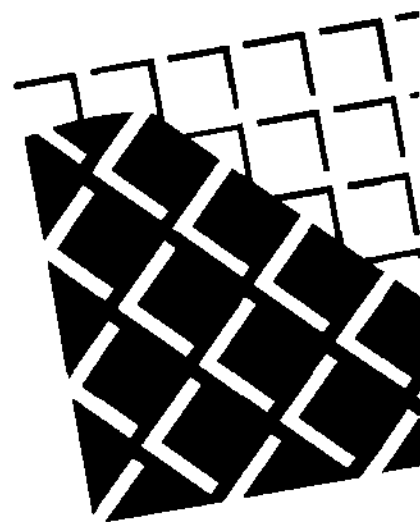


Riding the Semiconductor Wave into Japan

Japanese Semiconductor Industry Service



267

Dataquest

 a company of
The Dun & Bradstreet Corporation

Japanese Semiconductor Industry Service

June 29, 1988
Dataquest Incorporated
San Jose, California
Dataquest

DB a company of
The Dun & Bradstreet Corporation

1290 Ridder Park Drive
San Jose, California 95131-2398
(408) 437-8000
Telex: 171973
Fax: (408) 437-0292

Sales/Service Offices:

UNITED KINGDOM
Dataquest UK Limited
13th Floor, Centrepont
103 New Oxford Street
London WC1A 1DD
England
01-379-6257
Telex: 266195
Fax: 01-240-3653

FRANCE
Dataquest SARL
Tour Gallieni 2
36, avenue Gallieni
93175 Bagnolet Cedex
France
(1)48 97 31 00
Telex: 233 263
Fax: (1)48 97 34 00

EASTERN U.S.
Dataquest Boston
1740 Massachusetts Ave.
Boxborough, MA 01719
(617) 264-4373
Telex: 171973
Fax: (617) 263-0696

GERMANY
Dataquest GmbH
Rosenkavalierplatz 17
D-8000 Munich 81
West Germany
(089)91 10 64
Telex: 5218070
Fax: (089)91 21 89

JAPAN
Dataquest Japan, Ltd.
Taiyo Ginza Building/2nd Floor
7-14-16 Ginza, Chuo-ku
Tokyo 104 Japan
(03)546-3191
Telex: 32768
Fax: (03)546-3198

KOREA
Dataquest Korea
63-1 Chungjung-ro, 3Ka
Seodaemun-ku
Seoul, Korea
(02)392-7273-5
Telex: 27926
Fax: (02)745-3199

The content of this report represents our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies, but is not guaranteed as to accuracy or completeness. It does not contain material provided to us in confidence by our clients.

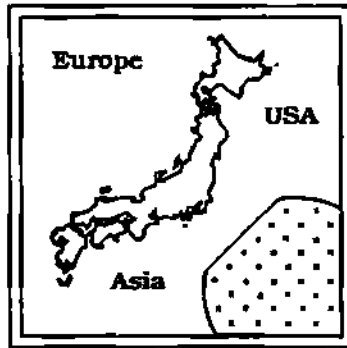
This information is not furnished in connection with a sale or offer to sell securities, or in connection with the solicitation of an offer to buy securities. This firm and its parent and/or their officers, stockholders, or members of their families may, from time to time, have a long or short position in the securities mentioned and may sell or buy such securities.

Printed in the United States of America. All rights reserved. No part of this publication may be reproduced, stored in retrieval systems, or transmitted, in any form or by any means—mechanical, electronic, photocopying, duplicating, microfilming, videotape, or otherwise—without the prior written permission of the publisher.

RIDING THE JAPANESE SEMICONDUCTOR WAVE INTO JAPAN

AGENDA

- 8:30 a.m. **Welcome**
Gene Norrett
Corporate Vice President and Division General Manager
Components Division
Dataquest Incorporated
- 8:45 a.m. **Japanese Industry Trends**
Osamu Ohtake
Director
Japanese Semiconductor Industry Service
Dataquest Japan Limited
- 9:15 a.m. **Perspective on Semiconductor Applications**
David G. Norman
Research Analyst
Semiconductor User and Applications Group
Dataquest Incorporated
- 9:45 a.m. **Access to the Japanese Market: Oasis or Mirage?**
Elisabeth Blaettermann
Dataquest Associate
- 10:15 a.m. **Coffee Break**
- 10:45 a.m. **Emerging Technologies and Alliances**
Sheridan Tatsuno
Senior Industry Analyst
Japanese Semiconductor Industry Service
Dataquest Incorporated
- 11:15 a.m. **Panel Discussion**
Succeeding in the Japanese Market
- 12:00 Noon **Lunch**



Riding the Semiconductor Wave
into Japan

JAPANESE INDUSTRY TRENDS

OSAMU OHTAKE

Director

Japanese Semiconductor Industry Service
Dataquest Incorporated

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

AGENDA

- Overview
- Company trends
- Product trends
- Market forecast

ESTIMATED CAPITAL SPENDING

(Billions of Yen)

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Fujitsu	125.0	72.0	58.0	39.7	47.0
Hitachi	130.0	92.0	65.0	40.0	58.0
Matsushita	95.0	87.0	58.0	22.0	52.0
Mitsubishi	70.0	62.0	40.0	16.0	25.0
NEC	140.0	123.0	102.0	40.0	50.0
Oki	28.0	26.0	22.0	21.0	38.0
Sanyo	35.0	26.0	22.0	22.0	30.0
Sharp	28.0	36.0	32.0	22.0	34.0
Toshiba	148.0	123.0	85.0	70.0	80.0

Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

ESTIMATED R&D SPENDING

(Billions of Yen)

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Fujitsu	26.0	28.0	30.0	31.0	38.0
Hitachi	40.0	45.0	45.0	51.0	58.0
Matsushita	25.0	28.0	33.0	35.0	45.0
Mitsubishi	27.0	29.0	28.0	30.0	33.5
NEC	38.5	46.0	50.0	56.0	66.0
Oki	11.0	12.0	12.0	13.0	17.0
Sanyo	13.5	16.0	17.0	17.5	20.0
Sharp	13.0	14.0	15.0	17.0	20.0
Toshiba	36.0	40.0	46.0	52.0	66.0

Source: Dataquest

COMPANY TRENDS -- NEC

- Worldwide strategy with worldwide fabs
- Top-heavy organization
- V33 original MPU without microcode
- Seeking alliances to achieve worldwide strategies
- Strengthening memory business

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

COMPANY TRENDS -- TOSHIBA

- Ready to be worldwide leader: memory products
- Motorola alliance going well
- Increasing ASIC revenue
- COCOM impact not big?
- BICMOS: next important area

COMPANY TRENDS -- HITACHI

- Refocus on memory business
- Alliance with VLSI Technology
- Introducing H32 TRON chip
- Fab in Texas
- Strengthening Asian operations

© 1988 Dataquest Incorporated June — Reproduction Prohibited

COMPANY TRENDS -- FUJITSU

- Worldwide ASIC leader
- Introduced compiler design tool ZEPHCAD
- Strong captive demand
- Constructing Malaysian plant

COMPANY TRENDS -- MATSUSHITA

- 16M DRAM at ISSCC
- Big investment in 1988
- Increasing purchasing due to market access
- Developing new line of consumer goods

© 1988 Dataquest Incorporated June — Reproduction Prohibited

COMPANY TRENDS -- MITSUBISHI

- Cautious about investment
- Manufacturing and licensing agreements
- Good memory, MCU, and power products business
- Linear business declining

COMPANY TRENDS -- SHARP

- Leading in optoelectronics (laser diode)
- Emphasizing memory business
- Planning to have new fab in 1988
- Increasing mask ROM production

© 1988 Dataquest Incorporated June — Reproduction Prohibited

COMPANY TRENDS -- SANYO

- Marketing RISC 32-bit MPU from VLSI Technology
- New fab profitable
- Strengthening sales power
- Looking at other semiconductor products: memory?

COMPANY TRENDS -- SONY

- New fab from Fairchild
- Strengthening CCD sensor and SRAM business
- Growing captive market
- Good make-buy strategy

COMPANY TRENDS -- SEIKO EPSON

- Concentrating on ASIC business
- Making big investment
- Increasing captive demand
- Many alliances in foundry area
- Providing full-custom design capabilities in United States

COMPANY TRENDS -- NMB SEMICONDUCTOR

- Turned profitable
- Many alliances
- Constructing second fab for 1M DRAM

© 1988 Dataquest Incorporated June — Reproduction Prohibited

COMPANY TRENDS -- YAMAHA

- Strengthening ASIC business
- Rebuilt plant to have 1.2-micron technology
- Strengthening merchant sales with multifunctional ASIC

COMPANY TRENDS -- RICOH

- Opened design center
- Starting marketing of BICMOS CBIC
- Provided 16-bit MPU for CBIC

© 1988 Dataquest Incorporated June — Reproduction Prohibited

COMPANY TRENDS -- TI JAPAN

- Making big investment
- 20-year anniversary in Japan
- Three board members in Japan
- Strengthening design center

COMPANY TRENDS -- MOTOROLA JAPAN

- Toshiba alliances going well
- Pushing new micro products
- Needs to develop ASIC business in Japan
- Planning high growth

© 1988 Dataquest Incorporated June — Reproduction Prohibited

COMPANY TRENDS -- INTEL JAPAN

- Aiming to be leader in 32-bit market
- Facing hard competition from NEC
- Returned to profitability
- Close cooperation with U.S. headquarters

COMPANY TRENDS -- NATIONAL SEMICONDUCTOR JAPAN

- National and Fairchild merged
- Mitsubishi sells 32-bit MPU
- Strengthening ASIC business

© 1988 Dataquest Incorporated June — Reproduction Prohibited

COMPANY TRENDS -- AMD JAPAN

- AMD and MMI merged
- Developing synergy
- Strengthening technical support

OTHER COMPANY TRENDS

- LSI Logic has many orders
- Several U.S. start-ups are increasing revenue
- Europeans are trying to expand
- Asian companies' growth moderating

© 1988 Dataquest Incorporated June — Reproduction Prohibited

PRODUCT TRENDS -- MICRO

- Hitachi starts sampling H32 TRON chip
- 32-bit war (80386, 68020/30, V70, H32, and VM8600)
- Overall slow market growth
- Moving with new products toward high-end applications

PRODUCT TRENDS -- MEMORY

- Shortage to continue in 1988 (1M DRAM, 256K DRAM, etc.)
- Increasing capacities
- Dependent upon semiconductor agreement
- Cautiousness among Japanese suppliers

© 1988 Dataquest Incorporated June — Reproduction Prohibited

PRODUCT TRENDS -- ASICs

- Design starts are increasing (gate array)
- Prices stabilizing (gate array)
- CBICs: the emerging area
- Increasing importance of penetration in emerging areas

PRODUCT TRENDS -- BIPOLAR LOGIC

- ASICs replacing standard logic?
- Increased speed
- Increasing foreign company shares
- Captive usage of ASICs increasing

© 1988 Dataquest Incorporated June — Reproduction Prohibited

PRODUCT TRENDS -- LINEAR

- Slow demand in consumer area
- Rush to develop industrial use (flash converter)
- BICMOS products increasing
- Linear ASIC business starting

PRODUCT TRENDS -- DISCRETE

- Power MOSFET business growing
- Increasing SO packages
- Developing power ICs
- Emerging GaAs devices

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

PRODUCT TRENDS -- OPTOELECTRONICS

- Price erosion will stop (laser diode)
- CCD image sensor is growing
- High-bright LED is growing
- Production shifts to Asia

JAPANESE MARKET FORECAST

(Millions of Dollars)

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
Total Semiconductor	18,214	19,845	18,788	21,071	25,404
IC	14,059	15,359	14,487	16,261	19,844
Discrete	3,019	3,234	3,066	3,403	3,914
Optoelectronic	1,136	1,252	1,235	1,407	1,646

Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

CONCLUSIONS

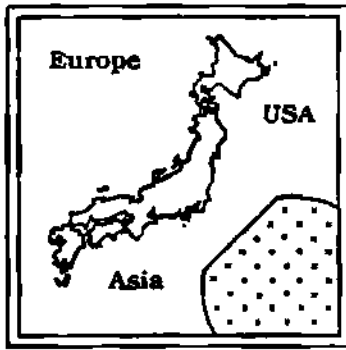
- **Mild recovery in 1988**
- **Increasing alliances**
- **Micro and ASIC technology changing**
- **New consumer goods with new chips**
- **Keeping world leadership position**

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

Dataquest

DB a company of
The Dun & Bradstreet Corporation



Riding the Semiconductor Wave
into Japan

PERSPECTIVE ON SEMICONDUCTOR APPLICATIONS

DAVID G. NORMAN

Research Analyst
Semiconductor User and Applications Group
Dataquest Incorporated

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

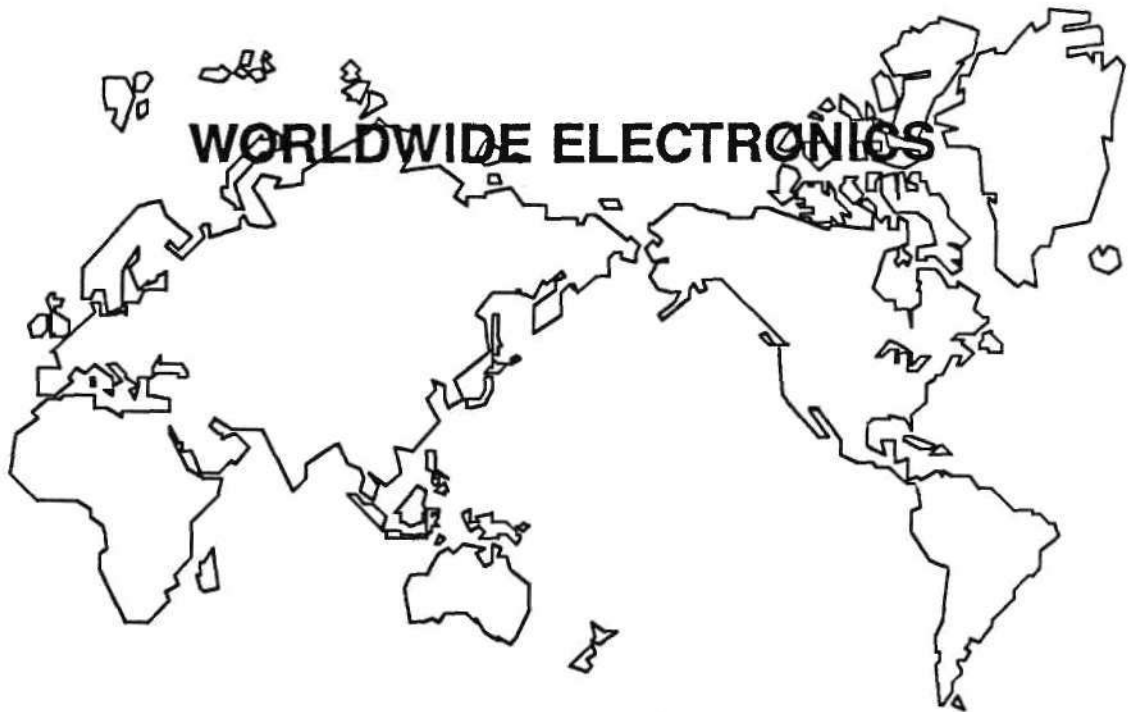
AGENDA

- **Worldwide electronics**
- **Regional electronics**
 - **Japan**
 - **North America**
 - **Europe**
 - **Rest of World**
- **Application market issues**
- **User issues**

MAIN POINTS

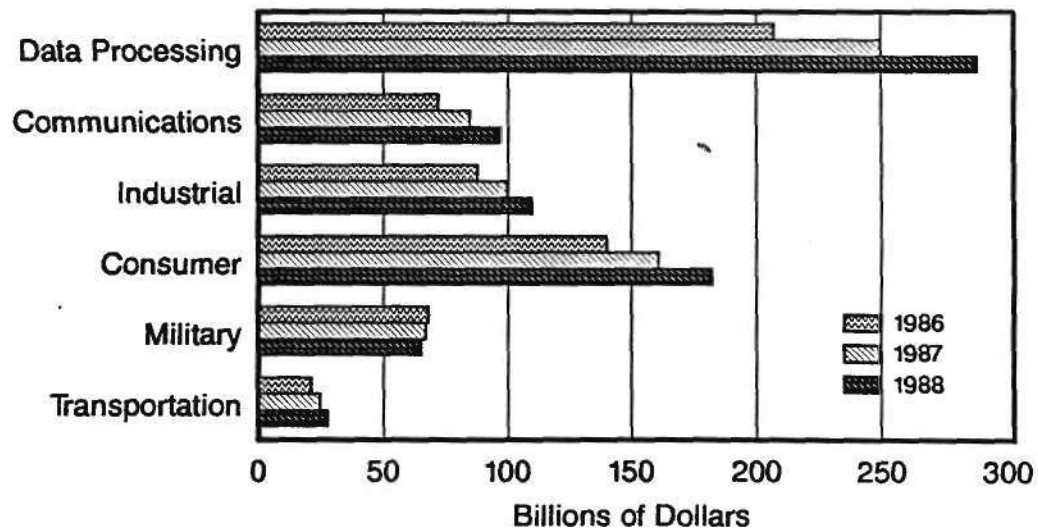
- **Critical markets**
- **Demand drivers**
- **Issues**

© 1988 Dataquest Incorporated June — Reproduction Prohibited



WORLDWIDE ELECTRONICS PRODUCTION

Application Market



Source: Dataquest

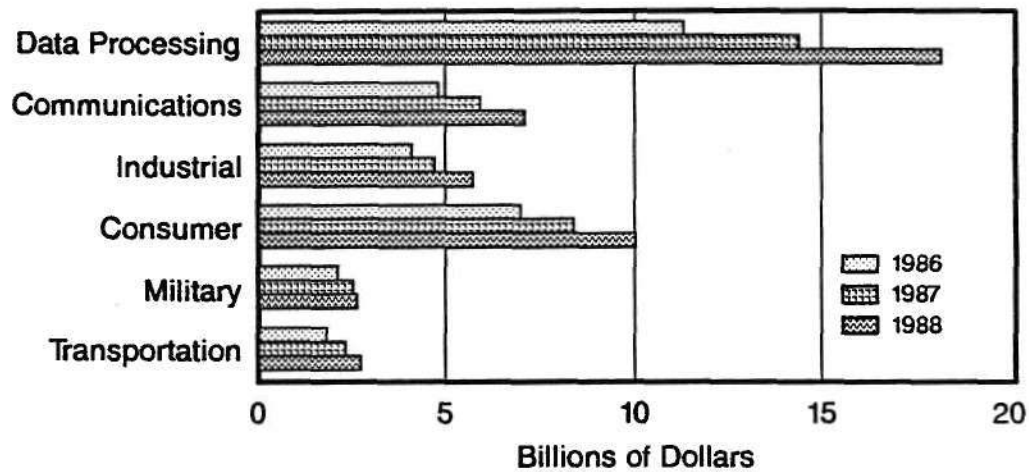
© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

WORLDWIDE SEMICONDUCTOR CONSUMPTION

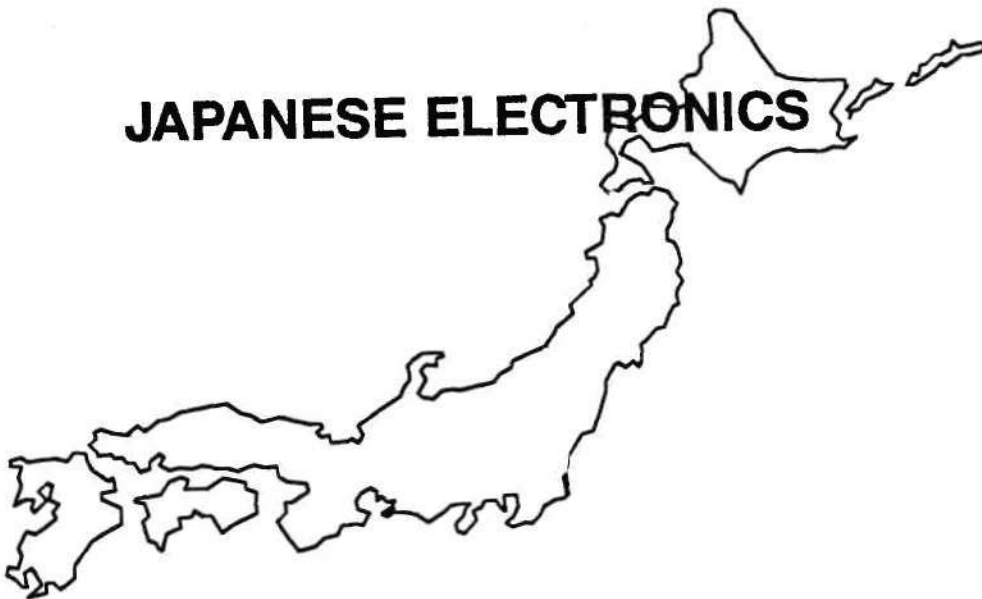
By Application Market

Application Market



Source: Dataquest

JAPANESE ELECTRONICS

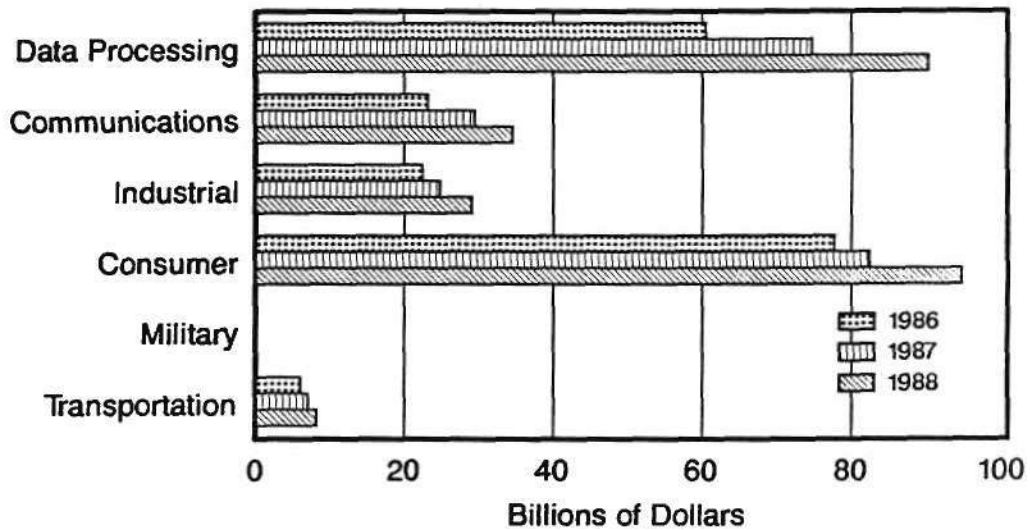


© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

JAPANESE ELECTRONICS PRODUCTION

Application Market

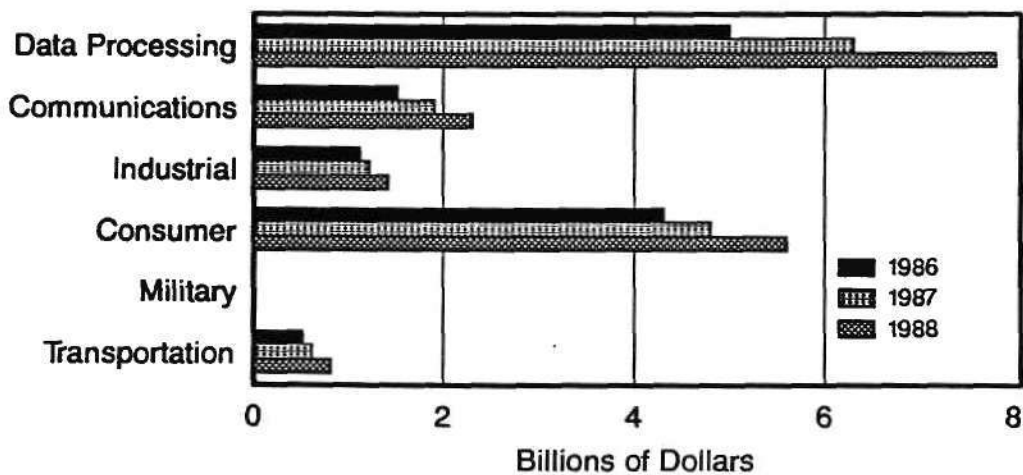


Source: Dataquest

JAPANESE SEMICONDUCTOR CONSUMPTION

By Application Market

Application Market



Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

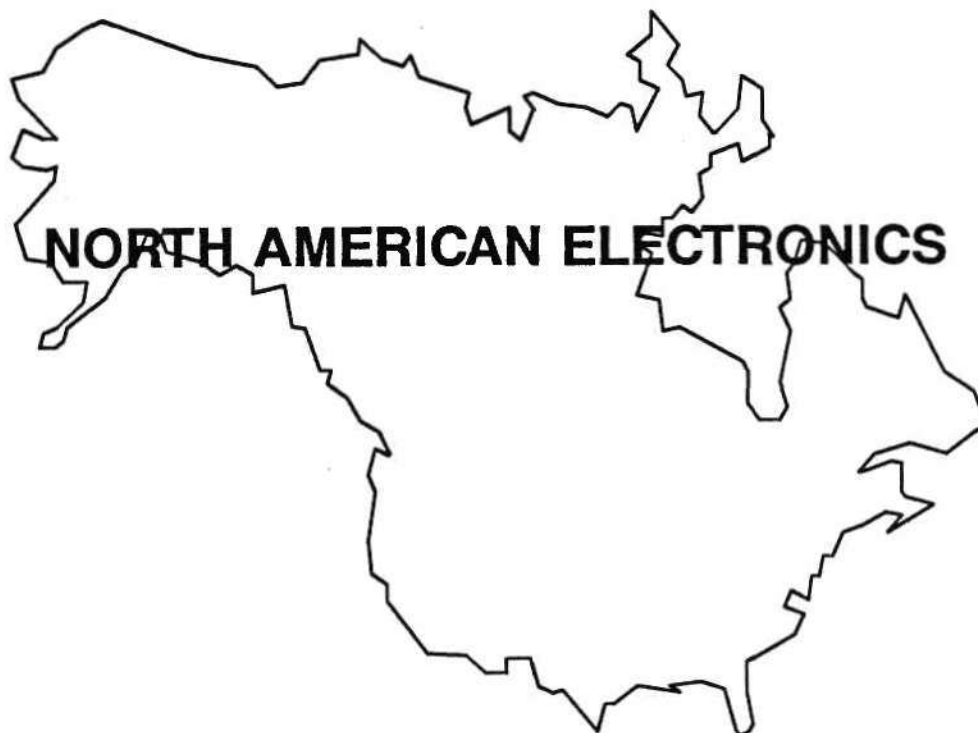
OUTLOOK FOR JAPAN'S MAJOR SEMICONDUCTOR MARKETS

(Billions of Dollars)

	<u>1987</u>	<u>1991</u>	<u>CAGR</u> <u>1987-1991</u>
VCRs	\$8.6	\$11.1	6.6%
Mainframe	\$8.1	\$13.6	13.8%
Personal Computers	\$2.6	\$ 5.3	18.4%
Terminals	\$5.0	\$ 8.3	12.9%
Color TVs	\$5.3	\$ 7.1	7.6%

Note: Based on production value

Source: Dataquest

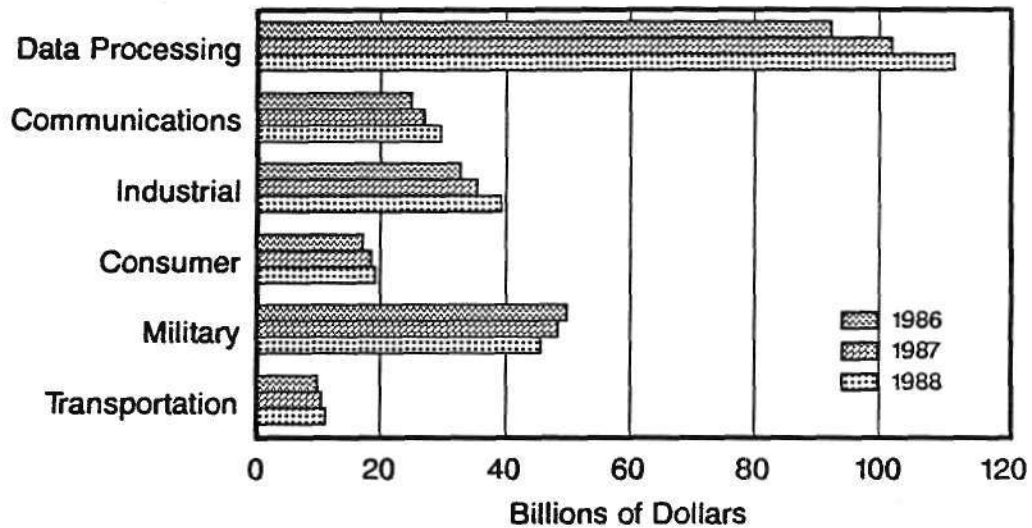


© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

NORTH AMERICAN ELECTRONICS PRODUCTION

Application Market

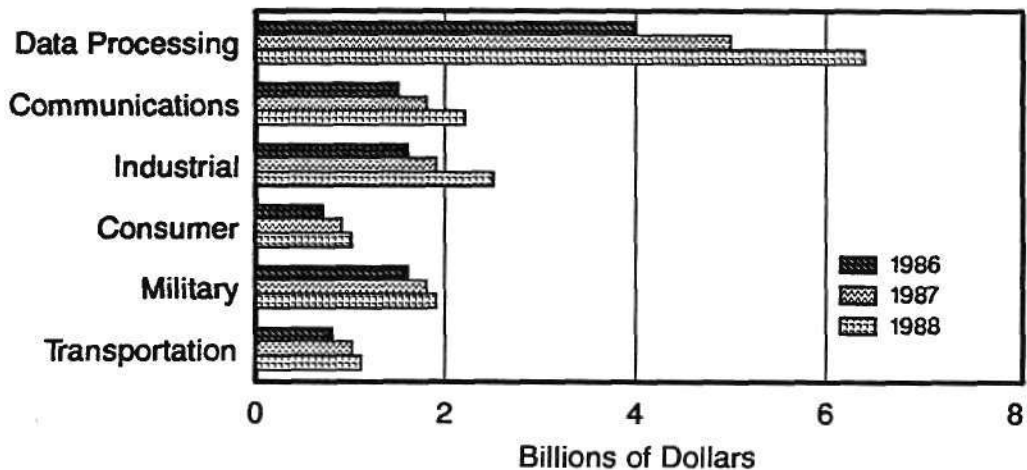


Source: Dataquest

NORTH AMERICAN SEMICONDUCTOR CONSUMPTION

By Application Market

Application Market



Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

OUTLOOK FOR NORTH AMERICA'S MAJOR SEMICONDUCTOR MARKETS

(Billions of Dollars)

	<u>1987</u>	<u>1991</u>	<u>CAGR</u> <u>1987-1991</u>
Personal Computers	\$19.2	\$26.3	8.2%
Automotive Power Train/ Engine Control	\$ 3.2	\$ 4.2	7.1%
Rigid Disk Drives	\$17.3	\$21.2	5.2%
Corporate Resource Computers	\$13.6	\$16.7	5.3%
Large Department Computers	\$ 9.4	\$12.3	6.8%

Source: Dataquest

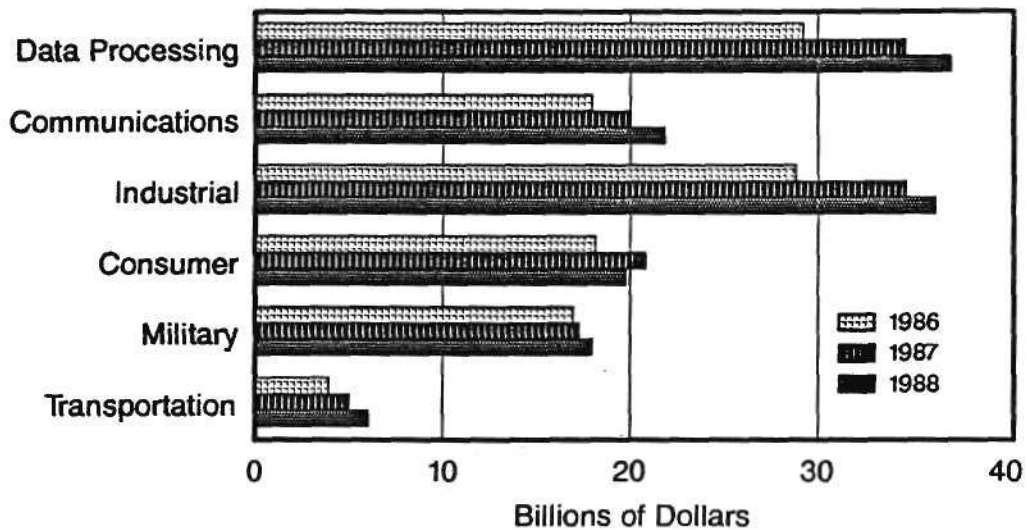


© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

EUROPEAN ELECTRONICS PRODUCTION

Application Market

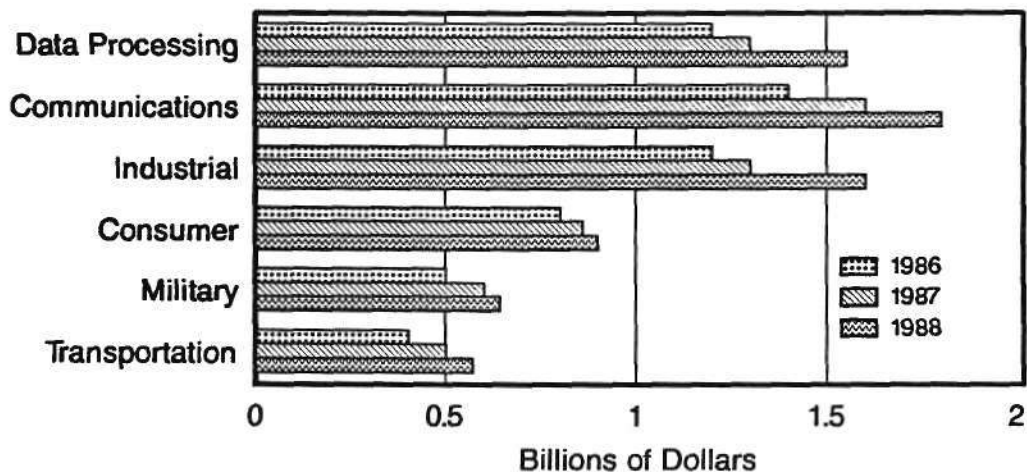


Source: Dataquest

EUROPEAN SEMICONDUCTOR CONSUMPTION

By Application Market

Application Market



Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

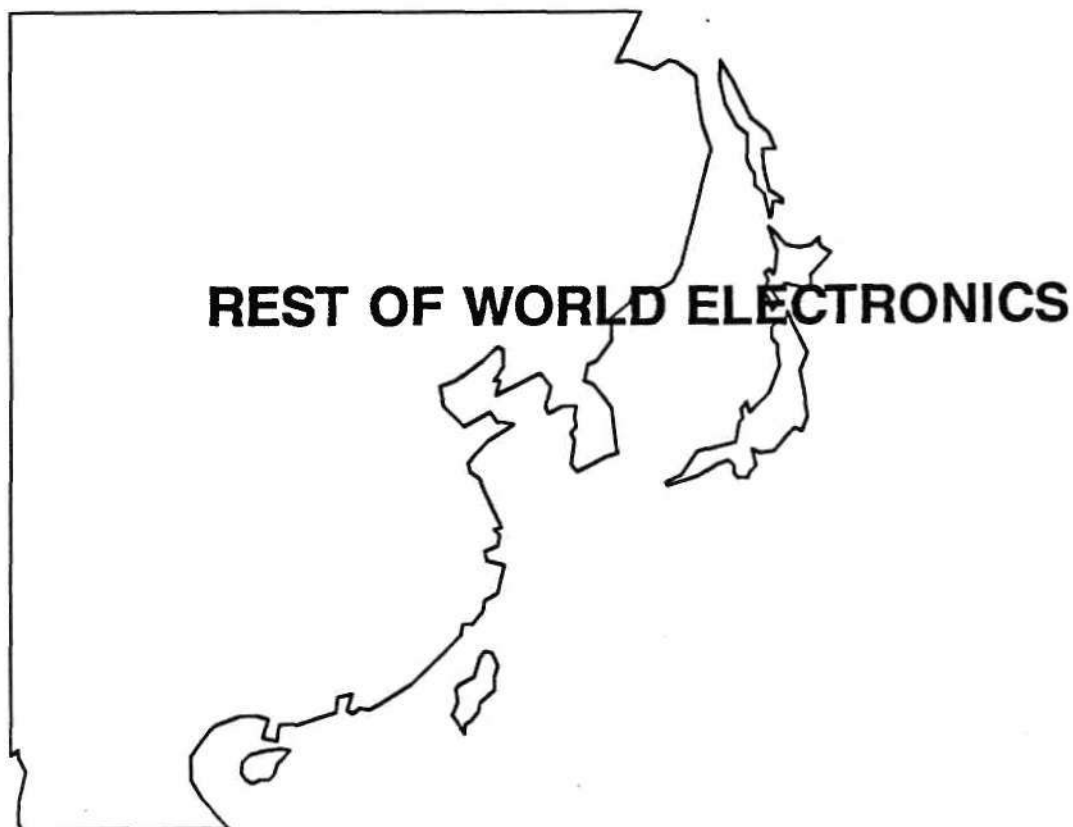
Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
 1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

OUTLOOK FOR EUROPE'S MAJOR SEMICONDUCTOR MARKETS

(Millions of Dollars)

	<u>1987</u>	<u>1991</u>	<u>CAGR</u> <u>1987-1991</u>
Compact Disk Players	\$ 447	\$ 730	13.0%
Personal Computers	\$8,424	\$11,645	8.4%
Automotive/Engine Control	\$2,734	\$ 4,278	11.8%

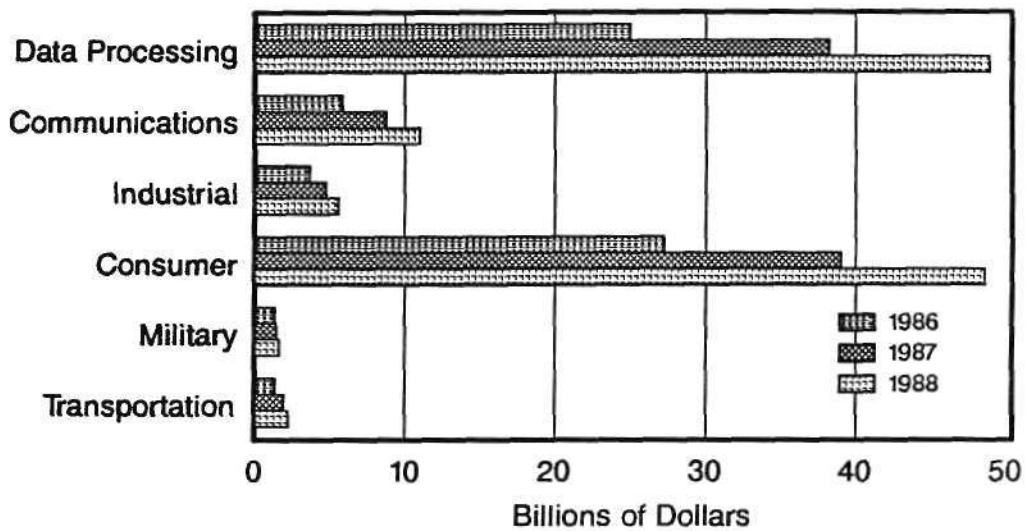
Source: Dataquest



© 1988 Dataquest Incorporated June — Reproduction Prohibited

REST OF WORLD ELECTRONICS PRODUCTION

Application Market

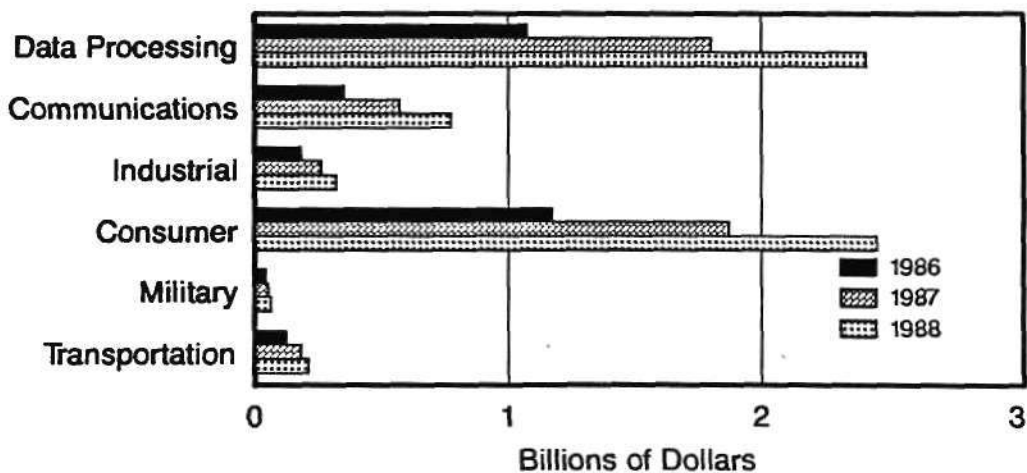


Source: Dataquest

REST OF WORLD SEMICONDUCTOR CONSUMPTION

By Application Market

Application Market



Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

OUTLOOK FOR REST OF WORLD MAJOR SEMICONDUCTOR MARKETS

(Millions of Dollars)

	<u>1987</u>	<u>1991</u>	<u>CAGR</u> <u>1987-1991</u>
Personal Computers	\$ 931	\$2,168	23.5%
TVs	\$1,440	\$1,937	7.7%
VCRs	\$ 325	\$ 518	12.3%

Note: Includes Republic of China, Hong Kong, and Singapore

Source: Dataquest



© 1988 Dataquest Incorporated June — Reproduction Prohibited

DATA PROCESSING ISSUES

- Japan's new focus on the information processing industry
- Product availability:
 - Leading-edge memories and microprocessors
- IBM PS/2 clonability
- Acceptance of OS/2

COMMUNICATIONS ISSUES

- ISDN
- FDDI
- Upgrade analog to digital switching technology
- Integration of voice and data communications
- Connecting the desk

© 1988 Dataquest Incorporated June — Reproduction Prohibited

INDUSTRIAL ISSUES

- Technology upgrade: move from analog to digital
- Network standards for manufacturing automation
- Islands of automation instead of centralized control
- Automation growth in industries other than automotive

CONSUMER ISSUES

- Base of manufacturing shifting
- Searching for the next VCR
- Only one major U.S.-based company exists
- Increased functionality to drive sales

© 1988 Dataquest Incorporated June — Reproduction Prohibited

MILITARY ISSUES

- Slowing of Reagan era
- Upgraded programs
- Foreign dependency on technology
- Defense sharing (NATO, Japanese involvement)
- Keeping up with competition

TRANSPORTATION ISSUES

- Component reliability
- Emerging semiconductor applications:
 - Antilock braking
 - Electronic suspension
 - Airbags/seat restraints
 - Electronic steering
- Continued automotive semiconductor growth despite slowing auto production
- Semiconductor products to be integrated in near term:
 - 16-bit microcontrollers
 - Application-specific standard products
 - Power ICs

© 1988 Dataquest Incorporated June — Reproduction Prohibited

WHAT'S ON THE USERS' MINDS?



WHAT'S ON THE USERS' MINDS?

The Major Issues

1986

Pricing
Quality/reliability
On-time delivery
Supply/availability/shortages
JIT/inventory control
Reducing vendor base
Product obsolescence
Second-sourcing
Forecasting

1987

Pricing
Availability/lead times
Quality/reliability
On-time delivery
FMVs/trade agreement
Cost control
JIT/inventory control
Surface mount
New products/obsolescence
ASICs
Offshore manufacturing
and procurement

© 1988 Dataquest Incorporated June — Reproduction Prohibited

WHAT'S ON THEIR MINDS?

The Major Issues 1988

- Availability/lead times/shortages
- Pricing
- On-time delivery
- Cost control
- Memories
- Quality/reliability
- Reducing vendor base
- New products/obsolescence
- JIT/inventory control
- Fluctuating yen/currency exchange

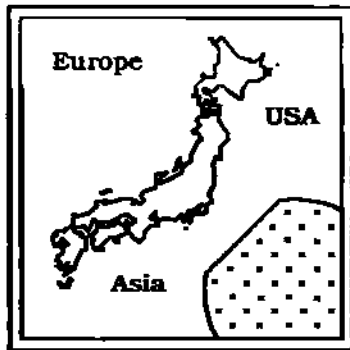
CONCLUSIONS

- Critical markets for success:
 - Data processing
 - Consumer
- Demand drivers:
 - Personal computers
 - VCRs
- Issues:
 - Semiconductor availability
 - Technology dependence

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest

DB a company of
The Dun & Bradstreet Corporation



Riding the Semiconductor Wave
into Japan

ACCESS TO THE JAPANESE MARKET: OASIS OR MIRAGE?

ELISABETH BLAETTERMANN

Associate

Japanese Semiconductor Industry Service
Dataquest Incorporated

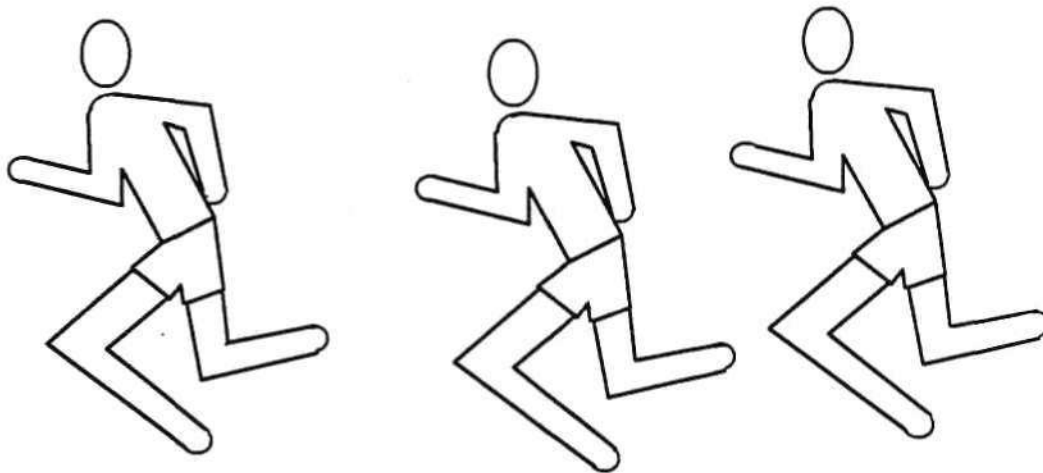
© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

AGENDA

- Basic rules for doing business overseas
- Elements for success on the Japanese market
- Conclusion

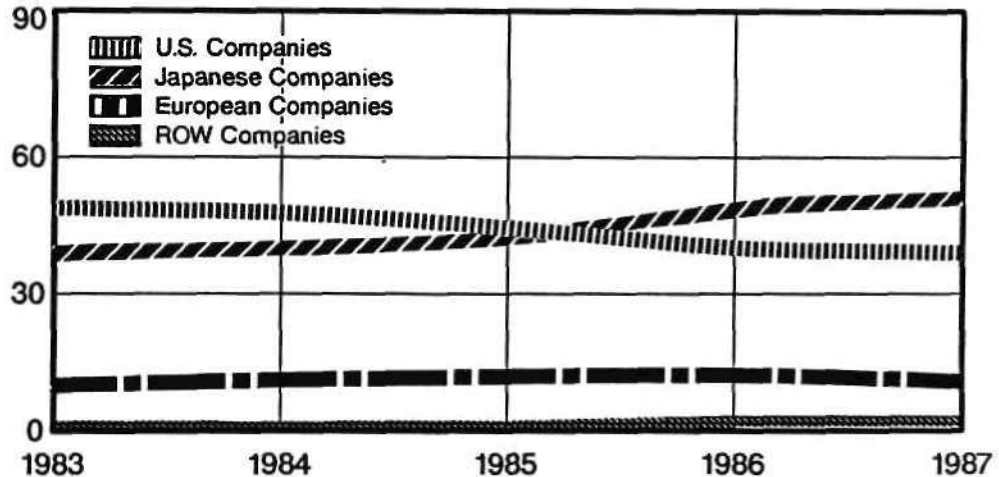
WHY ENTER A FOREIGN MARKET?



© 1988 Dataquest Incorporated June — Reproduction Prohibited

WORLDWIDE SEMICONDUCTOR MARKET SHARE

Percent of World Sales



Source: Dataquest

MAIN REASONS FOR DOING BUSINESS OVERSEAS

- Profits
- Proximity to technology trends
- Image of being a local supplier
- Competitive advantage



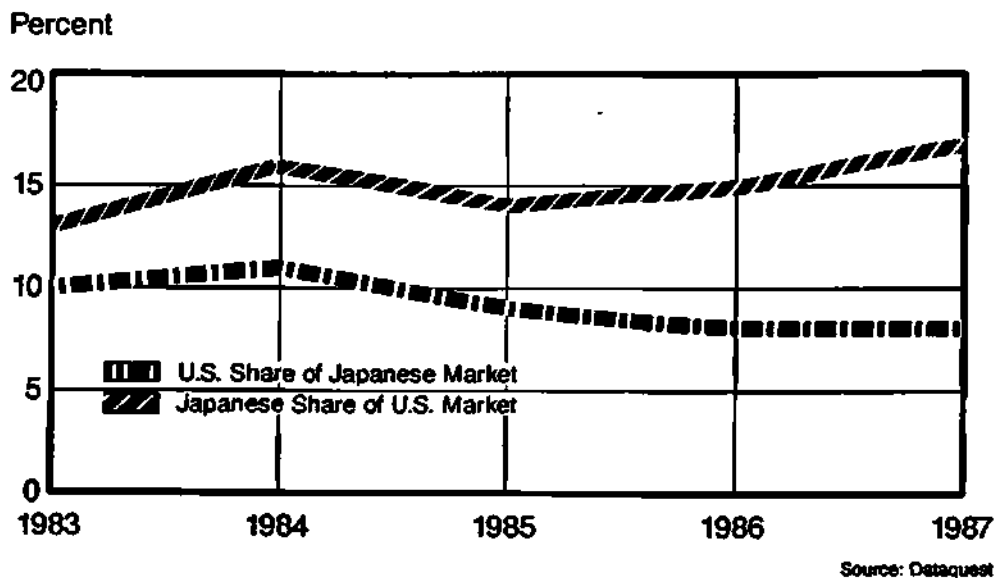
© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

MAIN REASONS FOR DOING BUSINESS OVERSEAS

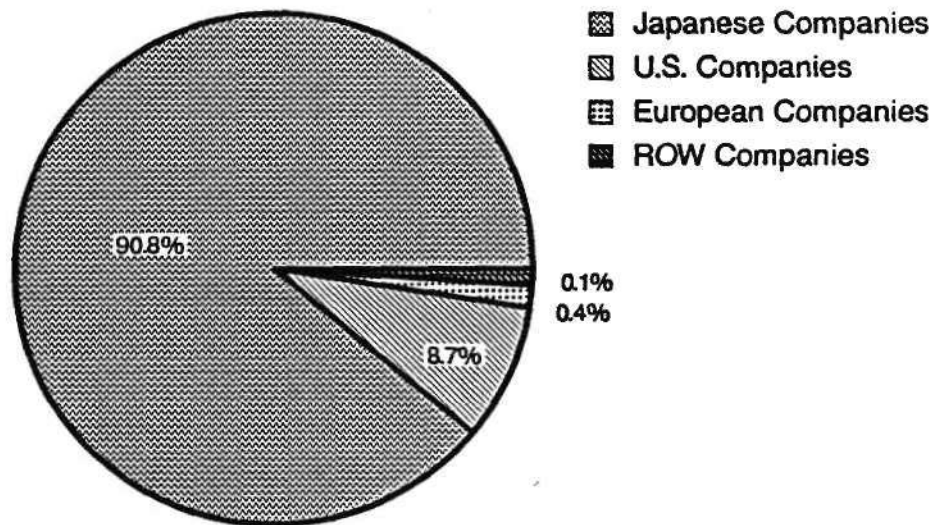
- New sources of supply
- Lower labor cost
- Manufacturing inside trade barriers

U.S. SHARE OF JAPANESE MARKET VS. JAPANESE SHARE OF U.S. MARKET



© 1988 Dataquest Incorporated June — Reproduction Prohibited

SUPPLIERS TO JAPANESE SEMICONDUCTOR MARKET -- 1987



Source: Dataquest

SUCCESS IN THE JAPANESE MARKET MEANS

- Analyze the market before entering it (not during), setting realistic targets
- Emphasize unique products
- Follow your long-term strategy
- Send your best executives to Japan



© 1988 Dataquest Incorporated June — Reproduction Prohibited

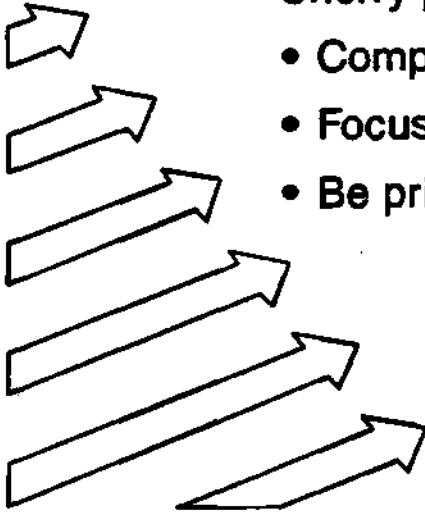
Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

MARKET PENETRATION

Existing Product Line Strategy

Cherry pick from present product line

- **Compete on uniqueness**
- **Focus on high-value applications**
- **Be price competitive**



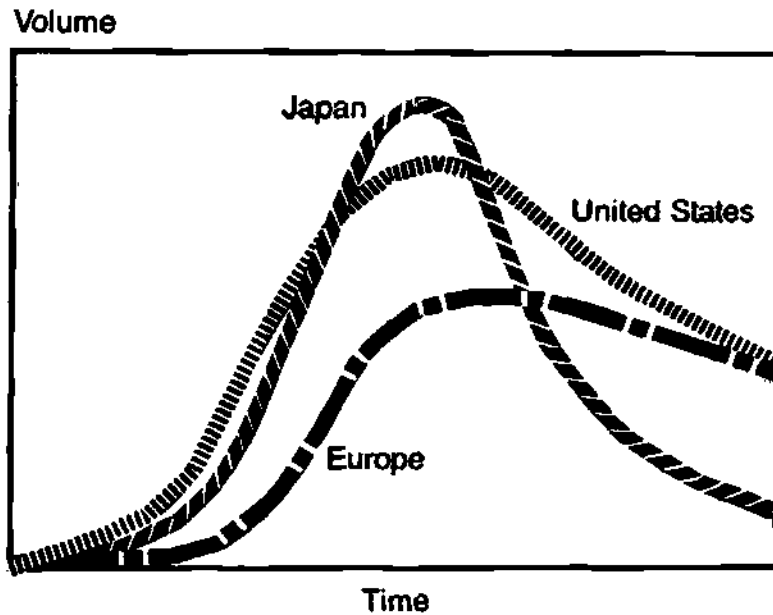
PRODUCT LIFE CYCLE

**Evaluate state of
life cycle of targeted product**

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

PRODUCT LIFE CYCLE

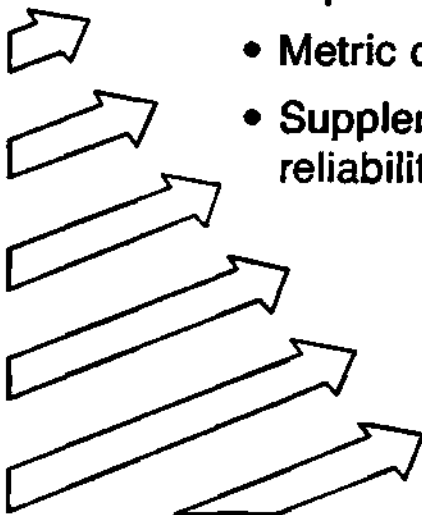


Source: Dataquest

MARKET PENETRATION

Show necessary and expected support

- Japanese specs
- Metric dimensions
- Supplement spec sheets with test data, reliability data, application notes

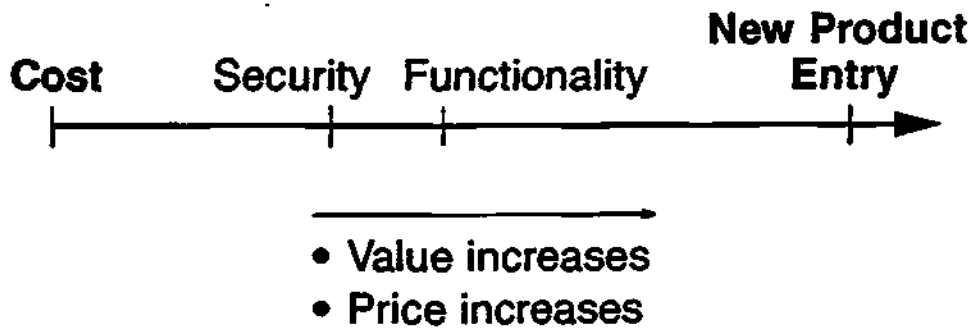


© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

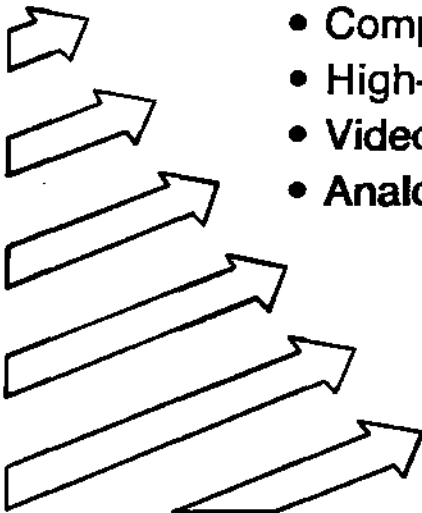
MARKET PENETRATION

New Products
Benefit Spectrum to Customer

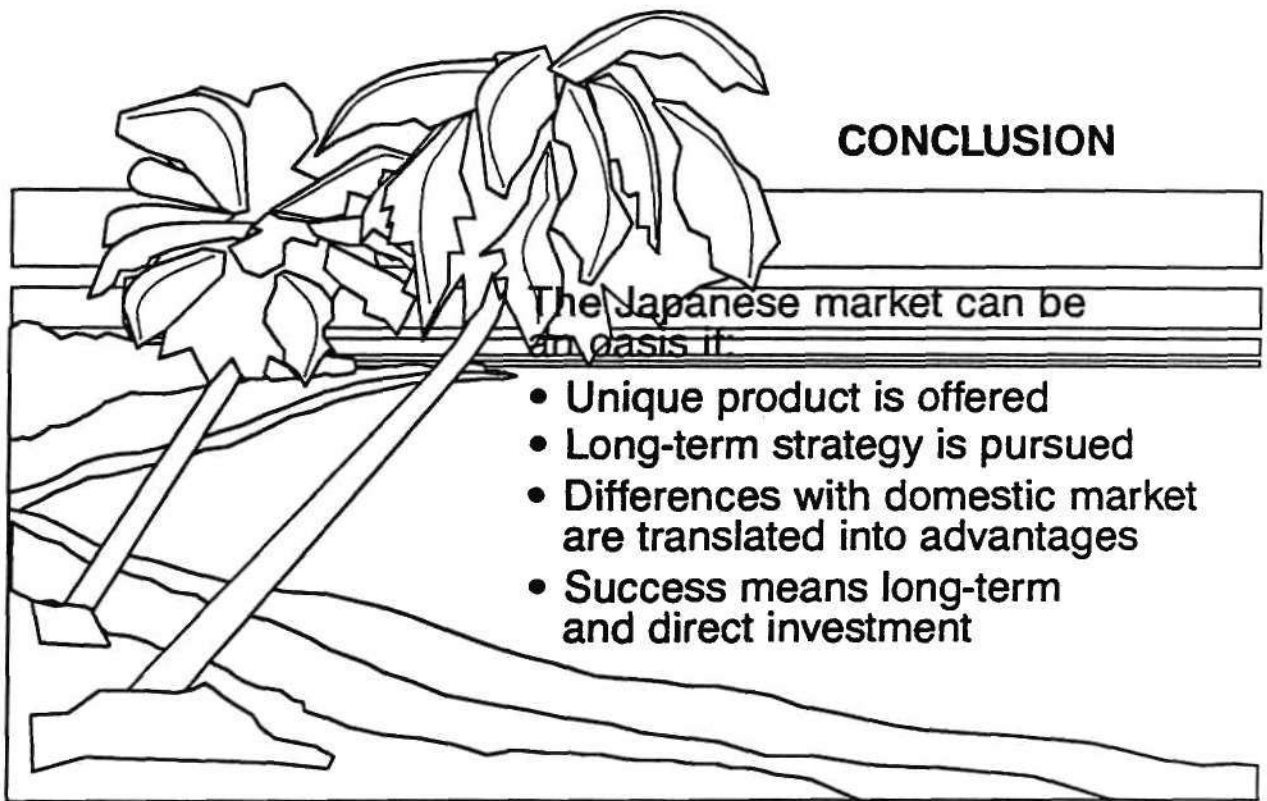


MARKET PENETRATION

- 32-bit MPU, RISC, SPARC
- DSP
- Complex standard cells – software
- High-performance bipolar devices
- Video DACs
- Analog devices



© 1988 Dataquest Incorporated June — Reproduction Prohibited

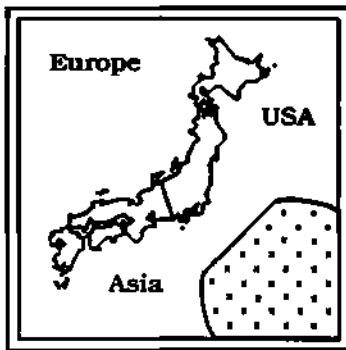


© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

Dataquest

DB a company of
The Dun & Bradstreet Corporation



Riding the Semiconductor Wave
into Japan

EMERGING TECHNOLOGIES AND ALLIANCES

SHERIDAN TATSUNO

Senior Industry Analyst
Japanese Semiconductor Industry Service
Dataquest Incorporated

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

OVERVIEW -- JAPANESE INDUSTRY REPOSITIONING

Pre-1985

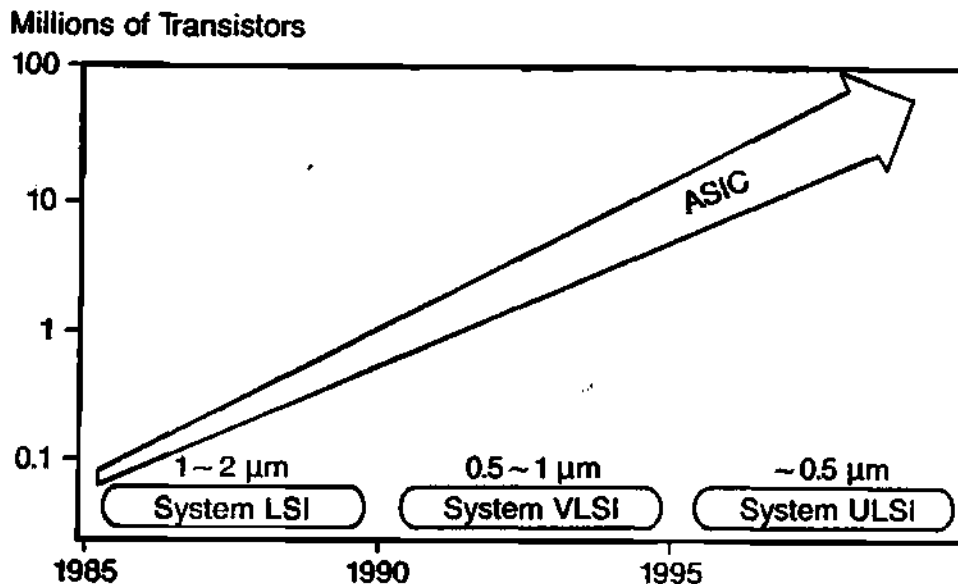
- Commodity ICs
- MPU licensing and second-sourcing
- DRAMs

Post-1985

- ASICs and CAD software
- Proprietary MPUs, TRON, and RISC
- Specialty memories

Source: Dataquest

LARGE-SCALE ASIC TRENDS



Source: Dataquest

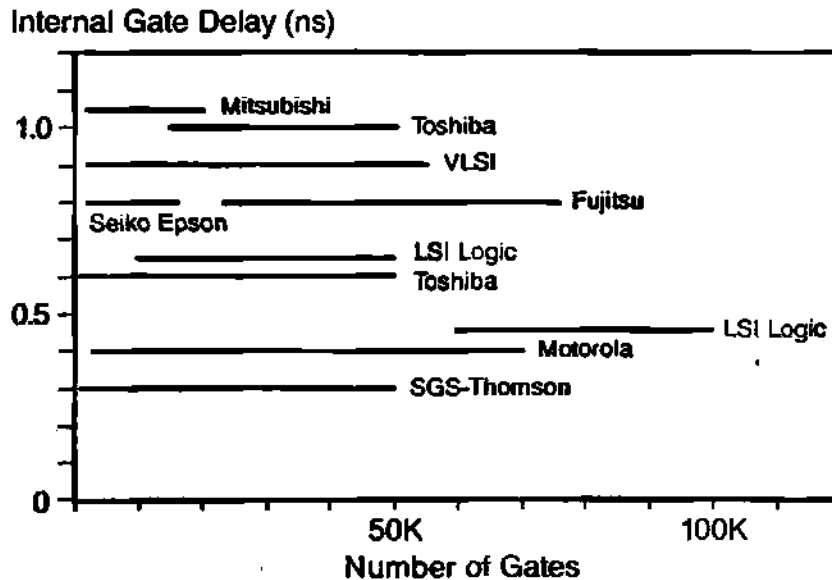
© 1988 Dataquest Incorporated June — Reproduction Prohibited

LARGE-SCALE ASIC TRENDS

1 ~ 2 μm System LSI	0.5 ~ 1 μm System VLSI	~ 0.5 μm System ULSI
<ul style="list-style-type: none"> • 8/16-bit CPU core • Module generator • Megacell library 	<ul style="list-style-type: none"> • 32-bit CPU core • High-function module generator • Standard LSIs into megacells • Chip-level silicon compilers 	<ul style="list-style-type: none"> • 64-bit CPU core • Chip-level silicon compiler, by use • AI superchip (ultraparallel processors)

Source: Dataquest

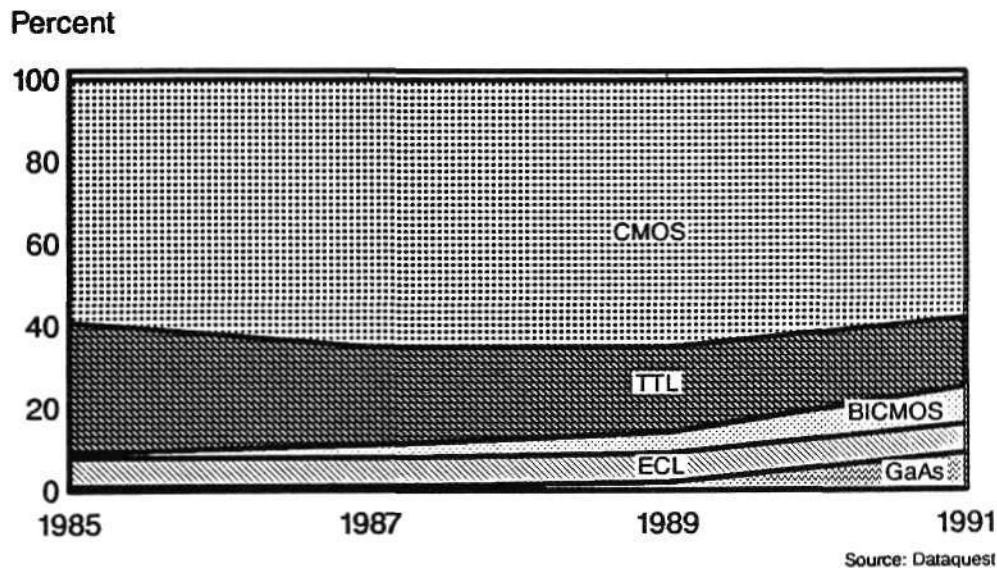
CHANNELLESS GATE ARRAY VENDORS IN JAPAN



Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

ESTIMATED JAPANESE GATE ARRAY MARKET BY TECHNOLOGY



JAPANESE BICMOS ASIC SUPPLIERS AND PRODUCTS

<u>Company</u>	<u>Product</u>	<u>Technology</u>	<u>Gates</u>
Fujitsu	Gate array	1.5-micron CMOS	430-2,160
		1.5-micron bipolar	
Hitachi	Gate array	2.0-micron CMOS	630-2,550
	Gate array	1.3-micron CMOS	4,000-14,000
NEC	Gate array	1.6-micron CMOS	624-3,140
		3.0-micron bipolar	
	Gate array	1.6-micron CMOS	6,372-10,348

Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

JAPANESE ASIC ALLIANCES

<u>Date</u>	<u>Japanese Co.</u>	<u>Partner</u>	<u>Products</u>
April 87	Mitsubishi	VLSI Technology	2-micron CMOS wafers
May 87	Yamaha	Western Design	Standard cells
Oct. 87	Okura	Xilinx	Logic cell arrays
Oct. 87	Mitsui & Co.	European Silicon Structure	Direct-write ASICs
Dec. 87	Kanematsu Semiconductor	Oak Technology	PS/2-compatible ASICs

(Continued)

JAPANESE ASIC ALLIANCES

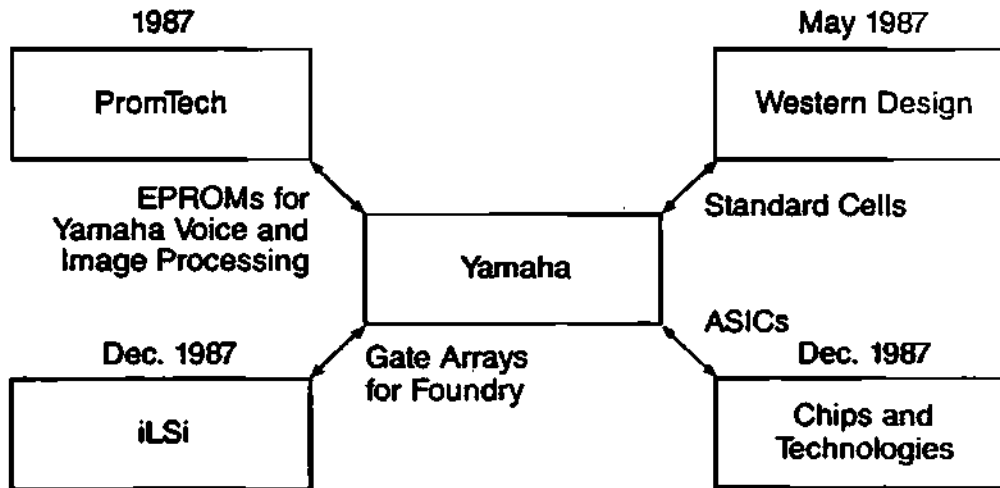
<u>Date</u>	<u>Japanese Co.</u>	<u>Partner</u>	<u>Products</u>
Dec. 87	Yamaha	Chips and Technology	ASICs
Dec. 87	Yamaha	iLSi	iLSi gate arrays for Yamaha foundry
Dec. 87	ADC (Nippon Chemical)	VLSI Technology	VLSI ASICs
April 88	Oki	iLSi	iLSi gate arrays for Oki foundry
May 88	Hitachi	VLSI Technology	Standard cells for CMOS/BICMOS processes

Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

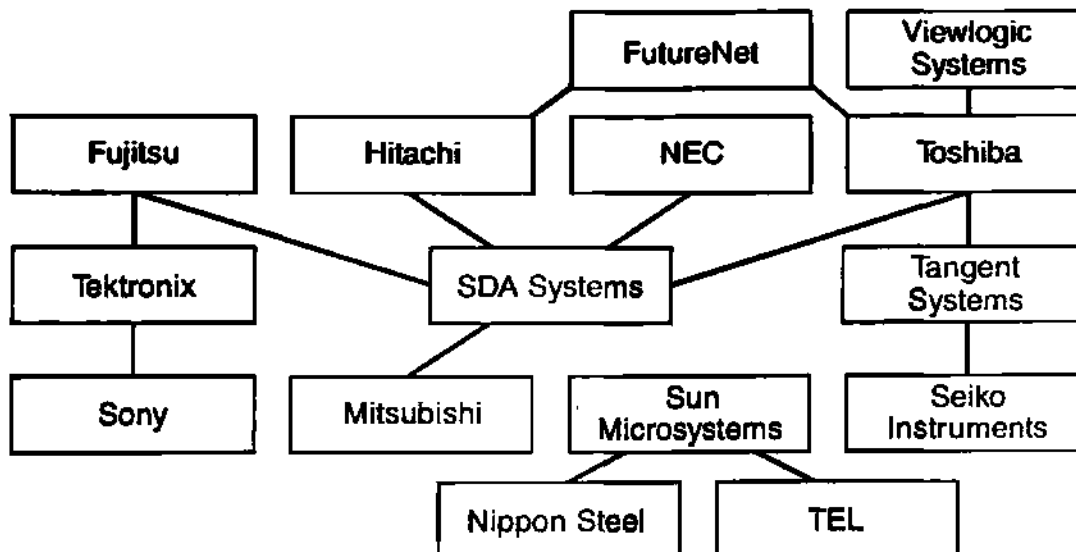
Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

YAMAHA'S VLSI ALLIANCES



Source: Dataquest

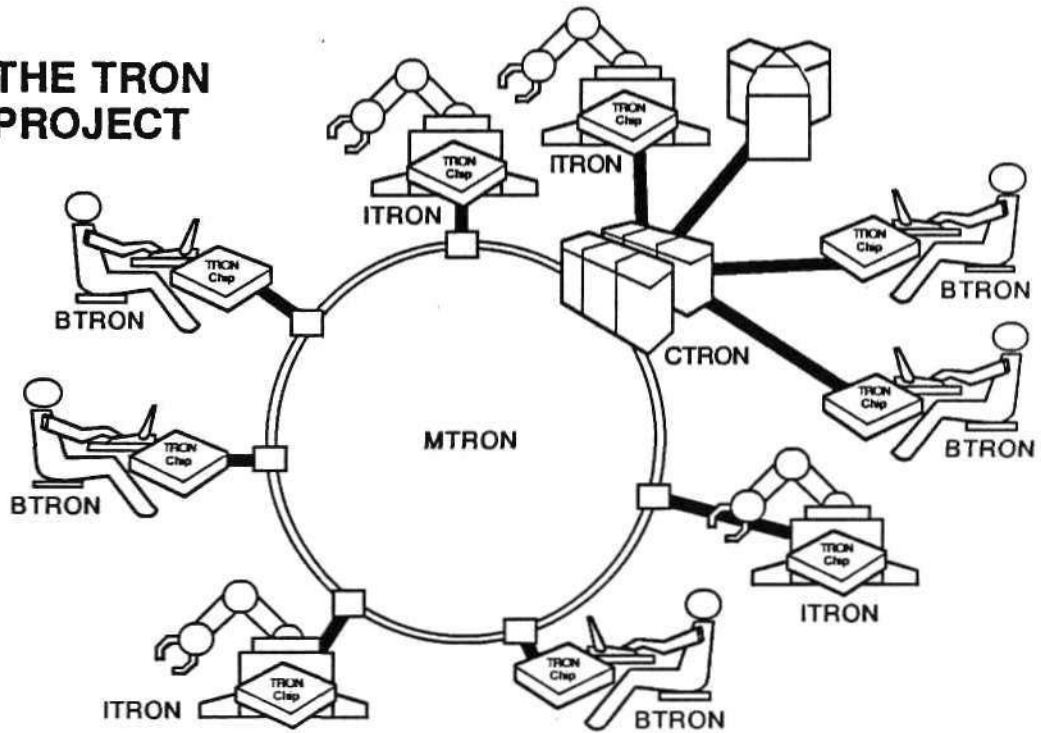
THE U.S.-JAPANESE VLSI CAD TOOL ALLIANCES



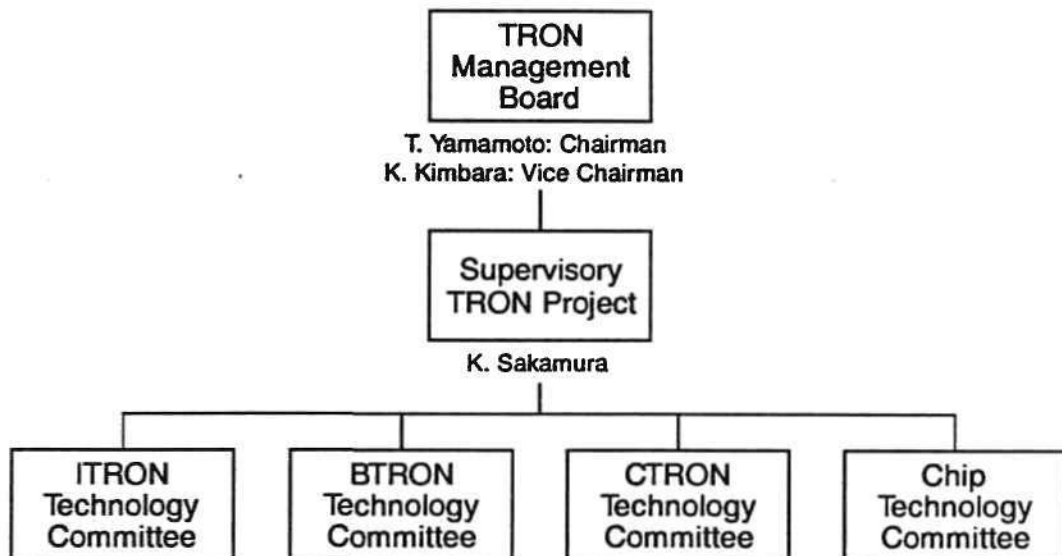
Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

THE TRON PROJECT



ORGANIZATION OF THE TRON PROJECT



Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

ORGANIZATION OF THE TRON PROJECT

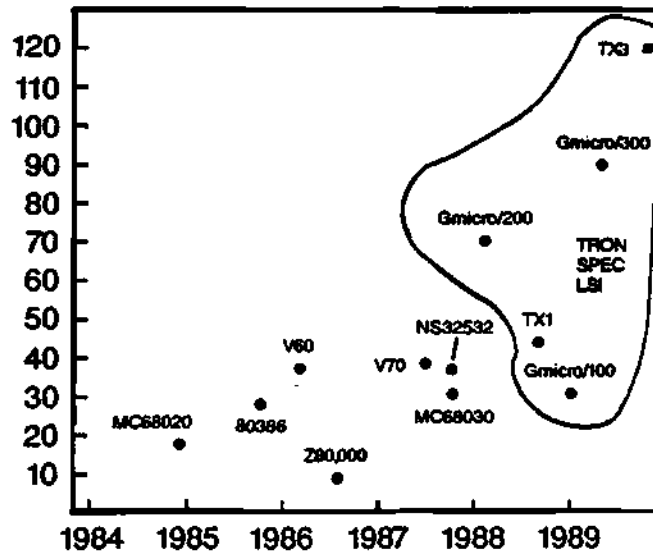
	ITRON Technology Committee	BTRON Technology Committee	CTRON Technology Committee	Chip Technology Committee
Hitachi	O	O	O	X
Fujitsu	O	O	O	X
Mitsubishi	O	O	O	X
Toshiba		O	O	O
NEC	O	O	O	
Matsushita		O		O
Oki		O	O	O
NTT			O	

O = Under development
X = Gmicro family

Source: Dataquest

32-BIT MICROPROCESSOR TRENDS

Transistors (10K)



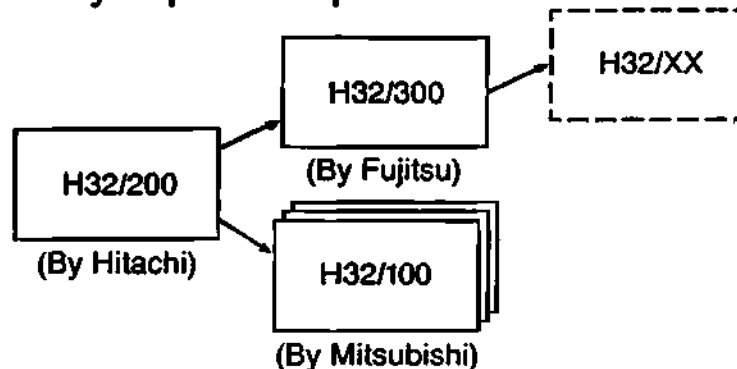
Note: TRON chips are encircled.

Source: Nikkei Electronics

© 1988 Dataquest Incorporated June — Reproduction Prohibited

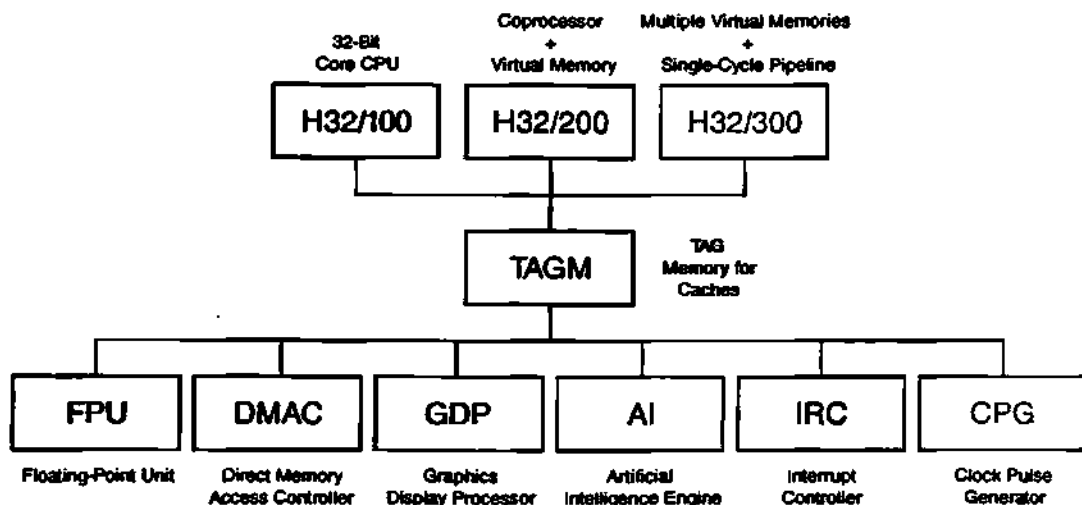
Gmicro FAMILY DEVELOPMENT

1. Global microprocessor family
2. Joint development; Hitachi, Fujitsu, Mitsubishi
3. TRON architecture
4. Family expansion plan



Source: Hitachi

HITACHI 32-BIT MICRO H32



Source: Hitachi

© 1988 Dataquest Incorporated June — Reproduction Prohibited

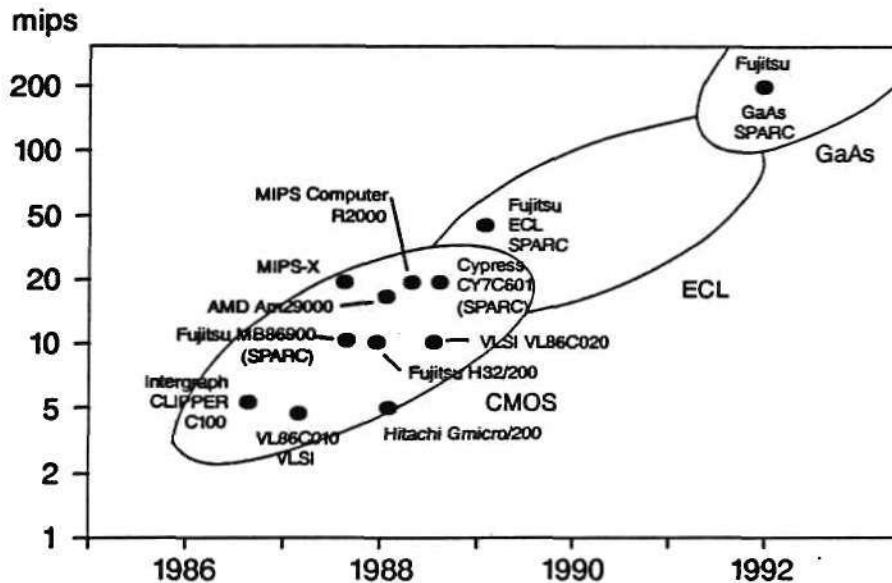
Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

SAMPLING SCHEDULE

		1988				1989	
		1Q	2Q	3Q	4Q	1Q	2Q
LSI	H32/100						X
	H32/200		X				
	H32/300						X
	FPU				X		
	DMAC			X			
	IRC		X				
	TAGM	X			X		
	CCM			X			
Tool	CPG						
	Assembler		X				
	C		X				
	ASE (Emulator)				X		
	SBC				X		

Source: Dataquest

RISC 32-BIT MPUs



Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

JAPANESE 32-BIT MPU ALLIANCES

<u>Japanese Co.</u>	<u>Partner</u>	<u>Products</u>
Fujitsu	TRON Association	H32/300
Hitachi	TRON Association	H32/200
Mitsubishi	TRON Association	H32/100
Fujitsu	Sun Microsystems	SPARC (MB86900)
Fujitsu	Nippon Steel	SPARC CAD system
Fujitsu	Intergraph	Wafers for CLIPPER
Kubota	MIPS Computer	MIPS RISC computers and MPUs
Mitsui & Co.	ASCII	32-bit application-specific integrated processor (ASIP)
Sanyo	VLSI Technology	2-micron 32-bit ACORN RISC chip set

Source: Dataquest

HIGH-PERFORMANCE COMPUTER APPLICATIONS

<u>Application</u>	<u>Requirements</u>	<u>Devices</u>
Primary Memory	Speed, density	BICMOS DRAMs, cache tags, cache data RAMs
Secondary Memory	Nonvolatility, density	Low-power DRAMs, flash memory
Graphics Memory	Speed, density interface	Video RAMs, video DACs (SRAMs), color palette memory, fast SRAMs/FIFOs, high-density ROMs
Control Storage	Speed, diagnostics, organization	Smart fast SRAMs/EPROMs/ EEPROMs

Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

HIGH-PERFORMANCE COMPUTER APPLICATIONS

<u>Application</u>	<u>Requirements</u>	<u>Devices</u>
Program Storage	Density, speed	Faster, larger EPROMs; flash memory; faster, larger EEPROMs
Processor-to-Processor Communication	Density, speed, buffering features	Smart, fast FIFOs; smart, fast, dual-port ROMs
Processor-to-Peripheral Communication	Density, buffering features	Smart, slow FIFOs
Peripheral Memory	Density, buffering features	Frame DRAMs, pseudo-SRAMs, EPROMs

Source: Dataquest

JAPANESE SPECIALTY MEMORY ALLIANCES

<u>Date</u>	<u>Japanese Co.</u>	<u>Partner</u>	<u>Products</u>
Jan. 87	Sharp	WaferScale	EPROMs
Jan. 87	Asahi Kasei	ICT	EEPROMs
March 87	Okii	Catalyst	16K/64K CMOS EEPROMs, serial EEPROMs
May 87	Sharp Fuji Electric	MOSel	4K to 256K SRAMs, dual-port SRAMs
June 87 1987	New Japan Steel Yamaha	Simtek PromTech	IC card EEPROMs EPROMs for Yamaha voice and image processing

Source: Dataquest

© 1988 Dataquest Incorporated June — Reproduction Prohibited

SUMMARY

- Japanese vendors are shifting to high-value-added, high-profit niche markets.
- 67% of the Japanese gate array market in 1991 will be CMOS and BICMOS arrays.
- Japanese companies are entering alliances to get ASIC and CAD software technologies.
- TRON is coming in the 1990s; Japanese companies are already entering 32-bit MPU alliances.
- Specialty memory alliances are appearing.

© 1988 Dataquest Incorporated June — Reproduction Prohibited

Dataquest Incorporated, a company of The Dun & Bradstreet Corporation
1290 Ridder Park Drive, San Jose, CA 95131-2398 / (408) 437-8000 / Telex 171973 / Fax (408) 437-0292

Dataquest

DB a company of
The Dun & Bradstreet Corporation

Panel Discussion

- Long Term
 - Relationships —
 - Hire Japanese staff
 - bought land
 - local design
 - support
 - Stable Supplier — committed to Japan
 - will be around in the future
 - Local Manufacturing
 - Invest in bricks and mortar local supply
- Obstacles Yen/Dollar exchange
 - used to buy land cheaper
 - now product price cheaper
 - expensive to build local supply

APPENDIX I

EIAJ/SIA JOINT MARKET ACCESS PROGRAM

(Approved by EIAJ)

I. Establishing a Long-Term Relationship

EIAJ, SIA and their members will undertake the following mutual actions to establish a long-term relationship based upon mutual trust:

[SIA/EIAJ]

1. EIAJ and SIA will hold timely meetings between the industries, for the purpose of building an ongoing relationship, promoting mutual understanding, and creating a vehicle for solving problems arising between the U.S. and Japanese industries represented by SIA and EIAJ.
2. EIAJ and SIA will encourage, and promote meetings among top level management of EIAJ user and SIA supplier members, for the purpose of establishing ongoing business relationships between the U.S. and Japanese companies.
3. SIA and EIAJ will promote the establishment of complementary relationships between U.S. and Japanese semiconductor manufacturers at the design, manufacturing, and marketing stages, for the purpose of improving support systems in the Japanese market.

[SIA]

1. SIA supplier firms will continue to build support systems in Japan that are specifically designed for the Japanese market.
2. SIA supplier firms will develop effective long-term strategies for increasing the access of U.S. suppliers to the Japanese market.
3. SIA supplier firms will take timely steps to grant more autonomy to their Japan offices.

[EIAJ]

EIAJ and its user members, in order to improve the ability of foreign suppliers to predict the future demands of the major trends in the Japanese electronics market, and to plan accordingly, will:

1. Provide foreign suppliers with timely information concerning major trends in the Japanese electronics market:

2. Provide foreign suppliers with information, when available, on long-term future trends or needs of individual EIAJ user members.

II. Design-In Cooperation

Realizing that it is important for SIA suppliers to participate at the design stage so their devices will be designed-in to new strategic products, both sides hereby agree to implement the following actions:

[SIA/EIAJ]

1. SIA will encourage its supplier members to offer timely seminars for EIAJ members on a variety of important new products for various applications. EIAJ user members will support such seminars and will encourage their design engineers and purchasing managers to attend.
2. EIAJ and SIA will promote engineering exchange programs among their members in order to enable users and suppliers to effectively convey their needs to each other, and to encourage and support joint development of new products.

[SIA]

1. SIA will encourage its supplier members to establish additional design centers in Japan designed to meet the needs of Japanese users.
2. SIA supplier firms will provide Japanese users with timely information concerning new designs in order to promote users' design-in.

[EIAJ]

1. EIAJ user firms will provide foreign suppliers with timely information concerning trends and user needs to the maximum extent possible, in the Japanese electronics market.
2. EIAJ users individually will involve themselves, to the maximum extent possible, in special joint projects with foreign suppliers to develop new products.
3. EIAJ will encourage its members to involve suitable foreign suppliers early in the design cycle of strategic new products.

III. Continued Expansion in the Area of Existing Products

Both parties agreeing that foreign products adopted by Japanese users should continue to be available in the Japanese market, users recognizing the importance of maintaining stable purchaser/supplier relationships so long as QCDS remain acceptable and both parties realizing that it is important for foreign suppliers to expand their access in the area of already available products. EIAJ and SIA hereby agree to promote and encourage the following actions by their respective members:

[SIA]

1. SIA member firms will actively promote sales of targeted products in Japan by identifying the special features and merits of those products to the Japanese user, and by publicizing such features through publication and distribution of product literature written in Japanese.
2. SIA supplier firms will communicate to manufacturing personnel and design engineers worldwide, in addition to their Japan sales staffs, both sides' shared desire to improve supplier's quality, cost delivery and service support in the Japanese market.
3. SIA will encourage SIA supplier firms to continue to improve their delivery reliability in Japan through all reasonable methods, including maintaining adequate inventories in Japan, for prompt response to customer orders and accommodating customer's delivery requirements.

[EIAJ]

1. EIAJ will encourage each EIAJ user firm to individually establish a special committee to increase procurement of products of foreign suppliers.
2. EIAJ users will communicate within their companies, to engineering staff, management, and purchasing personnel, both sides shared desire to increase market access by foreign semiconductor suppliers members.
3. EIAJ users will make further efforts, to the fullest extent possible, to expand their qualifications of foreign products, EIAJ users will also provide foreign suppliers with timely

information concerning Japanese users specifications for product quality and conditions.

4. EIAJ will encourage its member companies to engage in long-term relationships with foreign suppliers on the same basis as with domestic suppliers. In the context of any long-term relationships it is understood that replacement of any foreign devices should be governed not by preference for domestic devices but solely by commercial considerations.

IV. Expanding the Range of Users and Suppliers

Realizing the importance of increased participation by a wide range of users and suppliers in order to secure market access, both sides agree to implement the following actions:

[SIA]

1. In cooperation with INSEC, SIA will reach out to a wider range of U.S. suppliers through public relations and educational programs in the U.S., and will encourage U.S. suppliers to increase sales activities specifically targeted to the Japanese market.
2. SIA supplier firms will continue to invest adequate resources to meet the needs of users, and will strengthen and expand their sales activities to reach a broader range of Japanese users through the development of more effective local business operations, including the use of local distribution agents.

[EIAJ]

1. EIAJ will strengthen and expand the functions of the Users Committee of Foreign Semiconductors, and will request cooperation from related groups in order to improve market access.
2. Major EIAJ users individually will encourage their related companies to procure products from foreign-based suppliers.

V. Expanding into Consumer Products and Automobile Areas

EIAJ users understand that SIA suppliers have a special interest in improving their access to the Japanese consumer electronics and automotive industries. SIA

suppliers understand that it is important for them to base marketing efforts on a long term strategy designed to meet Japanese user needs. In consideration of the importance of the aforementioned understanding, both sides agree to implement the following actions:

[SIA/EIAJ]

EIAJ, SIA and their member companies will explore opportunities to nurture mutual understanding at the industry level among member companies on both sides.

[SIA]

1. SIA and its supplier firms will make every reasonable effort to deepen their understanding of the needs of Japanese users in the consumer electronics and automotive industries.
2. SIA supplier firms will specify commodity products specifically designed for consumer goods and automobiles and further increase their sales promotion.
3. SIA supplier firms will demonstrate long-term and reliable capabilities in QCDS (Quality Cost Delivery & Service) by meeting the requirements of the Japanese consumer electronics and automobile markets.

[EIAJ]

1. EIAJ user firms will make all reasonable efforts to deepen understanding of the capabilities of semiconductors offered by foreign suppliers in the field of Japanese consumer electronics and automotive products.
2. EIAJ user firms will make all reasonable efforts to expand qualifications to increase procurement of commodity products of foreign suppliers in the field of consumer electronics and automotive products.
3. EIAJ will encourage EIAJ members to provide foreign suppliers with timely information concerning long-term technological trends and user needs to the maximum extent possible in the Japanese consumer electronics and automotive markets.

CHANGES IN JAPANESE PURCHASES OF FOREIGN PRODUCTS VERSUS CHANGE IN TOTAL PURCHASES

Among the 11 EIAJ company reports given to SIA in Tokyo on June 2 is individual user company data on increases in purchases of foreign semiconductors versus increases in overall purchases. Each user presents the data in a different manner, so SIA has compiled the information in this summary sheet. In addition, a comparison is made with the change in total Japan market demand and the change in foreign sales which would have occurred if we were on a linear path towards 20% in 1991. The comparison allows the reader to compare and calibrate the individual user data.

		<u>1986</u>	<u>1987</u>	(est) <u>1988</u>	(est) <u>1989</u>
FUJITSU	%Change in Foreign Purchases		74%	28%	
	%Change in Total Demand*		54%	25%	
HITACHI	%Change in Foreign Purchases	55%	19%		
	%Change in Total Demand	-5%	2%		
MATSUSHITA	%Change in Foreign Purchases		13%	27%	
	%Change in Total Demand		8%	2%	
MITSUBISHI	%Change in Foreign Purchases		11%	32%	
	%Change in Total Demand		7%	25%	
OKI	%Change in Foreign Purchases		30%	31%	
	%Change in Total Demand		19%	23%	
SHARP	%Change in Foreign Purchases		41%		
	%Change in Total Demand				
SONY**	%Change in Foreign Purchases			62%	
	%Change in Total Demand			31%	
TOSHIBA	%Change in Foreign Purchases	21%	14%	15%	
	%Change in Total Demand	12%	4%	9%	
COMPARISON	%Change in Foreign Purchases***		20%	46%	25%
TOTAL	%Change in Total Demand	-3%	5%	13%	5%
(Yen change)					

* Outside purchases only

** Q1 only

*** Assumes steady growth toward 20% share in 1991

SOURCE: Eleven EIAJ company reports provided as background for the third SIA/EIAJ Meeting, June 1, 1988, Tokyo.

Summary of 11 Semiconductor User Company Reports

	FUJITSU	HITACHI	JVC	MATSUMITA	MITSUBISHI	NEC	OKI	SANYO	SHARP	SONY	TOSHIBA
Targets		Each user plant has 1/2-year plan to increase	Targets set through 1990		"In accordance w/ the spirit of the U.S. S/C Agreement, we have increased the share of foreign-based S/C to 20%	"[NEC open] policy is reflected in actual results, since in both 1985 & 87, the share of foreign-made S/C in our total S/C consumption exceeded 20%	22% foreign in 1987	"At every division, a target is set quarterly"			"Target amounts are set by each plant." "The share of foreign-based S/C in the industrial area is already over 20%"
Organization	Task Force for Expansion of Purchases of Foreign Made Semiconductors - headed by materials group	Semiconductor Import Promotion Center: -7 corporate officers -multi-level structure	Overseas Procurement Promotion Office; Decentralized Procurement	After SIA/EIAJ Meeting, "S/C Program Committee" formed w/ 5 subcommittees	Committee on Import Promotion Strategies w/ 2 levels of subcommittees	Head Office International Purchasing Div. Company-wide S/C Demand-Supply Coordination Committee (incl. affiliates)	Head Office of Materials Planning (meet quarterly)	Overseas Procurement Dept. formed in April 1988. Monthly meeting to plan & monitor progress.	1/88, reorganization allows supplier to go to user dept., not S/C dept.	S/C Procurement Committee formed 2/88 (includes 25 user depts.)	S/C Import Promotion Committee - company-wide and at plant level
Seminars	June/July 1987, 43 seminars with 13 foreign firms. Import Fair, 22 F/S & 1500 engineers attended	1987, 54% more seminars than 1986		In 1987, 71% increase in number of seminars, total of 44 participating companies	1987 saw an 89% increase in # of seminars, and 109% increase in # of participating companies, over 1986	Annual Electronic Component Exhibition, 40 F/S participated	43 seminars w/ 124 participating suppliers in 1987, a 30-40% increase over 1986	1/88-5/88, 9 exhibits w/ 13 suppliers. Second "Imported" Materials Exhibition" planned for October.	5 exhibits w/ 1635 attendees. 2 seminars w/ TI & National.	Seminars scheduled for June	6 examples of 1988 seminars given, 4 plant exhibits with from 14-62 exhibiting companies
Qualification	In 1987, 400% increase in foreign products evaluated & 250% increase in foreign items qualified	228 qualification approvals in 1987, 42% increase over 1986			Seminar Quality Evaluation Center to shorten period of qualification. 59 products evaluated, 67 passed, 7 purchased	Company-wide Quality Standards in English				English manual available	
Design-ins	ASIC emphasis	17 design-ins in 1987, versus 8 in 1986 & 4 in 1985			11 examples given, totalling \$5.2 M procurement		440 foreign chips adopted at design stage in 1987, 37% over 1986			Examples of Motorola, TI, & LSI Logic design-ins.	300 design-ins in past 1-1/2 years, 7 examples given.

-SOURCE-

Eleven EIAJ company reports provided as background for the third SIA/EIAJ Meeting, June 1, 1988, Tokyo.

-KEY-

FSC = Foreign Semiconductor
F/S = Foreign Supplier
S/C = Semiconductor

Existing Products	FUJITSU	HITACHI	JVC	NAFUSHITA	MIYOSHIKI	SHC	OKI	SANYO	SHARP	SONY	TOSHIBA
Existing Products											
Michael Exchange	23 engineers 2nd visit to P/S in 1981, a sign at the time 1982 but date 1983. Period 12 weeks w/ 12 major P/S			Promoting exchanges	9/87-10 for- 10 factories visited -Exchanging info twice a year with certain companies	Done regularly	"We are pro- moting the shift from our own S/C and other domestic ones as well as the positive adoption of the existing for- sign-side S/C to our newly designed pro- ducts 455 foreign services ac- cepted for adoption in 1987 v. 310 in 1986		Dec. 1987 to April 1989, met w/ 5 companies.	S/C Proc. Cons. Review S/Cs used and inter- changes w/ PSCs when possible.	Switch over from internal/domestic to foreign in CMCs 1986, standard linear, memory.
Demand Forecast	Try to communicate long term demand and forecast to P/S			Inform major suppliers of forecasting forecast every 6 months, sign contracts every 3 months	Regular meeting w/ major P/S, 2-12 month forecast	Provided to main suppliers				3 month forecast provided to key suppliers.	
Broader base of users & Suppliers	"We ask pres- ents of our affiliates to set a goal for market access, detailed plan, and keep track of their pro- gress." 43 P/S in 1987 v. 35 in 1985			4 examples of consumers designing at 5-64 forests in consumer in 1985 v. 3-45 in 1987		241 Group Materials Committee proceeds purchase increases to subsidaries & affiliates. 1985-89 P/S	Vendor list for promotion of international procurement expected in July.	5 suppliers added in 1987, bringing total consumers to 30. Affiliated subsidiaries purchase promotion plans tracked monthly	Buyer "President" letter to Sony affiliated companies increased foreign purchases.	Working group w/ 9 related companies established. Visited P/S facilities 4/89. 19 new suppliers 1987/88.	
Auto & Consumer	-VCH & auto plant manager visit U.S. -Providing consumer development information								Chart of competitive consumer S/Cs prepared		

FUJITSU
Replacement of
old parts w/
FSCs has been
completed.
Focus now on
ASICs

HITACHI
Chairman FSC
Users Group.
"In the area of
standard de-
vices, Hitachi
exercises a
policy of ex-
panding the use
of FSC by
restoring the
portion of
orders going to
Hitachi's own
S/C division
which competes
w/ foreign-
based goods."
"Hitachi has a
unique bounty
system as an
incentive only
for S/C import
promotion since
1985 fiscal
year. The down-
side is paid to
factories which
have more
import volume
than the re-
spectively set-
up level of
volume on half-
year basis."

JTC
"Expect to see
the results by
fall of 1989"
MATSUMITA
"We are
promoting
replacement (of
our own
products) of
mainly
universal items
by foreign made
items."

MITSUBISHI

NEC

OKI

SANYO
4 examples of
sales
assistance

SHARP
Engineering w/ 5
exchanges v/
foreign
companies.
12/97-4/88.

SONY
90% of Sony
workstation is
foreign chips.
Detailed
questionnaire
of all manufac-
turing divi-
sions filed.
"Survey done -
shows consid-
erable work
being done with
foreign &
practices."
Contact persons:
Mr. Okura
Sales/Conductor
Procurement
Committee
Office
Sony Corp.
2-1-15 Kitashinagawa
Shinagawa-ku
108-8441
JAPAN

TOSHIBA
Mutual OEM
contract w/
Hitachi &
others to
develop long-
term relations.