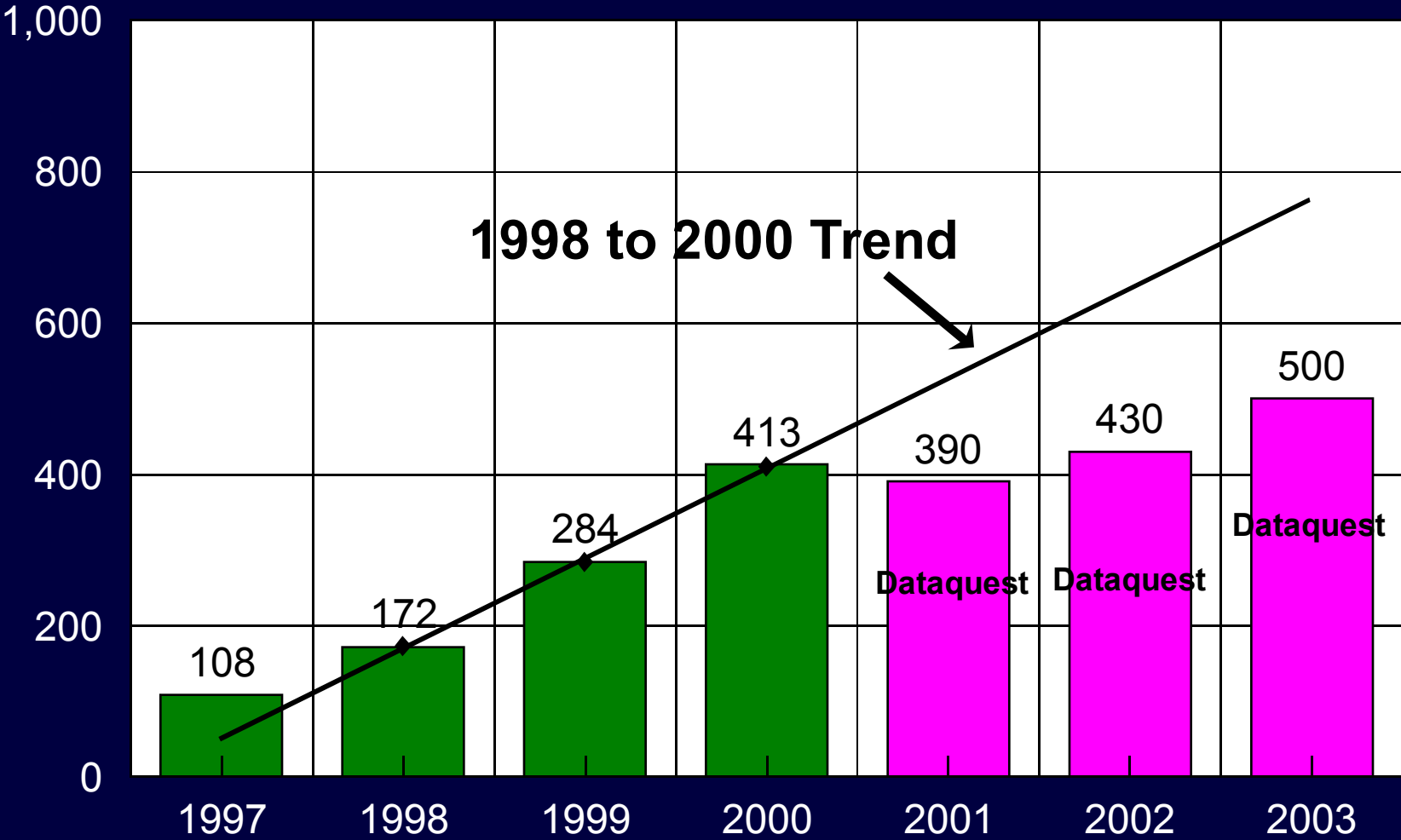
CY

FY ends September

LU

# WORLD CELLULAR PHONE GROWTH

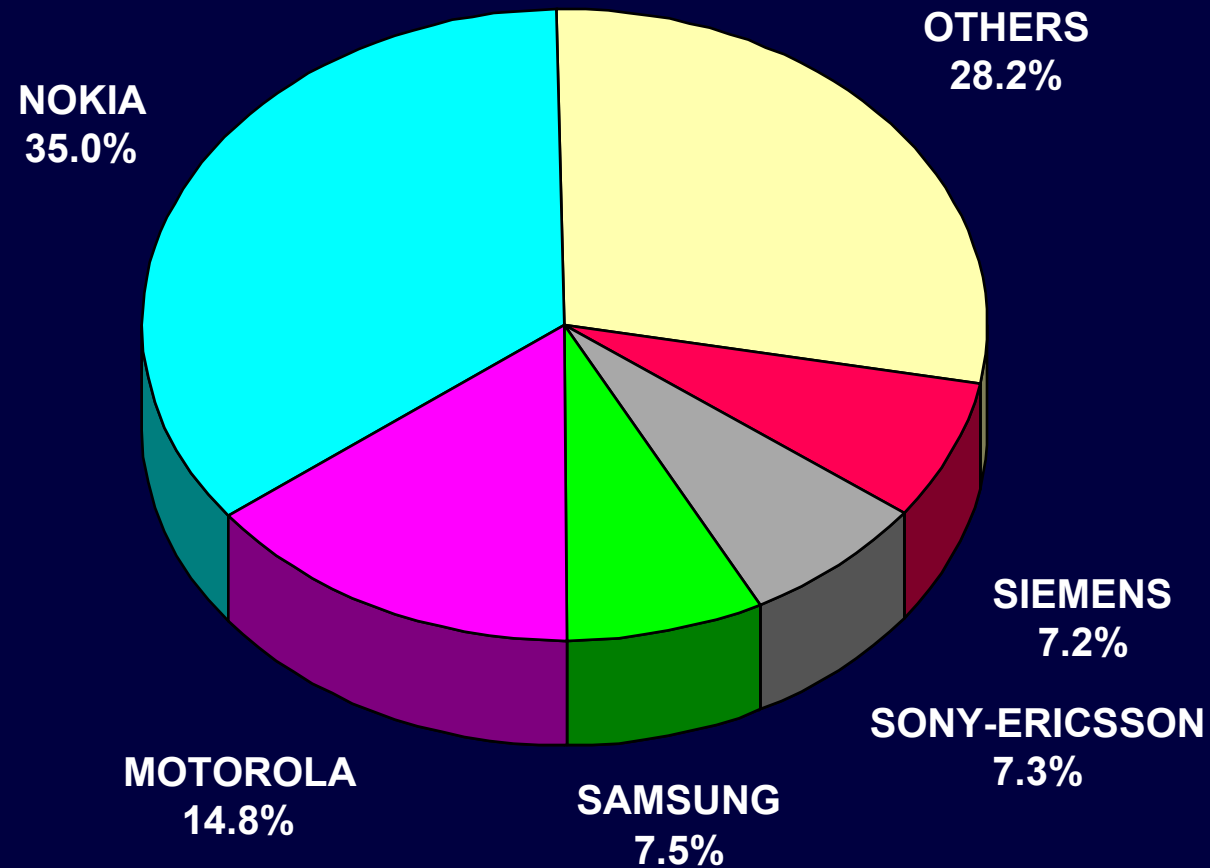
## TOTAL SALES - ANALOG & DIGITAL



IDC 8/2001, Dataquest 4/2002

# WORLD CELLULAR PHONE SALES

2001

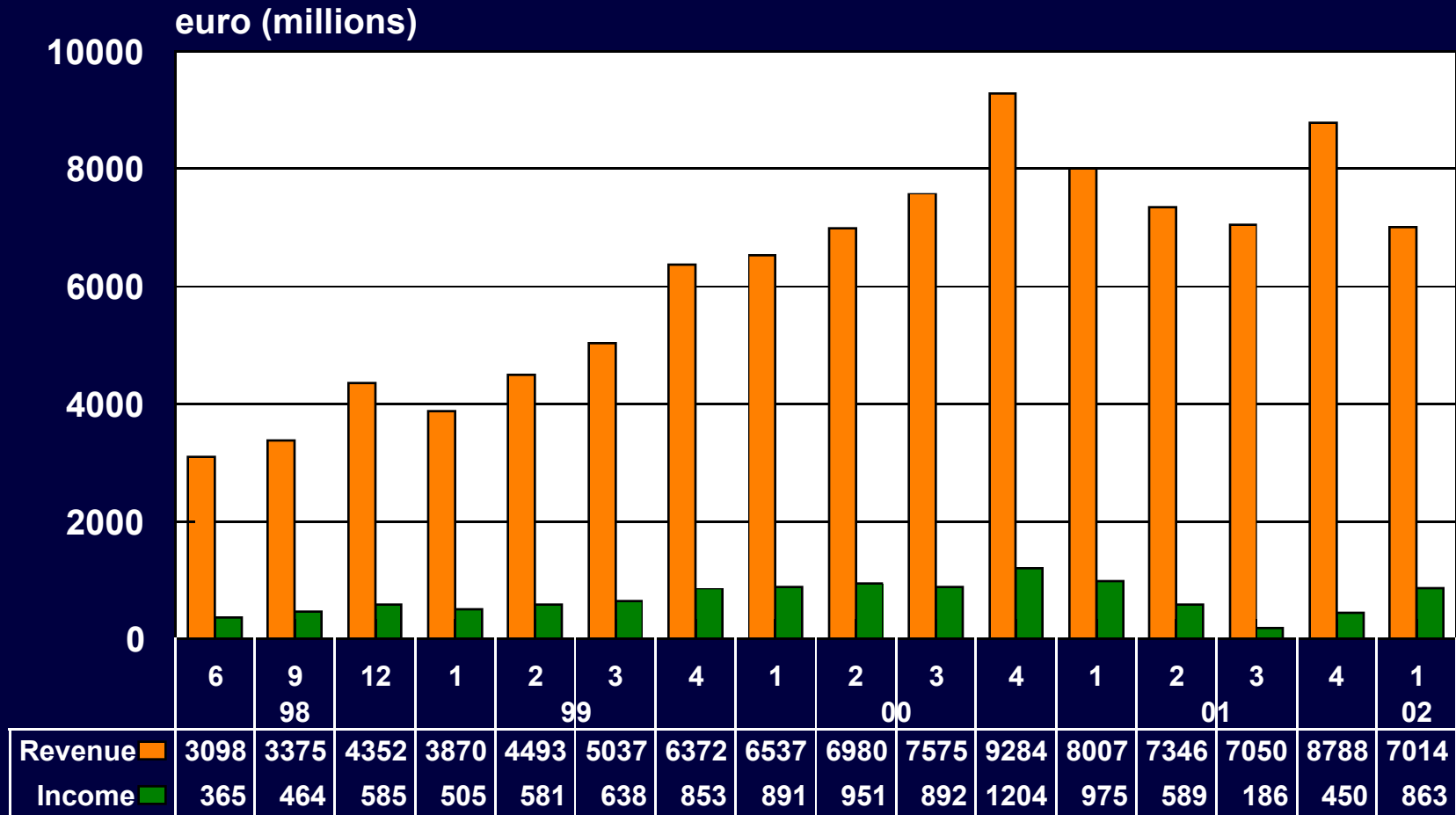


Custer Consulting 5/2001

**TOTAL: 395 MILLION UNITS**

# Nokia

## Revenue & Net Income



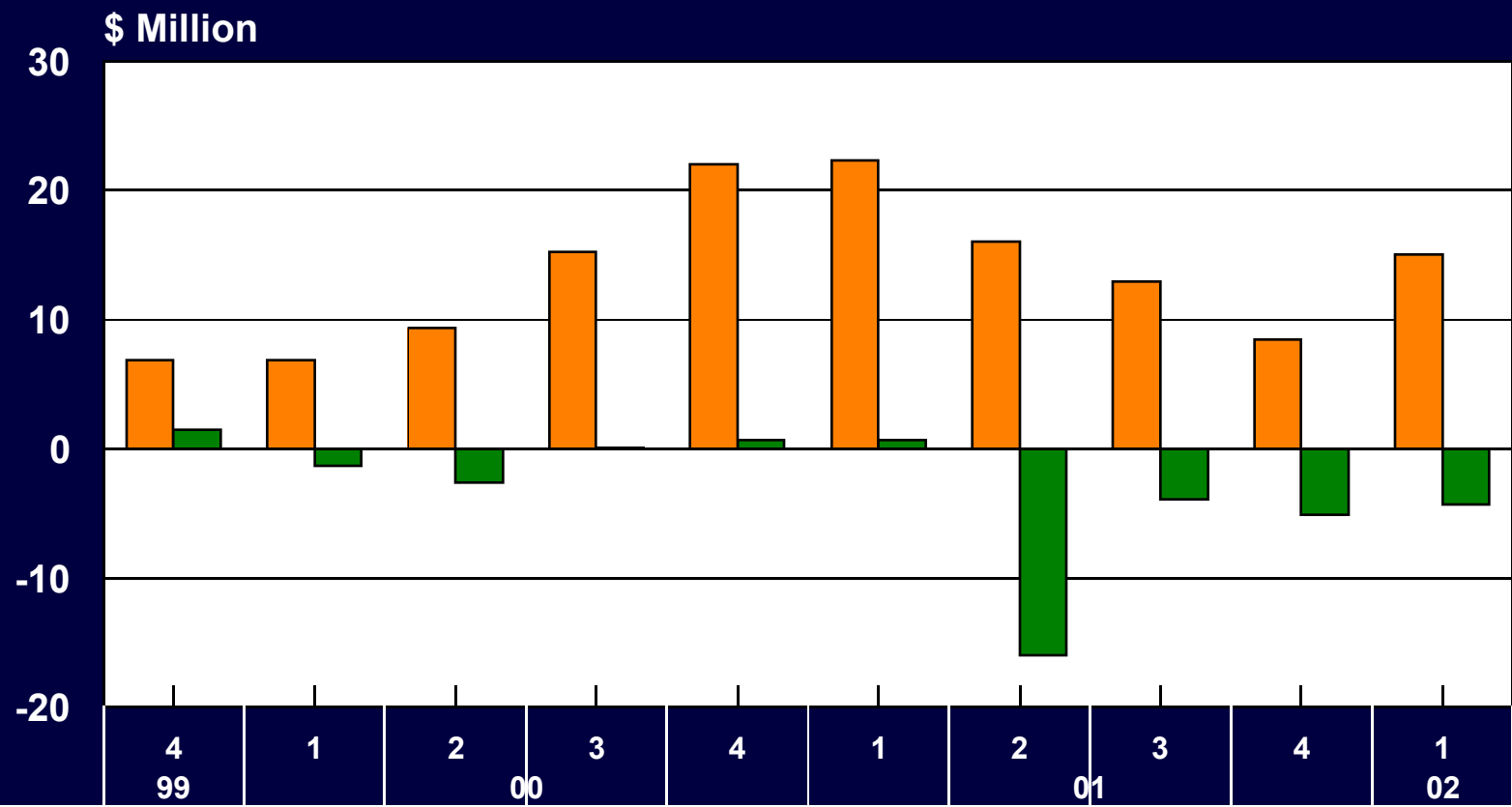
CY

NOK

FY=CY

# Sierra Wireless

## Revenue & Net Income



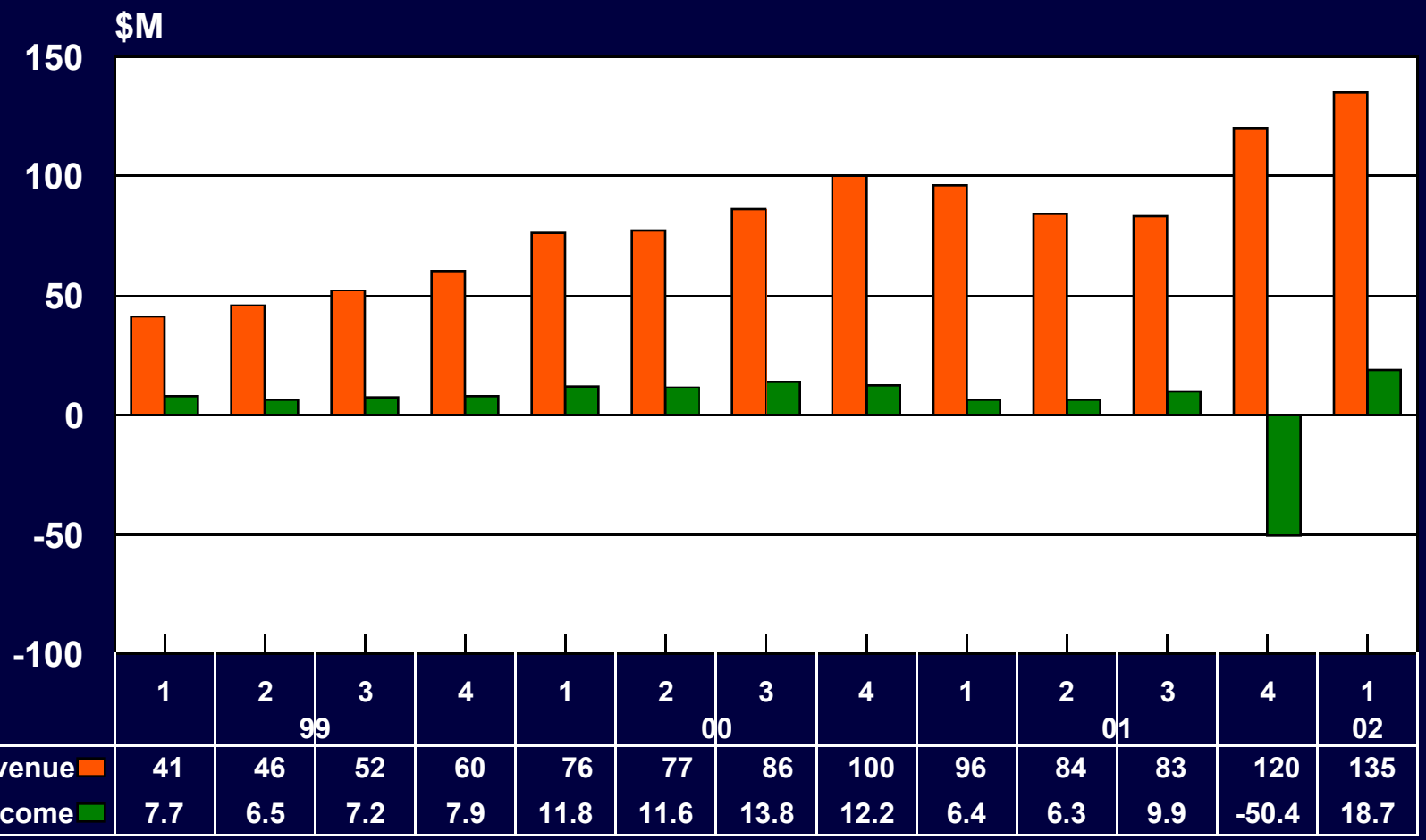
Revenue	6.9	6.9	9.4	15.2	22	22.3	16	12.9	8.5	15
Income	1.5	-1.3	-2.6	0.1	0.7	0.7	-16	-3.9	-5.1	-4.3

CY

SWIR

# Polycom

## Revenue & Net Income



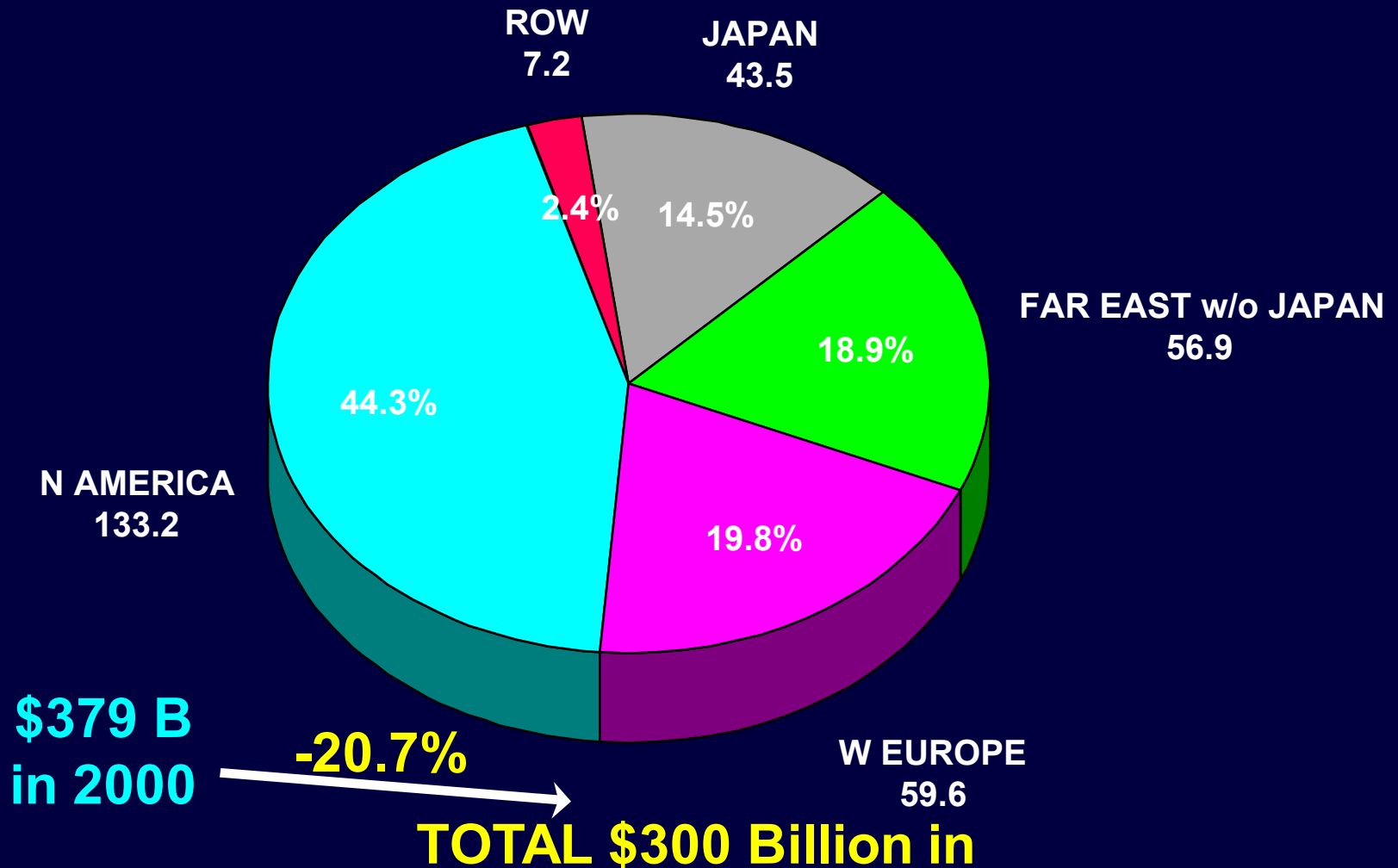
CY

PLCM

# Computer Equipment

# WORLD COMPUTER EQUIPMENT PRODUCTION

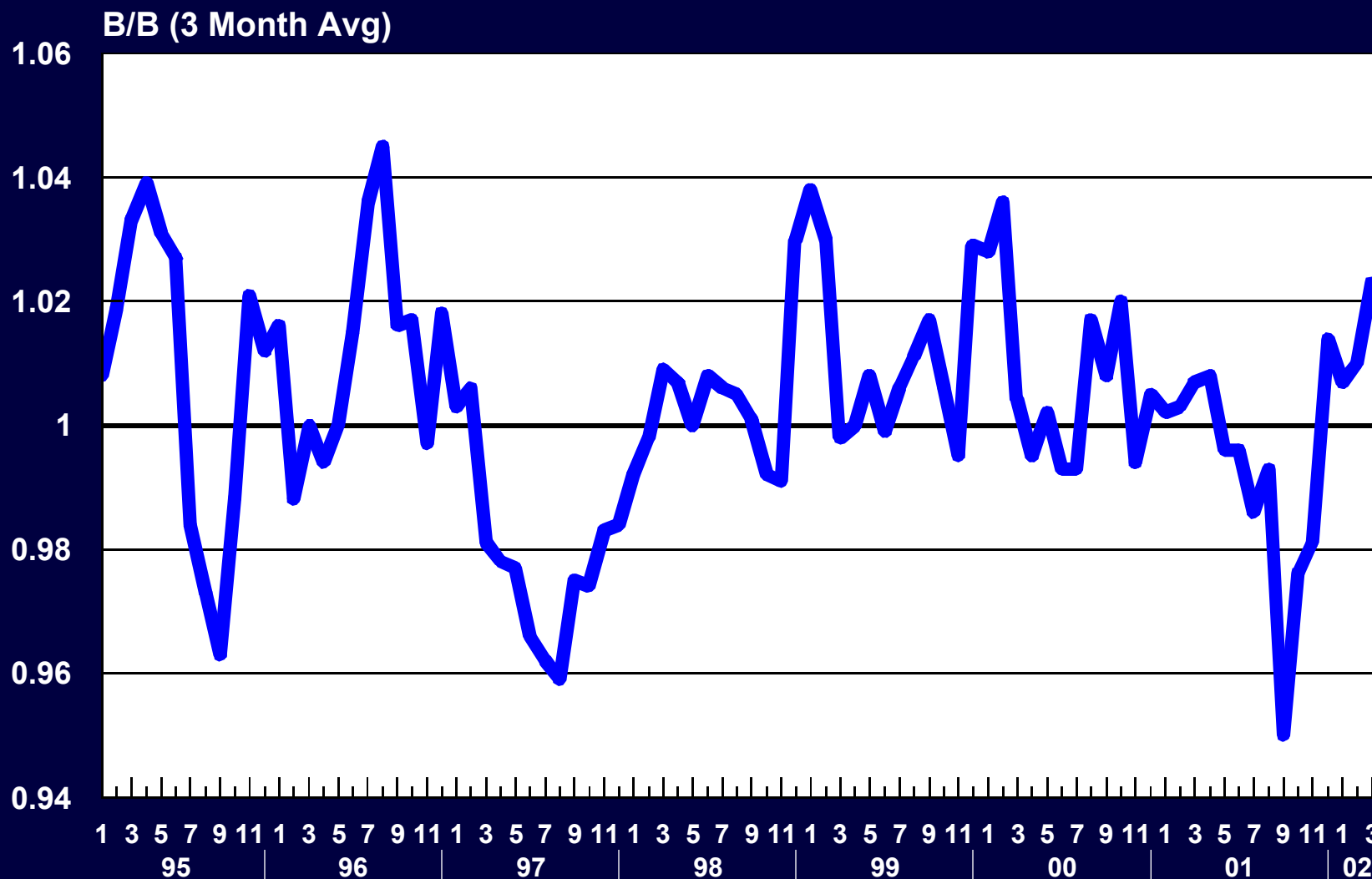
## 2001





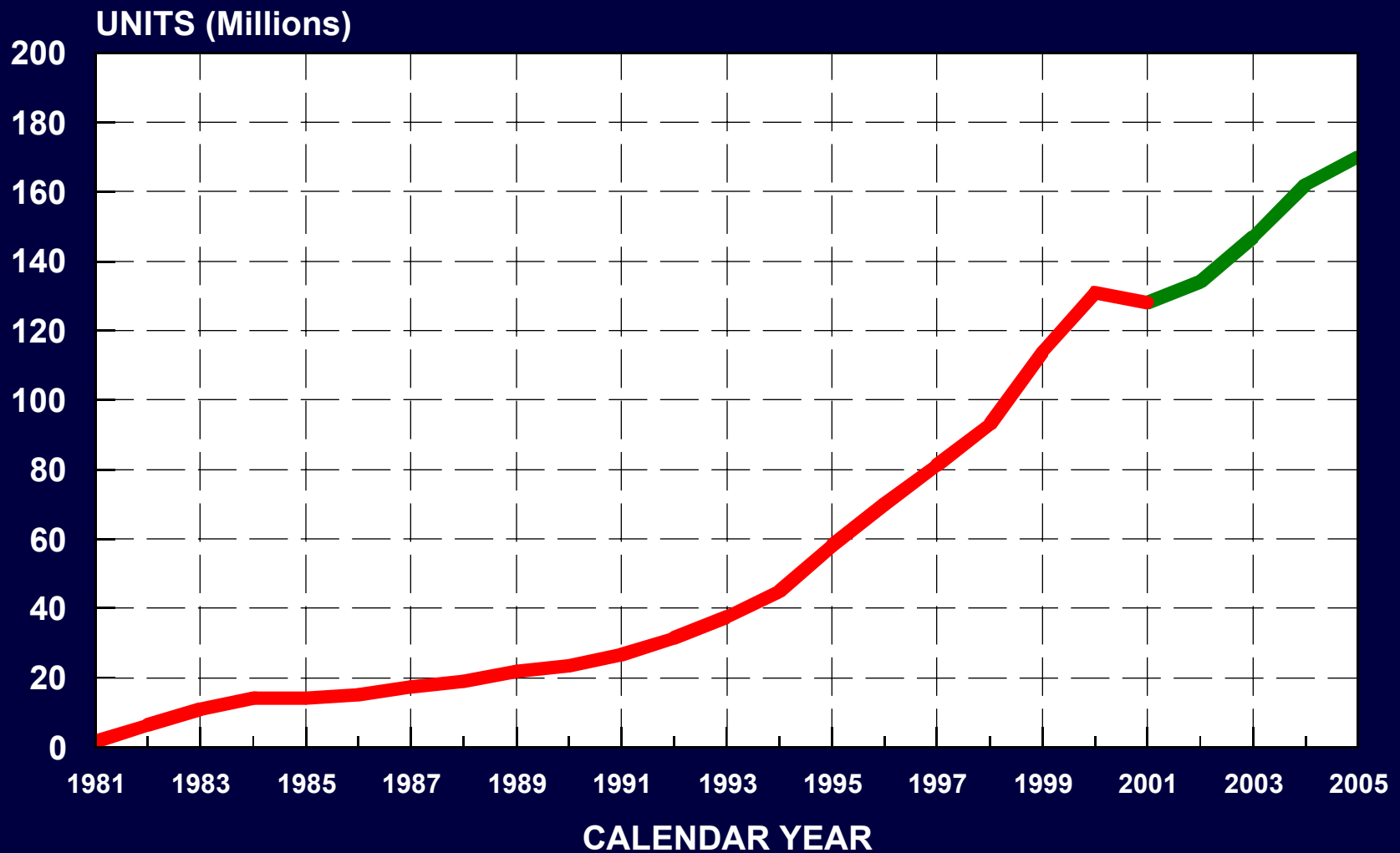
# U.S. Computers & Related Products Book/Bill Ratio

## 3-Month Average



# PERSONAL COMPUTER GROWTH

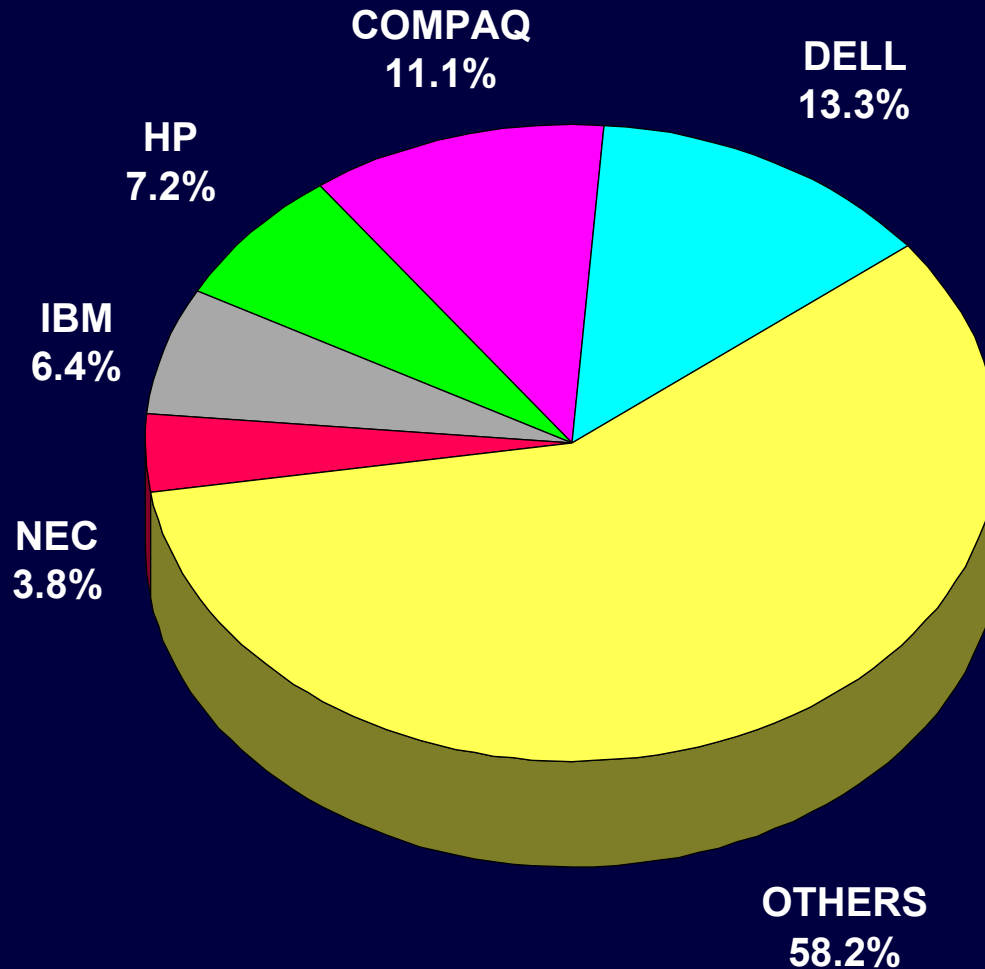
## GLOBAL SALES



Gartner Dataquest - historical data 1/2002, Custer forecast 1/2002  
Desktops, Notebooks, Ultraportables - does not include Servers

# WORLD PERSONAL COMPUTER MARKET

2001



DATAQUEST 1/2002

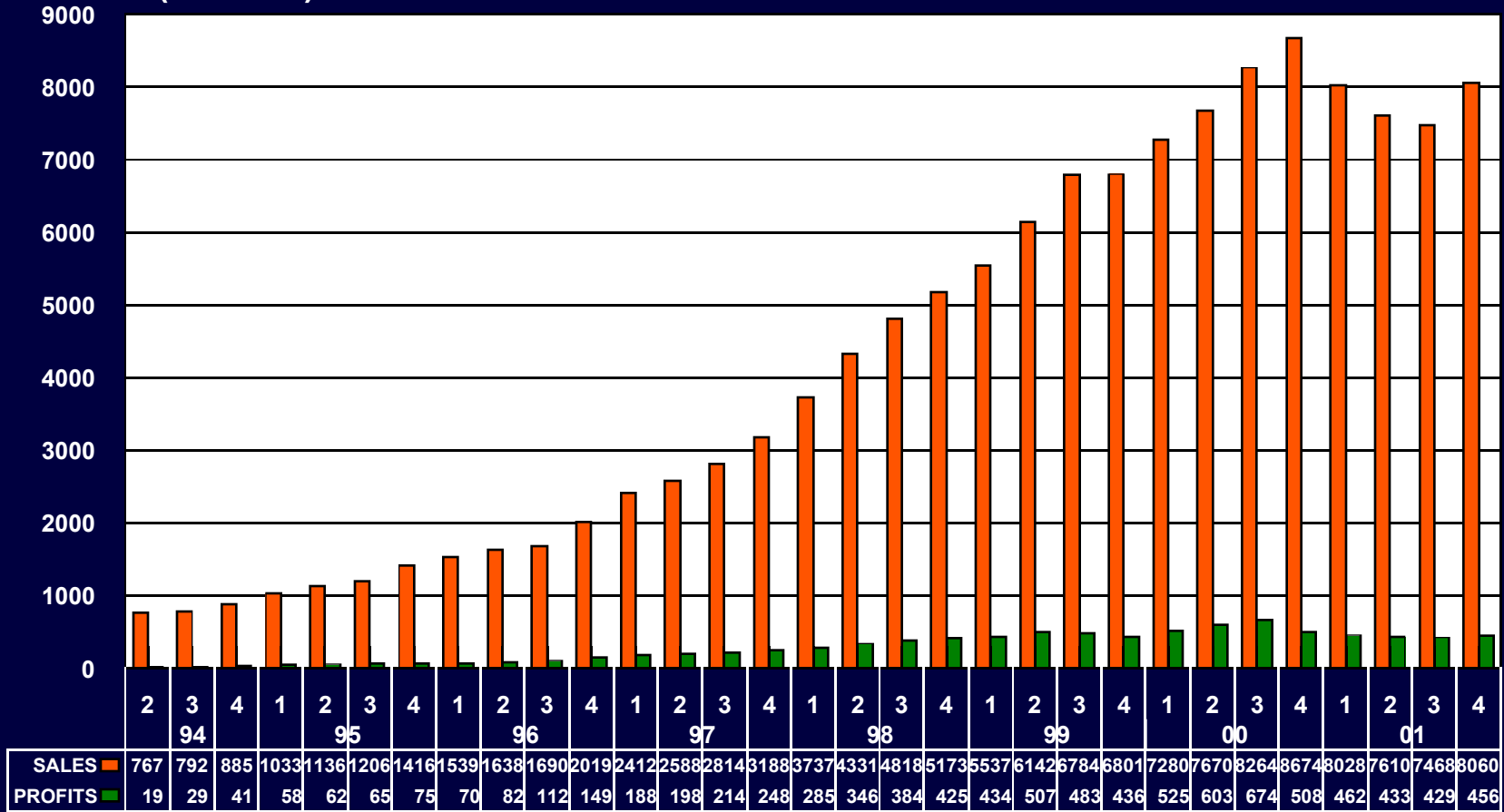
Preliminary, Servers not included

**TOTAL: 128 M UNITS**

# DELL COMPUTER

## Revenue & Net Income

\$ (Millions)



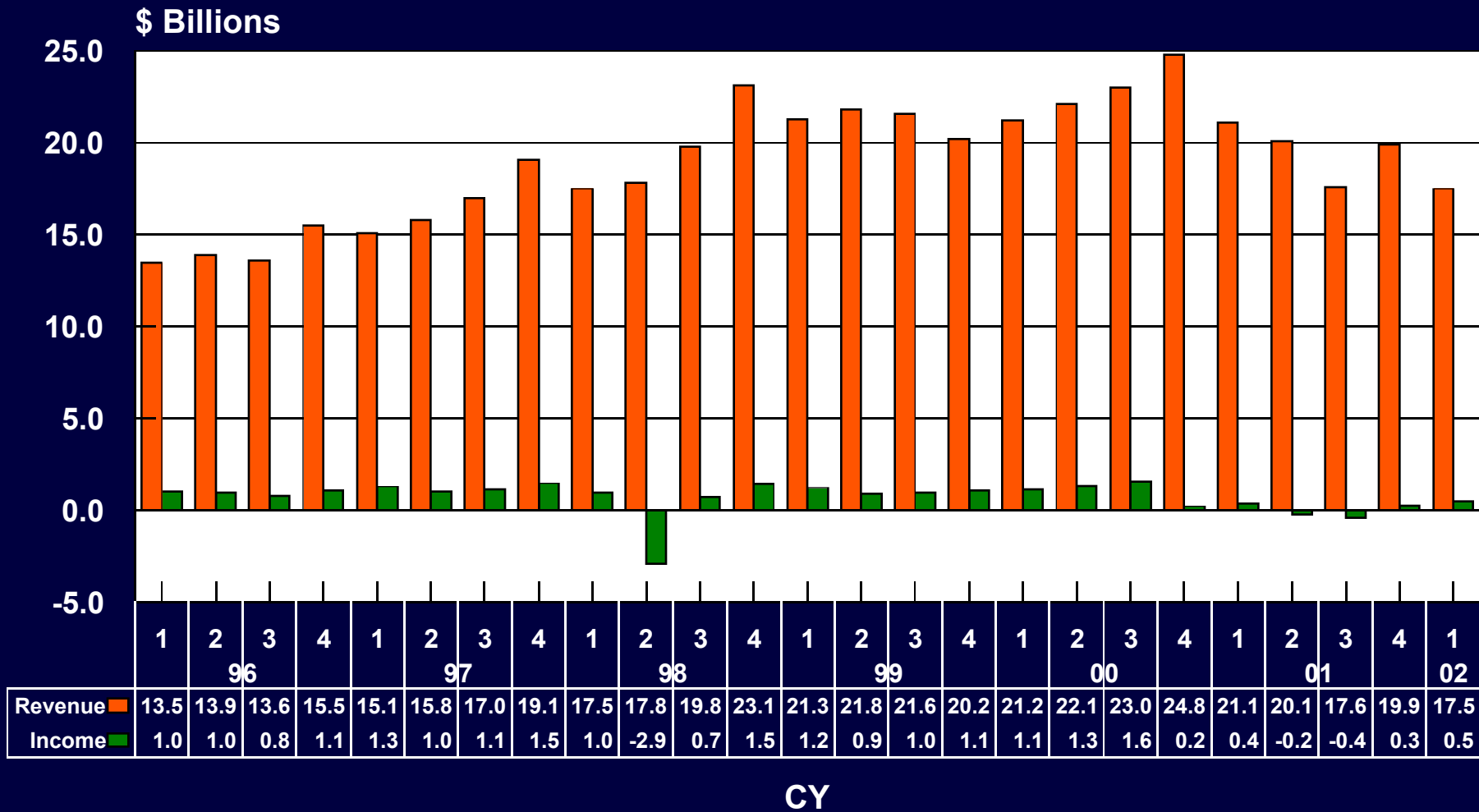
CY

DELL

FY ends October

# Hewlett-Packard (new)

## Revenue & Net Income



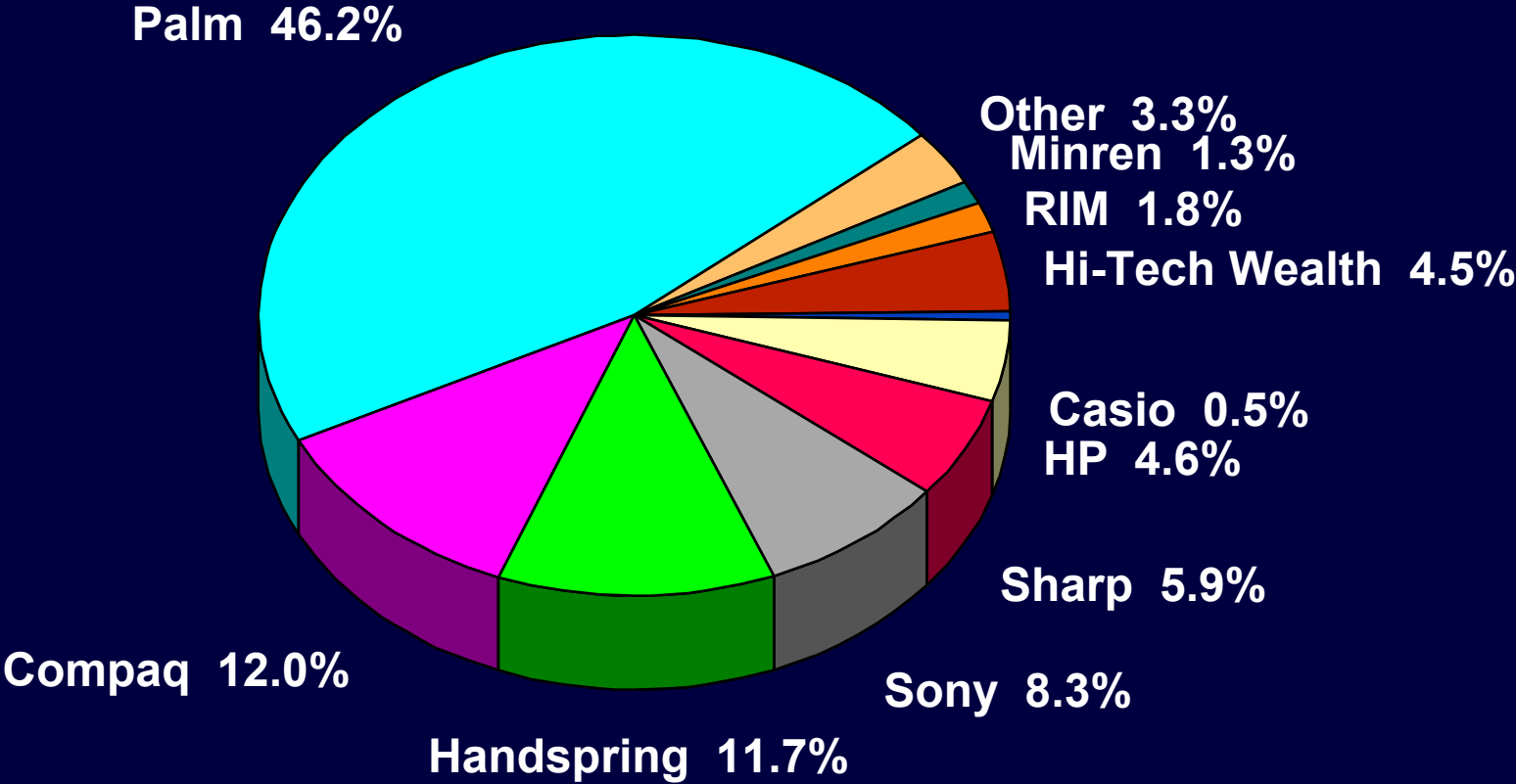
HP & Compaq combined

HPQ



# World Handheld Device Shipments

1Q' 2002

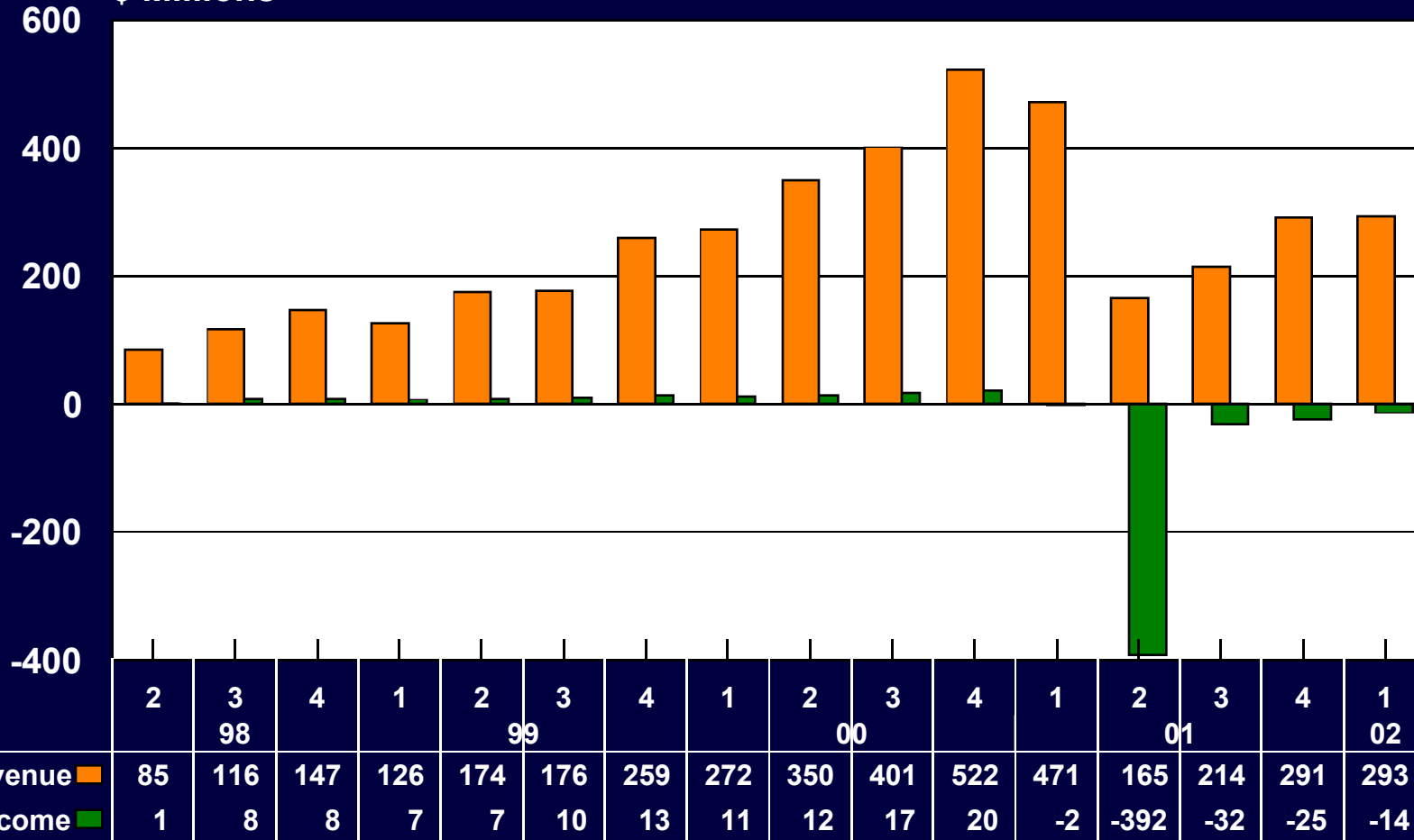


**Total 3.25 Million Units**

# Palm Inc

## Revenue & Net Income

\$ Millions



CY

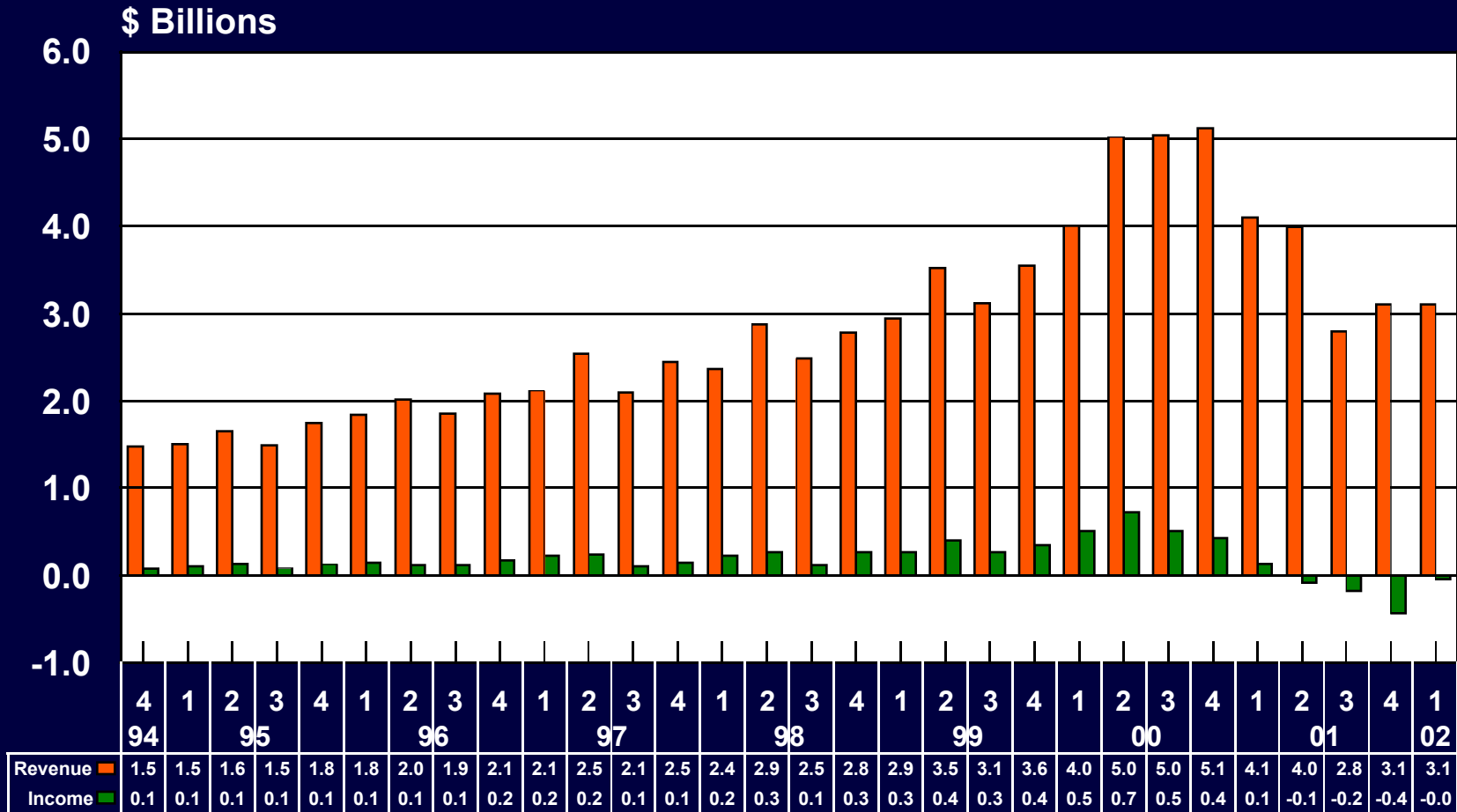
PALM

FY ends May

# Servers

# Sun Microsystems

## Revenue & Net Income



CY

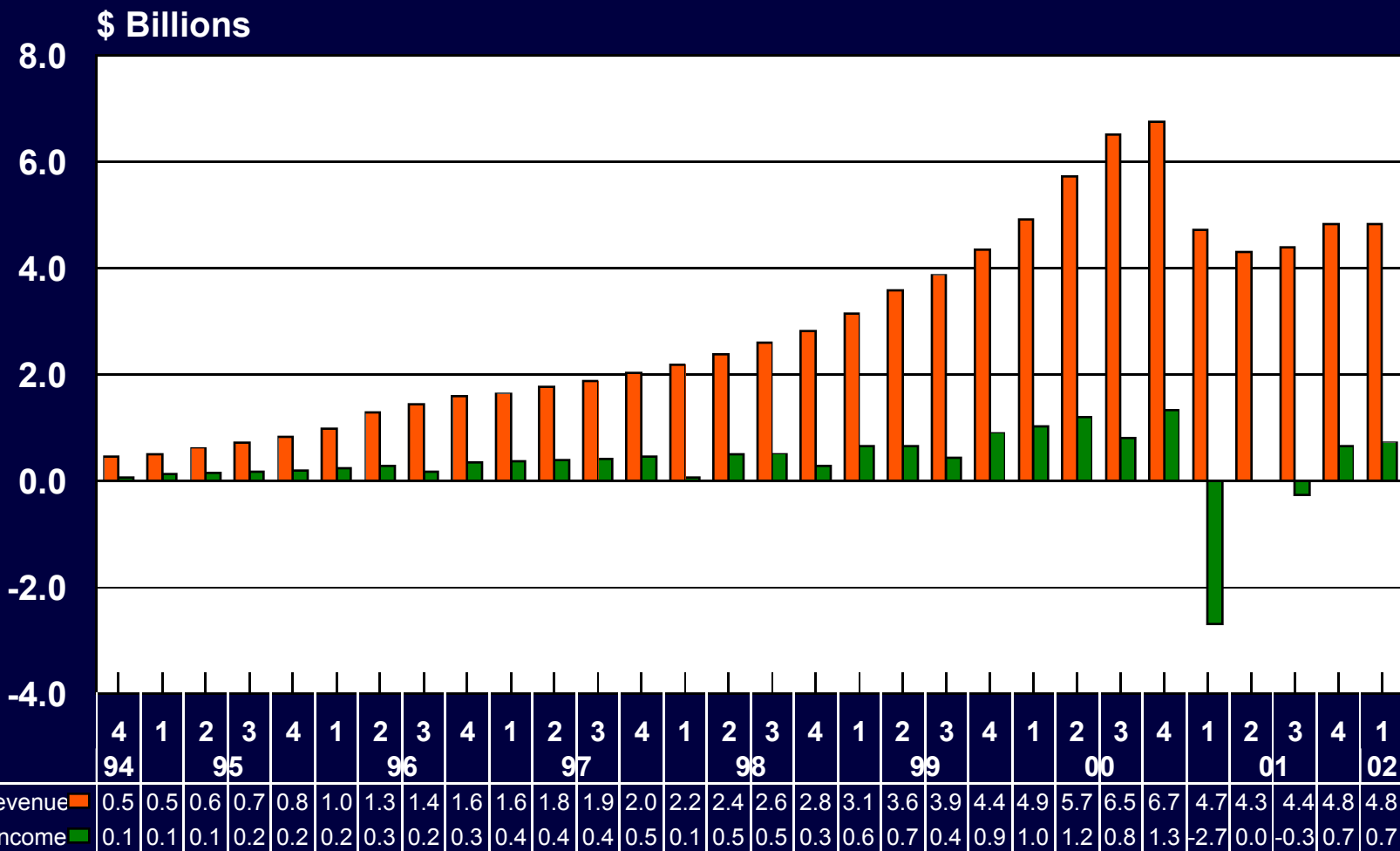
FY ENDS 6/30

SUNW

# **Internet Infrastructure**

# CISCO SYSTEMS

## Revenue & Net Income



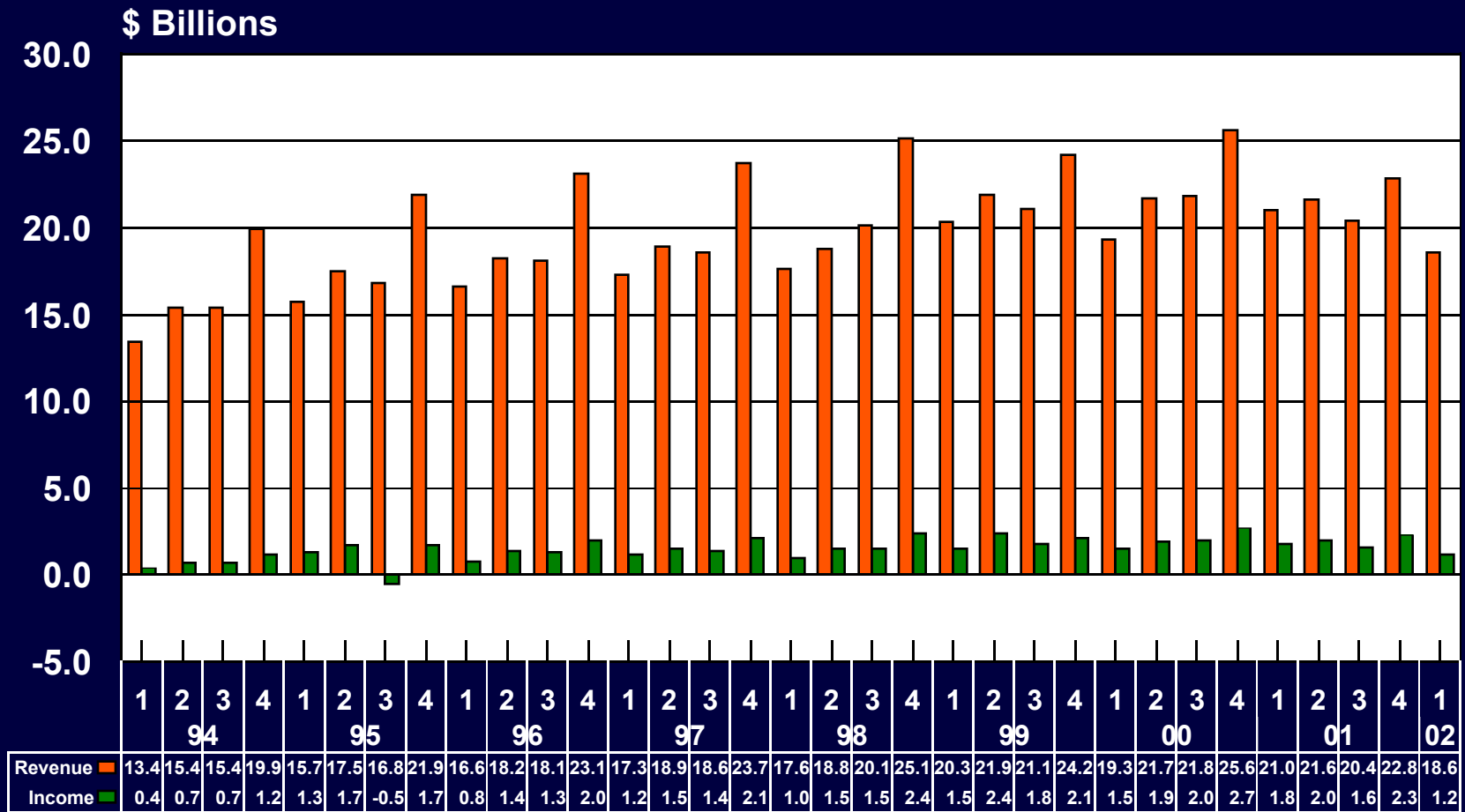
CY

CSCO

**Enterprise**

# IBM

## Revenue & Net Income



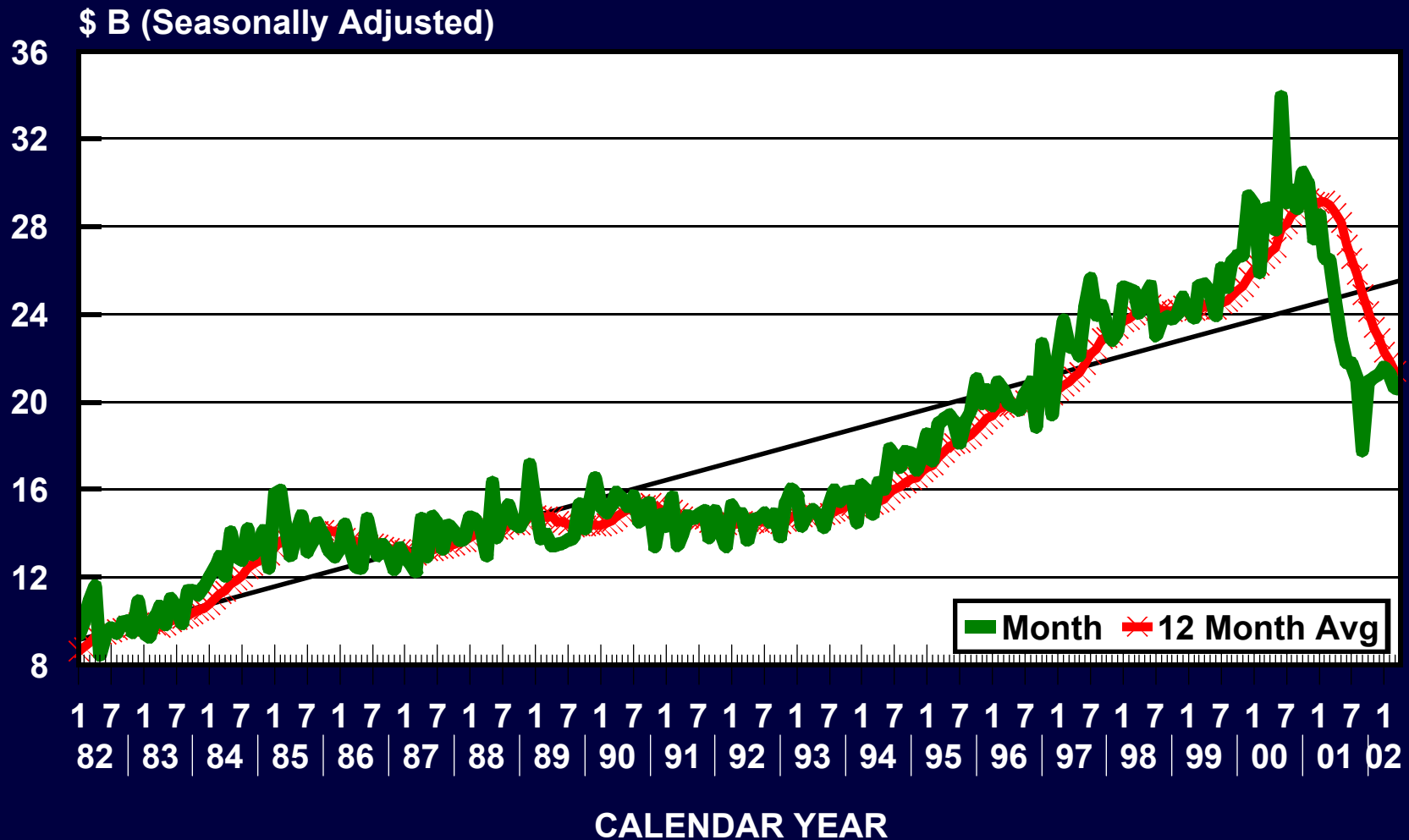
CY

FY=CY

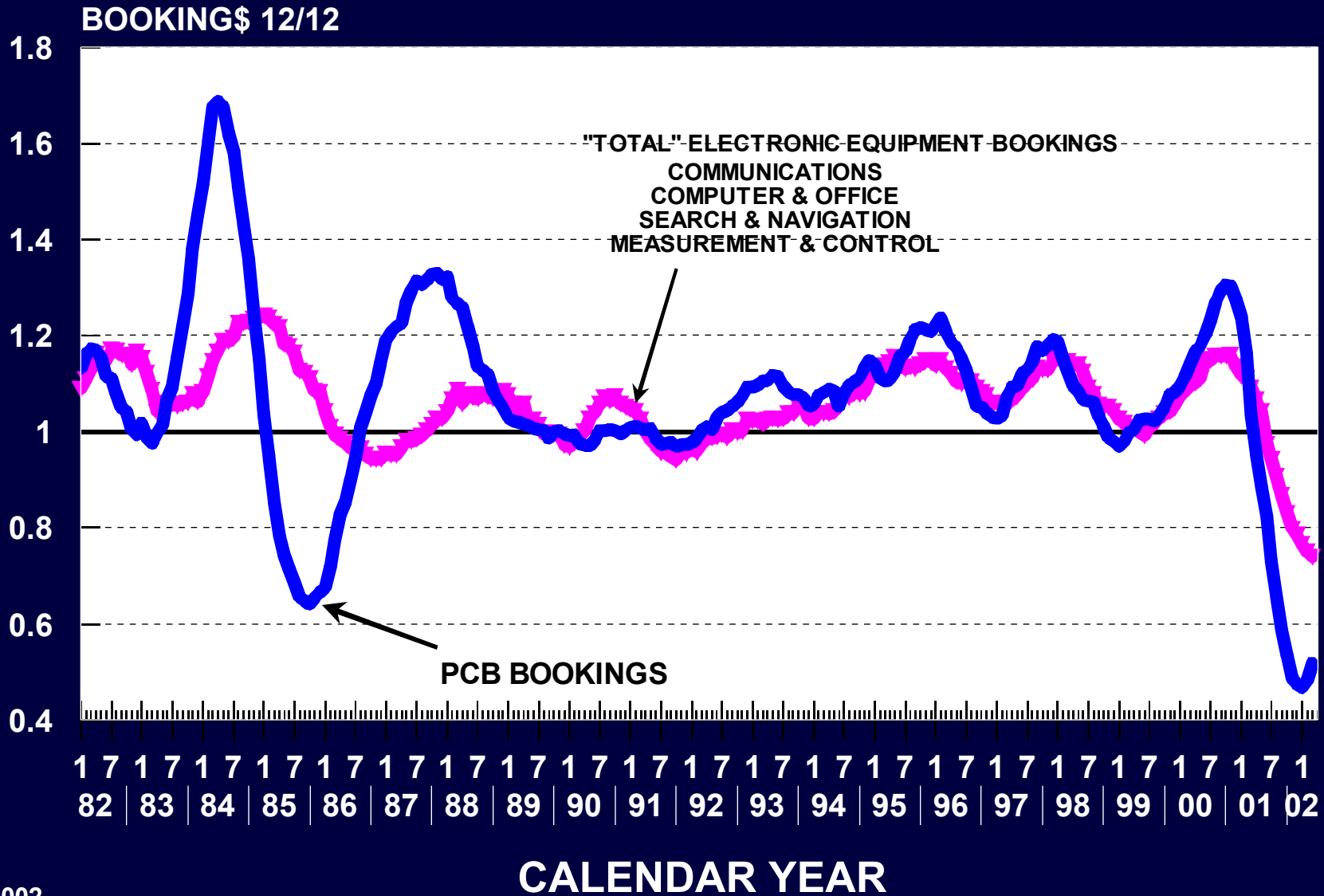
IBM

# **Electronic Equipment Summary**

# TOTAL ELECTRONIC EQUIPMENT BOOKINGS



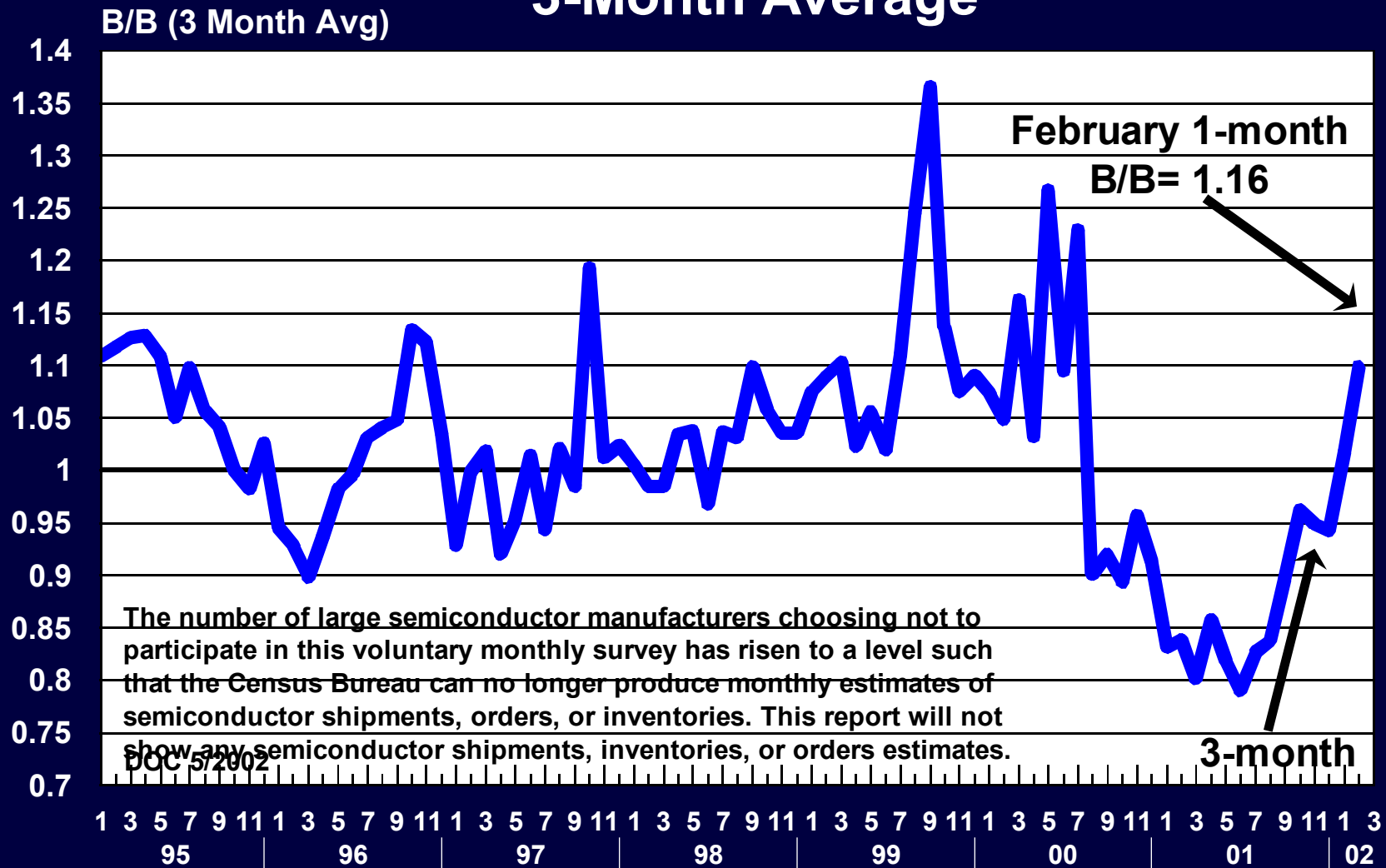
# U.S. PCBs vs Total Electronic Equipment



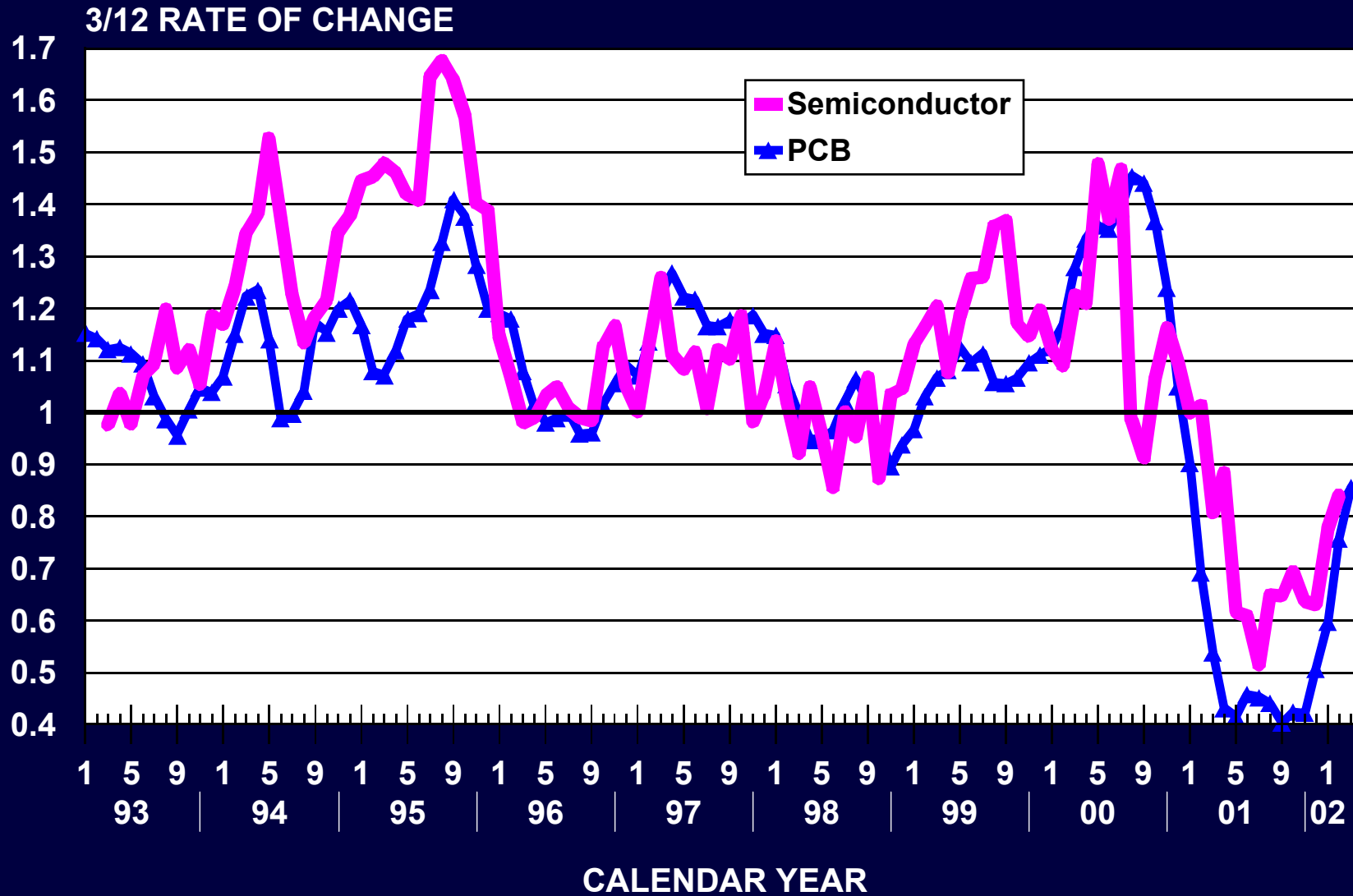
# Semiconductors

# U.S. "Semiconductor & Related Devices" Book/Bill Ratio

## 3-Month Average



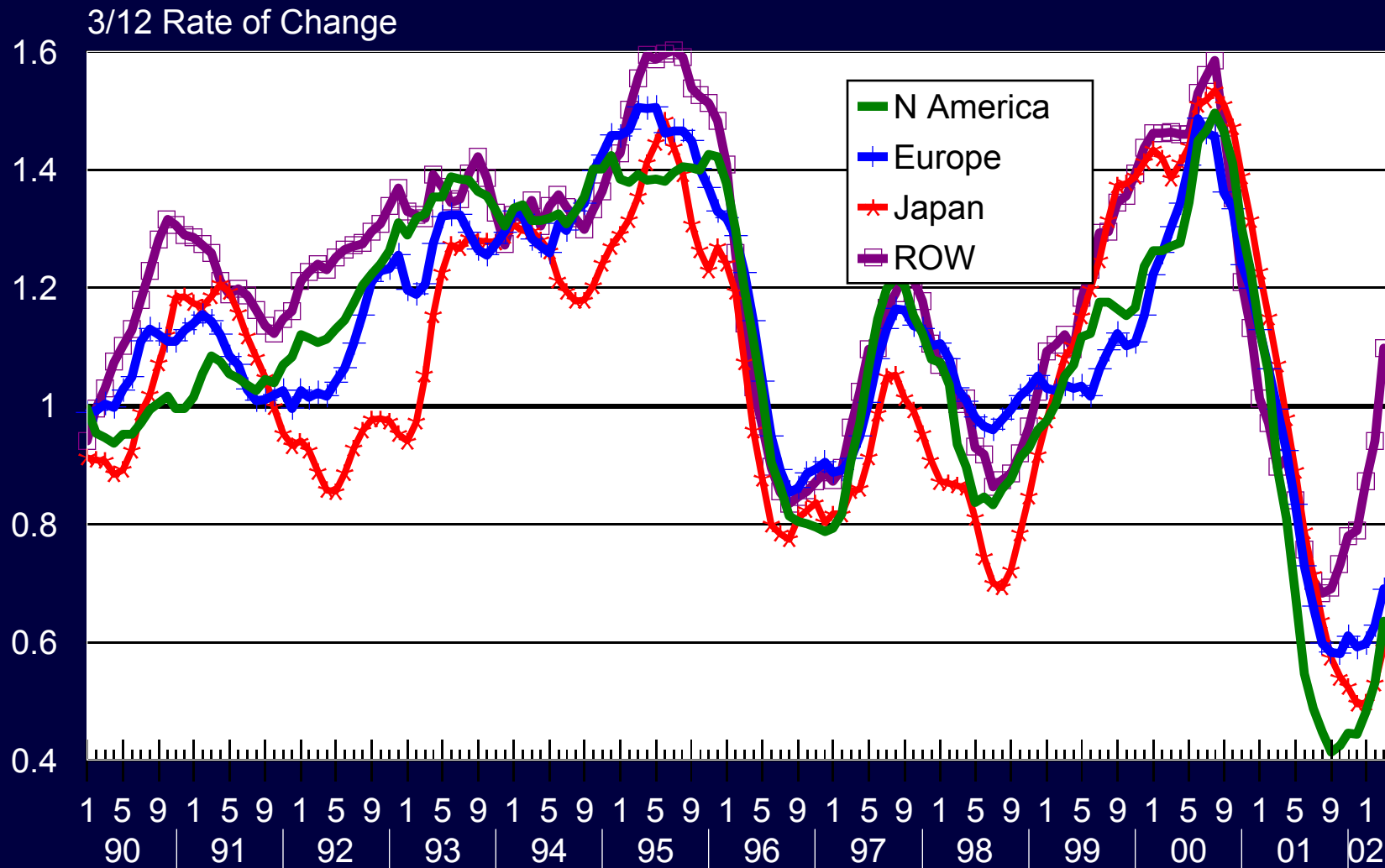
# U.S. PCB vs Semiconductor Orders



Data: IPC T/MRC & <http://www.census.gov/indicator/www/m3/>

# SEMICONDUCTOR GROWTH RATES

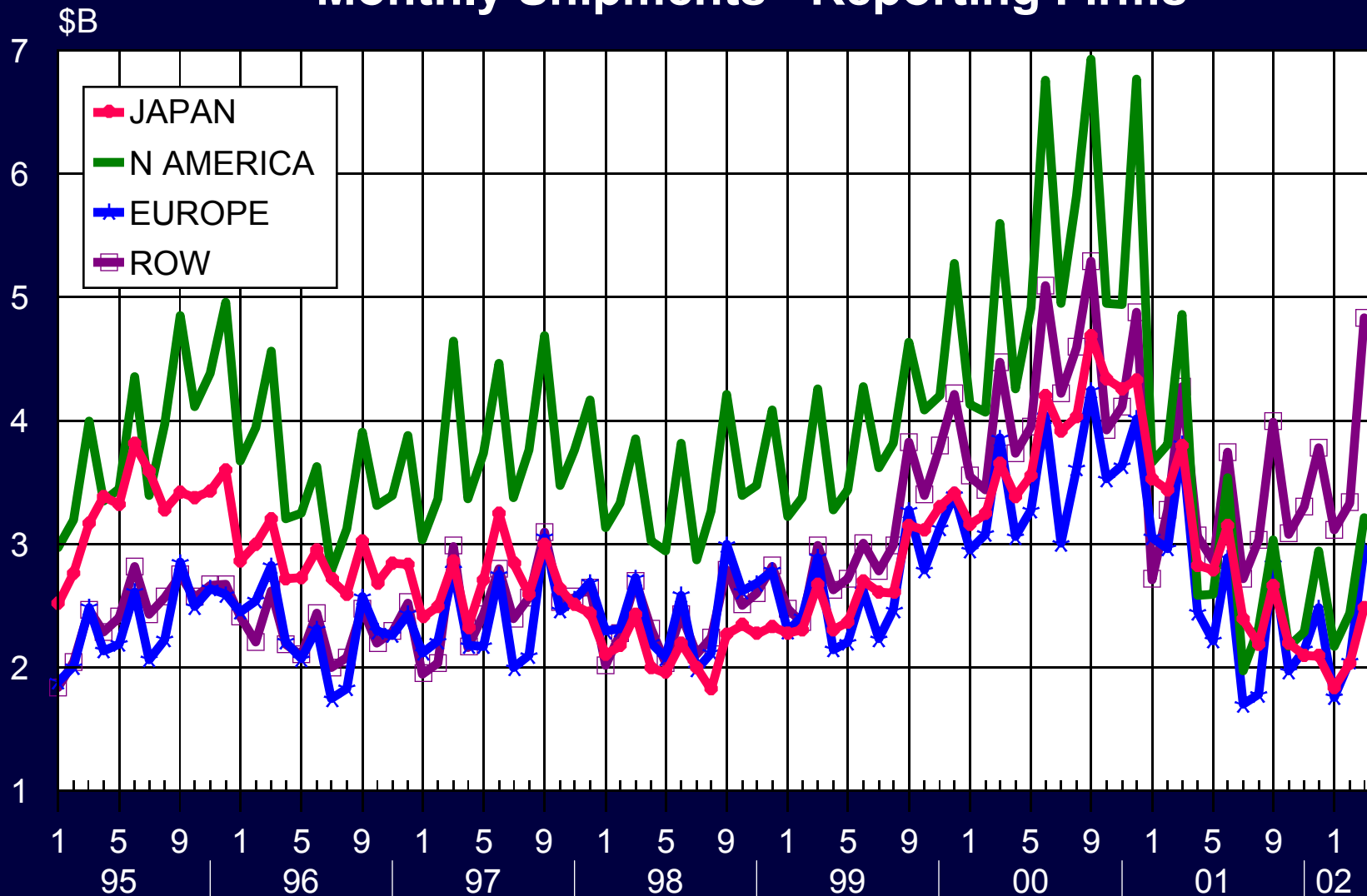
## TOTAL \$ SHIPMENTS TO AN AREA



Total \$ Shipments from All Countries to an Area  
SIA website: [www.semichips.org/](http://www.semichips.org/)

# TOTAL SEMICONDUCTOR \$ SHIPMENTS TO AREA

## Monthly Shipments - Reporting Firms

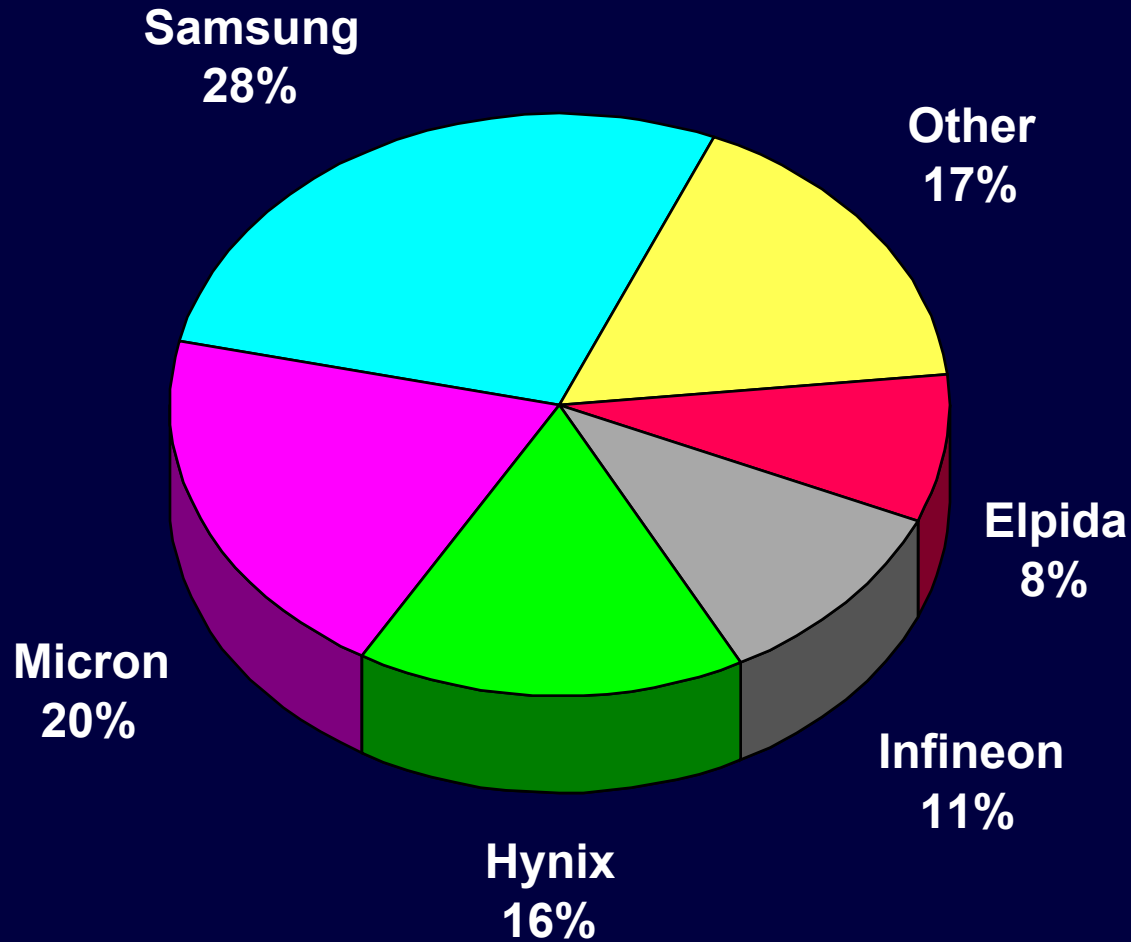


SIA website: [www.semichips.org/](http://www.semichips.org/)



# WORLD DRAM SALES

2001

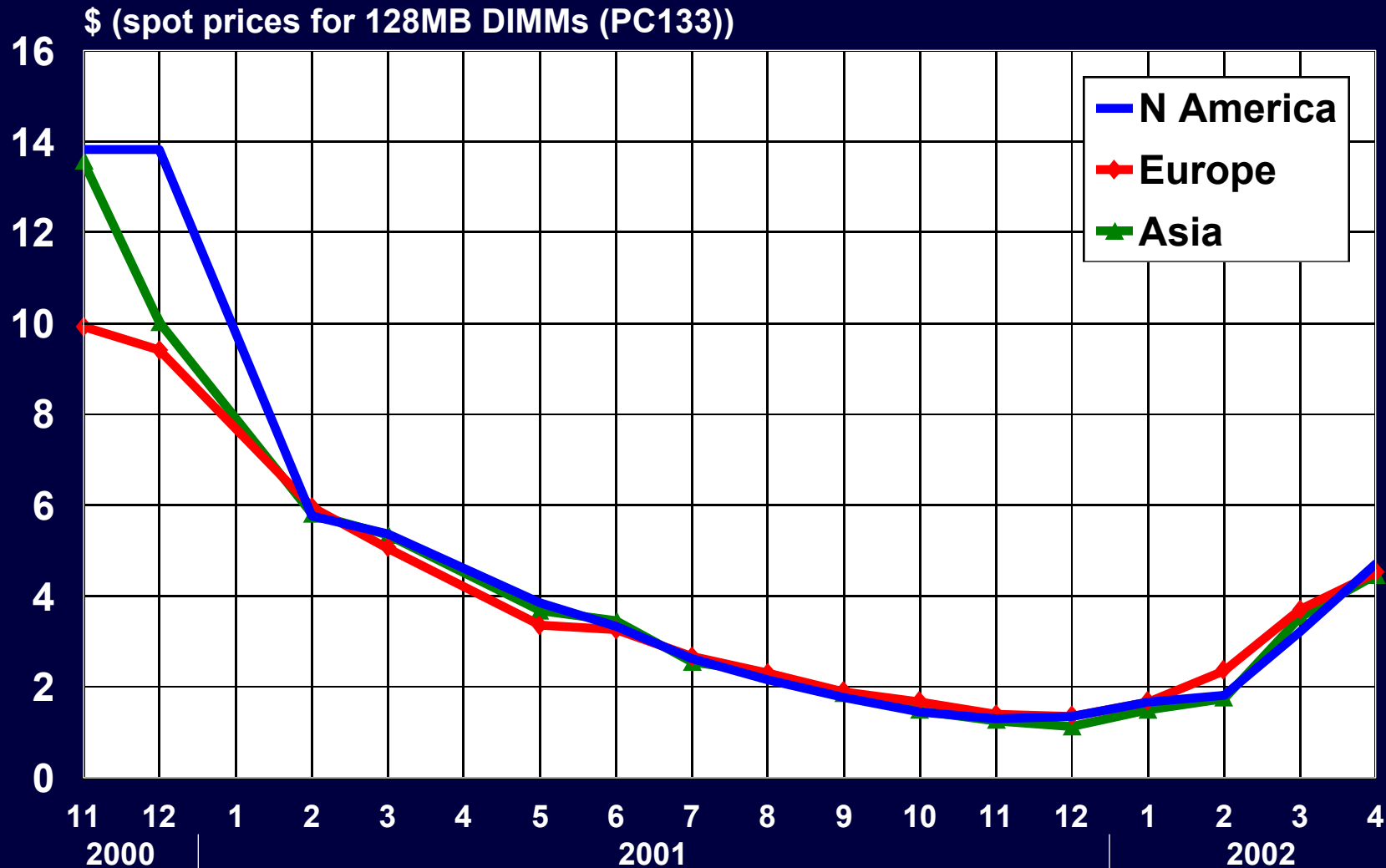


SEMICO Research 4/2002

**\$11.2 Billion**

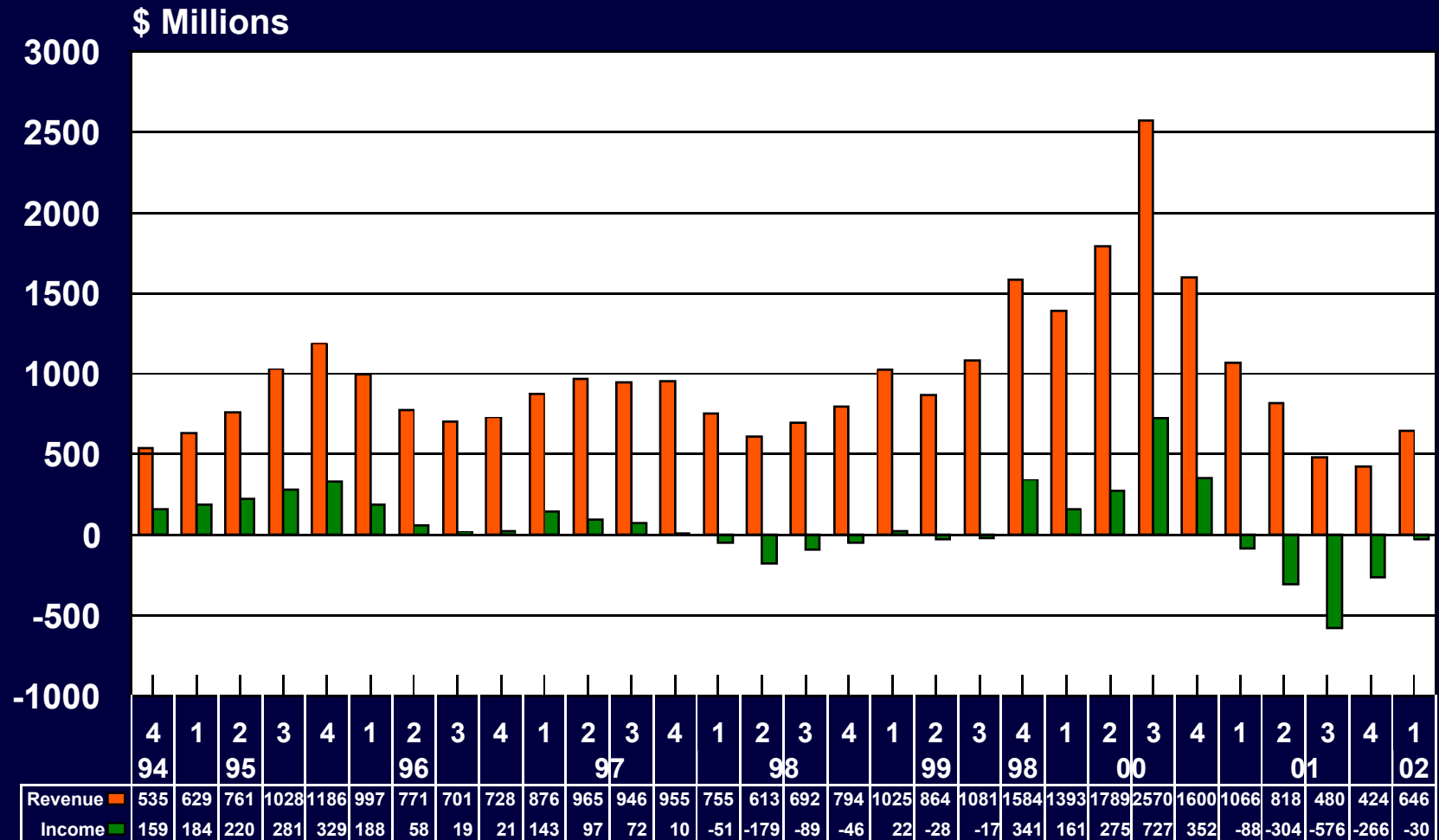
# DRAM Prices (large volume users)

30-Day Rolling Averages of 128Mb DRAMs (PC133, 16M x 8)



# MICRON TECHNOLOGY

## Revenue & Net Income

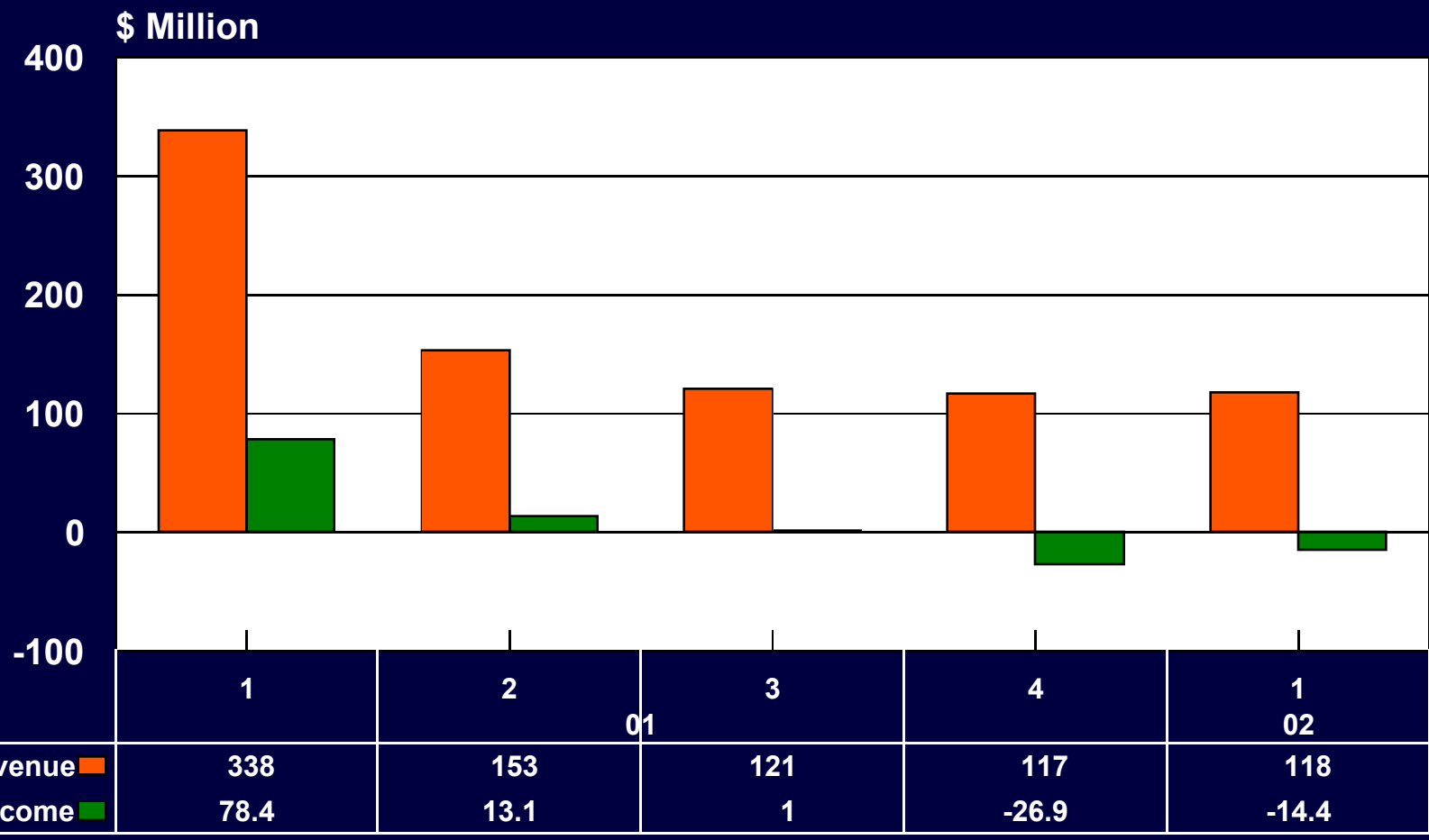


CY

MU

# Kemet Corp

## Revenue & Net Income



CY

KEM

# Capacitor Makers' Tantulum Obligations with Cabot (\$ M)

<u>Company</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>
AVX*	129	64	64	48
Kemet**	77	65		
Vishay	145	150	150	150

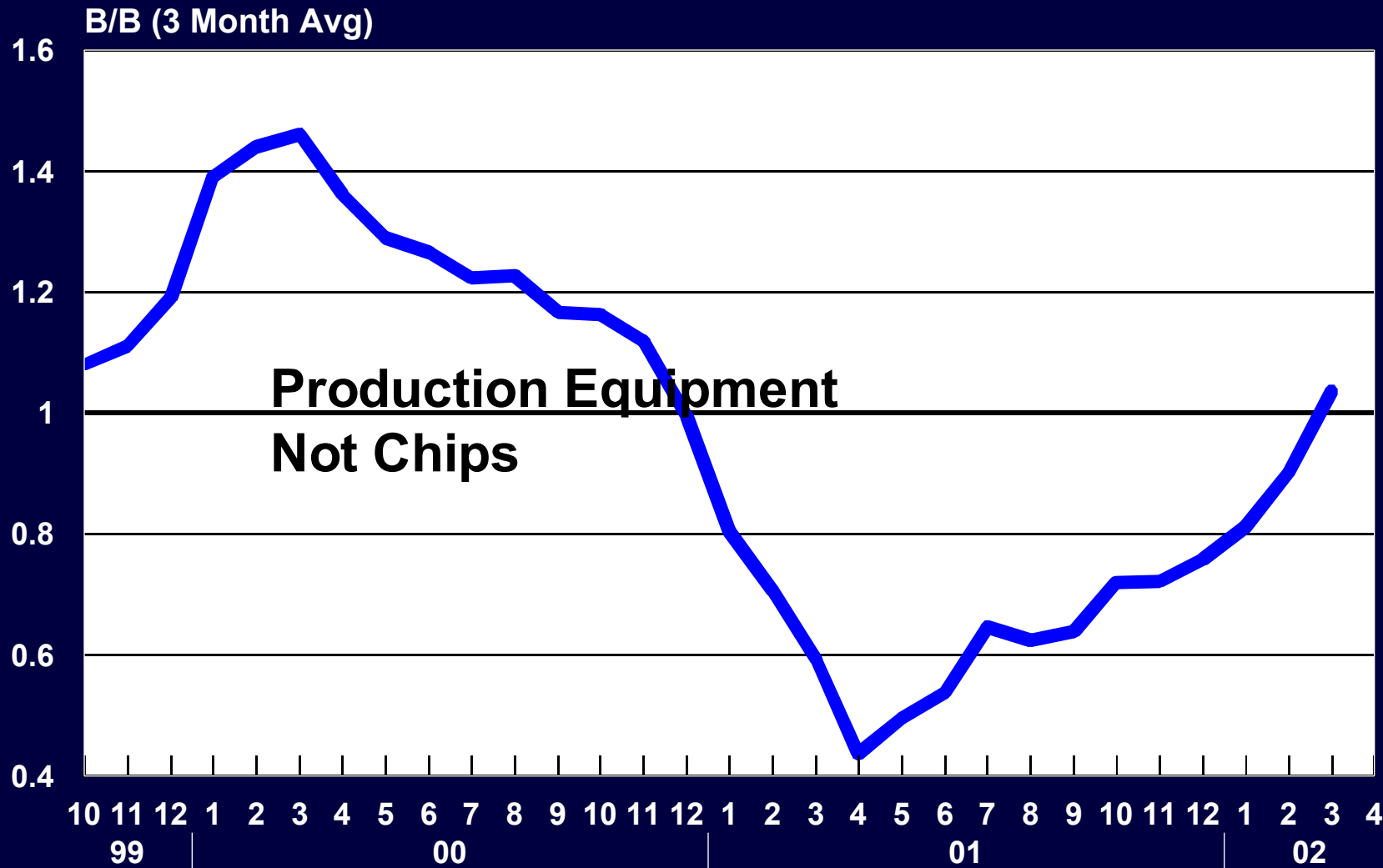
\* Fiscal Year ends March

\*\* Kemet's contract expires end of 2003

Electronic Buyers News: April 2002

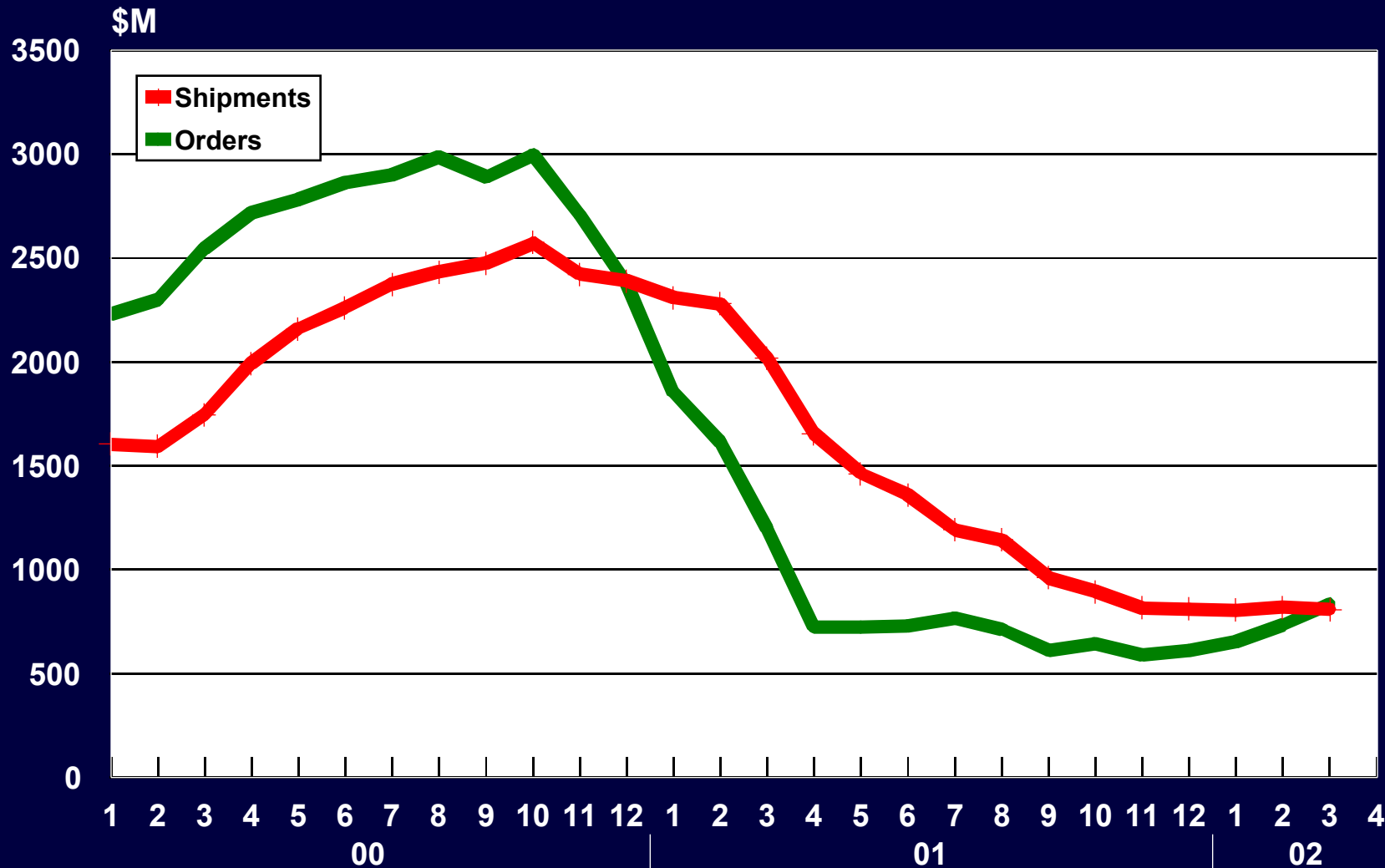
Thomas Weisel Partners, Company Reports

# N American Semiconductor Equipment Industry Book/Bill Ratio



**SOURCE Semiconductor Equipment and Materials International**  
<http://www.semi.org>

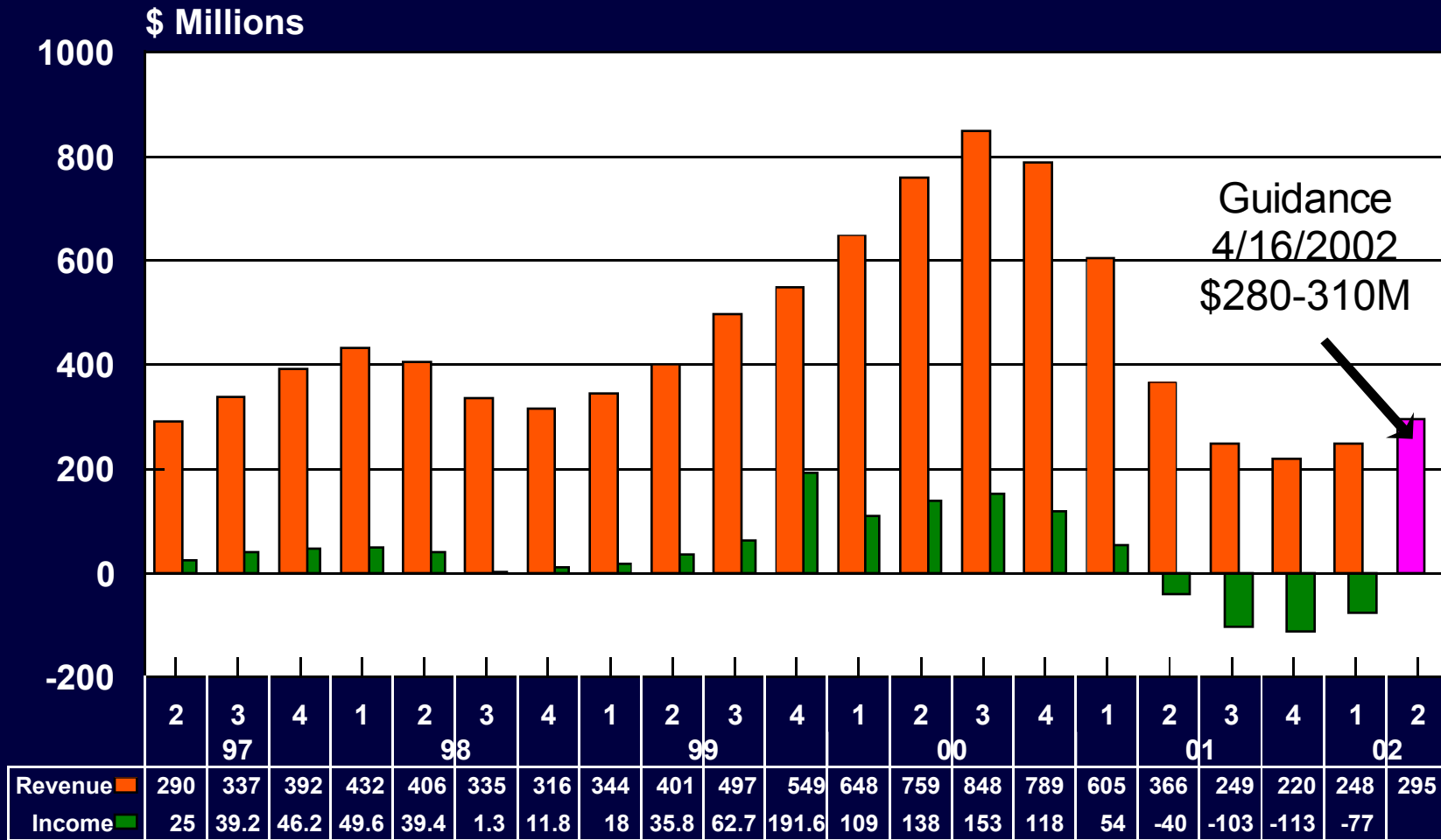
# N American Semiconductor Equipment Industry Shipments & Orders



**SOURCE Semiconductor Equipment and Materials International**  
<http://www.semi.org>

# Teradyne

## Revenue & Net Income



CY

TER

# **Electronic Manufacturing Services**

# Top World Contract Electronic Manufacturers

## 2001 vs 2000

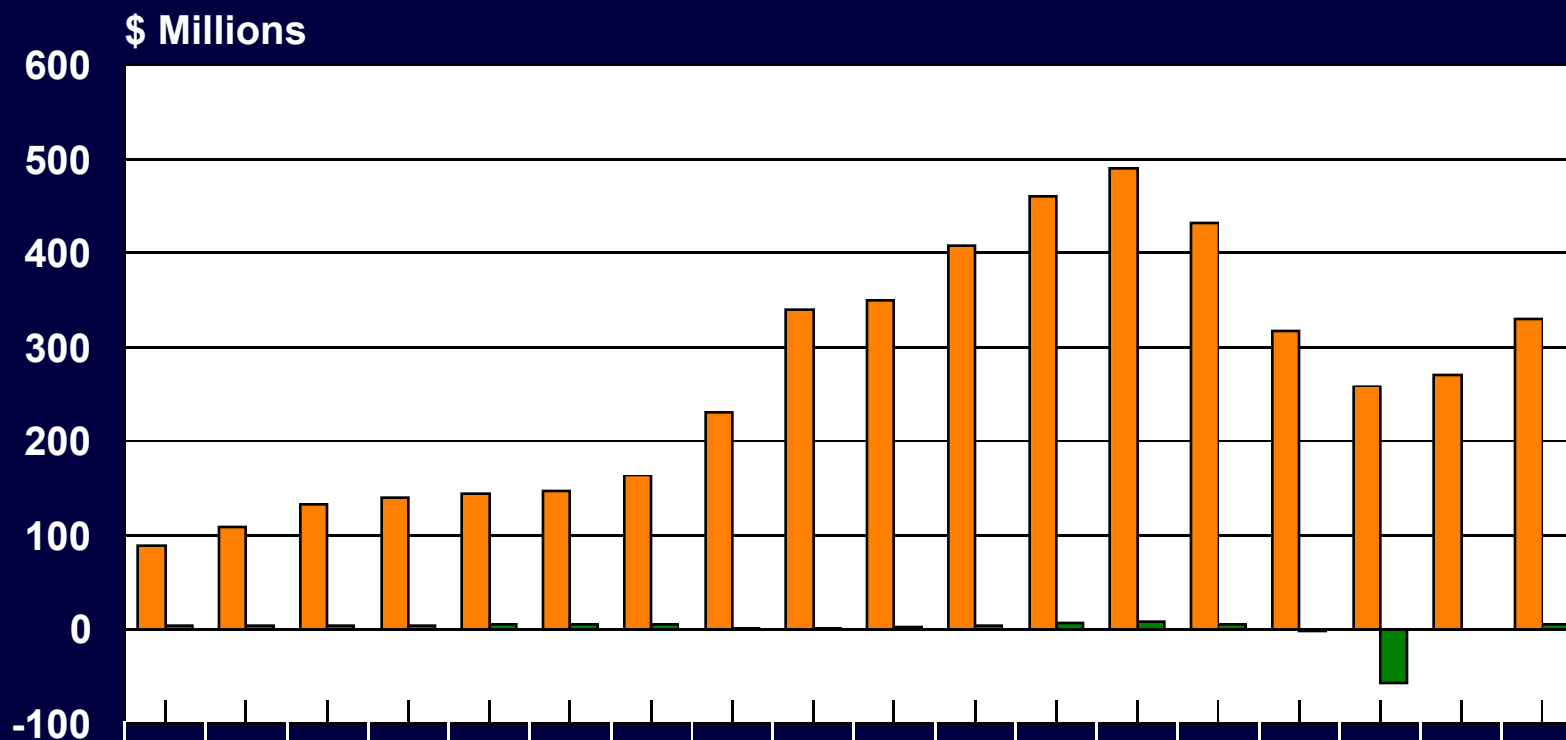
			<u>2001</u>	<u>2000</u>	<u>Grow %</u>
Solectron (w/CMAC)	SLR	USA	17,393	18,589	- 6
Flextronics	FLEX	Singapore	12,923	10,369	+25
Sanmina-SCI	SANM	USA	10,831	13,447	-20
Celestica	CLS	Canada	10,004	9,752	+3
Jabil Circuit	JBL	USA	4,086	3,998	+2
Elcoteq Network	Y.ELC	Finland	1,725	2,050	-16
Manufacturers' Services Ltd	MSV	USA	1,550	1,757	-12
ACT Manufacturing	ACTM	USA	1,286	1,371	- 6
Benchmark Electronics	BHE	USA	1,277	1,706	-25
Viasystems	VG	USA	1,206	1,510	-20
<b>Total Top 10</b>			<b>62,281</b>	<b>64,549</b>	<b>- 4%</b>

**Sources: Company Data (MSV estimated for 4Q'01)**

**\$US Millions converted at constant CY2000 exchange**

# Benchmark Electronics

## Revenue & Net Income



Revenue	88	108	133	140	144	147	163	230	339	349	407	460	490	432	317	258	270	329
Income	4.2	3.7	3.7	4.2	4.7	5	5.6	1.3	1.3	2	3.6	6.2	8.1	5.1	-2.1	-57	-0.3	5.3

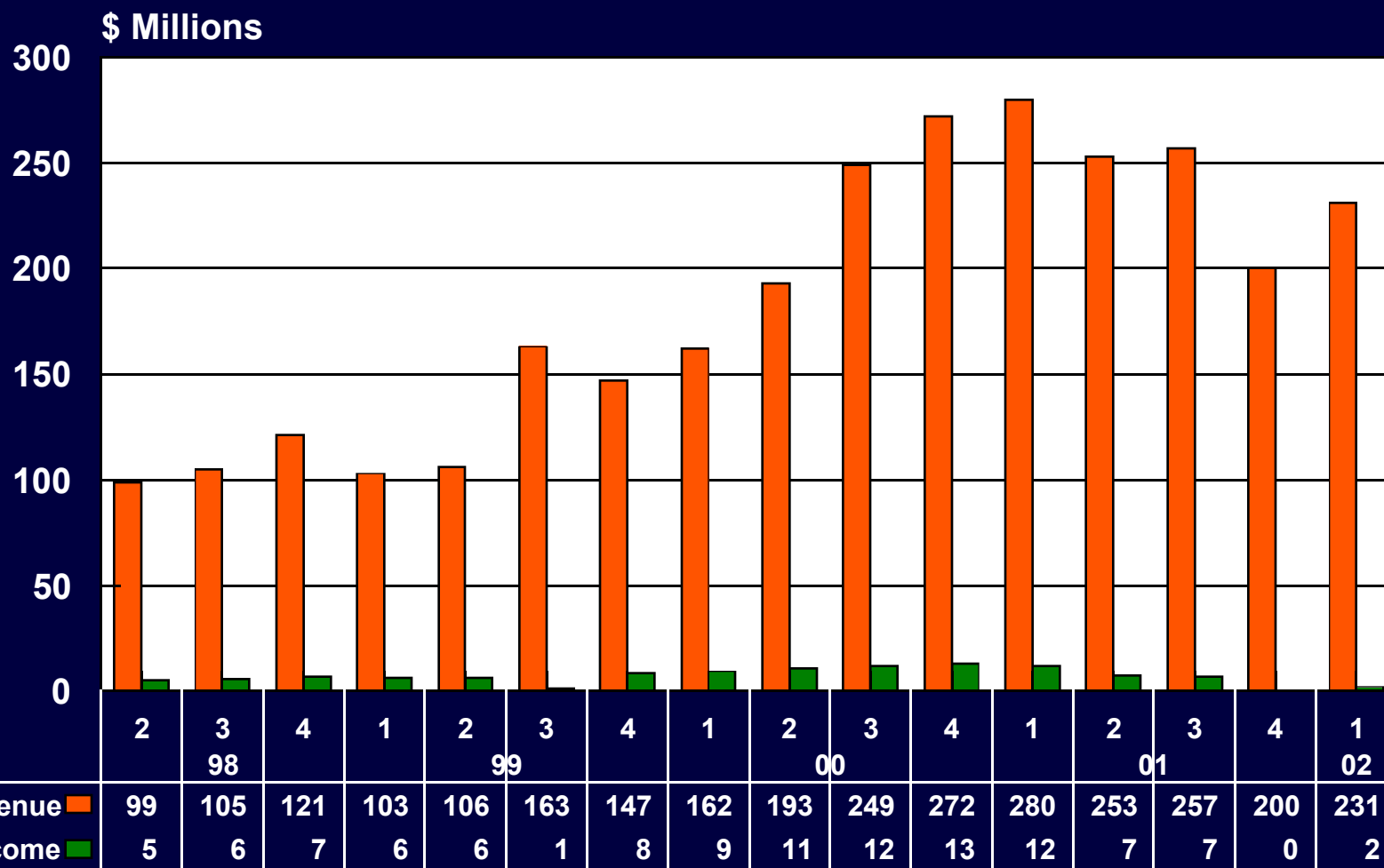
FY=CY

CY

BHE

# PLEXUS CORP

## Revenue & Net Income



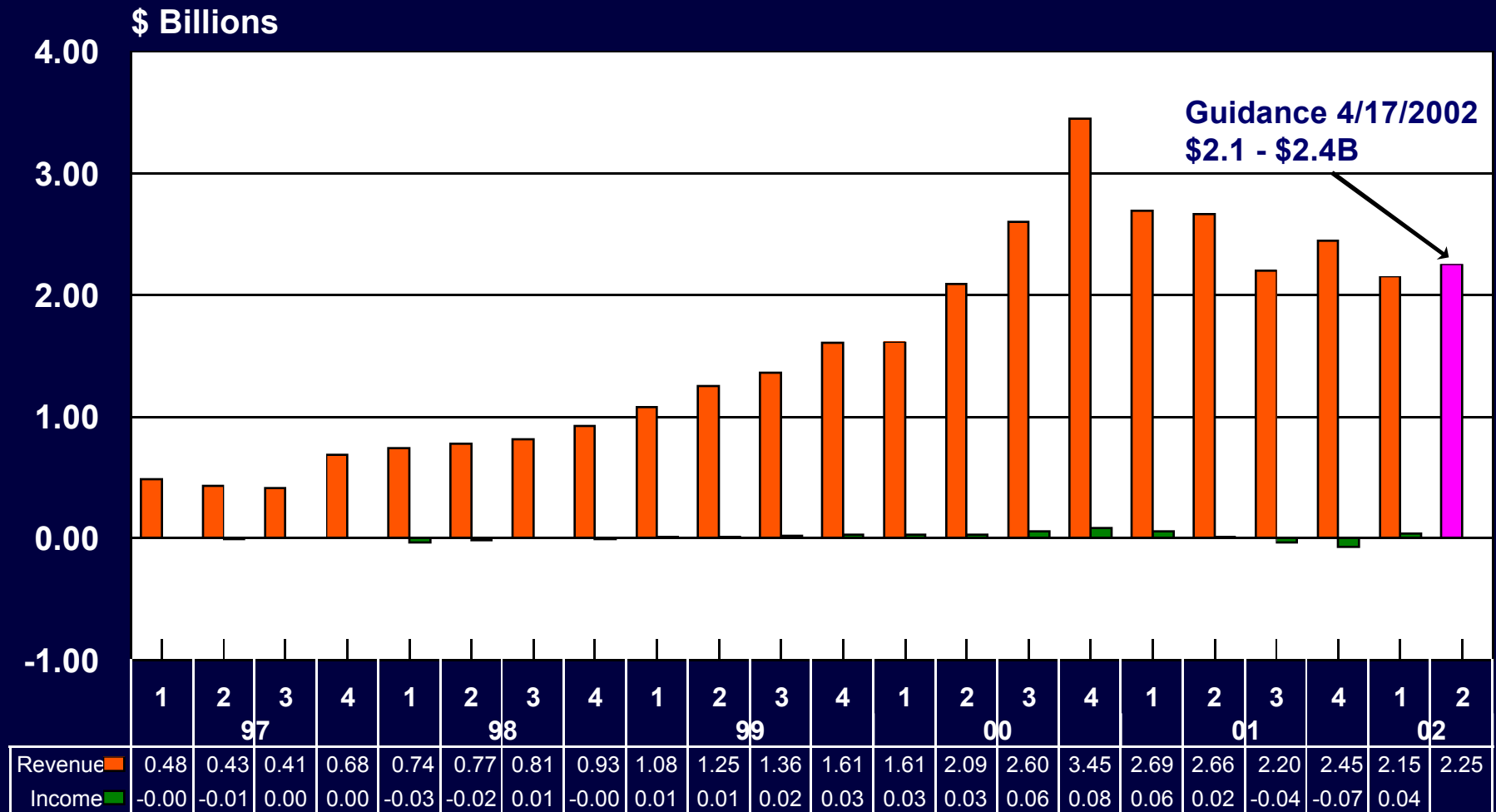
CY

FY ends September

PLXS

# Celestica

## Revenue & Net Income



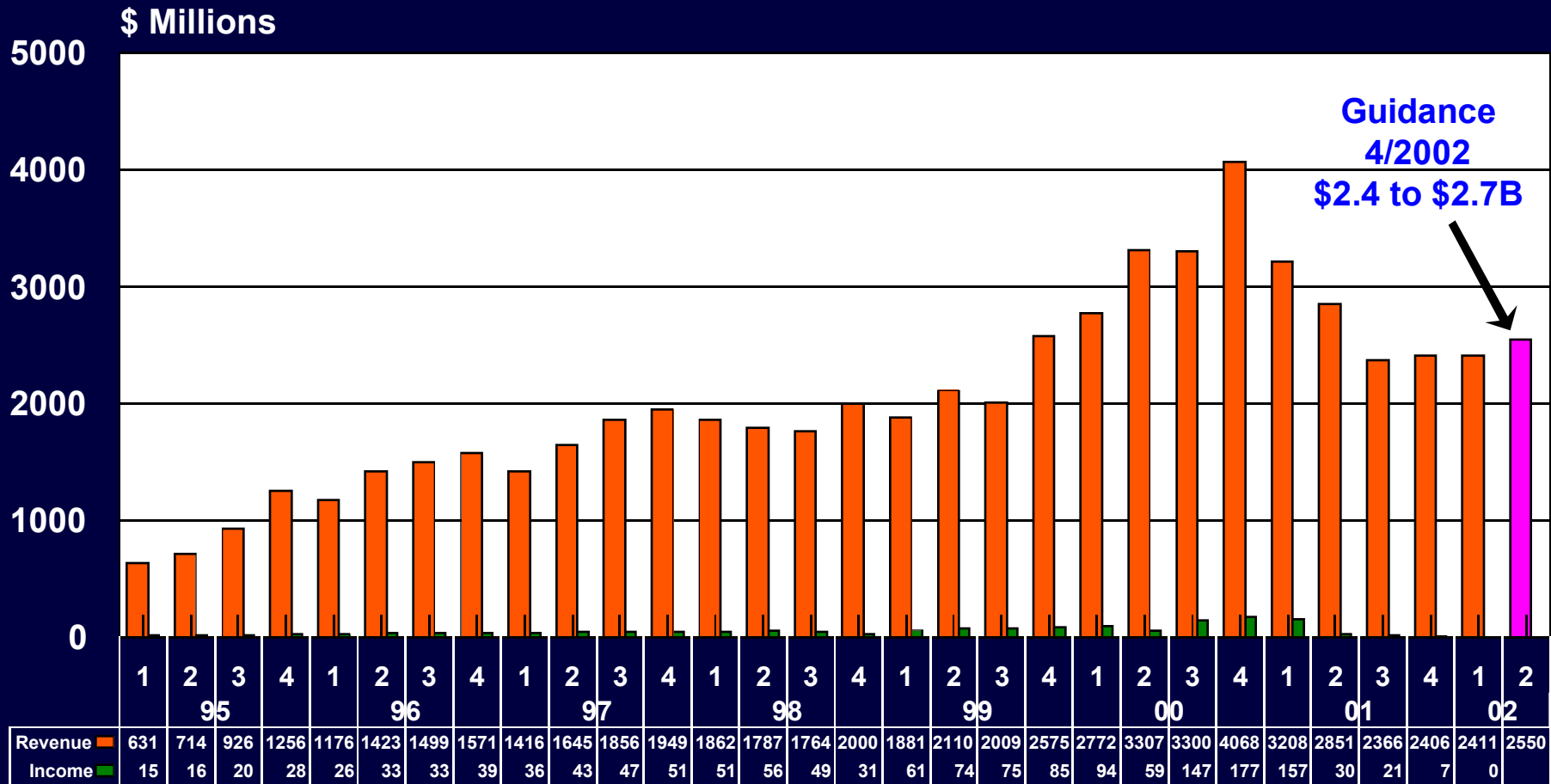
FY=CY

CY

CLS

# SANMINA-SCI CORP

## Revenue & Net Income



FY ends September 30  
(historical data = combined Sanmina & SCI)

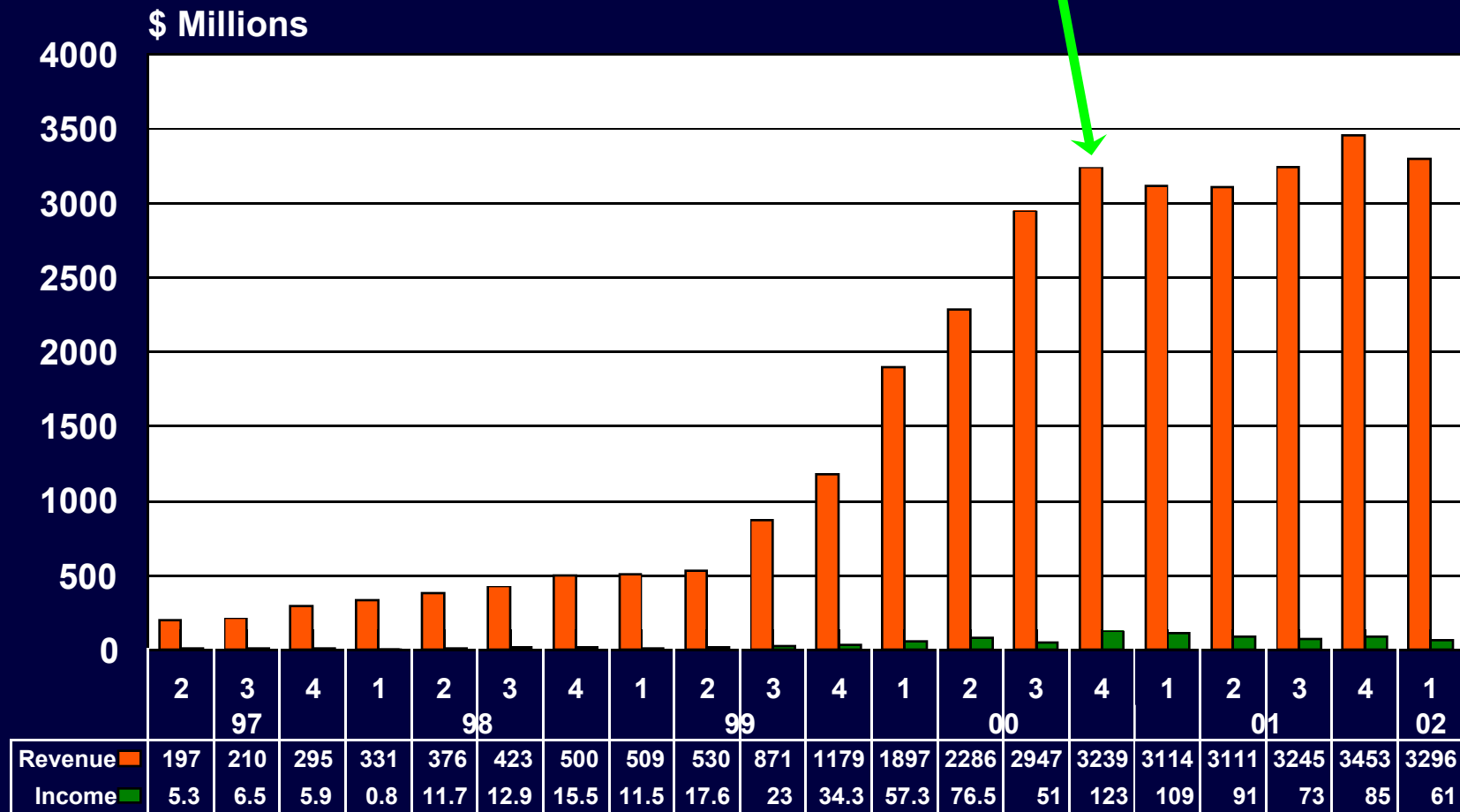
CY

SANM

# Flextronics

## Revenue & Net Income

PCBs: \$750 million  
out of \$12 billion  
annualized sales



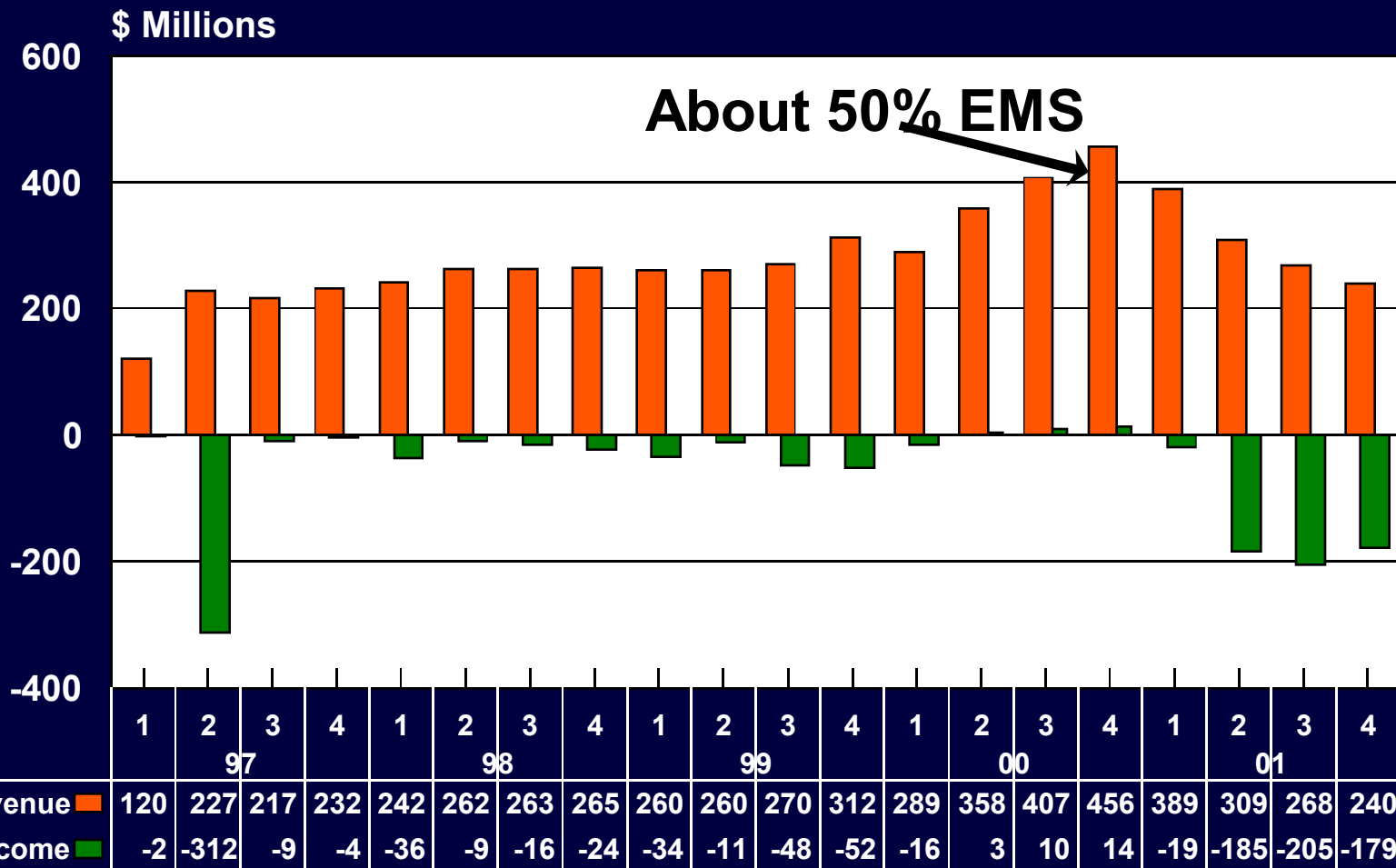
FY ends 3/31

CY

FLEX

# VIASYSTEMS

## Revenue & Income



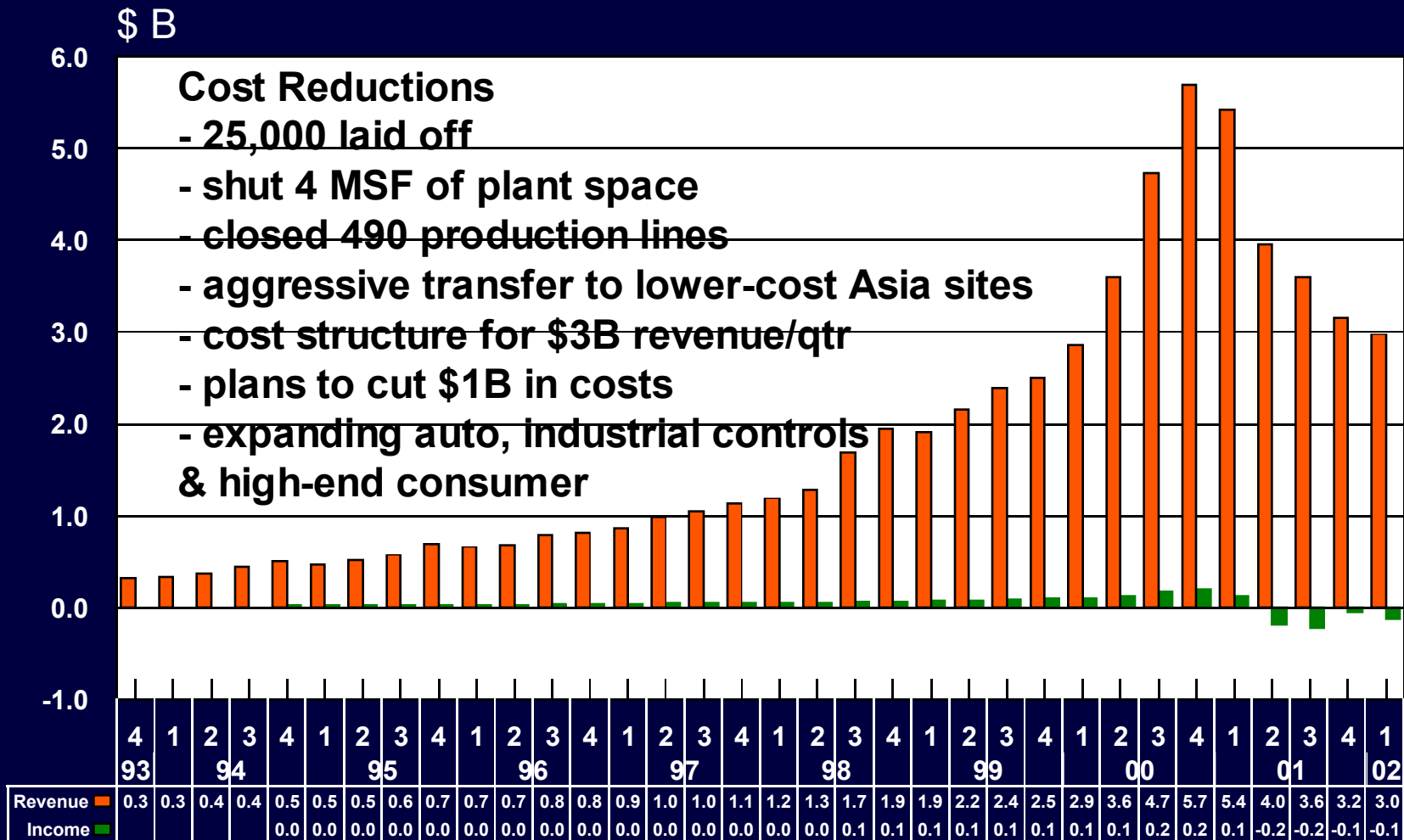
CY

VSGI

Sources: 10Q & 10K reports and company press releases

# SOLECTRON

## Revenue & Net Income

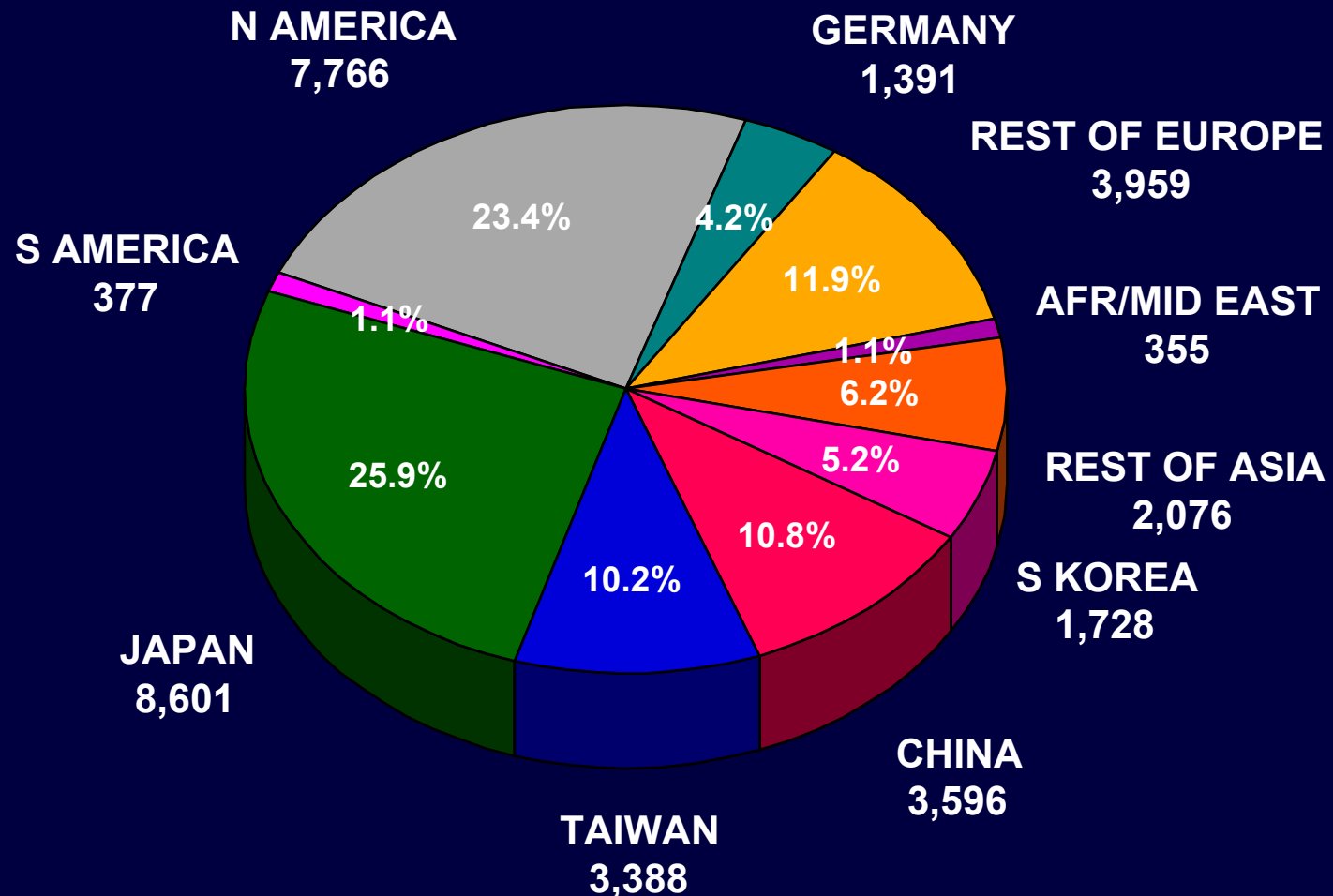


FY ends in August

SLR

# 2001 WORLD RIGID & FLEX PCB PRODUCTION

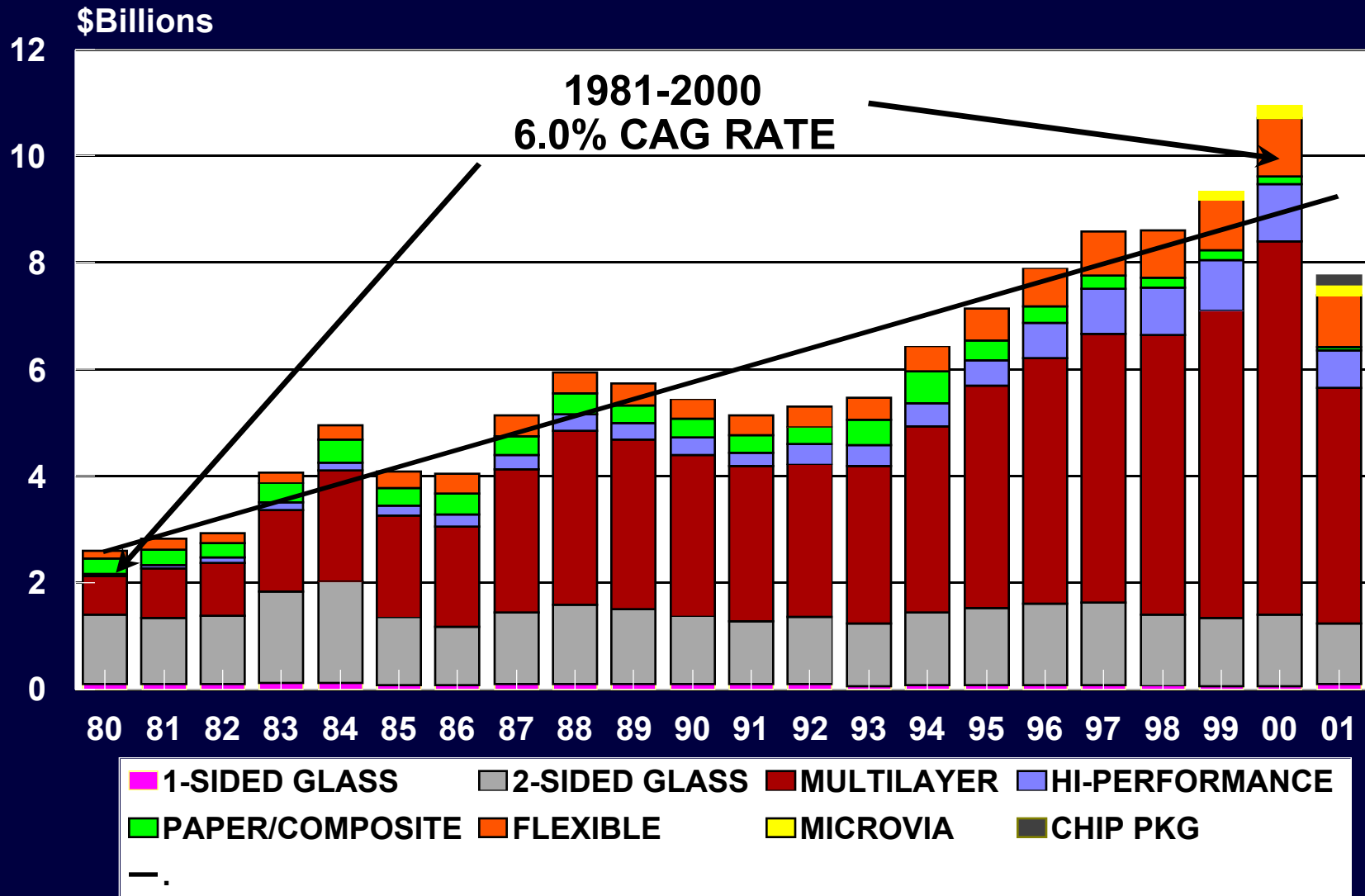
## BY GEOGRAPHICAL AREA (\$M)



**Total: \$33.2 Billion**

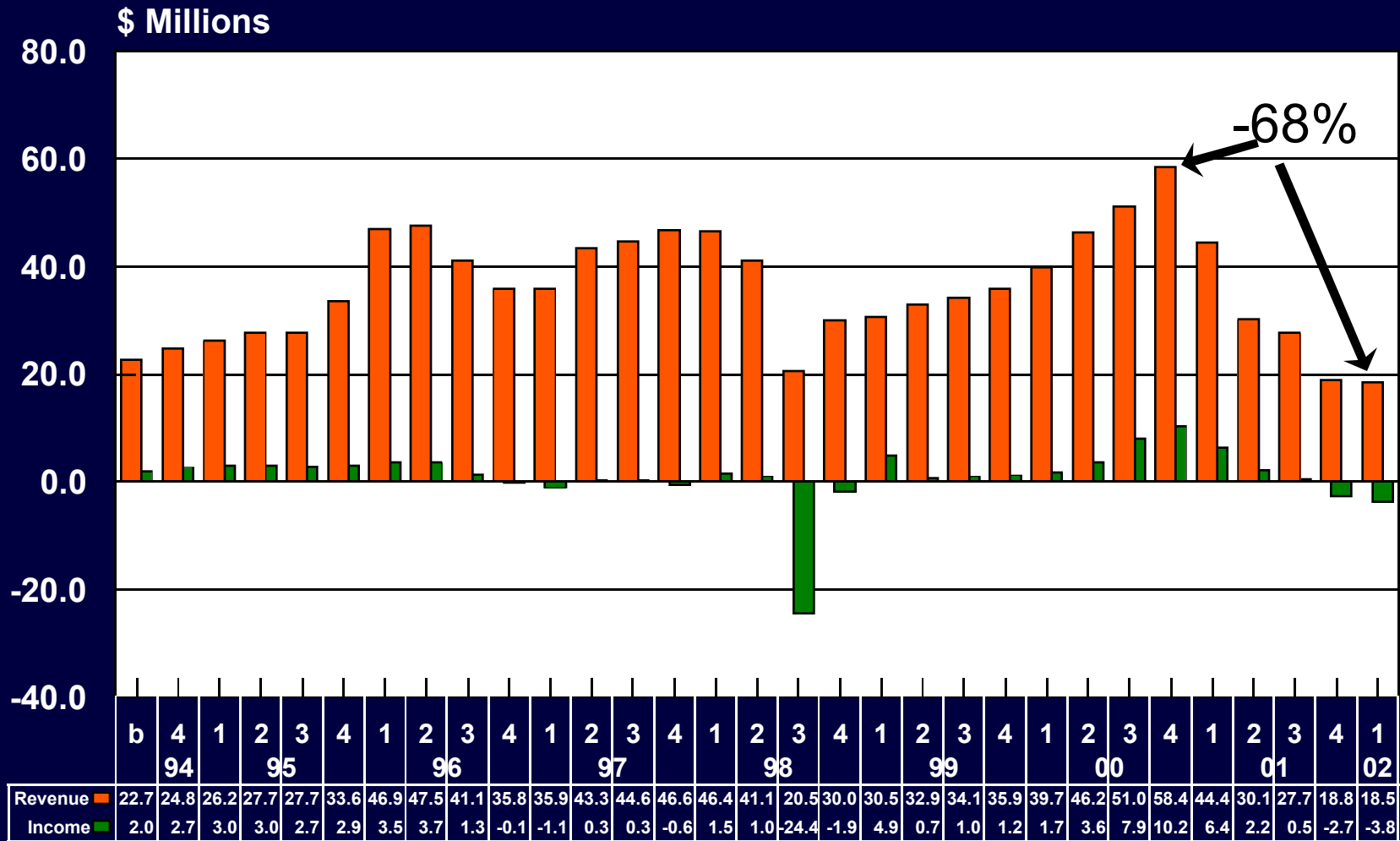
IPC T/MRC 5/2002 (includes microvia PCBs & chip packaging substrates)

# N. AMERICAN PCB SHIPMENTS



# MERIX

## Revenue & Net Income

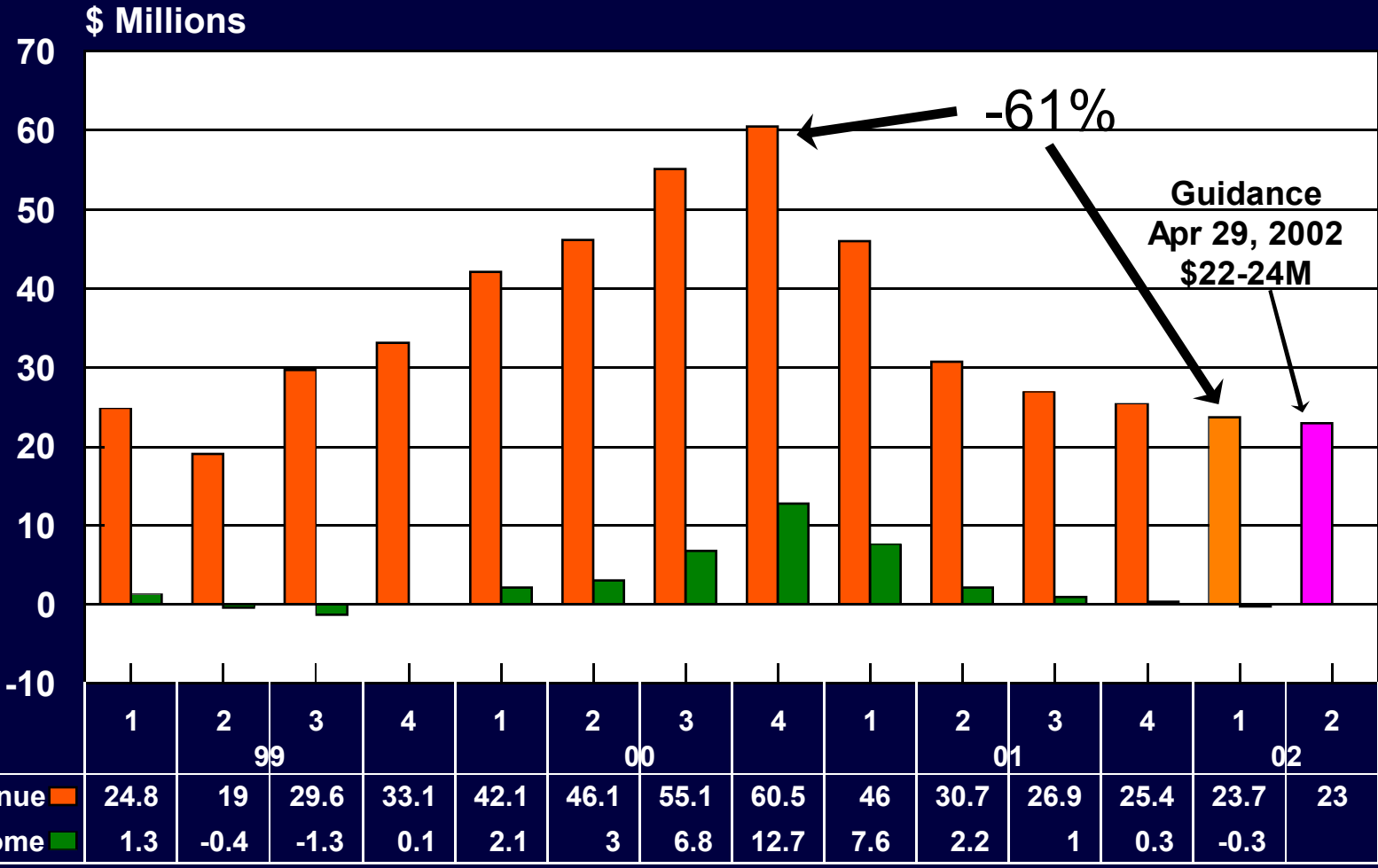


MERIX

FY ends May

# TTM Technologies

## Revenue & Net Income



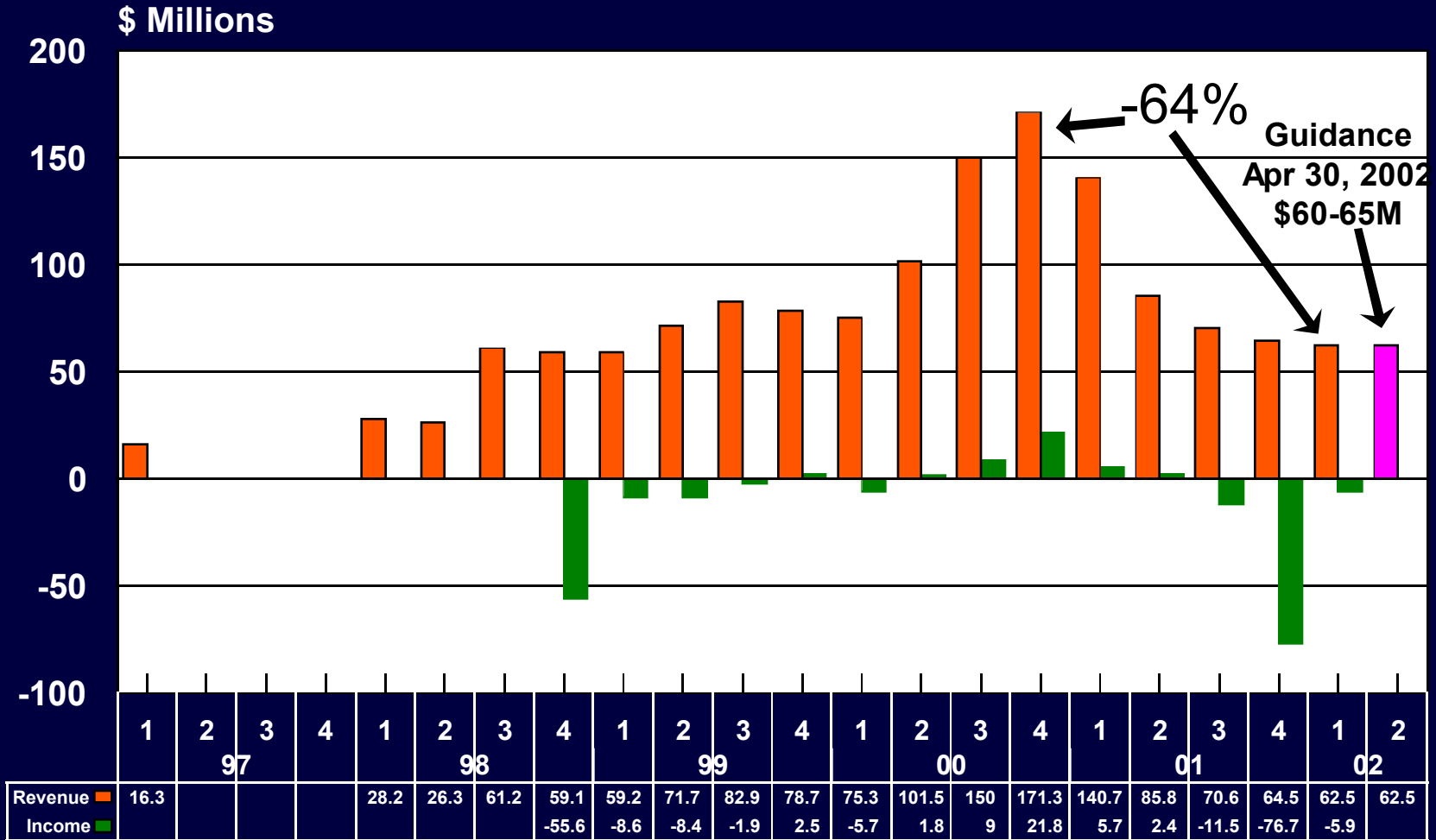
FY=CY

CY

TTMI

# DDi Corp

## Revenue & Net Income



FY=CY

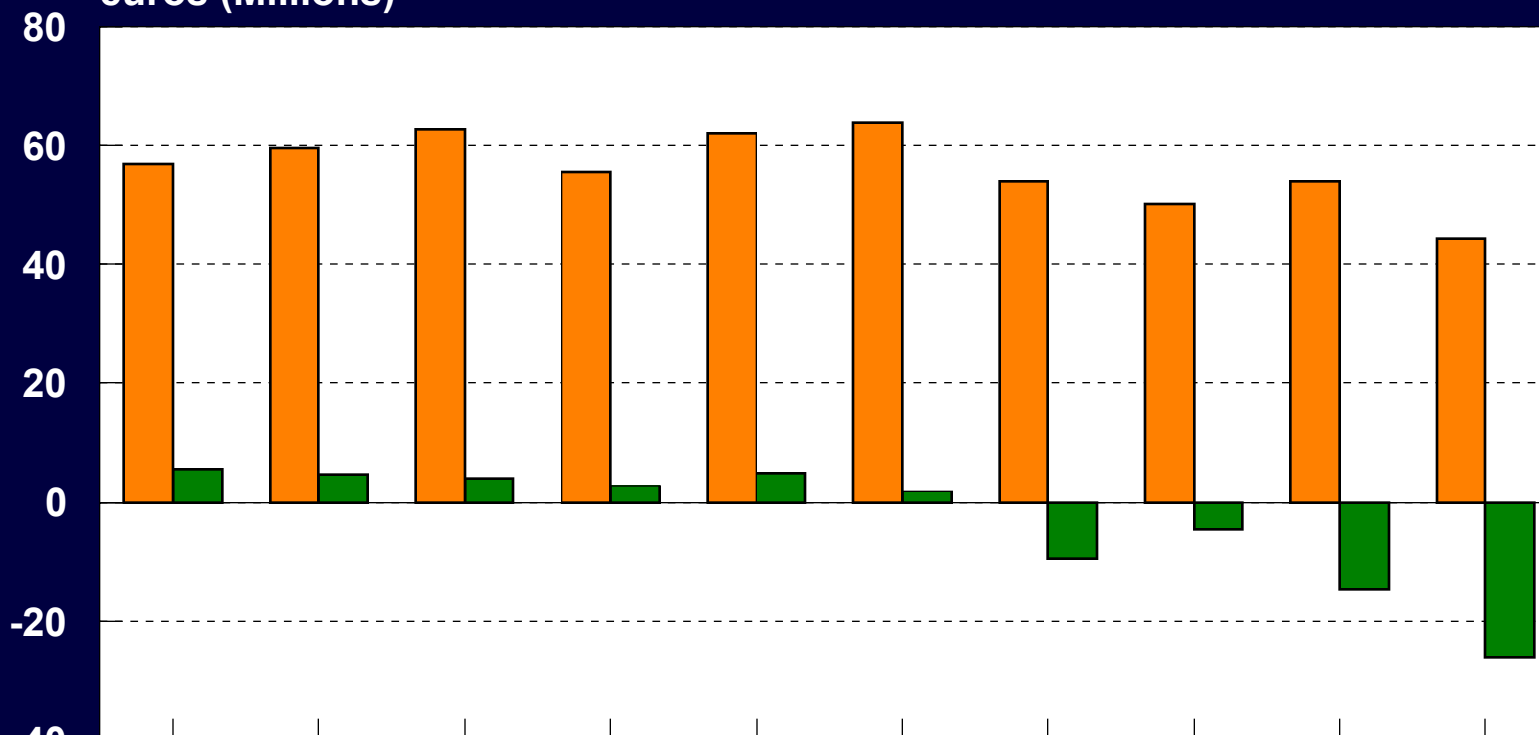
CY

DDIC

# Aspocomp, Finland

## Revenue & Net Income

euros (Millions)



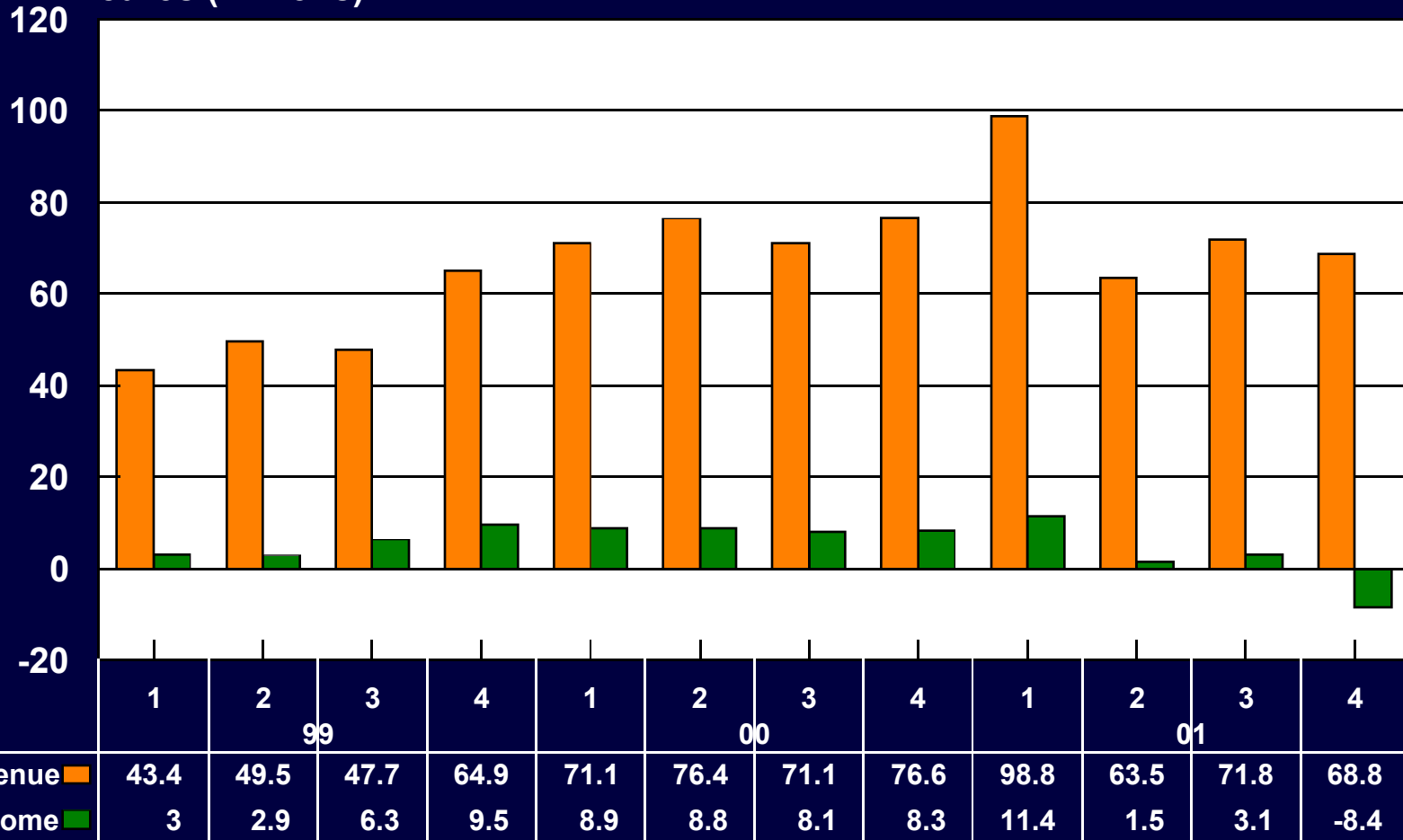
	4 99	1 00	2 00	3 00	4 00	1 01	2 01	3 01	4 01	1 02
Revenue	56.9	59.6	62.6	55.6	62	63.7	54	50.1	54	44.3
Income	5.4	4.7	3.9	2.7	4.9	1.8	-9.5	-4.6	-14.6	-26.2

CY

# AT&S, Austria

## Revenue & Net Income

euros (Millions)

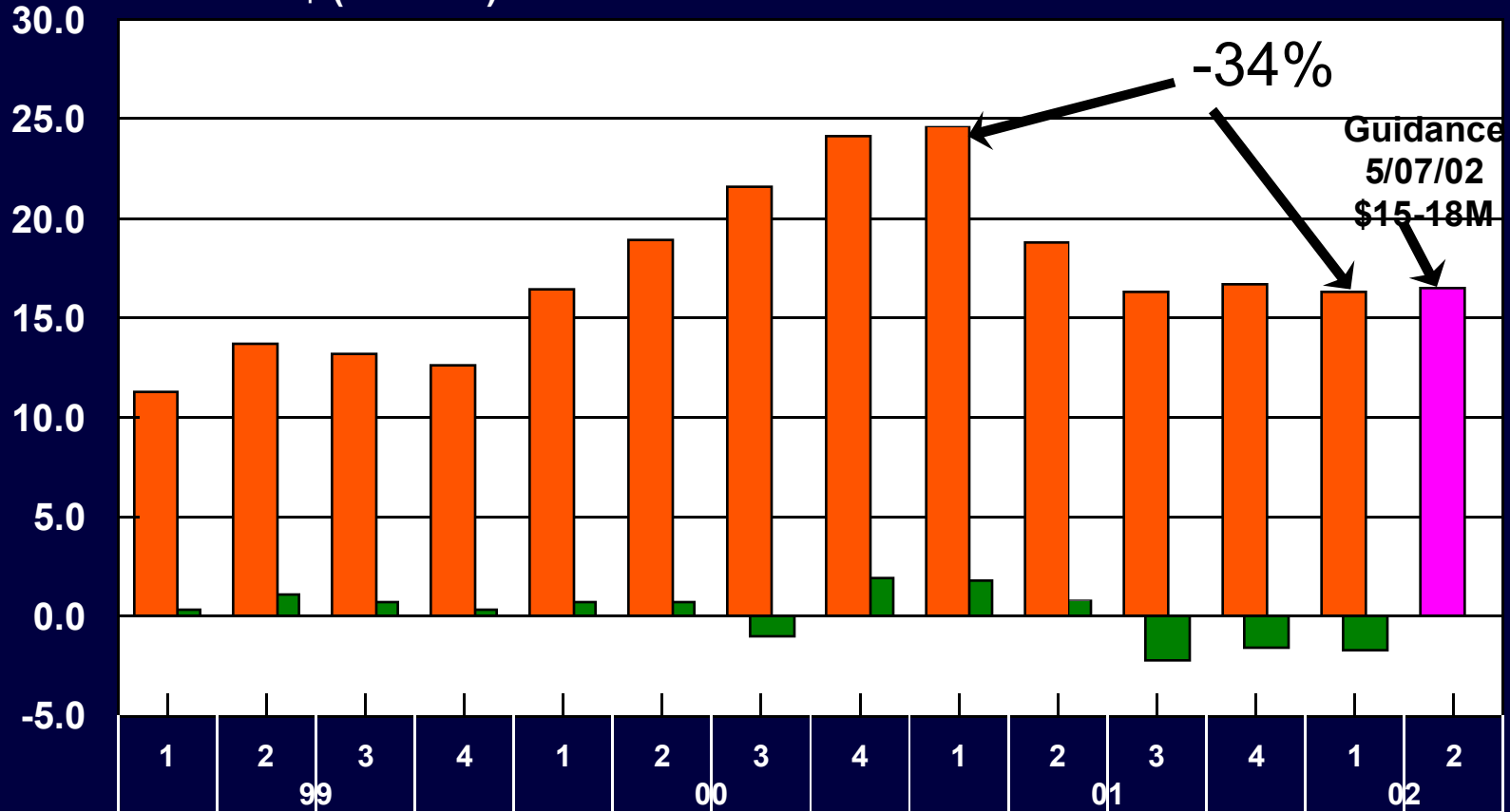


CY

# Coretec Inc

## Revenue & Net Income

Canadian \$ (Millions)



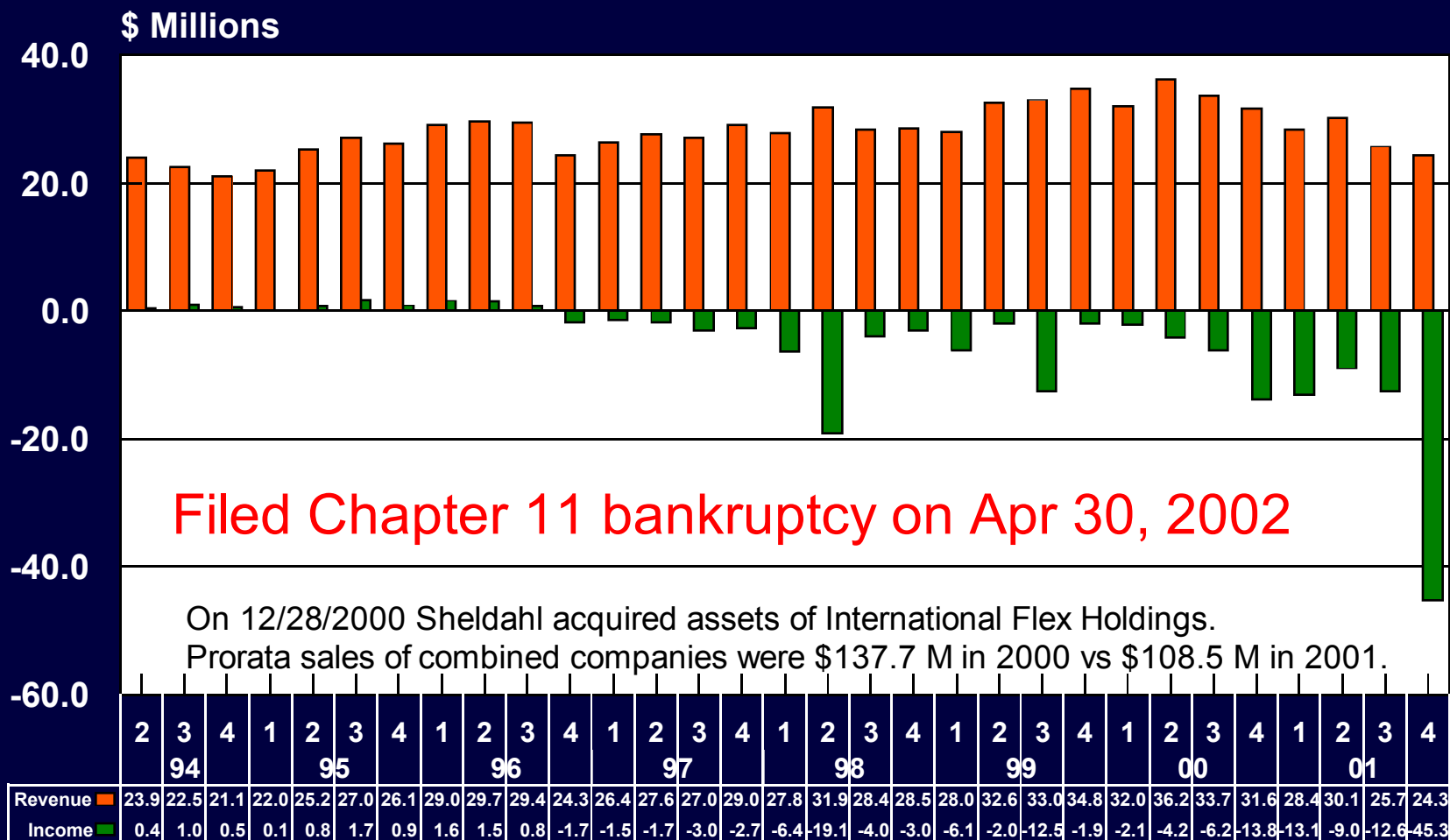
Revenue	11.3	13.7	13.2	12.6	16.4	18.9	21.6	24.1	24.6	18.8	16.3	16.7	16.3	16.5
Income	0.3	1.1	0.7	0.3	0.7	0.7	-1.0	1.9	1.8	0.8	-2.2	-1.6	-1.7	

FY=CY

T.C.Y.

# SHELDAHL

## Revenue & Net Income

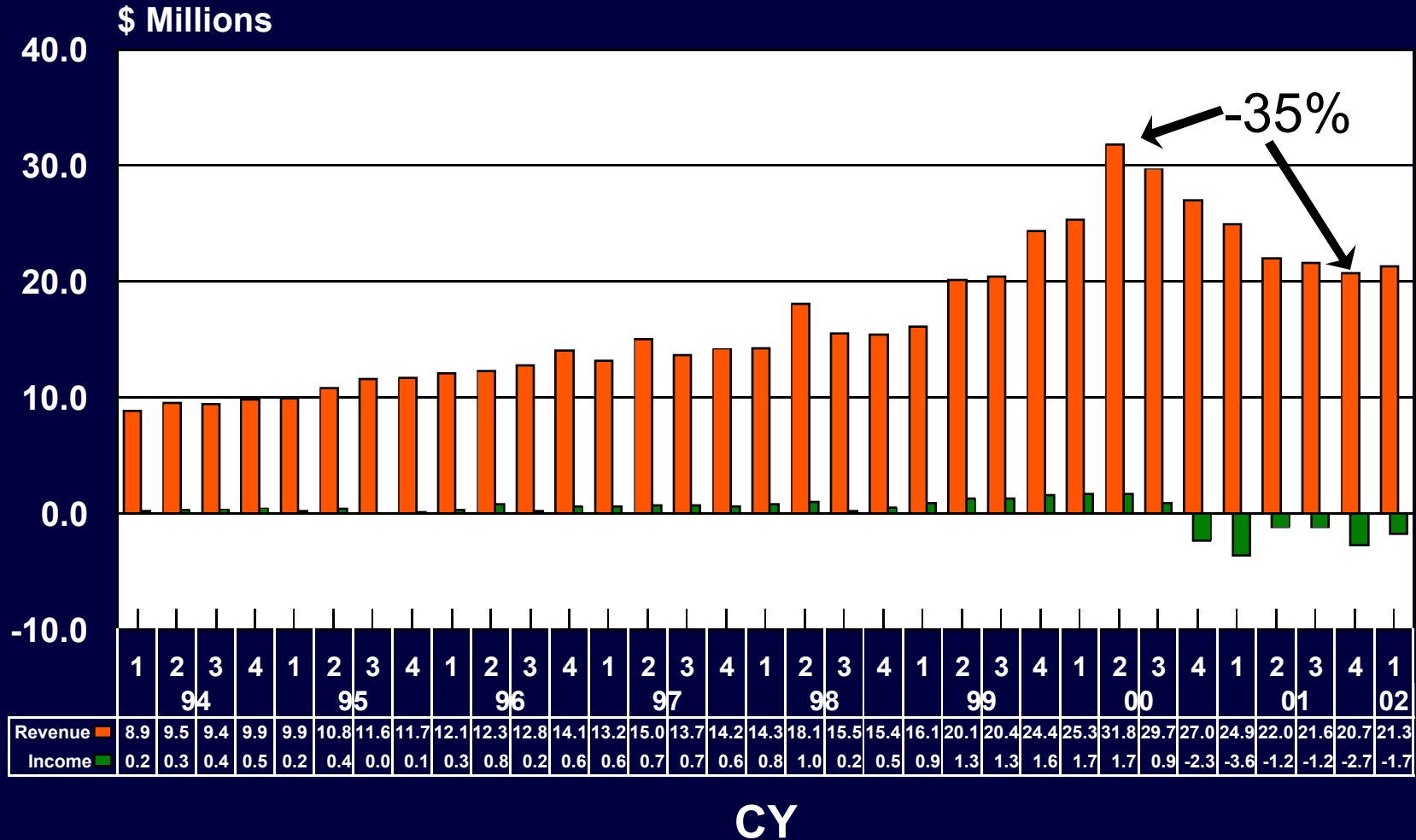


CY

SHEL

# PARLEX

## Revenue & Net Income

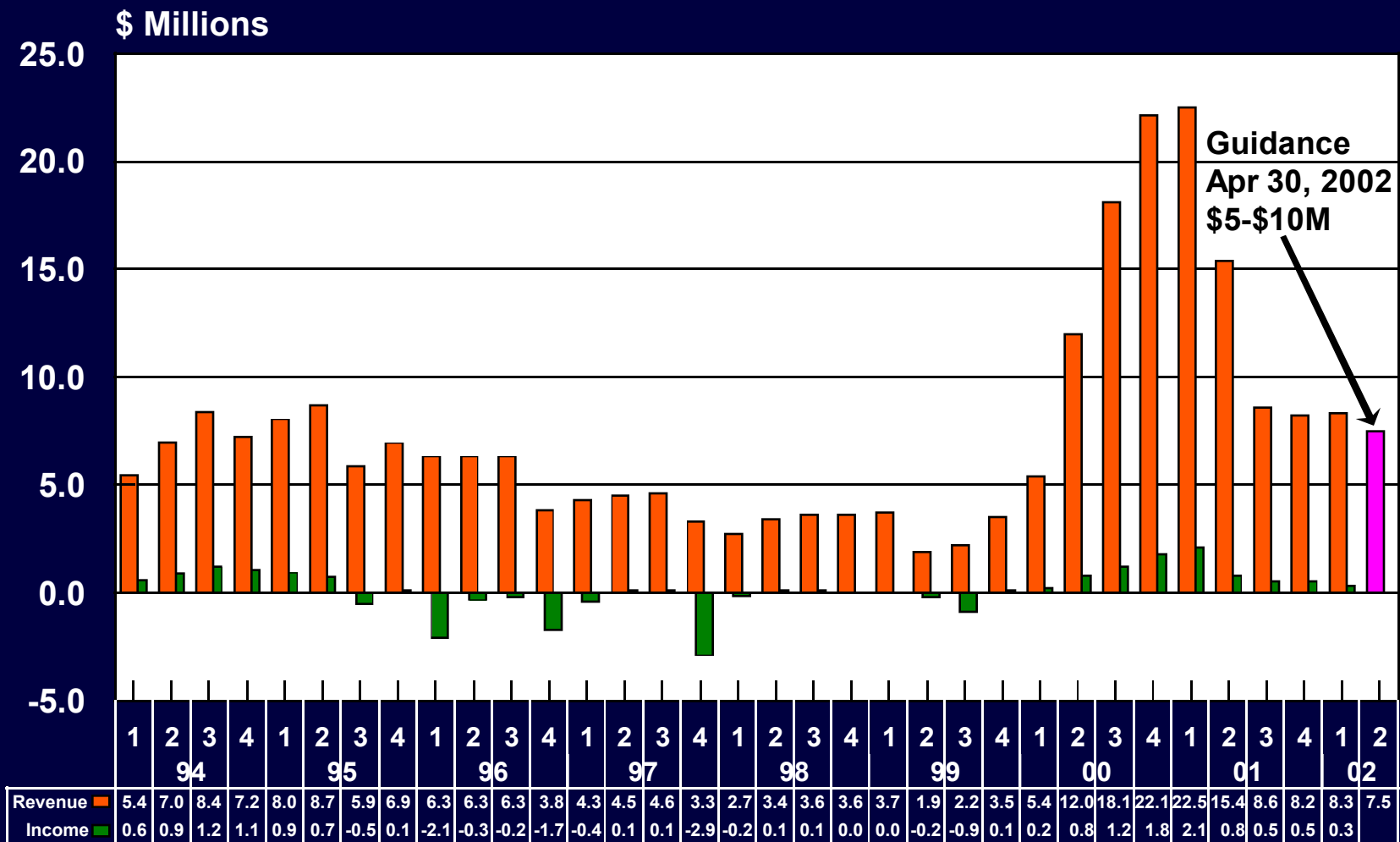


FY ends June 30

PRLX

# M-WAV

## Revenue & Net Income

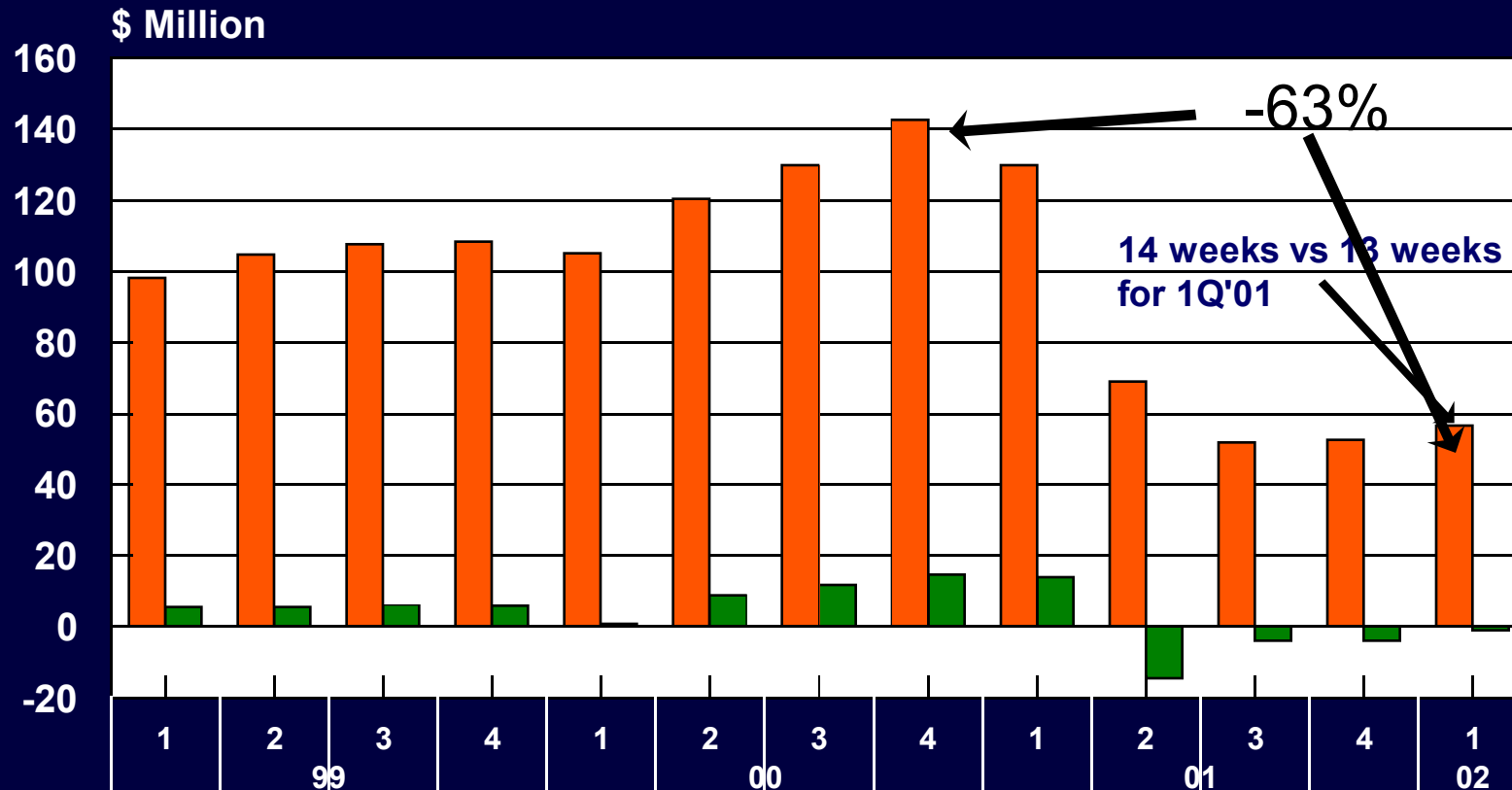


FY = CY

MWAV

# Park Electrochemical Corp

## Revenue & Net Income



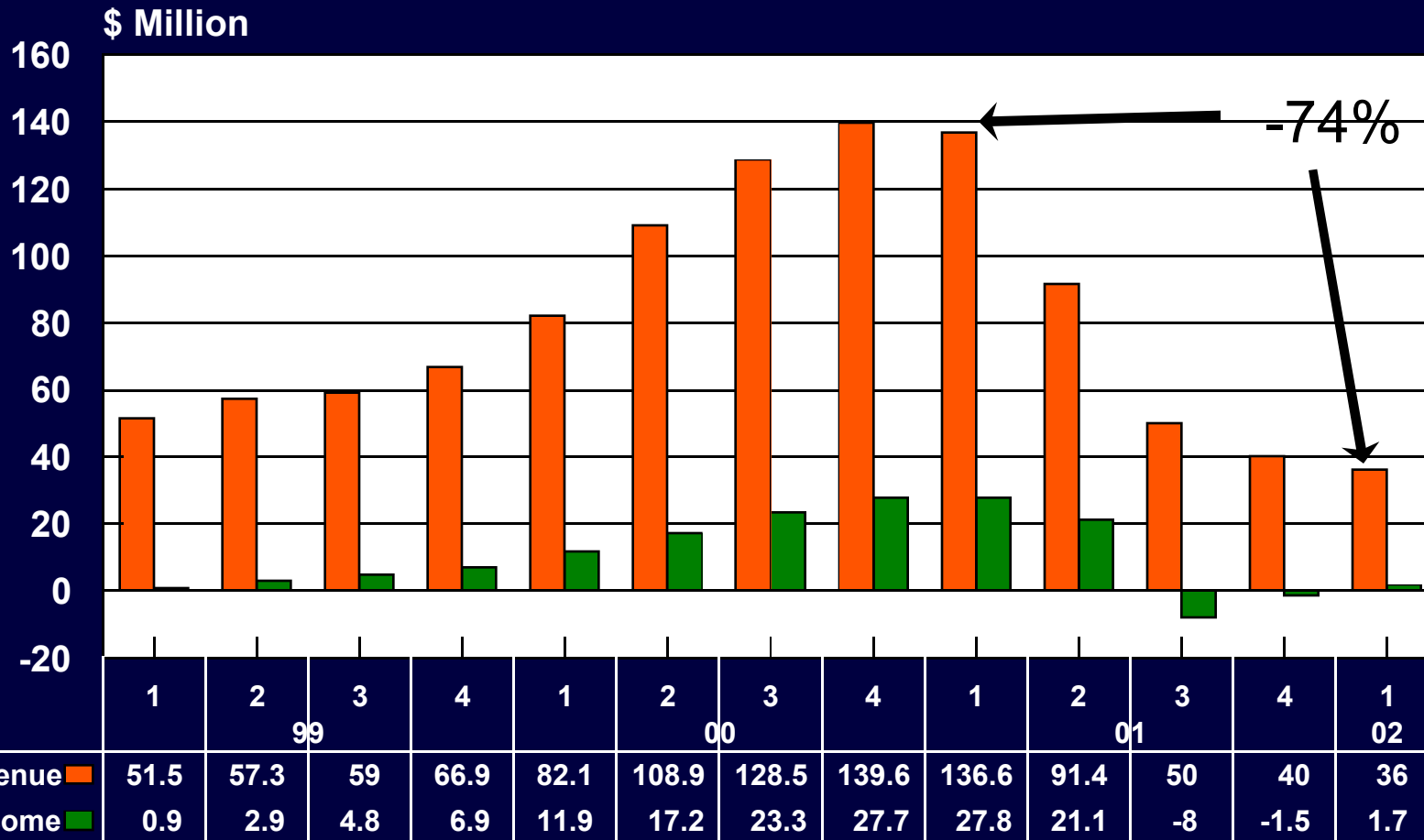
Revenue	98.1	104.5	107.7	108.2	104.9	120.2	129.9	142.6	129.6	69.1	51.7	52.6	56.6
Income	5.4	5.7	6.1	5.8	0.8	8.8	11.7	14.8	14.1	-14.6	-3.8	-4	-1

CY

PKE

# Electro Scientific Industries

## Revenue & Net Income

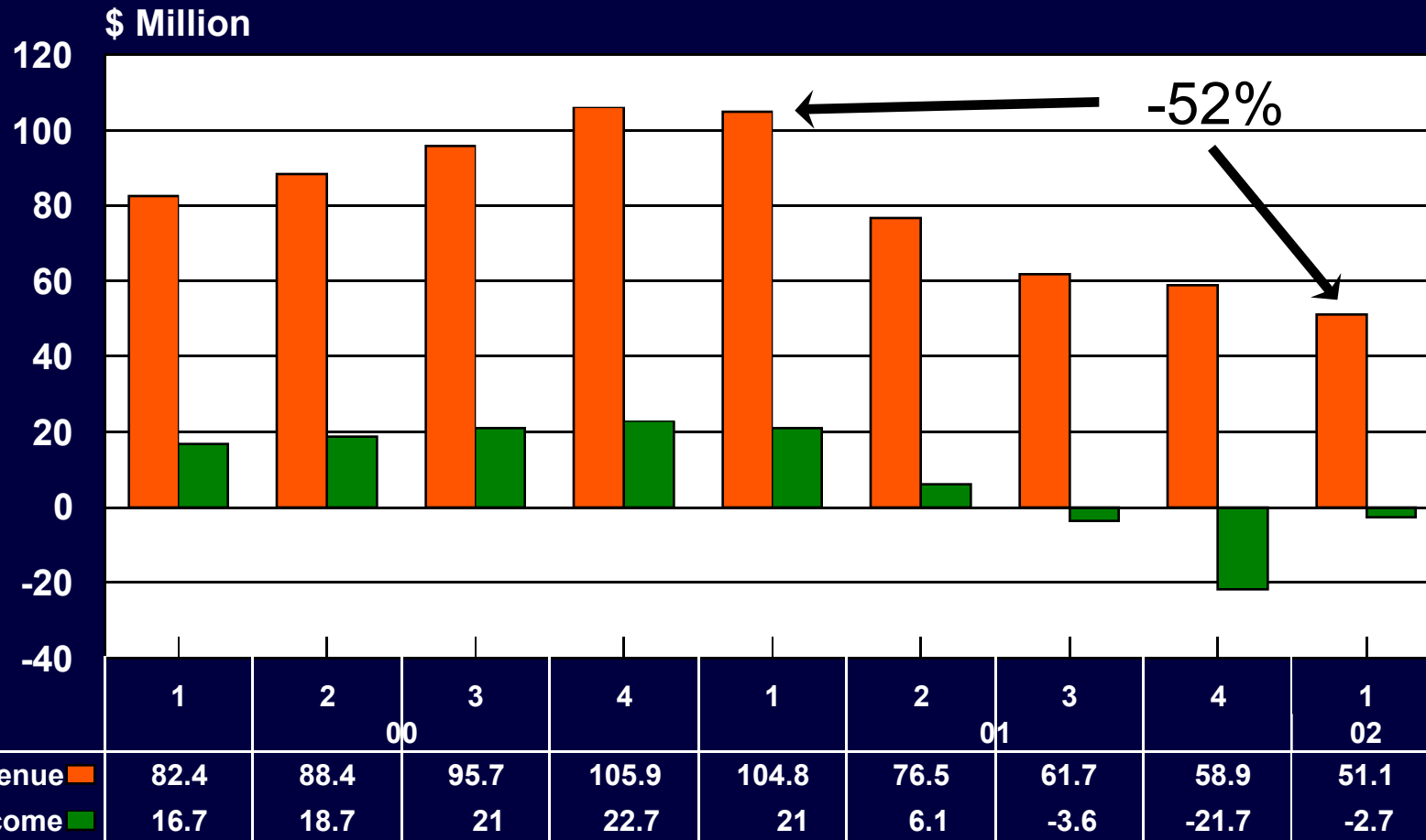


CY

ESIO

# Orbotech

## Revenue & Net Income



CY

ORBK

# TOP TAIWAN "PUBLIC" PCB MANUFACTURERS

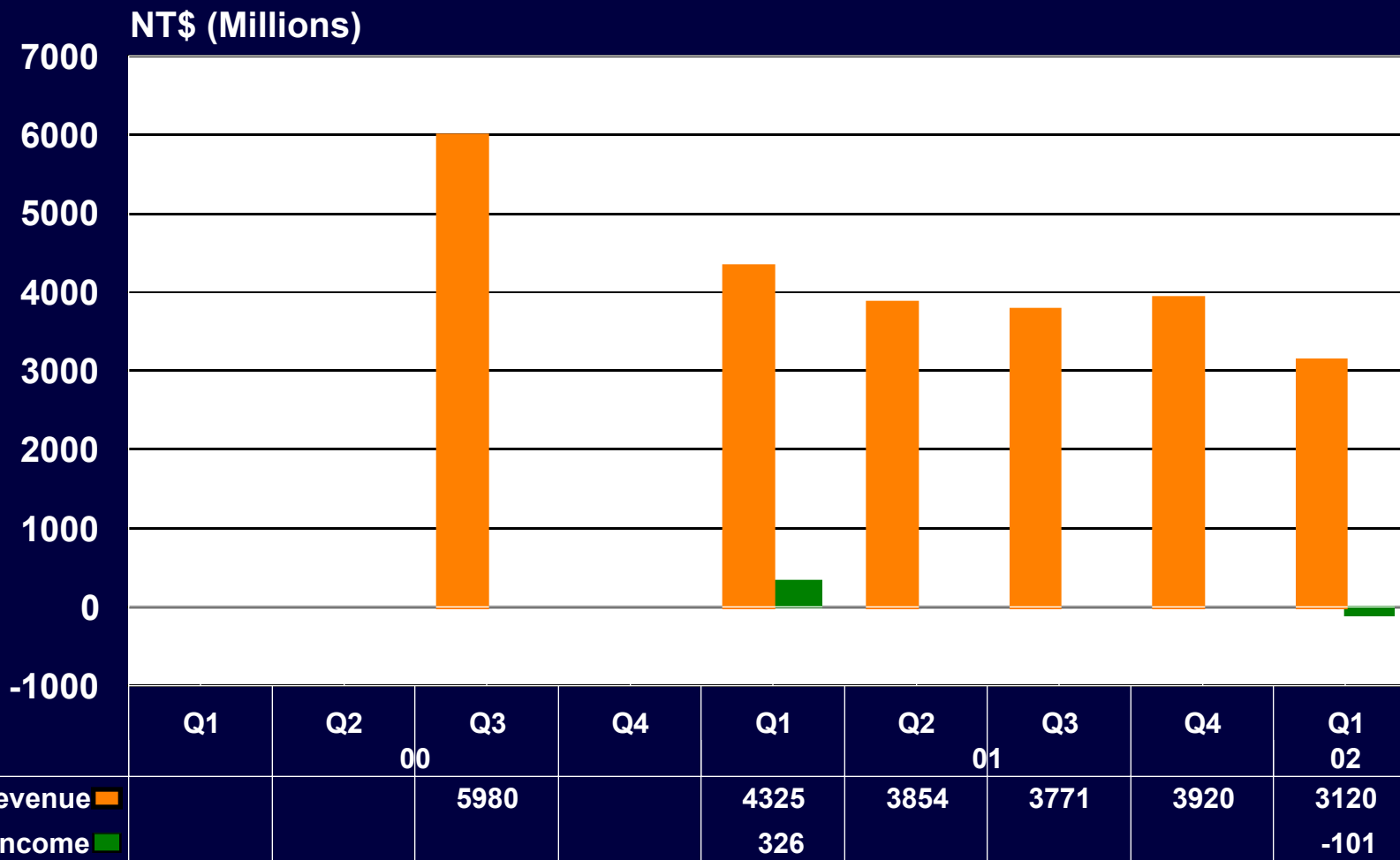
2001 Sales (\$M)

	PCB \$M
Compeq	470
Nan Ya	304
Uni Micro	252
Ya Shin	225
Unicap	199
Gold Circuit	178
WUS	171
Chin Poon	150
Unitech	139
Tripod	115
Printed Wire	82
Yeti	67
Vertex	67
Yang An	64
Boardtek	57
Shea May	54
Victory	47
Hannstar	49
Chant World	36

33.8 NT\$ = 1 US\$ (average exchange rate in 2001)

# Compeq, Taiwan

## Revenue & Net Income

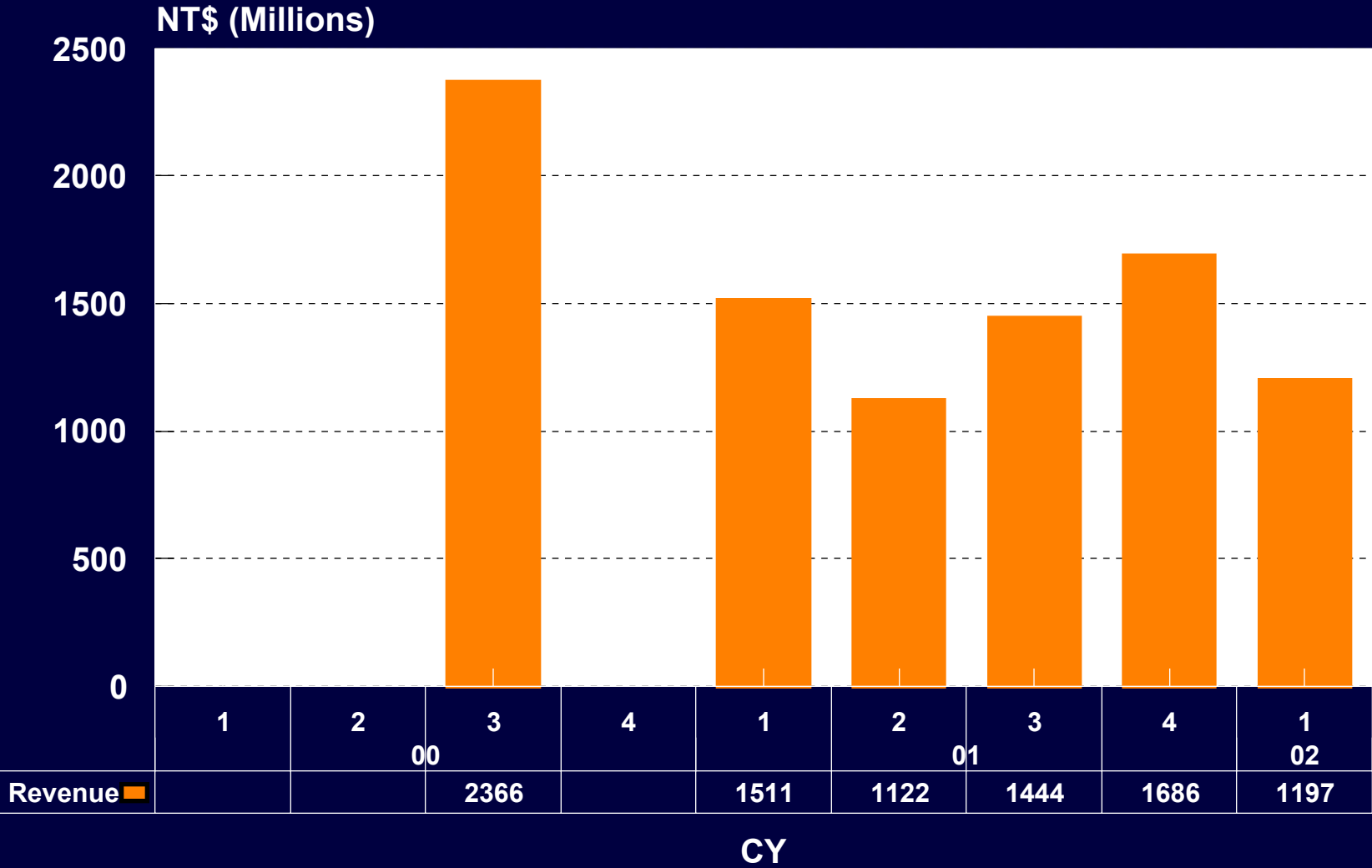


CY

35 NT\$ = 1 US\$

# Wus, Taiwan

## Revenue



35 NT\$ = 1 US\$

# N. AMERICAN PCB MANUFACTURERS - PUBLIC DATA

## QUARTERLY SALES & NET INCOME (\$M)

		LAST YEAR		THIS YEAR		QUARTER
		SALES	INC	SALES	INC	ENDING
CIRCUIT WORLD	TSE:CCW	6.5	0.6	3.4	-0.5	3/02
CORETEC	TSE:CYY	16.4	1.2	10.9	-1.1	3/02
DDi	DDIC	140.7	5.7	62.5	-5.9	3/02
INNOVEX	INVX	34.9	-23.3	35.0	0.3	3/02
MERIX	MERX	44.4	6.4	18.5	-3.8	2/02
M-WAV	MWAV	22.1	1.8	8.2	0.5	3/02
PARLEX	PRLX	24.9	-3.6	21.3	-1.7	3/02
SHELDAHL	SHEL	31.6	-13.8	24.3	-45.3	12/01
TTM	TTMI	46.0	7.6	23.7	-0.3	3/02
<b>TOTAL</b>		<b>367.9</b>	<b>-17.1</b>	<b>207.9</b>	<b>-58.0</b>	
<b>INCOME %</b>			<b>-4.7%</b>		<b>-27.9%</b>	

**Includes foreign sales**

# N. AMERICAN CEMs WITH PCB FABs - PUBLIC DATA

## QUARTERLY SALES & NET INCOME (\$M)

		LAST YEAR		THIS YEAR		QUARTER
		SALES	INC	SALES	INC	ENDING
FLEXTRONICS	FLEX	3114	109	3297	61	3/02
SANMINA-SCI	SANM	3198	157	2411	0	3/02
VIASYSTEMS	VG	456	14	240	-179	12/01
TOTAL		6768	279	5948	-118	
INCOME %			4.1%		-2.0%	

**Includes foreign sales**

# MARCH N AMERICAN PCB GROWTH INDICATORS

% GROWTH - Mar 2002 vs Mar 2001

**RIGID PCB \$ SHIPMENTS**

**DOWN 35.5%**

**RIGID PCB \$ BOOKINGS**

**DOWN 15.0%**

**RIGID PCB BOOK/BILL RATIO**

**3-MONTH AVG      0.99**

**1-MONTH            0.98**

**LAMINATE+PREPREG SQ FT SHIPMENTS**

**DOWN 24.9%**

**LAMINATE+PREPREG SQ FT BOOKINGS**

**DOWN 32.2%**

**FLEX CIRCUIT \$ SHIPMENTS**

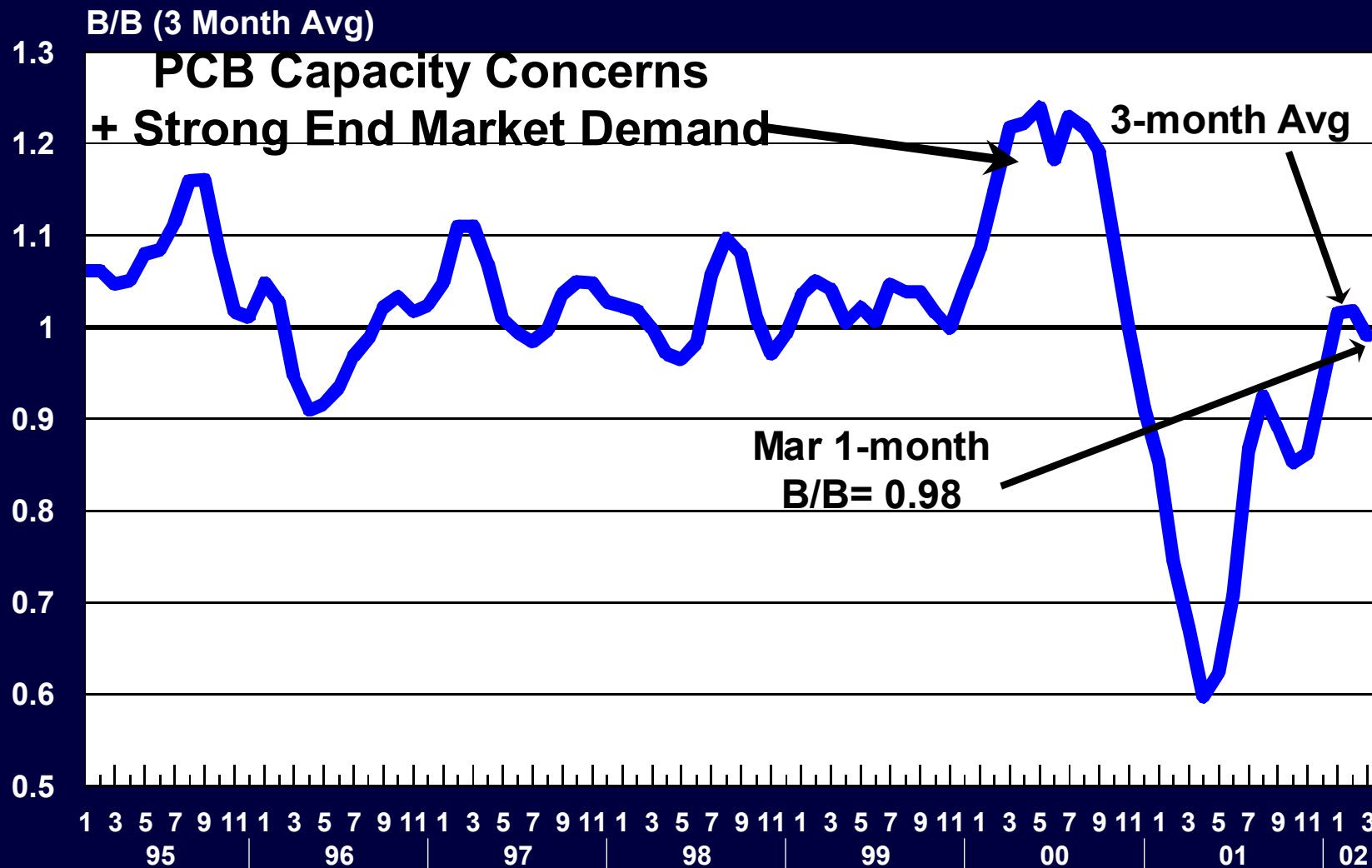
**DOWN 6.2%**

**FLEX CIRCUIT \$ BOOKINGS**

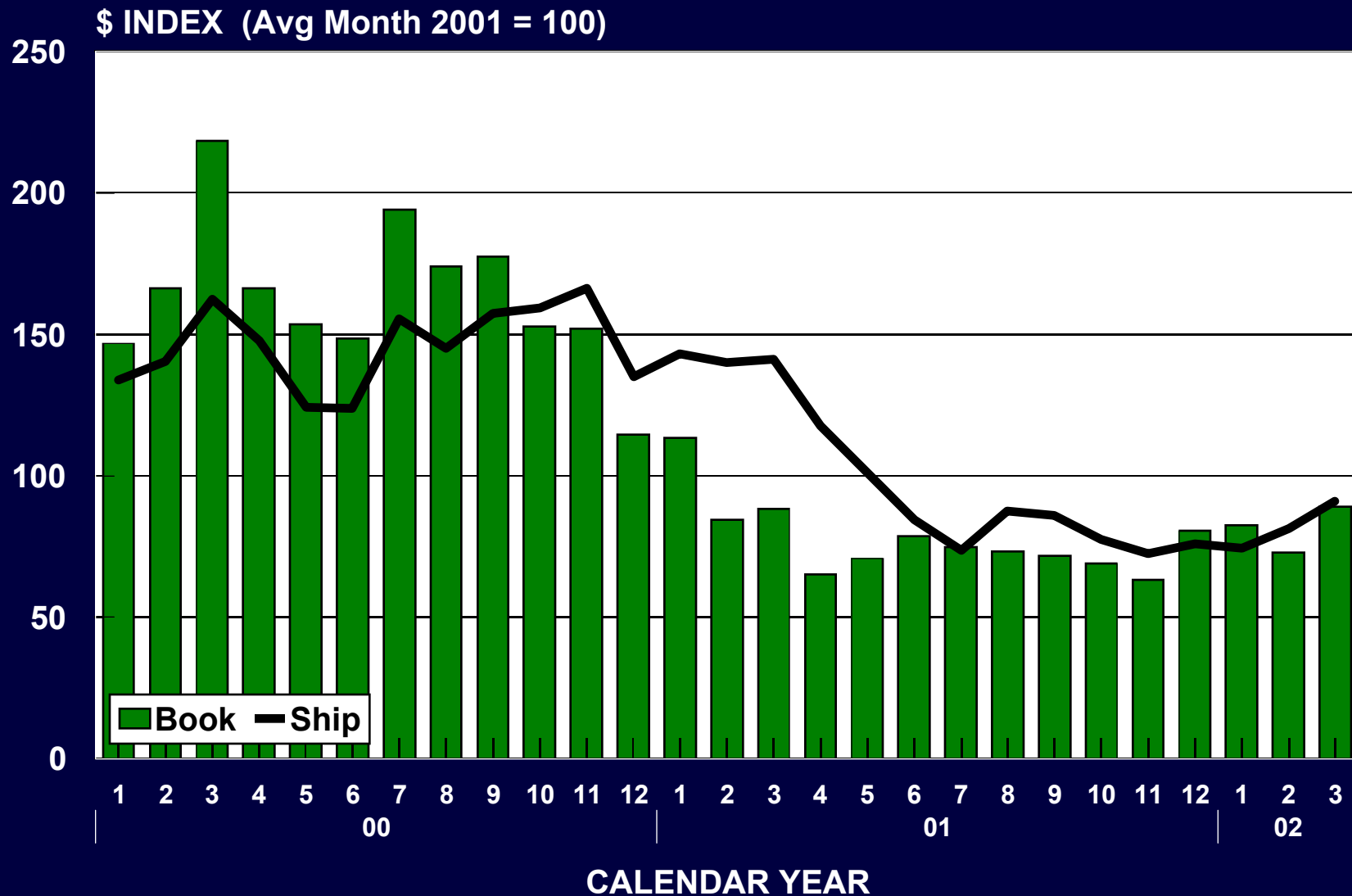
**DOWN 13.1%**

# Rigid PCB Book/Bill

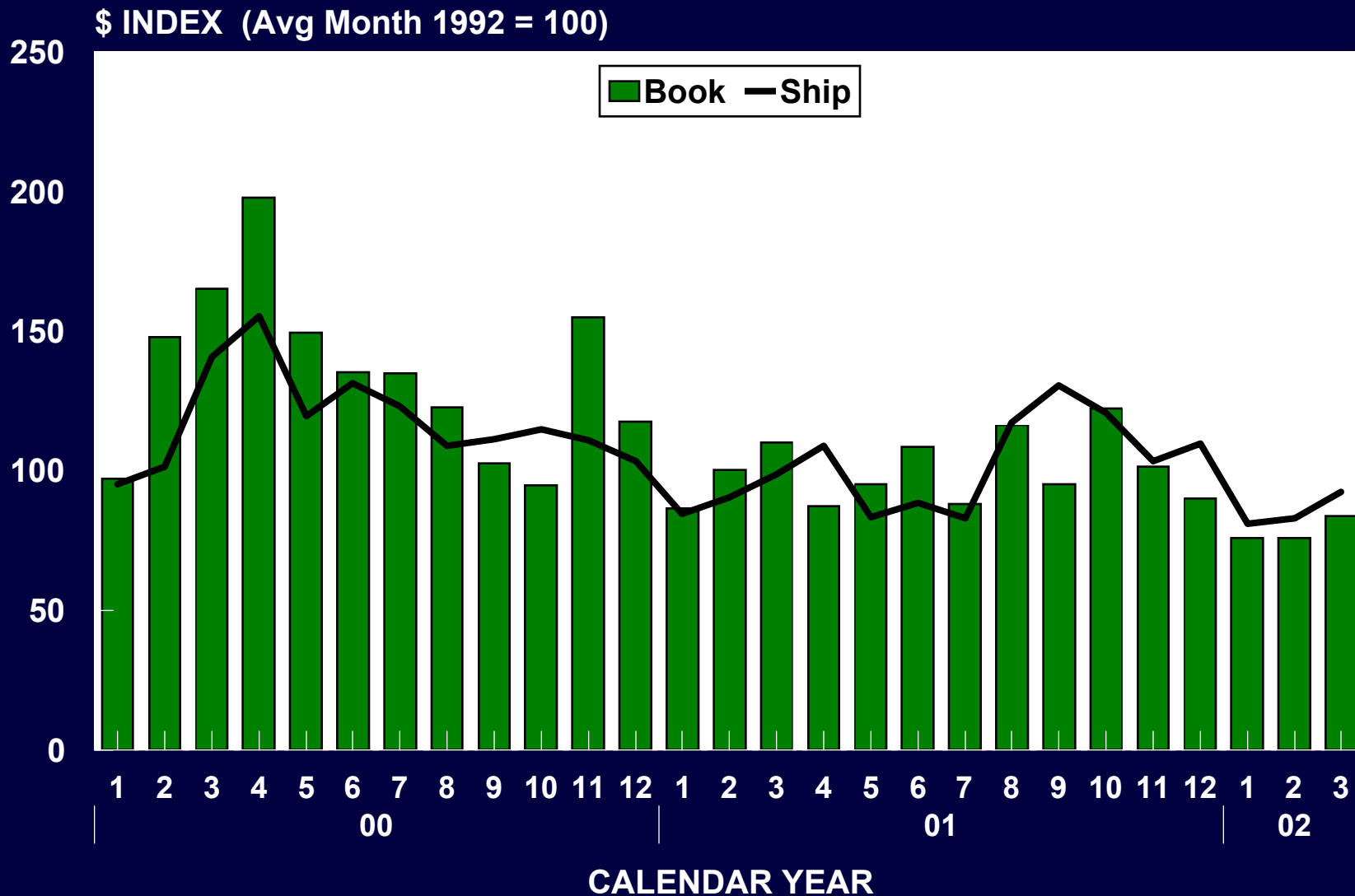
N. America



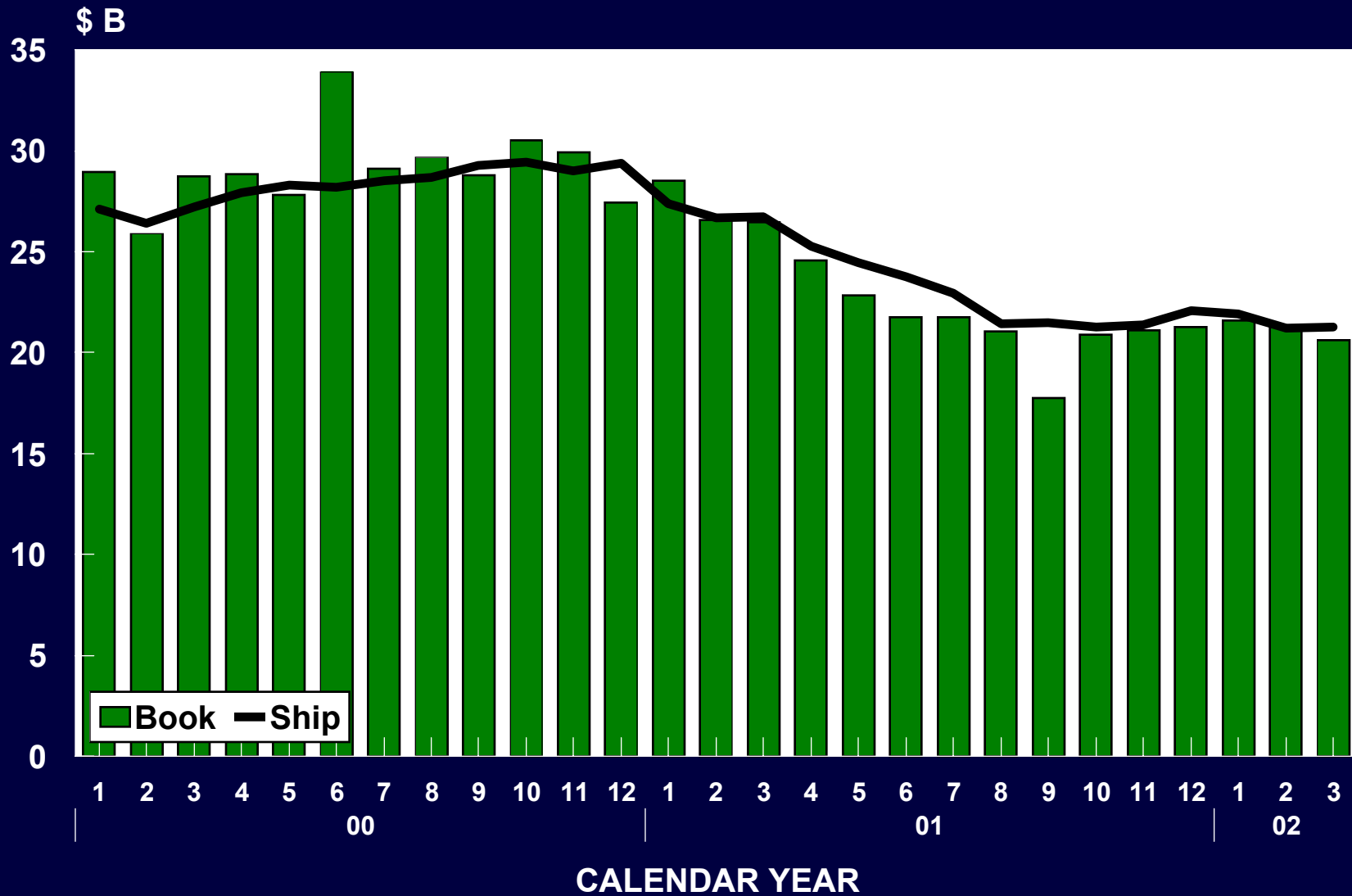
# U.S. RIGID PCB BOOKINGS & SHIPMENTS



# U.S. FLEX CIRCUITS BOOKINGS & SHIPMENTS



# U.S. ELECTRONIC EQUIPMENT BOOKINGS & SHIPMENTS

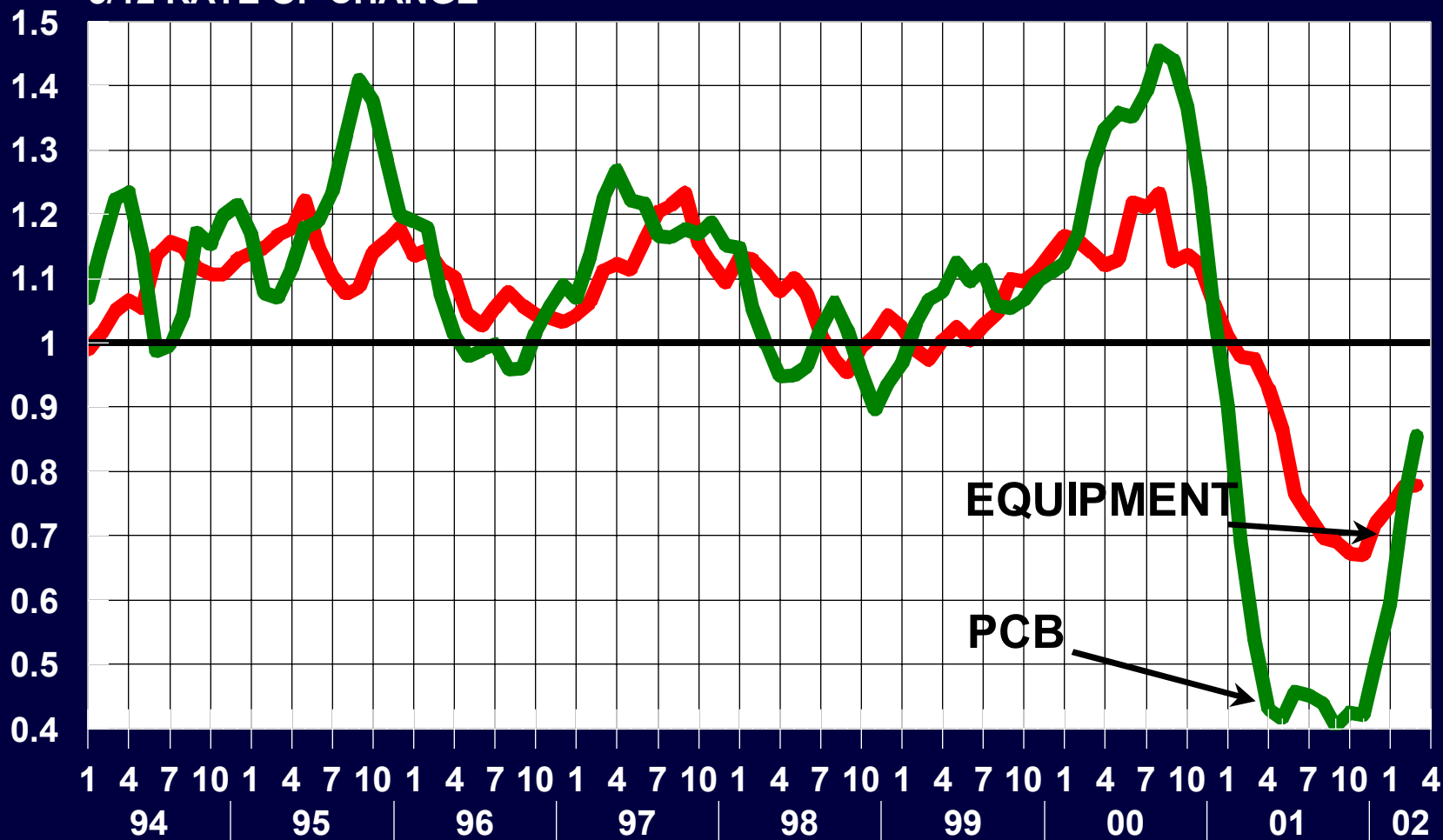


Dept of Commerce

# U.S. ELECTRONIC EQUIPMENT vs PCBs

## \$ BOOKINGS GROWTH

3/12 RATE OF CHANGE



# PRESENT GROWTH RATES (%)

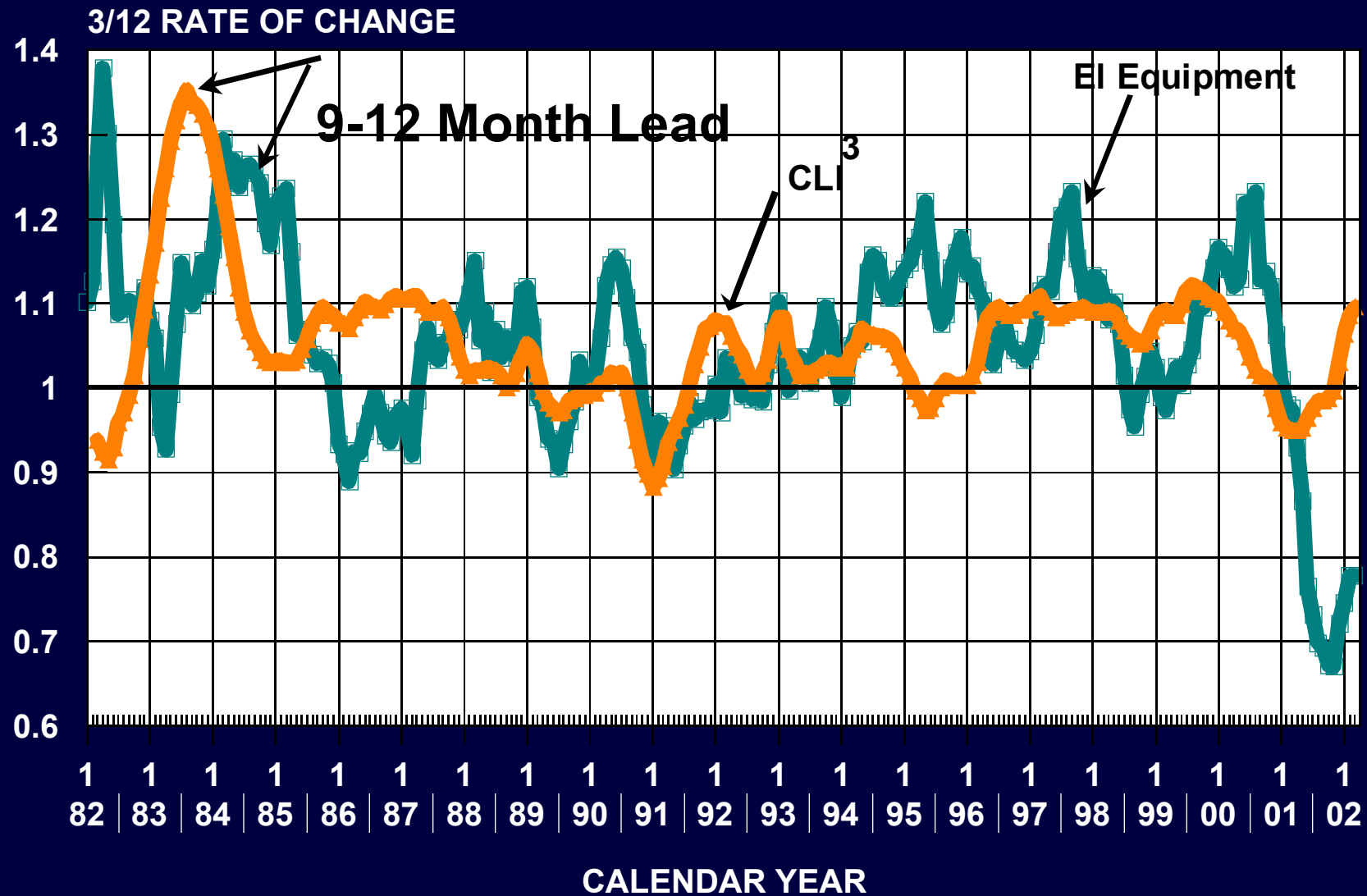
## U.S. ECONOMY & ELECTRONICS INDUSTRY

	LATEST MONTH	ANNUAL GROWTH RATE	3-MONTH GROWTH RATE
RIGID PCB ORDERS \$	3/02	51.9	85.5
RIGID PCB SHIPMENTS \$	3/02	58.8	58.2
LAMINATE+PREPREG ORDERS SF	3/02	41.2	60.1
SEMICONDUCTOR ORDERS \$	2/02	67.8	84.0
<b>ELECTRONIC EQUIPMENT ORDER \$</b>			
COMPUTER & RELATED	3/02	72.9	75.1
COMMUNICATIONS	3/02	58.2	67.2
MEDICAL, MEASUREMENT & CONTROL	3/02	99.4	99.8
SEARCH & NAVIGATION	3/02	83.5	80.4
TOTAL ELECTRONIC EQUIPMENT	3/02	73.8	77.8
INDUSTRIAL PRODUCTION	3/02	95.5	96.2

NOTE: 3 month growth rates compare most recent  
3 months to same 3 months one year earlier

# Future Outlook

# Electronic Equipment Orders vs Conference Board Composite Leading Indicator

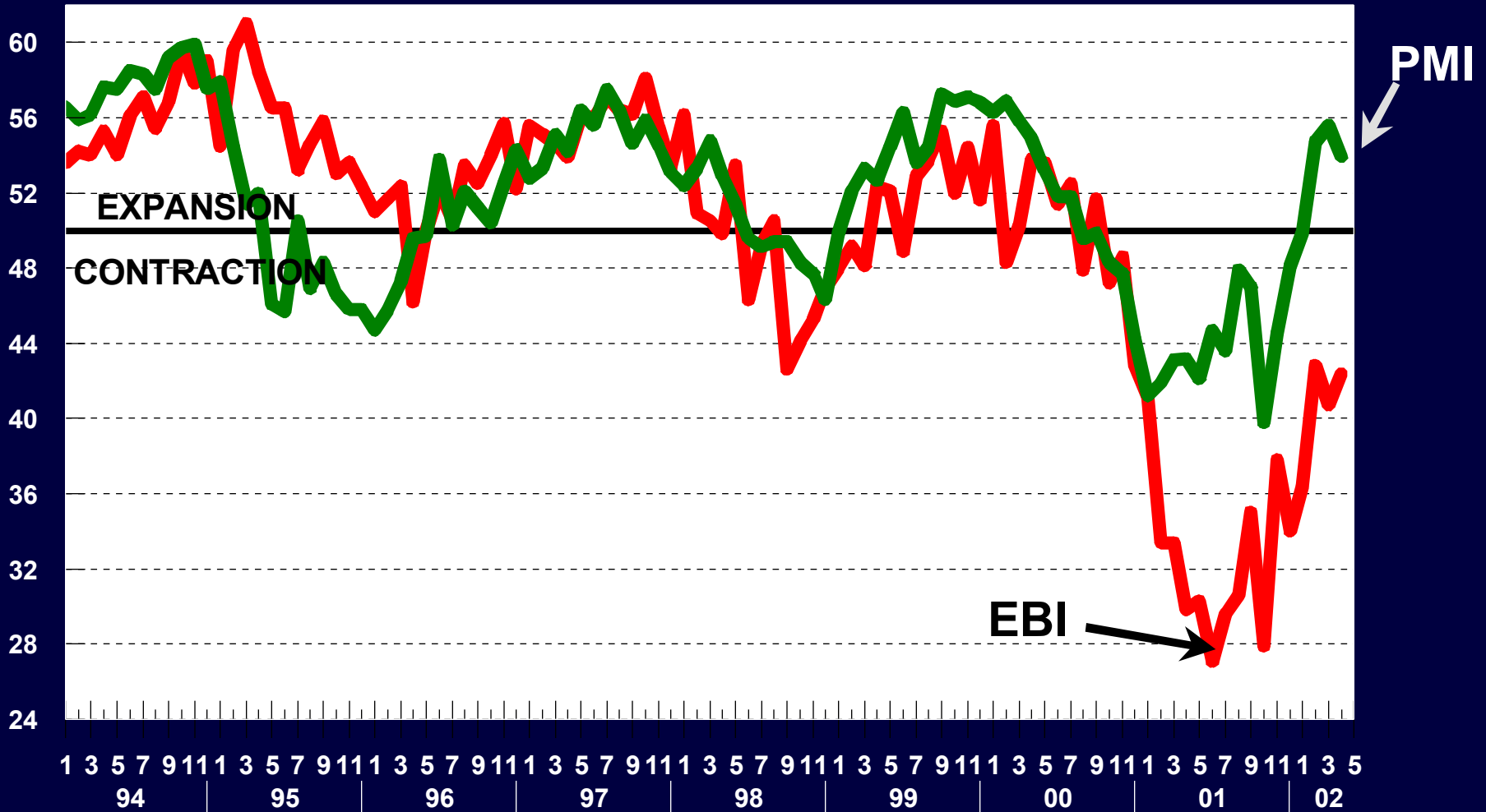


Data: Dept of Commerce & Conference Board

<http://www.tcb-indicators.org/>

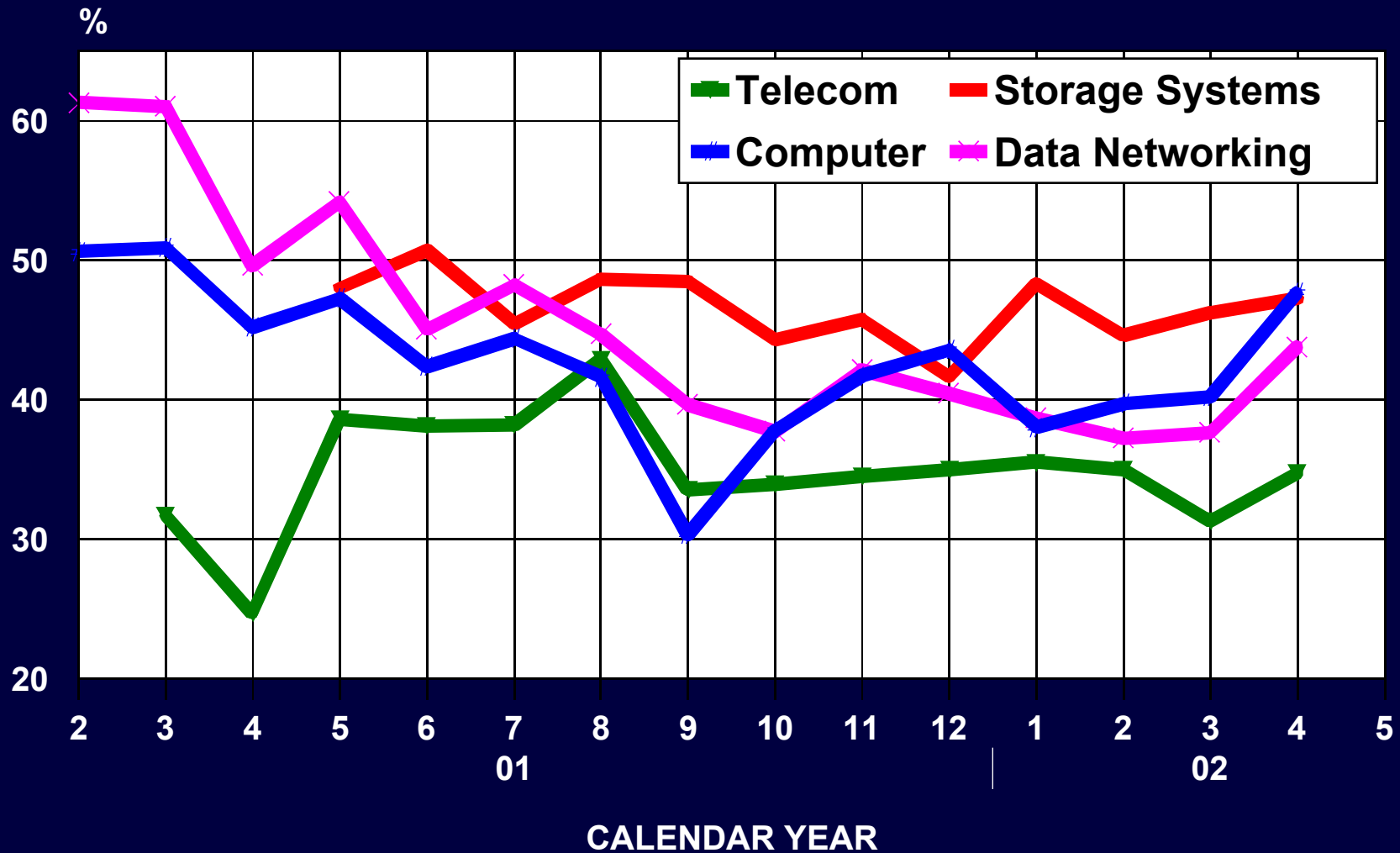
# PMI vs EBI "QUEST" ELECTRONIC BUYERS' INDEX

DIFFUSION INDEX



# IT Future Hardware Spending

% of Companies That Plan to Increase Spending



CIO Magazine Tech Poll  
<http://www.cio.com/info/releases>

# Summary & Conclusions

# Summary

- **The Boom of 2000 was followed by a massive slowdown in 2001. Electronic component orders plummeted due to inventory reduction efforts, a sharp drop in electronic equipment demand & Sept 11 effects.**
- **The "Food Chain" has shifted significant production to China, Eastern Europe and other "low cost" areas.**
- **OEM & CEM inventory levels have now declined and equipment orders are slowly increasing.**
- **Leading indicators predict broad & accelerating growth in 2H'02 and CY 2003.**

# Summary

- The personal computer slump has been offset by large volumes of "computer-like" video game machines.
- Wired Telecom, semiconductor fab and test & measurement equipment recovery will be delayed to 2003.
- Military electronics and security devices are niche growth markets. Automotive has remained relatively stable.
- Inventory replenishment is the current growth driver. Broad end market recovery is needed for a sustained expansion.
- Most companies will take a "wait & see" posture before adding capacity or infrastructure.

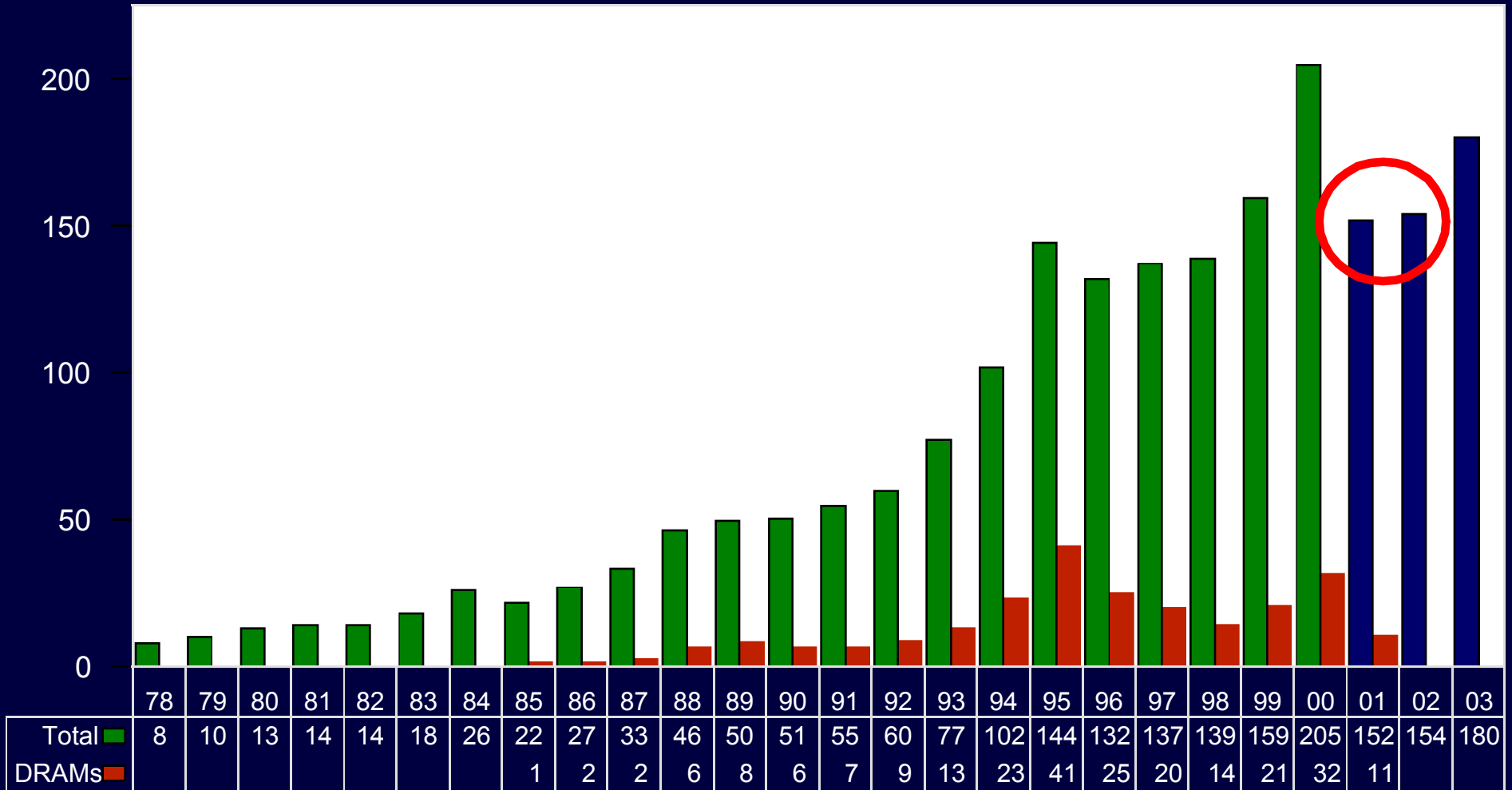
# Electronic Equipment Production Growth

Constant \$ Growth Rates Converted @ Constant Exchange Rates

	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>
World	12.0	-10.7	-1.0	10.1	11.5
USA	10.7	-15.0	-2.9	9.2	11.9
W Europe	11.9	-9.8	-2.8	8.9	8.8
Japan	7.6	-10.2	-4.5	6.1	7.5
Four Tigers	18.2	-9.8	4.1	13.4	13.7
China	15.1	5.7	8.1	16.8	15.5

# World Semiconductor Sales Total & Memory

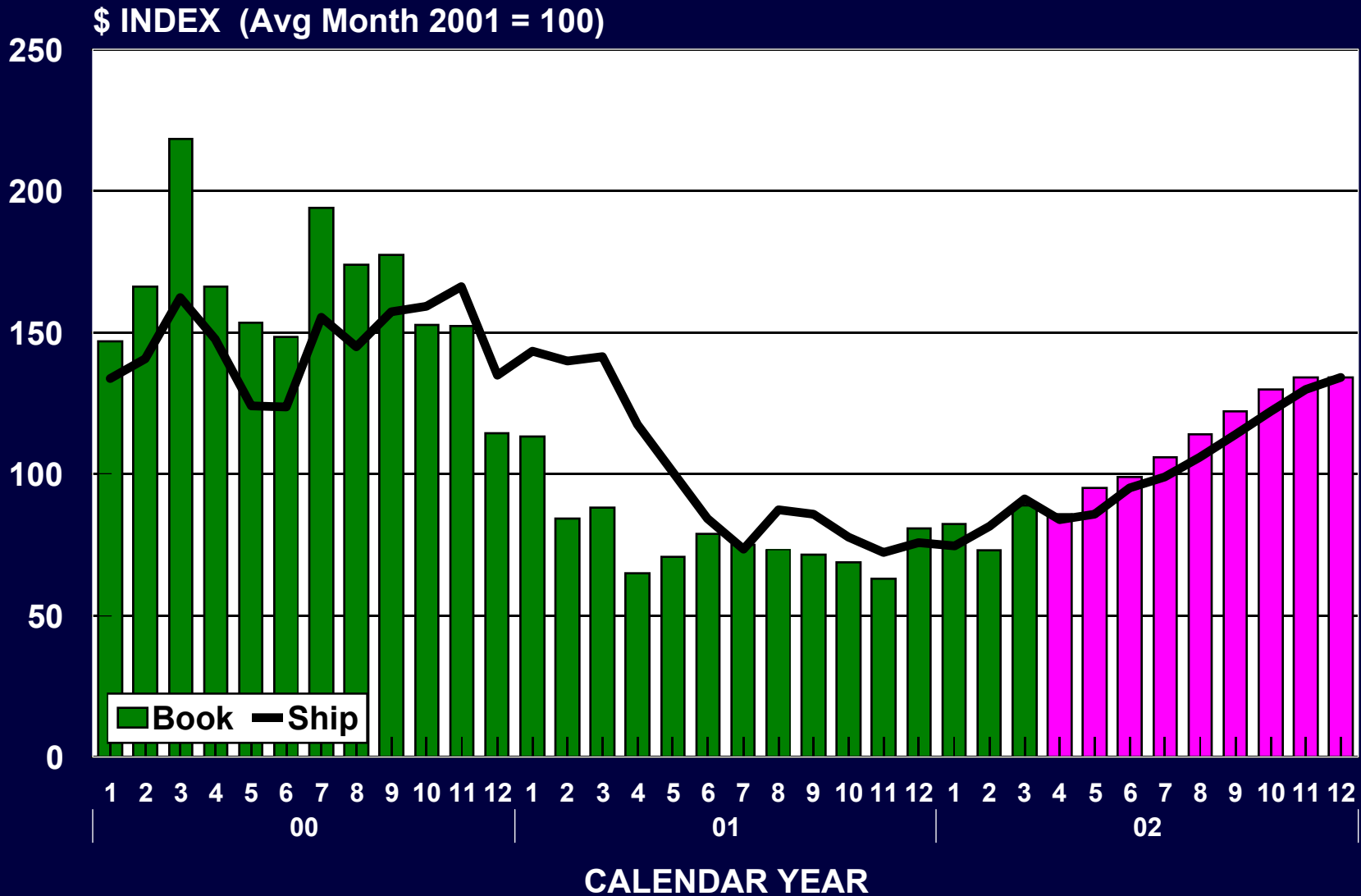
\$ Billions



SIA 11/2000, IC Insights 10/01, Dataquest 12/01, IDC 4/02

# U.S. RIGID PCB BOOKINGS & SHIPMENTS

## 0% Growth Scenario for CY2002



Custer 3/2002 based upon data through 2/2002 + monthly order updates in green