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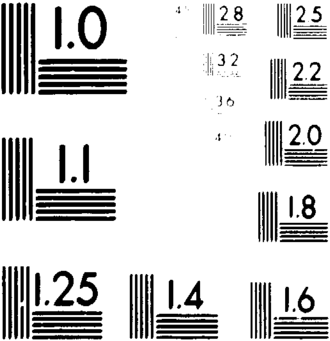

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THE FINAL REPORT

ON

UNIDO PROJECT NO. US/INT/79/065

UNIDO CONTRACT NO. 83/17

PROGRAMME FOR THE IDENTIFICATION AND PROMOTION OF INDUSTRIAL INVESTMENT PROJECTS RELATED TO ONE SPECIFIC INDUSTRY SECTOR (ELECTRONICS INDUSTRY)

Prepared by UNICO International Corporation

for

The United Nations Industrial Development Organization (UNIDO), Vienna, Austria

September, 1983

UNICO International Corporation

Tokyo, Japan

TABLE OF ABBREVIATIONS

A/D	Analog/Digital
AMI	American Microsystems, Inc.
ß-max	Name of a consumer VTR system
B.O.I	Board of Investment
B/W TV	Black and White television
BEPZ	Bataan Export Processing Zone
CdS	Cadmium sulfide
C-MOS	Complimentary metal oxide semiconductor
CEIEC	China Electronics Import & Export Corp.
CKD	Completely knocked down
CP	Country Paper
CPU	Central processing unit
CRT	Cathode ray tube
CTV	Color television
EDB	Export Development Board
EIAJ	Electronics Industry Association of Japan
FET	Field effect transistor
FIAC	Foreign Investment Advisory Committee
GCEC	Greater Colombo Economic Commission
IC	Integrated circuit
IIPQS	Industrial Investment Project Questionnaires
LCD	Liquid crystal display
LSI	Large-scale integrated circuit
MIL	Military
MSI	Middle-scale integrated circuit
NERD	National Engineering Research & Development Center of Sri Lanka
PCB	Printed circuit board
PPM	Parts per million
R&D	Research and development
SAWF	Surface acoustic wave filter
SG	Signal generator
Si	Silicon
SIDFA	Senior Industry Development Field Advisor
SKD	Semi-knocked-down
SOFISEDIT	Société Financiere Sénégalaise Pour le Development de l'Industrie et du Tourisme.
SOSEA	Société Senegalaise d'Electronique Appliquée
UHF	Ultra high frequency
UNIDO	United Nations Industrial Development Organization
VHF	Very high frequency
VHS	Name of a consumer VTR system
VTR	Video tape (cassette) recorder

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7-2 Matsushita Electric (National-Panasonic-Technics-Quasar)

7-3 SONY (This is SONY)

7-4 Hitachi (Guide to Yokohama works, Gifu branch works and Takayama branch plant), Outline of Hitachi, Ltd. and Hitachi Review Oct. 1982/Vol. 31/No. 5

7-5 Sanyo Electric Co., Ltd. (A guide to color T.V. manufacturing division)

7-6 Toshiba Corporation (Toshiba towards 2000)

7-7 Alps Electric Co., Ltd. annual report 1982-83

7-8 Nomura Research Institute (NRI)

7-9 Japan Broadcasting Corporation (NHK), Broadcast Engineering and Technical Monograph (No. 32 June 1982) - High-definition television

7-10 Agency of Industrial Science and Technology, Ministry of International Trade and Industry of Japan (MITI) and Guide to Electronical Laboratory 1982-1983 (ETL)

7-11 Ricoh Watch Co., Ltd. (technical service manual--ricoh quartz watch 560 and 700 types)

7-12 Mitsumi

7-13 Mitsui MFG Co., Ltd.

7-14 NED (Nippon Electronics Development Company) and SCC (Computer, Communication and Control)

CHAPTER 1

INTRODUCTION

CHAPTER 1
INTRODUCTION

The United Nations Industrial Development Organization (UNIDO) has proceeded with supply of assistance and cooperation on behalf of the industrialization of developing countries, and as one aspect of that activity recently has taken a number of measures intended to facilitate the transfer of capital and technology by the private sector to the developing countries.

There are many constraints to the transfer of capital and technology from industrialized countries to industrializing countries; these constraints involve, in addition to factors arising from differences in political, economic and social systems, shortages of capital, low levels of technology, and problems based on work-related practices. It has been indicated that among those constraints often the developing countries lack the following:

1. Adequate capability to undertake investment planning

2. Knowledge and experience sufficient to enable them to identify the high-priority areas for promotion of investment

This lack results in major discrepancies in views when discussions are held between representatives of the industrialized and the industrializing countries.

As one measure to contribute to solving this problem, UNIDO has advocated, on the basis of the identification of specific industrial categories in the developed countries, the provision to personnel from the developing countries of hands-on training which is suited to local conditions in their countries. The Japanese Government in 1981 offered to bear the entire expense of this effort and in April of the same year the UNIDO Tokyo Investment Promotion Services (Tokyo IPS) office was opened.

Thereafter, as result of study by UNIDO Headquarters, TOKYO IPS and the concerned developing countries regarding the industrial category to be selected, the decision was made to select the electronics industry, as the industry of highest common interest. TOKYO IPS, in order to implement the intended programme, arranged for cooperation to be provided by the Electronics Industries Association of Japan.

Further, UNIDO Headquarters (Vienna) and UNICO International Corporation (Tokyo) signed a contract on March 11, 1983, "Subject: U/INT/79/065 - Identification and Promotion of Industrial Investment Projects related to one Special Industry Sector (Electronics Industry) in Four Participating Developing Countries and in Japan" whereby UNICO could cooperate in implementing this project.

This report is the final report by UNICO on this project, submitted in accordance with the request of UNIDO Headquarters, Investment Co-operative Programme Branch (ICPB) and TOKYO IPS.

CHAPTER 2

IMPLEMENTATION PLANTS FOR THIS PROJECT. THE CONSULTANT'S ASSIGNMENT AND PERFORMANCE OF WORK

CHAPTER 2

IMPLEMENTATION PLANS FOR THIS PROJECT, THE CONSULTANT'S ASSIGNMENT AND PERFORMANCE OF WORK

2-1 Implementation Plans for this Project

The following explanation of the implementation plans for this project, based on the general description as given in Chapter 1, was made by UNIDO IPS, Tokyo, to the competent government agencies, the Electronics Industries Association of Japan, and the Consultant.

1) Identification of a specific advanced country and specific industrial sector: Japan; electronic equipment industry.

2) Identification of the relevant organization and companies which could cooperate: Electronic Industries Association of Japan (EIAJ); representative companies belonging to the EIAJ.

The above organization was designated as an Advisory Committee and the committee members were as follows.

- Electronic Industries Association of Japan
  Mr. M. Moriyama, Manager, Research & Statistics Department

- Matsushita Electric Industrial Co., Ltd.
  Mr. K. Ishii, Director of Planning Deptartment

- Hitachi Ltd.
  Mr. T. Mine, Manager, Marketing Research Consumer Products Group

- SONY Corporation

  Mr. A. Takenaka, Manager, Research & Planning External Corporate Affairs Division

- Alps Electric Co., Ltd.

  Mr. H. Asakawa, Manager, Overseas Operations Planning

- Sanyo Electric Co., Ltd.

  Mr. K. Fukasawa, Director, Marketing Research Department

The Secretariat for the project was ISP Tokyo.

3) Identification of developing countries desiring to participate

In accordance with a suggestion by Tokyo IPS, UNIDO Headquarters decided to invite four countries to participate. Regarding selection of the countries, the proposed criteria as of October 1982 were as follows.

A. Quasi-industrialized nations which already had established business channels on a commercial basis are to be excluded. Examples: Hongkong, Singapore, Republic of Korea, Brazil.

B. Countries for which conditions made it ultimately difficult to establish an electronics industry are to be excluded.

C. Countries positioned between the foregoing two categories and which are thought to be capable of establishing electronics industries within several years are to be included. From this viewpoint, inquiries were sent to 8 countries (China, Algeria, Senegal, the Philippines, Sri Lanka, Jamaica and two others) and at this time China, the Philippines, and Senegal have expressed interest.

4) Selection of participating countries

After the identification of possible participating countries, the UNIDO Headquarters would make the final selection on the basis of contacts with those countries. Each country is to be invited to send two persons to Tokyo, i.e., one government official and one person from industry.

5) Materials to be prepared for the participants

A. An outline survey of the electronics industry and related data

B. Investment possibilities list for the electronics industry (including joint venture possibilities)

C. Supplementary information related to the investment possibilities list

6) Cooperation by related persons for preparation of the above materials

A. Advance submission of a resume (guideline) from Japan

B. Local advice by a Japanese consultant

C. Advice from UNIDO Headquarters

7) Determination of materials to be brought to Tokyo

It was decided that after an advance check of 5) by UNIDO and the Japanese side that participants would bring to Tokyo items A) and B) in 5) above.

8) The Tokyo programme

A. Duration and timing: 30 days, tentatively in February and March, 1983

B. Participants: A total of 8 persons from 4 countries

C. Contents:

1. Lectures on subjects of common, basic interest

2. Factory visits

3. Selection of promising investment opportunities through direct discussions with Japanese experts. For opportunities for which information is incomplete or for which modification is needed, improvements would be sought through use of suggestions from the Japanese side.

4. In the event that identified projects are of direct interest to Japanese companies, discussions could be held with the objective of attaining the stated goals.

9) Appointment of the Advisory Committee

Discussions between UNIDO Headquarters and IPS Tokyo were as follows

Tasks for the Advisory Committee

A. Preparation of the list of the electronics products to be covered by the programme

B. Advice regarding selection of participating countries

C. Advice regarding qualifications of persons to attend the Tokyo programme

D. Cooperation and guidance on resumes and guidelines regarding materials preparation by the participants

E. Advance check of the materials prepared, and offering of advice where necessary or advisable

F. Obtaining cooperation by related persons for preparation of plans for the Tokyo programme

G. Particularly for investment possibilities to be discussed with Japanese companies, study of them in advance and preparation of a suitable programme

H. Evaluation of the Tokyo programme and offering of advice for future activities

2-2 The Consultant's assignment and implementation of work

On the basis of the items given in 2-1 above, the Consultant began the following as concrete planning for the project.

1) Members of the Consultant's project team

Name	Function
Mr. Y. Mikami (Team Leader)	Mechanical Engineer
Mr. K. Sato	Industrial Process Engineer
Mr. K. Kawai	Economist/Electronics Marketing
Mr. K. Kosugi	Electronics Engineer

2) Preparation of documents to be distributed to the four participating countries

The types of documents to be distributed to the participating countries were specified as follows.

A. List of selected products and its brief explanatory note

B. An outline of the country paper (CP)

C. Industrial Investment Project Questionnaire (IIPQ)

D. The consumer electronic industry (monograph)

In addition to the above, the Consultant assembled information from published sources available in Japan and concerning the electronics industry in the participating countries and in Japan, for use by each country's participants. This information was compiled under the title, "The Electronics Industry in Developing Countries (Programme Reference Document)."

Further, in conformance to instructions by Mr. Abdelmoneim of ICPB, the Consultant prepared "List of industrial products and its brief explanatory note". This list, however, was not distributed to the four participating countries but, rather, was sent to UNIDO Headquarters for use there.

The documents A-D enumerated above were personally delivered to Mr. Abdelmoneim when he visited Japan in March 1983. Because Mr. Abdelmoneim's plans called for him to visit the four countries after holding discussions in Japan, arrangements were made for him to deliver the four sets of these documents on that occasion.

3) The four participating countries

The four countries selected for participations in this project were:

A. The People's Republic of China
B. The Republic of the Philippines
C. The Democratic Socialist Republic of Sri Lanka
D. Republic of Senegal

4) Dispatch of the Consultant's experts to the four countries

On the basis of the contract the Consultant dispatched two experts to the four countries. The purpose of this was primarily to offer suitable suggestions regarding the preparation of documents the participants would submit at the time of the UNIDO Tokyo Programme.

The two experts were:

Mr. K. Kawai	....	Team Leader of Mission, Electronics Marketing
Mr. K. Kosugi	......	Electronics Engineer

The schedule for visiting the four countries was as follows.

A.	China	May 8 - 15, 1983
B.	Philippines	May 16 - 21, 1983
C.	Sri Lanka	May 28 - June 4, 1983
D.	Senegal	June 5 - June 13, 1983

The subjects discussed by the two consultants when they visited these countries was as follows.

A. The Consultant would cooperate in accordance with the thinking of UNIDO headquarters regarding "how can development of electronics industries in developing countries be promoted, and what are the possibilities regarding cooperation by Japan".

B. Cooperation and advice for preparation and review of the CP and IIPG prepared by the Tokyo programme representatives.

C. Present conditions and future development planning of electronics industries in each participating country.

D. Confirmation of desires of the participating countries in connection with the Tokyo programme.

E. Where possible, inspection visits to consumer electronics production facilities in the four countries.

F. Making requests and holding discussions regarding the presentation by each country's participants about their country's electronics industry as part of the Tokyo programme.

5) Preparation for and implementation of the Tokyo Programme.

Concerning details on the preparation and implementation of the Tokyo Programme, please refer to Chapter 3. The role assigned to the Consultant was as follows.

A. Preparation of the agenda and plans for the Tokyo Programme, to be hold for four weeks from July 11 to August 5, 1983.

B. Determination of the contents of the lectures to be given during the Tokyo Programme.

C. Selection of lecturers.

D. Selection of companies and factories to be visited.

CHAPTER 3

IMPLEMENTATION OF THE FOUR-WEEK TOKYO PROGRAMME

CHAPTER 3

IMPLEMENTATION OF THE FOUR-WEEK TOKYO PROGRAMME

On June 13, 1983 the two experts despatched by the Consultant to the four participating countries returned to Japan. A meeting of the Advisory Committee was immediately called, and the experts reported on the progress made by the four countries in completing the required documents, the names and fields of specialization of the persons to be sent to the Tokyo programme and plans of the four countries regarding production of electronic goods.

After this report was made, notification was issued by IPS TOKYO that the four-week Tokyo programme would be held from July 11 to August 8, 1983. One month remained for preparation for the programme.

3-1 Preparatory Work for the Tokyo Programme

In connection with the detailed contents of the Tokyo programme which had been discussed by the Advisory Committee in the past, a more detailed review was made of the schedule for the programme. The schedule was made to include the following.

A. Preparation of the curriculum
B. Selection of lecturers
C. Preparation of lecture materials
D. Selection of the venue for the programme lectures
E. Identification of companies and factories to be visited.

1) Preparation of the curriculum

Great effort was made to formulate a curriculum which would serve to deepen the knowledge and understanding of the programme participants regarding the electronics industry.

The thinking which comprised the basis for curriculum formulation was as follows.

A. Historical background of the development of the electronics industry to the present day

B. Present conditions and future of the electronics industry

C. Trends in the world electronics industry, and Japan's electronics industry

D. Production of electronic parts, and materials for the electronics industry

E. Government policy related to development of Japan's electronics industry

F. Nature of the electronics industry, and conditions necessary to establish an electronics industry (environment, policy, technology)

G. Management in the electronics industry, and training of technical staff and workers

H. Quality control, in support of the electronics industry

I. Provision of chances for obtaining an understanding of the electronics industry by direct observation

J. Creating opportunities for participants to enter into discussions with suitable companies, regarding the electronics products their countries desire to produce.

K. R&D which is fundamental to the electronics industry

L. Marketing by the electronics industry

M. The factory environment where electronics products are made; location of factories and site conditions; attitudes of management and workers regarding production

The above items were to be incorporated in the curriculum.

(2) Selection of lecturers

At first it was expected that lecturers could be selected from among suitable persons on the Advisory Committee and companies belonging to the EIAJ, but in order to cover the field of 1) above, it became necessary to go beyond that range of possible lecturers. Although qualified persons in the private sector or government are fully occupied with their ordinary responsibilities, IPS Tokyo was successful in obtaining lecturers' commitments by making requests in the name of UNIDO.

(3) Preparation of lecture materials

The gist of the Tokyo programme was explained to each lecturer, and a number of meetings were held with each lecturer to insure that the contents of each lecture would conform to the objective and organization of the programme as a whole.

As is generally recognized, it is extremely difficult to find anyone who will prepare and deliver a lecture in English. To impose the requirement that the lecture be made in English often will lead to a decline to accept the offer to speak. Fortunately, through the efforts of IPS Tokyo, interpreters were secured, to interpret lectures delivered in Japanese.

Each lecturer was requested to draft the manuscript for his lecture. In almost all cases, busy daytime schedules meant that they had to prepare these drafts after returning home in the evening. The drafts received by the Consultant were written in Japanese. A staff member of the Consultant translated most of these into English, through a prodigious effort, and according to an extremely tight schedule. One paper was commissioned to an outside translator in order to insure that all materials would be available when needed. The direct expenses for the translation, editing and typing work required are not recoverable from UNIDO as the Consultant's contract does not provide for reimbursement for this cost. The work was undertaken by the Consultant, nevertheless, in accordance with the request of IPS Tokyo, but at the expense of the Consultant. A major effort was necessary to insure that all materials would be ready in time.

The conditions described above should be heeded by UNIDO in the event that similar activities are held in Japan, as they are common conditions typical of Japan. Further, that all costs of preparation of translations, editing, typing and reproduction were borne by the Consultant deserves special attention.

(4) Selection of the venue for the Tokyo programme meetings

For lectures, use was made of the meeting room of the Japan-China Association which is near the IPS Tokyo office.

(5) Determination of companies and factories to be visited, and leaders

A. Company visits

A schedule for company visits was made on the basis of the lists of electronic products previously prepared by the participants and their stated desires regarding companies to be visited, in order to achieve their objectives for their visits to Japan. In preparing the schedule it was necessary to arrange for four groups of participants to go to different companies on the same day, and it was necessary for the Consultant to provide assistance because of the need to escort the participants everywhere due to their unfamiliarity with Tokyo, and the importance of attaining the best possible results at every company visited, all of which was extremely difficult for IPS Tokyo because of the limited number of staff there.

B. Factory visits

Almost all factories for electronic products are outside of Tokyo, in the suburbs or at considerable distance. Because of that the Advisory Committee was requested to select factories which were near Tokyo, and still conformed to the purpose of the Tokyo programme. It was extremely difficult to obtain permission to visit these factories because of desire on the part of the companies to maintain company secrets in this industry where technological change and competition are at such high levels.

That the factory visit plans could be realized is due to the special efforts made by the Advisory Committee. Because of the high importance assigned to maintaining corporate secrets, the Consultant's personnel were not permitted to visit the factories.

C. Leaders

Since the Consultant's personnel were not permitted to visit the factories in the capacity of leaders of the participants' group, the consultant cannot report on that aspect of the Tokyo programme.

(6) Cooperation by the Consultant during the Four-Week Tokyo Programme

As noted in 3-1 above, the Consultant cooperated with IPS Tokyo from the stage of preparation of the curriculum through preparation of lecture materials and other aspects of the Tokyo programme. During the four weeks of the programme, the services of Mr. Kawai were utilized for all four weeks and those of Mr. Kosugi were utilized for the first and fourth week. In addition to mobilizing these experts, one of the Consultant's secretaries, who had been assigned to this project, devoted her full time to the programme for three of the four weeks.

3-2 Four-week Tokyo Programme

(1) Duration

The duration of the programme, as determined in the preparatory work described in 3-1, was from July 11 to August 5, 1983.

(2) Participants from the four countries

The names of the participants are provided in Appendix 2. Their number is as follows.

China	3
Philippines	2
Sri Lanka	2
Senegal	2
Total	9

(Because of procedural matters, the Philippines' participants attended the programme from July 14.)

(3) Contents of the Tokyo programme

A. The entire schedule for the Tokyo programme is given below as Table 1.

In Table 1, the lectures, factory visits and company visits are listed in chronological sequence. Regarding company visits, however, in some cases participants made individual arrangements to visit specific companies and because the Consultant was not informed about these visits, they are not listed here.

B. Content of lectures

The lecture materials are provided as Appendix 5 (5-1 to 5-9). In some instances the lectures made use of a blackboard to supplement his speech. The Consultant had personnel present at all lectures and therefore has been able to prepare the summaries. Use of these summaries in conjunction with the lecture materials will enable an understanding of the nature of the lectures to be obtained.

(4) Content of the lectures and nature of the factory and company visits

A. Opening ceremony, Monday, July 11, welcome address by Mr. M. Saito, Head of IPS, Tokyo

Summary

a) Background of implementation of this project, with emphasis on why the electronics industry was selected from among all others in Japan.

b) This programme is being carried out by means of the support of the Government of Japan, the EIAJ, and the Advisory Committee.

c) Rather than expect immediate results from this project, it is desired that it achieve its objective over the long term.

Table-1 SCHEDULE OF FOUR-WEEK TOKYO PROGRAMME
(LECTURES, COMPANY AND FACTORY VISITS)
July 11, 1983 - August 5, 1983

Month, Date 1983	LECTURES, COMPANY AND FACTORY VISITS
	10:00 - 11:00
	Introduction of staff of IPS, TOKYO
July 11 (Mon)	11:00 - 12:00
	Opening Ceremony
	Welcome address by Mr. M. Saito - Head of IPS, TOKYO Speech by Mr. Abdelmoneim, UNIDO, ICPB, Vienna Orientation on Programme by Mr. H. Takanashi. IPS, TOKYO
	13:00 - 15:00
	Lecture on "Japanese Consumer Electronics Industry and its profile by Mr. K. Ishii Director of Planning, Matsushita Electric Industrial Co.
July 12 (Tue)	10:00 - 12:00
	Lecture on "Electronics Industry in Japan by Mr. T. Takai, Managing Director, Electronics Industries Association of Japan (EIAJ)
	14:00 - 16:00
	Presentation of Country Papers--"Electronics Industry and its Prospects" by representatives of Senegal, Sri Lanka and China (30 min. each)
	17:00 - 18:30
	Reception by UNIDO, IPS, TOKYO at Japan-China Association
	Factory Visits
July 13 (Wed)	10:00 - 12:00
	TV Factory at Fukaya, Toshiba Corporation
	13:30 - 16:00
	IC Factory at Hanyuu, Tokyo Sanyo Electric Company
	9:00 - 10:00
	Speech by Mr. Abdelmoneim of UNIDO, ICPB
July 14 (Thurs)	A Group
	10:00 - 12:00
	Lecture on "Electronics Parts Industry, and its Research and Development (R&D)" by Mr. A. Ogasawara, Managing Director, Alps Electronic Company
	B Group
	10:00 - 12:00
	Lecture on "Japan's Technical and Economic Cooperation Scheme" by Mr. H. Suzuki Director of Technical Cooperation Division, Ministry of International Trade and Industry (MITI)

13:00 - 15:00

Lectur on "Vocational Training for Electronics Industry" by Mr. N. Fuse, Dept. Director of Overseas Technical Cooperation Division, Ministry of Labour.

July 15 (Fri) Visit to Think-Tank - Nomura Research Institute

(NRI)

10:00 - 12:00

Introduction of NRI
Lectures on "Japanese Electronics Industry and its Promotional Policies" and "World Electronics Industry and its Structure" by Mr. O. Hayama, Director of Industrial and Economic Dept., NRI

13:00 - 15:00

Lectures on "Overseas Investment of Japanese Electronics Industry" and "Japanese Investment and Asian Electronics Industry" by Mr. M. Kobayakawa, Chief Research of Electronics Industries, NRI.

Market Survey at Akihabara

July 16 (Sat) 13:00 - 18:00

Market survey

July 18 (Mon) Visit to National Broadcasting Station

10:00 - 12:00.

Visit the Broadcasting Centre, Japan Broadcasting Corporation (NHK)

13:00 - 15:30

Visit to Technical Research Laboratory, NHK New Technological Development on Broadcasting Devices and Equipment

July 19 (Tue) Speech on "The Arrangements for Company/Factory Visits by Mr. M. Saito, UNIDO, IPS, TOKYO

9:00 - 10:00	China
10:00 - 11:00	Philippines
11:00 - 12:00	Senegal
12:00 - 13:00	Sri Lanka

18:00 - 20:00

Reception by UNIDO, IPS, TOKYO at The International House of Japan

Billateral Discussion with Japanese Manufacturers

	China	Philippines	Senegal	Sri Lanka
July 20 (Wed)	10:00 - 12:00	10:00 - 12:00	10:00 - 12:00	10:00 - 12:00
	Iwatsu Electric Company	Sony Corporation Head Office, Tokyo, attended by Mr. K. Kosugi, Consultant	Toshiba Corporation Head Office, Tokyo, Attended by Mr. E. Yoshitake UNIDO, IPS	Meisei Electric Co., Ltd. Head Office, Tokyo attended by Mr. H. Takanashi
	19:00		14:30 - 17:30	
	Trip to Himeji by JNR "Bullet Train" attended by Toshiba Corporation		Sony Corporation Head Office, Tokyo, attended by Mr. K. Kosugi, Consultant	

July 21 (Thurs)	9:30 - 14:00	10:00 - 12:00	10:00 - 15:00	10:00 - 12:00
	Toshiba Corporation at Himeji Factory	Japan Software Industry Association, attended by Mr. H. Takanashi UNIDO IPS, Tokyo	Hitachi Sales Corp. Hitachi Ltd. Yokohama Factory, Attended by Mr. T. Mine, Hitachi Ltd.	Japan Software Industry Association Head Office attended by Mr. H. Takanasni, UNIDO IPS, Tokyo
	16:00	13:30 - 16:10		14:00 - 16:00
	Osaka Terminal Hotel	Akai Electric Co., Ltd. Head Office, Tokyo, attended by Mr. H. Takanashi		Engineering Consulting Firms Association (ECFA), Attended by Mr. Ohta, ECFA
		19:24	19:24	19:24
		JNR "Bullet Train" to Osaka	JNR "Bullet Train" to Osaka	JNR "Bullet Train" to Osaka

July 22 (Fri) 9:00 - 12:00

Visit to the Sanyo Electric Company
Observation of "Solar Hause" at Sanyo, Osaka

July 25 (Mon) Factory Visits

9:30 - 12:00

Technology Hall at Matsushita Electric Industrial Co. ("National")
Head Office, Matsushita Electric Industrial Co.

13:30 - 14:45

Electric Lighting Factory, Matsushita Electronics Corporation ("National")

15:30 - 16:45

Capacitor Factory, Matsushita Electronic Components Co. ("National")

July 26 (Tue) Factory Visits

9:30 - 12:00

Tape Recorder Factory, Sanyo ELectric Co., Ltd.

14:00 - 16:00

Video, Audio & HiFi Factory, Sanyo Electric Co., Ltd.

July 27 (Wed) Factory Visit

9:30 - 12:00

Calculator, Office-Computer Factory, Sharp Corporation.

14:10 JNR "Bullet Train" to Tokyo

July 28 (Thur) 9:30 - 11:30

Lecture on "Integrated Circuits, its technological trend and future" by Mr. O. Fujii, Director Electronics Devices Division, EIAJ

13:00 - 16:00

Lecture on "Methodology on Feasibility Study for Industrial Project" by Mr. S. Hiraki, Manager The Industrial Bank of Japan Ltd.

Bilateral Discussion with Japanese Manufacturers

	China	Philippines	Senegal	Sri Lanka
July 29 (Fri)	10:00 - 12:00	9:30 - 10:00		10:00 - 12:00
	Sony Corporation Head Office, Tokyo, attended by Mr. K. Kosugi, Consultant	Oki Electric Co. at Hachioji Factory	.	Hitachi Ltd. at Atago Office attended by Mr. T. Mine, Hitachi Ltd.
	15:00 - 17:00	14:00 - 16:00		14:00 - 16:00
	Hitachi Ltd., Head Office attended by Mr. T. Mine, Hitachi Ltd.	Ricoh Watch Co., Ltd. at Ricoh Building (Ginza) attended by Mr. K. Kawai, Consultant		Ricoh Watch Co., Ltd. at Ricoh Building (Ginza) attended by Mr. K. Kawai, Consultant

Aug. 1 (Mon) 10:30 - 16:30

Visit to Electrotechnical Laboratory, Agency of Industrial Science and Technology, MITI located at Ibaragi Prefecture.

Materials Division, Electronic Device Division, Information Science, Electronic Computer, Automatic Control, Radio-and Opto-Electronics, Energy, Standards and Measurements, etc.

Bilateral Discussion with Japanese Manufacturers

	China	Philippines	Senegal	Sri Lanka
Aug. 2 (Tue)	9:00 - 12:00			10:30 - 12:00
	Toshiba Corporation Head Office, Tokyo			Nippon Electric Co., Ltd. attended by Mr. H. Takanashi
	13:00 - 15:00	14:00 - 15:30		14:00 - 16:00
	Y.E Data Co., Ltd.	Mitsui MFG. Co., Ltd. at Tokyo Office attended by Mr. K. Kawai, Consultant		Japan Industrial Technology Association attended by Mr. H. Takanashi
Aug. 3 (Wed)	15:00 - 16:30	9:30 - 12:00	10:30 - 12:00	9:30 - 12:00
	Japan ECD Co., Ltd. (Mr. Dong) attended Mr. H. Takanashi	Nintendo Co., Ltd. attended by Mr. H. Takanashi	Sharp Corporation Tokyo Office	Nintendo Co., Ltd. attended by Mr. H. Takanashi
				15:00 - 16:30
				Japan ECD Co., Ltd. attended by Mr. H. Takanshi
				17:00 - 18:00
				CKD Corporation attended by Mr. H. Takanashi

15:00 - 17:00

Lecture on "Quality Control, QC Circle and Productivity" by Mr. H. Karatsu, Managing Director, Matsushita Communication Industrial Co., Ltd.

Bilateral Discussion with Japanese Manufacturers

	China	Philippines	Senegal	Sri Lanka
Aug. 4 (Thur)	10:00 - 12:00 Anritsu Electric Co., Ltd. at Minami -Azabu-Head Office, Tokyo attended by Mr. H. Takanashi, UNIDO, IPS, Tokyo	10:30 - 15:30 Mitsumi Electric Co., Ltd. at Atsugi, Kanagawa Pre. attended by Mr. K. Kawai, Consultant	10:00 - 12:00 NEC Show Room at Hibiya, Tokyo, attended by Mr. K. Kosugi, Consultant	10:30 - 12:30 NED (Nippon Electronics Development Co., Ltd) at Shinjuku Tokyo, attended by Mr. K. Sato, Consultant
	14:00 - 16:00 Toshiba Corporation Head Office, Tokyo			13:30 - 15:30 Software AG of Far East INC. Head Office Chuo-ku, Tokyo attended by Mr. K. Sato, Consultant
				16:00 - 17:00 Santoku Metal Industrial Co., Tokyo attended by Miss. Iwasaki
				17:00 - 18:00 NRI
Aug. 5 (Fri)	Bilateral discussion with UNIDO, IPS TOKYO and Participants Impression and results in Four week Tokyo Programme 9:00 - 10:00 China 10:00 - 11:00 Philippines 11:00 - 12:00 Senegal 12:00 - 13:00 Sri Lanka			Sri Lanka 15:00 - 16:00 CSE Co., Ltd. attended by Miss. Iwasaki 16:30 - 17:30 Japan Software Industry Association attended by Miss. Iwasaki
	18:00 - 20:00 Reception by UNIDO, IPS, TOKYO at President Hotel, Tokyo			

B. Speech by Mr. M.O. Abdelmoneim, Senior Industrial Development Officer, UNIDO Headquarters/ICPB

Summary

UNIDO is not a commercial organization but, rather, provides support for industrial production and financing for the purpose of accelerating the industrialization process.

This project is the first of its kind to be undertaken by UNIDO, and therefore it is all the more important that it result in success. It is hoped that during the Tokyo programme the participants will have the experience of establishing direct contacts with Japanese electronics makers.

Prior to opening of the Tokyo programme, each participating country has prepared a Country Paper (CP) and completed an Industrial Investment Project Questionnaire (IIPQ). I do not know how well these have been done but expect that they should be improved on the basis of further review of them.

a) Country Paper

These documents are highly valuable as aids to companies which require detailed knowledge about your countries in order to decide on investing there.

b) Industrial Investment Project Questionnaires

These documents are intended to stimulate investors in foreign countries to invest in your own countries.

The Tokyo programme only begins here; its completion and success ultimately depend on the efforts of each one of you.

Finally, I ask that all of you write and submit an evaluation of the programme after conclusion of these four weeks here. It is not necessary for you to sign these reports as we are interested only in your frank opinion.

C. Orientation on Programme by Mr. H. Takanashi, IPS, TOKYO

a) Participants from the three countries present (China, Sri Lanka, Senegal) were introduced. An explanation was made that the participants from the Philippines were being delayed by procedural formalities.

b) The entire schedule of the four-week programme was explained.

D. Lecture on "Japanese Consumer Electronics Industry and Its Profile", by Mr. K. Ishii, Director of Planning, Matsushita Electric Industrial Co.

a) Present conditions in Japan's consumer electronics industry

Production by Japan's consumer electronics industry in 1982 was valued at about ¥3.5 trillion; this was 4.4% less than the value for 1981. The reasons for the halt in the growth exports were the lowered demand for audio products, and also the decrease in shipments of VTRS due to the needs to adjust overstocked inventories abroad.

b) History of Japan's Consumer Electronics Industry

By 1940, there were 38 broadcast stations throughout the country, with 5,668,000 subscribers. At the time Japan Broadcasting Corp. (NHK) commenced TV broadcasting in 1952 radio broadcasters had increased to 137 NHK and 21 commercial stations, with 10,539,000 subscribers to the former. Commercial TV broadcasts began in 1953, and within two years there were two commercial stations and six operated by NHK. However, the total number of TV subscribers numbered only 165,000.

c) Discussion

i) Sri Lanka

Q: At present, at how many places does Matsushita have overseas operations?

A:

Factories	62
Sales offices	65

ii) China

Q: What is the extent that Japanese parts and components for Japanese electronics products were purchased during 1950 - 1960?

A: Imports were made from the USA. Gradually there was a shift to domestic production.

Q: In the Textbook, on page 5, "electronics products for consumer use made up about one-third of all electronics" is written; what do you expect in the future?

A: Expansion of production
Electronics products for consumer use:
10%/year
Electronics products for industrial use:
15 - 20%/year

Thus, higher growth is expected for industrial than for consumer electronics products

E. Lecture on "The Japanese Electronics Industry how it has attained its present position", Tuesday, July 12, 1983, by Mr. T. Takai, Executive Vice President, EIAJ

Summary

The total production of Japan's electronics industries amounted to $44 billion in 1982. This figure demonstrates that in the last ten years, the Japanese electronics industry has increased 2.9 times in scale, and that it has achieved an average growth rate of 11.2 percent per year.

In 1957, the Japanese government passed the "Provisional Law to Promote the Electronic Industries". The aim of this law was to help develop our electronic industries as the core industry of our national economy. When the "Provisional Law" was established, the annual production of Japanese electronic industries was less than $400 million. Their technological level and production scale were at least 20 years behind those of America. The most important objective of this "Provisional Law" was to form a solid national consensus which acknowledged the electronic industries as the industry best suited to be the core industry of Japan. I would like to emphasize here that the formation of such a national consensus is absolutely necessary for the development of electronics industries in any country.

The main points covered in the lecture were as follows.

a) Strategy of Japanese Electronic Industries: Intensification of consumer electronics (consumer-oriented product)

b) Quality control system and increase of productivity

c) The Japanese workers' sense of participation in management

d) Characteristic of the management of Japanese electronics industries

e) Some conclusions

   i) Electronic components are the foundation.

ii) Domestic market should be a base market for electronic products.

iii) Which process is more desirable to adopt in the initial stage of development of electronic industries? Comparatively labour intensive manufacturing and assembling processes, or comparatively capital intensive and automated ones?

iv) Quality control comes first. Then, enhancement of productivity.

v) Competitive electronics can not be produced in an environment where one thinks it is up to engineers to take care of quality control.

vi) To motivate all workers on the shop floor and make them quality-conscious is most important.

f) Discussion

i) Senegal

Q: How is the national consensus obtained?

A: A committee is formed, with members from the electronics industry association, business, labor, university faculty and government officials. Each company obtains low-cost finance from the Japan Development Bank. This approach was used when the Japanese economy was at a very low level, after the war. As background, starting even before modern times education was widespread, and historically it has been easy to obtain understanding on many subjects.

ii) China

Q: Will Japan continue to give emphasis to consumer electronics in the future?

A: Japan will probably shift from consumer use to industrial use products

iii) Sri Lanka

Q: What work does EIAJ do?

A: Research, and promulgation of standards.

g) Remarks

In order to develop the electronics industry, efforts were made to enact a "provisional law" on the basis of a national consensus. This point was of very high interest to the participants and there was a statement of desire to study this method of approach in greater detail.

F. Presentation of Country Papers - "Electronics Industry and its prospects" by representatives of Senegal, Sri Lanka and China

The persons who were present at the lectures were as follows.

i) Electronic Industries Association of Japan
Mr. M. Moriyama and Mr. O. Fujii

ii) Japan - China Association
Mr. I. Nakamura, Mr. S. Kajita and Mr. A. Hirayama

iii) Japan Consulting Institute
Mr. N. Miyajima

iv) Japan International Cooperation Agency
Mr. T. Imazu

v) Nomura Research Institute
Mr. M. Kobayakawa

vi) The Industrial Bank of Japan, Ltd.
Mr. S. Hiraki

vii) Matsushita Electric Industrial Co., Ltd.
Mr. K. Ishii

viii) Sanyo Electric Co., Ltd.
Mr. K. Fukazawa

ix) Hitachi, Ltd.
Mr. T. Mine and Mr. K. Nishikawa

x) Kanematsu-Gosho Ltd.
Mr. A. Hika

xi) SGV-Tsuda Ltd.
Mr. Umemura

xii) Engineering Consulting Firms Association, Japan
Mr. K. Hagiwara

G. Lecture on "Electronics Parts Industry, and its Research and Development (R&D)," Thursday, July 14, 1983, by Mr. A. Ogasawara, Managing Director, Alps Electronic Co., Ltd.

Summary

i) Electronic parts are classified as active components and passive components. In Japan the ratio of these is about 50:50. In the case of the Alps Electric Company 10 years ago there were about 10,000 employees of whom 70% were production line workers, and women. Today the number of employees is still about 10,000 but this includes about half the number of line workers that were employed 10 years ago, and they produce four times as much as their counterparts did 10 years ago. This is a consequence of automation.

ii) Regarding the future trends for parts, the following should be noted.

A) Trend toward high performance, miniaturization and reduction of weight
B) Shortening of product life cycles
C) Automation of production and testing
D) Use of computers for design and manufacturing work (CAD, CAM)

iii) To give a personal opinion on the difference between research and development, development is work with a clearly defined objective and time horizon, and research depends largely on individual abilities, and has no deadline for completion, while a mistaken judgment here can be fatal to the company.

iv) Regarding quality control, AQL and PPM are often confused. Acceptable quality level refers to the reject or defect rate specified as the maximum acceptable level in the sales contract. Parts per million is the reject rate of parts at the customer's. In general, in Japan the limit of 20 ppm is used as a standard. Because it is difficult to attain this by means of random sampling which is the method used in the past, there is an ongoing shift toward total inspection by automated means.

c) Discussion

i) Sri Lanka

Q: Is total inspection performed by the parts maker or the set maker who buys from him?

A: In Japan, by the parts maker.

Q: What rate is used for license fees?

A: License fees at Alps are 60% when we pay and 40% when we receive. At present, our payments still exceed our receipts.

ii) Senegal

Q: It is unbelievable from the viewpoint of Europe that the reject rate in Japan in 20 PPM. In my experience, the reject rate for switches in West Germany is 10% and in Italy and France it is about 20%.

A: We are endeavoring on a daily basis to keep the rate at 20 PPM by use of a feedback system supplying data from the users. I think that the figure of 10% for West Germany is something of an exaggeration but my impression when I visited German factories is that there is a great account of work being done by hand, which would result in a high level of rejects. There also may be a difference in the precision of dies.

Q: What is the level of reliability of automatic manufacturing equipment, and what is the frequency of breakdowns?

A: Man and machine are integrated; they help each other. Because almost all of our production equipment is made in-house, we are very confident in it. Anytime there is a breakdown we work all night if necessary to immediately repair it on the spot.

iii) China

Q: What is Alps' market share and position in the industry?

A: Our share is about 10-15%. Our major competitors include Matsushita Electronic Components Co., Ltd., which is about the same size as we are, and TDK, which is somewhat larger than we are. There are about 10 companies which are half the scale of Alps, and about 30 companies which are one-tenth our scale.

iv) Philippines

Q: What about the life cycle of parts at present, and the outlook for it in the future?

A: Now, about 3-5 years. It will be shorter in the future. The time needed for R&D, however, will be longer than at present.

iv) Sri Lanka

Q: In the future, won't there be an end to growth of demand for electronic parts, and a reaching of the limit regarding mass production by the automation route? Also, please explain Alps' policy regarding overseas production.

A: Because there will continue to be development of new electronics products in the future, and there will not be saturation of the markets, parts demand should continue to grow. Second, because the life cycle of electronic parts is short, there are many types of such parts, and the capital investment requirement is high, at present we are not very interested in overseas production.

H. Lecture on "Japan's Technical and Economic Cooperation Scheme" by Mr. H. Suzuki, Director of Technical Cooperative Division, Ministry of International Trade and Industry of Japan (MITI)

Summary

In 1955, Japan began to supply economic cooperation through reparations, and technical cooperation through participating in the Colombo Plan. During this period, the amount of Japan's Official Development Aid (ODA) increased rapidly, parallel to the rapid growth of the Japanese economy, and as shown in the table below, whereas it was $244 million in 1965, it increased to $3,170 million in 1981.

	(US$ million)
1965	243.7
1970	458.0
1975	1,147.7
1980	3,303.7
1981	3,169.8

The content of Japan's ODA in 1981, $3,169.8 million, by scheme, is as shown below.

	(US$ million)	(%)
Official Development Assistance	3,169.8	100
Grants	810.4	26
Bilateral Assistance		
Financial Grants	432.0	14
Technical Co-op.	378.4	12
Loans, etc.	1,450.0	45
Subtotal	2,260.4	71
Contributions to multilateral organizations	909.4	29

Note: Classification is that of the DAC.

	(US$ million)	(%)
U.S.A.	5,783	23
France	4,177	16
W. Germany	3,181	12
Japan	3,170	12
England	2,195	9
Holland	1,510	6
Canada	1,189	5
DAC 17-nation total	25,635	100

The geographical pattern of distribution of the US$2,260 million bilateral component of Japan's ODA in 1981 is as shown in the following table.

Regional Distribution of Japan's Bilateral ODA (1981)

	(US$ million)	(%)
Total	2,260	100
Asia	1,604	71
Africa	317	14
Latin America	177	8
Europe	49	2
Mideast	32	1
Oceania	19	1

Note: The ranking of Asian countries for which Japan's aid amounts to a high level, in descending order, is Indonesia, S. Korea, Thailand, Philippines, Bangladesh, Burma and Pakistan.

JICA (Japan International Cooperation Agency)

i) Survey: Feasibility study, etc.

ii) Despatch expert to developing countries:
2,000 person/year

iii) Trainees: Training centers are located
7 places

Period: 12 months (Average 3 months)

iv) R&D:
MITI makes use of the research and development capability of the experiment stations operated by the Agency for Science and Technology, by inviting research fellows from developing countries so that they may undertake joint research and development work on new technology and other matters, so that the resources of their countries can be better utilized.

Note:

JCI: Japan Consultant Institute
MITI 75%, JCI 25%

JODC: Japan Overseas Development Corporation
MITI 75%

AOTS: Association for Overseas Technical Scholarship
MITI 50 - 70%

I. Lecture on "Vocational Training for Electronics Industry", by Mr. N. Fuse, Deputy director of Overseas Technical Cooperation Division, Ministry of Labour of Japan

Summary

In Senegal at the present time construction of a technical training center is progressing and several Senegalese persons who are expected to work at the center are now in Japan for a two-year study period. Moreover, work has been begun in Senegal at preparation of training materials. It is believed that the following three items are essential for collaboration for vocational training.

A. Facilities and equipment
B. Human resources: training officers, instructors
C. Training materials

Regarding facilities and equipment, these are easily obtained as long as the money needed to purchase them is available. But the problem of human resources is not solved only by money. For the development of human resources in particular it is necessary to plan in units of years and to have firm long-range goals.

In connection with formulating a vocational training plan, the following must be kept in mind.

A. Needs
B. Target(s)
C. Readiness

At some times "needs" is the most important factor, but it is normally a difficult task to develop the required number of persons within the available time to satisfy the requirements of a country's set of conditions.

In Japan at present more than 100 persons a year from overseas are given vocational training and during any given year Japan is found to be providing assistance for construction of several vocational training institutes overseas. It is expected that this sort of cooperation will continue to be provided in the future.

Discussion

i) Sri Lanka

Q: In cooperation from country to country or company to company provided on the basis of a contract? It is only people who are between being engineers and being craftsmen who are trained? There is a plan at Sri Lanka's industrial institute to build a training center; in such a case is cooperation possible?

A: The Ministry of Labour is involved only in government-to-government relationships. It seems that recently there has been an increase in company-to-company cooperation based on a contract of one kind or another. Of course, engineers are trained and craftsmen also are trained. It depends on the needs. If a consensus is formed within the Sri Lanka government and a formal request is submitted to the Japanese government, there would be no problem in taking this up for government-to-government cooperation.

ii) China

Q: All of the materials supplied to China are written in Japanese. Why?

A: There is no limitation requiring them to be only in Japanese. In Mexico, Japan has supplied an American-made computer as part of its cooperation. Very much depends on the wishes of the other government.

iii) Senegal

Q: When the training center is completed and is fully operational, it will train 20 electric technicians a year; won't there be a problem in their finding employment?

A: As already mentioned in the lecture, it is essential to get an understanding of needs when plans are being formulated. We have already indicated this to the Senegal government, and modifications are now being made.

J. Lecture on "Japanese Electronics Industry and its Promotional Policies" and "World Electronics Industry and its Structure", Friday, July 15, 1983, by Mr. O. Hayama, Director of Industrial and Economic Dept. NRI, at NRI.

Summary

Japan's policy for the electronics industry may be said to have been started with passage of the Law on Extraordinary Measures for the Promotion of the Electronics Industry (Denshinho) in 1957.

As the major feature of the Denshinho, three sectors were designated: that where experimentation and research should be promoted for the electronics industry, that where the start of industrial production should be promoted. This was in the effect the setting down of guidelines, and these guidelines had the effect of guiding the energy of private industry in the direction of participating in the electronics industry.

The Denshinho was automatically extended in 1964, and reformulated in 1974 as the Law on Extraordinary Measures for the Promotion of Specific Electronic and Machinery Industries (Kidenho), which was supplanted in 1978 by a law with a similar English name but commonly called "Kijoho" by the Japanese. The major features of the policies of these laws were as follows.

The Denshinho has a strong tone of establishing the foundation for Japan's electronics industry, but it had the nature of combining two previous laws, one for promotion of the electronics industry and one for promotion of the machinery industry and the Denshinho thereby sought to integrate and improve the policy framework, wherein special importance was assigned to the computer industry, which was still in an early developmental stage. The Kijoho recognized the importance of the software industry and the need to promote its development.

1957 Passage of the Denshinho
1964 Extension of the Denshinho
1971 Passage of the Kidenho
1978 Passage of the Kijoho

Factors in the development of Japan's electronics industry.

The development of Japan's electronics industry may be explained by referring to three general factors, namely;

A) Government policy
B) Activities by the private sector, and
C) The market environment

K. Lecture on "Overseas Investment of Japanese Electronics Industry" and "Japanese Investment and Asian Electronics Industry" by Mr. M. Kobayakawa, Chief Researcher on Electronics Industries, NRI.

Summary

There are more than 300 cases of overseas expansion by Japanese electronics companies. More than 60% of them are in Asia.

L. Market Survey at Akihabara, Saturday, July 16, 1983, 8 participants, Mr. M.O. Abdelmoneim and Mr. H. Takanashi, attended by Mr. K. Kosugi, Consultant.

Summary

Akihabara is one of the most unusual markets in the world; in an area of only about 0.25 square kilometer there are over 1,000 small and large establishments, selling electric appliances, electronic goods, parts, measuring instruments, computers, etc. This area alone is believed to account for 10-15% of total domestic sales of

Table 2 Overseas Corporations Established by Japanese Electronics Makers

(Unit: Number of companies)

	Consumer Electronics	Electronic Parts	Industrial Electronics	Total
West Europe	15	4	2	21
North America	15	7	9	33
Latin America	14	14	6	27
Asia	61	138	13	207
Others Regions	23	9	4	37
Total	128	172	34	325

Source: NRI

Note: Some companies produce more than one type of product, so line totals do not add to Total column figures.

Table 3 Estimation of Regional Distribution of Overseas Production by Japanese Companies (1978)

	Overseas production (1,000 units)	Regional Distribution (%)			
		West Europe	North America	Asia	Other
Color TVs	3,223	7.6	52.6	30.9	8.7
B & W TVs	3,222	(1)	0	84.6	15.3
Radios	10,551	(1)	0	93.0	6.9
Radio-cassette tape recorders	6,602	(1)	0	94.7	5.3
Car radios, car stereos	-	-	-	-	-
Stereo sets	704	(1)	0	67.6	32.4
Speaker systems	704	-	-	-	
Other hifi, amps	367	(1)	0	93.5	6.5

Source: EIAJ

Note: (1) included in "Other"

Table 4 Estimation of Regional Distribution of Overseas Production by Japanese Companies (1979)

	Overseas production (1,000 units)	Regional Distribution (%)			
		West Europe	North America	Asia	Other
Color TVs	4,029	7.8	52.8	29.0	10.4
B & W TVs	3,979	(1)	(1)	84.6	15.3
Radios	10,565	(1)	0	92.5	7.5
Radio-cassette tape recorders	10,103	(1)	0	95.3	4.7
Car radios, car stereos	406	(2)	(2)	(2)	(2)
Stereo sets	1,138	(1)	(1)	67.6	32.4
Speaker systems	1,047	(3)	80.5	19.5	(4)
Other hifi, amps	653	(1)	0	97.1	2.9

Source: EIAJ

Notes: (1) Included in "Other" category
(2) Not separable by region
(3) West Europe included in "Asia"
(4) "Other" included in North America

Table 5 Estimation of Regional Distribution of Overseas Production by Japanese Companies (1980)

	Overseas production (1,000 units)	Regional Distribution (%)			
		West Europe	North America	Asia	Other
Color TVs	5,744	10.3	60.8	13.3	15.7
B & W TVs	4,192	(1)	0	85.3	14.7
Radios	11,844	(1)	0	92.8	7.2
Radio-cassette tape recorders	11,586	(1)	0	93.9	6.1
Car radios, car stereos	581	(1)	0	42.3	57.7
Stereo sets	839	(1)	(1)	47.2	52.8
Speaker systems	1,551	9.9	81.4	8.7	(2)
Other hifi, amps	602	7.6	0	92.4	(2)

Source: EIAJ

Notes: (1) Included in "Other"
(2) Included in "Asia"

Table 6 Estimation of Regional Distribution of Overseas Production by Japanese Companies (1981)

	Overseas production (1,000 units)	Regional Distribution (%)			
		West Europe	North America	Asia	Other
Color TVs	6,486	12.9	58.0	14.7	14.5
B & W TVs	4,108	(1)	0	84.0	16.0
Radios	14,146	(1)	0	93.6	6.4
Radio-cassette tape recorders	11,586	(1)	0	94.1	5.9
Car radios, car stereos	730	(2)	0	(2)	(2)
Stereo sets	906	(1)	(1)	57.5	42.5
Speaker systems	1,510	14.0	76.5	9.5	(3)
Other hifi, amps	650	12.2	0	80.8	7.1

Source: EIAJ

Notes: (1) Included in "Other"
(2) Not separable
(3) Included in "Asia"

electric goods for consumer use, although it also has been estimated to have a 20% share. it is a microcosm of Japan consumer electric and electronic goods industry. The reason for its prominence is in goods industry. The reason for its prominence is in good part due to being near stations on several key railway and subway lines. To observe "everything" here would take a week or more. Therefore the objective of the visit here was defined in precise, limited terms so that the objective could be attained in the matter of an hour or two. The procedure followed is given below.

i) Microcomputer hardware and software shops
ii) Stores specializing in small parts such as resistors, condensers, switches, etc.
iii) Large stores, often called "electric department stores"
iv) Duty-free shops
v) Shops selling radio-controlled toys, model trains, etc.

Salient points about each of these are as follows.

A) Microcomputer shops

There are over 20 large and small microcomputer shops and showrooms concentrated on four floors of the Radio Kaikan building. Here it is possible to obtain almost any commercially available microcomputer in Japan, as well as information. It is a simple matter to purchase 64K static RAMs here; these represent the most advanced aspect of electronics technology in Japan today. In this building are showrooms devoted to NEC, Hitachi and Fujitsu microcomputers and in each showroom visitors can use any of 10 or more models free of charge. On weekends the crowd of junior and senior high school students is so great they must wait in line to get in.

B) Parts shops

There are over 200 shops specializing in parts. Some are as small as 6 square meters. Every conceivable electric and electronic part is on sale here. Thirty years ago the stores here mostly dealt in junk--U.S. military surplus--but now they sell parts for state-of-the-art applications. These shops are said to be places where one can easily learn the "secrets" behind Japan's electronics industry.

C) Large-scale finished products shops

A visit was paid to Ishimaru Electric, a typical large store handling finished products, and a so-called "electric department store." The building has 7 stories.

D) Duty-free shops

Many Akihabara stores sell products not only to ordinary customers but also to tourists, the latter being able to buy goods free of duty.

One of the largest is Yamagiwa, which occupies an entire building. From the first to the third floor, all kinds of electric and electronic products, cameras, jewelry, etc. are on sale.

E) Electronic toy shops

The annex of Hirose Musen, one of the large-scale shops, is entirely devoted to sale of electronic toys, radio-controlled cars and planes, transceivers, TV games, home-use computers, handheld games, model cars and model trains are typical of what is offered.

All the participants seemed to have knowledge about Akihabara but it was essential that they visit it to see for themselves. It seemed that they were at first overwhelmed by the scale of Akihabara and the diversity of products offered for sale there. Many stores had sales clerks who could speak a little or even passable English, and some has personnel who could speak other languages.

M. Visit to the Broadcasting center of Japan Broadcasting Corporation (NHK), Monday, July 18, 1983, 9 participants, Mr. M.O. Abdelmoneim, introduced by Mr. K. Oka, Senior Engineer, Technical Administration, Headquarters of Engineering, attended by Mr. Y. Mikami, Consultant

Summary

i) "Japanese electronics industry" a VTR film showing the production process of semiconductors and IC's
ii) Study various broadcasting equipment, facilities and studios

iii) Visit to Technical Research Laboratory of NHK

   A) New technological development for broadcasting devices and equipment
   B) Satellite broadcasting system, on-board transmit/receive equipment, transmission system, attitude control techniques
   C) High-definition television; to get more clear picture by changing number of scanning lines from 525 to 1,125.
   D) Information broadcasting; Japanese teletext, sound multichannel television, still-picture broadcasting, data transmission

N. Lecture on "Integrated Circuits (IC), its technical trend and future", Thursday, July 28, 1983, by Mr. O. Fujii, Director Electronics Devices Division, Electronic Industries Association of Japan

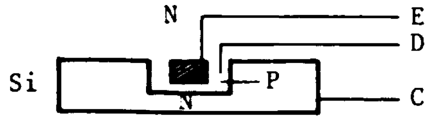
Summary

This lecture primarily dealt with basic technology for ICs.

Before ICs became widely used, it was necessary to use vacuum tubes. Bell Telephone Labs in America succeeded in making the first IC, using germanium. Thereafter germanium was supplanted by silicon which is widely available throughout the world.

"Transistor" was coined from the words "trans" and receiver". In Japan, the Sony company was the first to produce and sell "transistor radios", after World War II. It is also widely known that Fairchild an American company they played a major role in regard to development of the planar transistor and the emita-based collector.

The structure of an IC is as shown below.



P = Positive
N = Negative

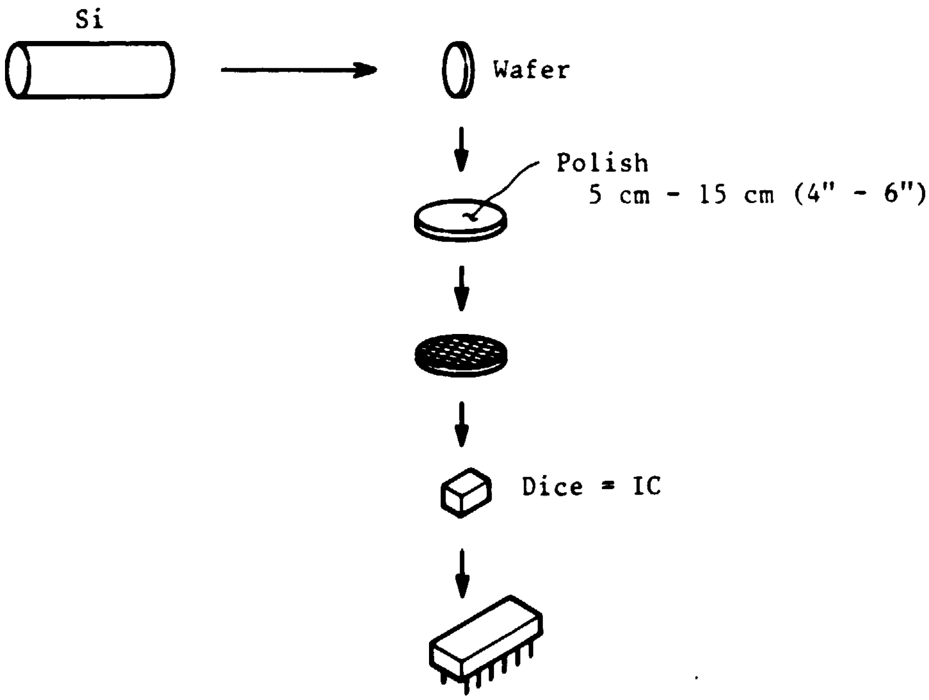
Utilization of the IC spread in America for defense uses and in Japan for consumer-goods uses.

Manufacturing process of ICs

SiO_2

Si (silicon metal)
Single crystal = mono crystal

The silicon is melted in a furnace and drawn through the air, and then cooled.



Fine processing of ICs

From 100 to several thousand elements are difficult to mount on one small IC. Therefore the processes of lithography, photo-resist, and etching are used.

Producing bigger wafers

Yield in making ICs can be improved if wafers are made larger in size. Because of cost considerations, rejects from among the dice (chips) made can be used for other purposes.

Materials

In addition to silicon, recently use of gas in small quantities has been begun.

Packaging

It is necessary to transport ICs to users in special containers which are hermetically sealed to prevent dust or dirt particles from adhering to the ICs.

Key points in production of ICs

i) Production of pure gas and pure water

   It is necessary to use high-precision machines and equipment in order to produce gas and water of high purity.

ii) Production of clean air

The clean degree of the IC production environment is determined by the design and fabrication of the "clean room" wherein the ICs are made.

iii) Production of better-quality (better performance) ICs

A combination of advanced technology in the fields of chemicals, optics, machinery and photography are needed to make good-quality (good performance) ICs. Particularly important is the fabrication of high-vacuum machines and development of a body of skilled workers and engineers.

iv) Other points

Regarding transportation and transportation cost of ICs, it is generally desirable to locate the production facility near an airport. In order to attract engineers of high capability it is necessary to provide a favorable environment for them to work in.

<u>Future of the IC industry</u>

We may think that there are no practical limits to the use of ICs. ICs are being made in Japan, the United States,and European countries, but because of the rapid tempo of development of the electronic industry developing countries face a major problem in attempting to establish an IC industry of their own.

Discussion

i) Philippines

Q: Please give the classification of ICs.

A: SSI = small scale integrated circuit

LSI = Large scale integrated circuit

VLSI = Very large scale integrated circuit

64K IC = 64 million memory capacity.

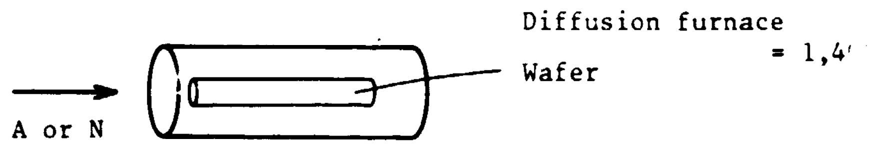
There are also those with 150 - 200 million memory capacity.

It is possible to put that much memory on a single chip.

ii) Sri Lanka

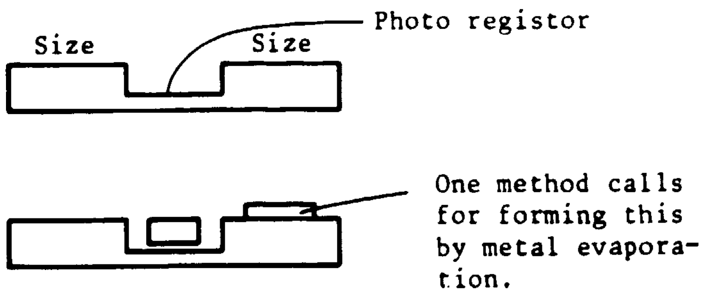
Q: How are impurities added to the IC?

A: The impurities are A, As, Al, etc.



Q: How are multi layer ICs made?

A:



iii) China

Q: What is the marketing size of wafers?

A: 5" (most common) } USA
7" } USA
4" - 5" ----- Japan

iv) Senegal

Q: What about micro-processors?

A: These are made in Japan. We also import some from the USA.

O. Lecture on "Methodology on feasibility study for industrial project", Thursday, July 28, 1983, by Mr. S. Hiraki, Manager of The Industrial Bank of Japan, Ltd.

Summary

It was believed important to assist the participants in obtaining an understanding of the electronics industry for them to become familiar with project feasibility studies; what they are and how they are made. This lecture was planned on that basis. For details covered in the lecture, see the text, provided with this report.

The gist of the lecture covered the following.

i) <u>Cycle of project appraisal</u>

A) Analyzing project steps
   a. Smooth coordination - right timing
   b. Minimized project cost - effective use of project cost
   c. Efficiently use of manpower - tight control of project schedule
   d. Country risk

B) Industrial project appraisal process

a. Identification

i Objectives

ii Strategies

b. Pre-feasibility and screening

c. Project formulation and reshaping

d. Decision-documentation-sign-disbursement

e. Follow-up

f. Post project evaluation

Discussion

There were no questions from the participants. Instead, an explanation to the following effect was provided, concerning the likely consequences of not performing a feasibility study.

A) In one country, a TV broadcasting tower was erected, but that country only imported TV sets and made none domestically.

B) Even though a steel mill was built, a country continued to import steel.

C) A certain Japanese company established a joint venture overseas and provided 49% of the equity. It was successful and began to make a profit. After that the host government changed its policy and it became impossible for the company to remit profits to Japan. The Japanese company decided it had to withdraw from the venture.

P. Visit to Electrotechnical Laboratory, Agency of Industrial Science and Technology, MITI, at

Tsukuba of Ibaraki prefecture Accompanied by Messers. Takanashi, UNIDO IPS, TOKYO, Mr. K. Kawai, Consultant
Monday, August 1, 1983.

Summary

Detailed Schedule:

10:05	Arrival at Arakawaoki (Departure from Ueno 9:01)
10:30 - 11:00	Outline of Electrotechnical Laboratory (D-822) Mr. K. Onda, Research Planning Office Mr. K. Nishiya, International Relations
11:05 - 11:30	Standards & Measurements Division (2A-114) Dr. T. Nemoto, Division Chief
11:35 - 12:00	Materials Division (C-324, M302) Dr. H. Ihara Dr. U. Ito, Section Chief
12:00 - 13:00	Lunch at "Green House"
13:00 - 13:40	Automatic Control Division (E-341) Mr. S. Wakamatsu, Division Chief Dr. H. Akahori, Section Chief
13:45 - 14:25	Computer Science Division (E-422, D-422-B) Mr. T. Sato, Section Chief Dr. K. Torii, Section Chief
14:30 - 15:10	Electronic Device Division (C-311-1) Dr. S. Kataoka, Division Chief
15:10 - 15:25	Coffee Break (D-822)
15:25 - 16:05	Radio- & Opto-Electronics Division (D215-1, E-042) Dr. J. Shimada, Division Chief Mr. Y. Mitsuhashi, Section Chief Dr. M. Ikeda, Section Chief
16:57	Departure from Arakawaoki for Ueno (Arrival at Ueno 17:59)

Q. Lecture on "Quality control, QC circle and productivity, August 3, 1983, by Mr. H. Karatsu, Managing Director, Matsushita Communication Industrial Co., Ltd.

Summary

Japan has 0.3% of the world's land area

Japan has 2.7% of the world's population

Japan produces 10% of the world's GNP.

Per household income in Japan is 4,550,000/year (about the same as the average for Europe)

Life expectancy of Japanese women: 79 (world's highest)

Life expectancy of Japanese men: 75 (world's highest)

Crime (murders): lowest in the world (1/6 of the rate in America)

Educational level: 96% of young people attend high school

37% of young people attend college

Illiteracy: zero

Almost all the Japan suffered great destruction during World War II. The population then was 70,000,000.

Natural resources: Japan's endowment is very limited.

Location: Among the countries with well-developed economies, Japan is the most remote.

The reasons may be given for the economic progress Japan has made:

A. The wisdom and knowledge of the Japanese

B. Great effort

Singapore is an example of a country which has little natural resources. It is smaller than Japan, has a population of 2,500,000, and has been independent for only 15 years. But it has become the second most important economic power in Asia, second only to Japan. The reason for this is prosperity of the industry there.

Industrialization

Human beings are important for the industrialization process. After World War II, even if Japan has the same machines and the same materials as the USA, Japan could not have produced the same goods as the USA. Japanese goods were synonymous with poor quality. Today, however, Japan produce many goods of high quality. It is thought that this has been made possible by Quality Control.

Productivity

Production is the result of integration of hardware (machines), human ware (humans) and software (management). Quality Control means to start with market research and make things that people need. Japanese cars sell well in Europe and America because they provide economical performance in places where gasoline is expensive.

It is necessary to avoid producing defective products. To have to inspect products is wasteful. If there are no defective products, there is no need for inspection work. To lower the defect rate is to lower product cost.

Our company produces four million microphones to be used as built-in parts of mini-cassette tape recorders a year. The production cost is about ¥30. The defect rate is 50 ppm (50 in 1,000,000). Four years ago production cost was ¥45. It was quality control that enabled us to lower production cost by such a wide margin.

Quality control

Quality control was born in America, but has not received very strong interest there.

When something is made, reasons are created for making some of them with defects. These included problems of product design, mistakes in estimating the characteristics of materials used, worker mistakes, and acceptance of unrealistic orders by salesmen.

To prevent defects it is vital to maintain teamwork by all persons concerned in the company. In our company we assign very high importance to Q.C. We work hard to set up QC Circles and produce better products thereby.

For example, we undertake evaluation of the market. Twice a year we collect our defective products and put them on display in the company. This enables workers to see with their own eyes the defective products they helped make.

I once had the chance to visit a certain foreign country. I paid a visit to a manufacturing plant there. The president only sat in his office and hardly ever went into the plant. The workers did not have any idea of how the things they made were being sold. Under such circumstance I don't think products of good quality can be made.

Discussion

i) Senegal

This was an extremely useful lecture. The situation is just as the speaker said it is.

ii) China

Q: What about training programmes for the workers?

A: Training is for manufacturing of good products, e.g. through design, sales etc. and not only is it concerned with production.

To produce good products, it is necessary to identify the cause of defects.

There must be thorough-going technological analysis. Statistical methods are used to analyze problems. Employees throughout the company participate in the QC Circle as activities. This is a characteristics of QC in Japan. Difficult theory and methodology is made easy for workers to understand.

R. Bilateral discussion with IPS TOKYO and participants
Friday, August 5, 1983
Participation by Messers. Kawai and Kosugi, Consultant

On the last day of the Tokyo programme IPS Tokyo held a meeting (debriefing) with each country's participants separately. The purpose of the meeting was to learn the results obtained by each group of participants and their observations on the programme. The meetings were held according to the following schedule.

China	9:00 - 10:00
Philippines	10:00 - 11:00
Senegal	11:00 - 12:00
Sri Lanka	12:00 - 13:00

Summary

i) China

A) Appreciation was expressed to UNIDO headquarters, IPS Tokyo and the Consultants for concerning of the programme, and planning and implementing it.

B) We had an opportunity to learn about Japanese industrial policy, not merely the Japanese electronic industry.

C) We were extremely impressed by the factory visits as well as mass production and also found the management of quality control to be of high interest.

D) In all we visited 13 companies, 15 factories and 5 research institutes; we made progress in discussing our proposals at the following:

Company A:	LCD project
Company B:	VTR project
Company C:	FET semiconductor project
Company D:	Telephone and oscilloscope project
Company E:	Tantalum metal project
Company F:	Measurement equipment project

Comments by Mr. M. Saito, head of IPS Tokyo.

We are aware that our coverage of industrial electronics was not as thorough as it could have been. Regarding your plans for industrial electronics, however, we would have preferred that you develop your plans somewhat more before bringing them to Japan.

ii) Philippines

A) We are grateful to have been able to complete the programme without any serious problems, thanks to your diligent efforts.

B) We regret that procedural problems resulted in our arriving in Japan on July 13, three days late.

C) Regarding our plans for a project calling for production of IC lead frames we were able to hold discussions with a company that is very interested in production in our country.

D) We were able to have meetings with officials of forward-looking companies in the field of electronic parts production, and also to visit factories.

Comments by Mr. M. Saito, head of IPS Tokyo

A) At present your country has three free trade zones, and is planning 10 more. It seems advisable to assign importance to improving the ones that exist today rather than make new ones.

B) Since it is necessary to establish more electronics parts industries, it would be necessary for the BOI to be more accommodating in providing support toward that objective.

C) In order to better publicize the capabilities and potential of the Philippines' electronics industry, and collect information about the Japanese electronics industry, greater use of the JETRO office in Manila may be made. It can be a base for maintaining closer connections between the electronics industries of each country.

iii) Senegal

A) We appreciate the chance to see and hear much about the Japanese economy.

B) We understand the causes behind the amazing development of the Japanese economy. That is, the employees in Japanese companies do their work in a team-oriented manner. Whether at the level of the company or the nation, they work for the larger entity, not merely for themselves. We were impressed by Japan's unique philosophy, which is not to be found in the West.

C) Frankly speaking, although we recognize that there was insufficient time, we would have preferred that the Consultant could have provided guidance better suited to our own conditions.

D) In Senegal, the agent for Company A is very strong and it is expected that we will be able to make progress on that basis.

iv) Sri Lanka

A) Company A expressed interest in our export processing zone.

B) There were three companies, which make radios, tape recorders, and electronic toys, which are interested in expanding to Sri Lanka.

C) We are thinking that it might be useful to invite a mission from the computer Association.

D) We visited various factories but did not find much of interest.

E) It would be good for Japanese industries to expand to Sri Lanka but the small size of the domestic market means they would have to be export-oriented.

F) We would like to maintain close contact regarding the solar cell project.

CHAPTER 4

A FINAL EVALUATION OF THE ENTIRE PROGRAMME

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1. The Tokyo programme had to be begun without our having had the benefits of adequate preparation.

   UNICO started its work as per the directions of IPS Tokyo, because of the constraint of available time, and this resulted in a discrepancy between what took place and what UNIDO headquarters had had in mind. That is, because of reasons which primarily included an absolute shortage of sufficient time, it was necessary to proceed in accordance with instructions from IPS Tokyo (for example, the Tokyo programme was so defined as to be limited to consumer electronics, and the schedule for the start of the Tokyo programme was changed without there having been sufficient time to adjust preparations accordingly), and there were some aspects which were contrary to the desires of UNIDO (for example, the number of experts who visited the four participating countries was two, and the experts were unable to prepare adequate information about the electronics industries of the countries visited before their departure).

   Although we may think that it would be necessary to make arrangements for the actual implementation of the programme only after the candidate projects had been advanced by the four participating countries, there was insufficient time between their selection of the candidate projects and the opening of the Tokyo programme, and some friction arose because of that. At least one month of preparation time should have been provided.

Only the Philippines and Senegal were able to provide the consultants with the CP and IIPQ at the time of the experts' visit to the participating countries. Sri Lanka sent the information to Tokyo after the Consultant's experts returned to Tokyo, and China's delegation brought the information with them when they came.

2. Functions of the Consultant

The functions of UNICO included the preparation of CPs, IIPQs and other documents, the dispatch of experts, and outside the provisions made in the Terms of Reference, to assist IPS Tokyo. Nevertheless, UNICO undertook to prepare the documents prior to the departure of the two experts, on the basis of our understanding that they were of vital importance for assuring success of the overall undertaking.

Initially it was proposed by IPS Tokyo that the lecture portion of the Tokyo programme be in the Japanese language, and that an interpreter be provided and tape recordings of the interpreter's presentation be given to the participants, but UNICO was of the firm opinion that this would be insufficient and undertook to prepare English-language texts, arrange for use of an overhead projector, and use videotapes in order to insure that the lectures were as effective as possible. Each lecturer was asked to provide a written copy of his presentation in advance, and almost all of the texts submitted to UNICO were drafted in the Japanese language. The Consultant proceeded to translate and edit the drafts in an extremely short period of time, and compile them into a reference text. In order to insure that the drafts were prepared properly, the Consultant held meetings with each lecturer individually, to explain in detail the purpose and method of the Tokyo programme. This work on behalf of the preparation of written materials, duplication and compilation of them for supply to the participants was undertaken at considerable expense, and at the expense of UNICO.

During the Tokyo programme, UNICO felt obligated to have two experts and one secretary attend all sessions, as a contingency in the event that a special situation arose. Mr. Sato attended sessions as required, Mr. Kawai attended all four weeks, and Mr. Kosugi attended the sessions during the first and fourth weeks.

3. Identification of Projects

Electronics is an industry in which the process of technological innovation is proceeding at a fantastic pace. Product lives are therefore very short. This has two important implications, (1) that there is a strong possibility that when an investment project is attempted through a tie-up with a manufacturer from an industrialized country, it easily can become obsolete, and (2) there is a disincentive to invest in an electronics industry project in a developing country. In view of the intense international competition in this industry, manufacturers in the developed countries have adopted a strategy according to which they have already expanded into promising countries, or have begun negotiations prior to expanding into those countries. In this sense, the electronics industry is a special case among all industries, and there thus is room for doubt as to the usefulness of UNIDO's deciding to undertake a project involving this particular industry. In the case of plastic processing industry, for example, the technology is generally already well established, and there should be many countries and many areas where UNIDO could make a contribution to industrialization through identification and generation of projects. It is believed that there will be a process of development of plastic processing industries in the developing nations as the oil-producing nations increase their share of petrochemical production. Whether it is a question of utilizing natural resources or human resources, when thinking of a domestic market it should be relatively easier to succeed with a somewhat maturing industry or body of technology in order to stimulate implementation of a project whereby transfer of technology can be accomplished. In such a case, it should be possible to an extent to create models for individual projects.

That is, in the identification of projects, it may be more desirable from the viewpoint of effectively accomplishing the objectives of UNIDO and using its capabilities to concentrate on projects for which there can be a relatively easy transfer of technology.

Further, (3) regarding the selection of countries, while it may be of some interest to assemble various countries each with a different level of relevant technology, and examine the potential of an industry at various levels, this approach is marred by lack of emphasis. Although China is manufacturing electronic parts, there is virtually no outlook for Senegal to begin to make those parts. It would be most efficient to combine countries with a similar level of capability and accomplishments in the relevant industrial field.

It may also be noted, (4) that the four participating countries did not have an adequate understanding of what the programme was intended to be. Regarding the dispatch of the experts, and specifically their qualifications, there was hardly sufficient time between UNIDO head-quarter's request that they be dispatched and the time that they had to depart for the best possible experts to be selected, and it is our understanding that there have been some complaints to the effect that the experts lacked proper experience. While they have made their best efforts to prepare an adequate report upon their return to Tokyo, working at the limit of their ability has not been enough to yield adequate results. Nevertheless, complaints which may emanate from the participating countries must be considered to be based on inadequate understanding on the part of those countries. themselves. For example, SIDFA (China) has had a complaint about UNICO's preparation of an advance report on the Chinese electronics industry, but this report was prepared at the request of Mr. Abdelmoneim. Moreover, the report was prepared with the belief that it would be of use to the country concerned in the compilation of documents required for the programme. Moreover, Sri Lanka complained that Japan did not attempt to convince them of the value of undertaking specific electronics industry projects, and had not prepared a project list with specifications (scale of the undertaking, investment budget, etc.). This is clearly a misunderstanding on the part of Sri Lanka.

Regarding (5) the results of this week's programme, we believe it to be of value for the participants to be able to see how volatile is the change in the electronics industry today, how short product life cycles are, how swiftly progress is being made in the direction of automation of parts production, and how the industry is striving to improve product quality. In this regard, it is thought that there are many hints which can be obtained from study of the development of electronics parts production lines in China. It is also believed that the other participating countries have become able to judge at what stage they may begin production, and whether it is desirable to do so at the present time. That is, we believe that they have considerably deepened their understanding of the present situation of the electronics industry. It is amply evident that it is vital to understand the special conditions prevailing in each industry as a basis for the identification and generation of industrial development projects.

4. Timing of the holding of the Tokyo programme

From the end of July to the first part of August coincides with summer vacation schedules at Japanese electronics firms, and production levels are reduced somewhat accordingly. This was the poorest time of the year to hold the programme. During September and October there are in Japan trade shows devoted to electronics technology, and announcement of new products, an office automation fair, etc. If this latter timing can be utilized, the benefits would be greater.

5. The theme of the Tokyo programme, and its concreteness

Although there is some unavailable duplication of what has been written above, a comment on the theme of the Tokyo programme, and its concreteness, is considered useful to provide at this point.

Reference may be made to Appendix 6, which gives Customs clearance information relating to electronic equipment. This information was obtained from the Ministry of International Trade and Information. The information demonstrates the great variety of encompassed within the general subject of "electronic equipment". On the basis of this information the Consultant prepared a list, as requested by IPS Tokyo, of products in the category of consumer electronics. It is extremely difficult even for electronics experts in industrialized countries to obtain an understanding of consumer electronics, industrial electronics and electronic parts in a short time. It is therefore thought to be advisable, in planning a future project such as the present one involving electronics, for UNIDO Headquarters to more precisely define the field or fields of specialization to be covered, and to endeavour that at the implementation stage the participants possess a relatively deep understanding of subject at hand.

CHAPTER 5

ADVISORY COMMITTEE AND THE ACHIEVEMENT OF THE OBJECTIVES OF THE TOKYO PROGRAMME

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Mention is made in Chapter 2 [2-1 (2)] of the Advisory Committee; in this chapter the composition of the committee and results accruing from the committee's work are presented and reviewed. Comments provided herein, however, are limited to that which can be made by the consultant who has been sub-coordinator for IPS Tokyo which together with the Advisory Committee were directly and indirectly responsible for managing this project.

1. Organization of the Electronic Industries Association of Japan (EIAJ)

   The Board of Governors and management organization of the Electronics Industries Association of Japan (EIJA) are as follows.

ELECTRONIC INDUSTRIES ASSOCIATION OF JAPAN

BOARD OF GOVERNORS

President	
Tadahiro Sekimoto	Nippon Electric Co., Ltd.
Vice Presidents	
Akio Morita	Sony Corp.
Shoichi Saba	Toshiba Corporation
Katsushige Mita	Hitachi, Ltd.
Toshihiko Yamashita	Matsushita Electric Industrial Co., Ltd.
Nihachiro Katayama	Mitsubishi Electric Corp.
Executive Vice President	
Toshio Takai	
Staff Vice President	
Ryuji Iwasaki	
Governors	
Katsutaro Kataoka	Alps Electric Co., Ltd.
Ichiro Tajima	Anritsu Electric Co., Ltd.
Takeo Sakabe	Asahi Glass Co., Ltd.
Toshio Shimoda	Clarion Co., Ltd.
Yoshio Fujino	DX Antenna Co., Ltd.
Taiyu Kobayashi	Fujitsu Ltd.
Shoji Furukawa	The General Corp.
Ryozo Nagahama	Hitachi Denchi, Ltd.
Masao Nakamura	Hokuriku Electric Industry Co., Ltd.
Satoru Furuhashi	Hosiden Electronics Co., Ltd.
Katsuro Sakamoto	Ikegami Tsushinki Co., Ltd.
Koichi Mukaiyama	Koa Denko Co., Ltd.
Noboru Nakamura	Kokusai Electric Co., Ltd.
Kazuo Inamori	Kyocera Corporation
Taro Kuninobu	Matsushita Electronic Components Co., Ltd.
Masao Matsuo	Matsuo Electric Co., Ltd.
Hajime Moribe	Mitsumi Electric Co., Ltd.

Koji Matsui	Japan Radio Co., Ltd.
Akira Murata	Murata Mfg. Co., Ltd.
Nobutaka Matsumura	Nippon Columbia Co., Ltd.
Kaichiro Hirai	Nichicon Capacitor Ltd.
Yoshio Ogino	Nihon Kohden Kogyo Co., Ltd.
Ichiro Shinji	Victor Company of Japan, Ltd.
Shojiro Oikawa	Oikawa Kogeisho Co., Ltd.
Namio Hashimoto	Oki Electric Industry Co., Ltd.
Takeshi Godai	Onkyo Corp.
Seiya Matsumoto	Pioneer Electronic Corporation
Harunobu Tashiro	Riken Dengu Seizo Co., Ltd.
Keizo Fujiwara	Sansui Electric Co., Ltd.
Kaoru Iue	Sanyo Electric Co., Ltd.
Akira Saeki	Sharp Corporation
Makoto Shirasuna	Shin-Shirasuna Electric Corp.
Kiyokazu Ohtsu	Shizuki Electric Company Inc.
Terutaka Ikeda	Showa Musen Kogyo Co., Ltd.
Shinobu Onikura	Soshin Electric Co., Ltd.
Saburo Tabuchi	Tabuchi Electric Co., Ltd.
Hikohachi Sato	Taiyo Yuden Co., Ltd.
Itsuya Tamura	Tamura Seisakusho Co., Ltd.
Kunio Kikuchi	Teikoku Tsushin Kogyo Co., Ltd.
Makoto Toida	Toko Inc.
Fukujiro Sono	TDK Electronics Co., Ltd.
Yasuo Suzuki	Toyo Communication Equipment Co., Ltd.
Kazuyoshi Ishizaka	Trio-Kenwood Corp.
Seiji Inoue	Yagi Antenna Co., Ltd.
Shozo Yokogawa	Yokogawa Electric Works, Ltd.

Auditors

Toshihisa Takebayashi	ELNA Co., Ltd.
Taro Nakatani	Toa ELectric Co., Ltd.

ORGANIZATION OF EIAJ

- President
  - Executive Council
  - Vice President
    - Board of Governors — committees
    - Executive Vice President
    - Staff Vice President
    - Secretariat
      - Administration Dept.
        - Administration and Government Relations Group
        - General Affairs Group
        - Accounting Group
        - Public Information Group
        - Communications and Industrial Electronics Div.
        - Consumer Electronics Div.
      - Engineering Dept.
        - Industrial Electronics Engineering Div.
        - Radio Equipment Engineering Div.
        - Consumer Electronics Engineering Div.
        - Electronic Components Standardization Div.
      - Electronic Components Dept.
        - Electronic Components Development Group
        - Electronic Components Administration Div.
        - Electronic Components Engineering Div.
      - Electronic Devices Dept.
        - Electronic Devices Administration Div.
        - Electronic Devices Engineering Div.
      - Research and Statistics Dept.
        - Research Group
        - Statistics Group
      - International Dept.
        - The First International Div.
        - The Second International Div.
      - Overseas Public Affairs Office
      - Kansai Branch
        - General Affairs Div.
        - Electronic Appliances Div.
        - Electronic Components Div.

2. This project and the Advisory Committee

When it was decided that this project would be carried out, IPS Tokyo requested the EIAJ to cooperate in its planning and execution (see Chapter 2). The first meeting between IPS Tokyo and the committee was held in autumn, 1982. At that time the Consultant had not yet signed a contract with the UNIDO headquarters and therefore did not attend the meeting. In order to decide on details of what would be done, a total of six meetings were held up to the time of the Tokyo programme. In advance of concluding a contract with the UNIDO Headquarters, the Consultant attended the second meeting and all subsequent ones. The key person in charge of the actual work by the committee on behalf of this project was Mr. Moriyama, manager of the Research and Statistics Department of the EIAJ. He was joined by five persons, one each from the EIAJ member companies cooperating for this project: Matsushita Electric Industrial Co., Ltd.; Hitachi, Ltd.; Sony Corporation; Alps Electric Co., Ltd.; and Sanyo Electric Co., Ltd.

The Consultant had thought that all documents necessary for the project would be prepared by the committee. Nevertheless the committee itself had no staff capable of handling the paperwork for this project, and the meetings of the committee were run in such a way that decisions made there were assumed to be final because there was not enough time to permit each company's representative to go back to the company and hold discussion, arrive at a conclusion, and the coordinate it with the others. The committee members from the five companies were not there primarily in the business interests of their companies but rather were advisers to IPS Tokyo. Therefore the committee itself could not decide on major items and assume responsibility for its decisions. As is noted in Appendix 4, 1 (3), the Advisory Committee was to provide "voluntary cooperation" for this project.

3. Contribution by Advisory Committe to the Project

The contribution to this project made by the Advisory Committee therefore must be viewed within the framework of the role of the committee as described above. As results of the strong initiative and efforts by IPS Tokyo, the following was done.

A) A lecture by Mr. T. Takai, Managing Director, EIAJ, was arranged.

B) A lecture by committee member Mr. K. Ishii, director of planning, Matsushita Electric Industrial Co., was arranged.

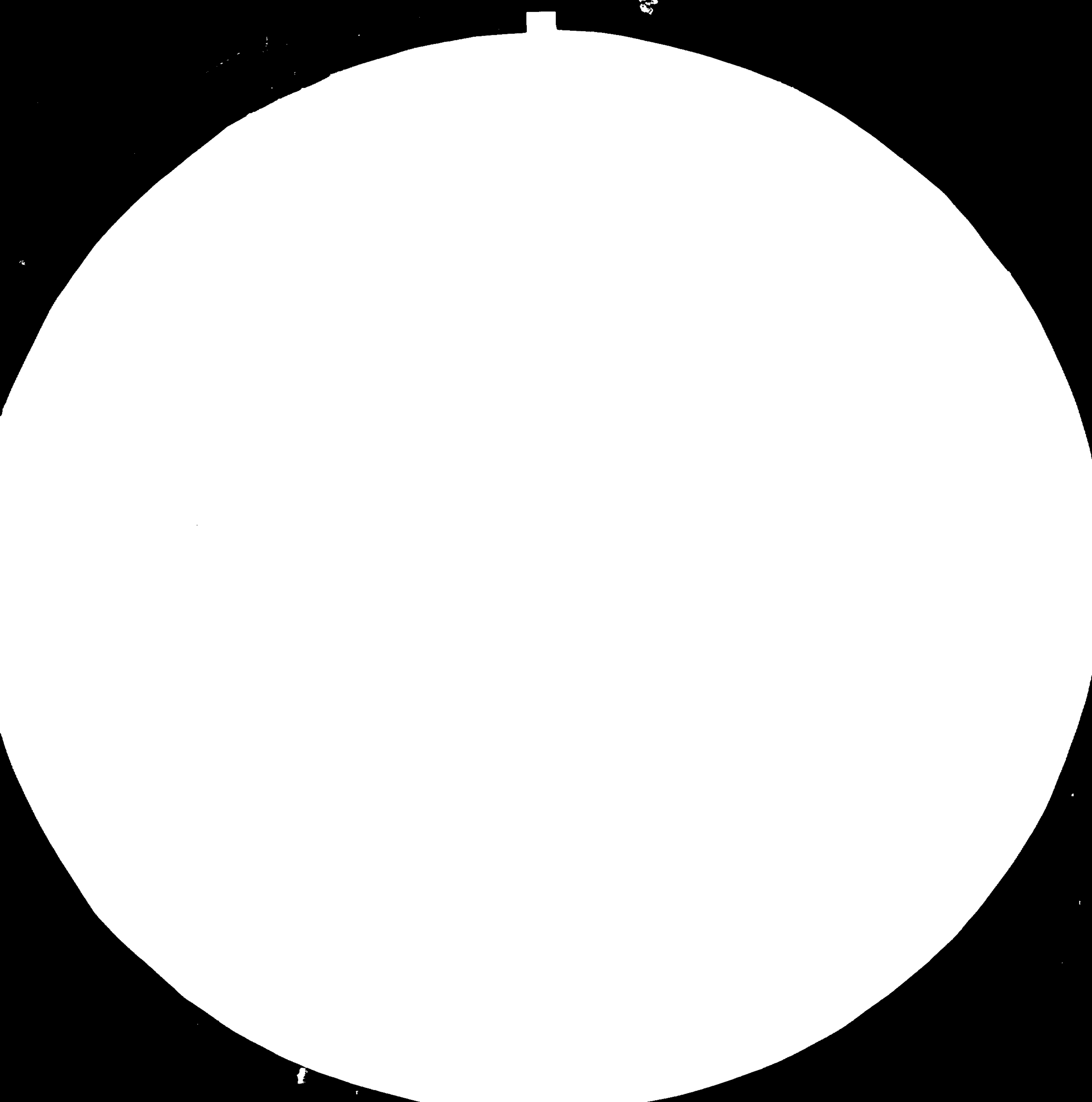
C) A lecture by another committee member Mr. A. Ogasawara, managing director, Alps Electronic Co., was arranged.

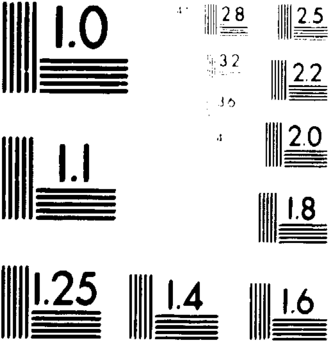
D) Members of the committee made it possible for participants to visit their factories.

E) Committee members also facilitated visits by the participants to their companies. There, they arranged for discussions to be held with business and technical personnel regarding specific project proposals advanced by the participants.

F) Through these company visits, they greatly facilitated future contracts with these companies.

G) In overall terms, it is believed that it was the efforts and cooperation of the members of the Advisory Committee that made it possible to conclude the project, which brought together participants from quite different countries, without any serious problems.





MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS

STANDARD REFERENCE MATERIAL 1010a

(ANSI and ISO TEST CHART No. 2)

APPENDIX 1

Terms of Reference Regarding the Programme for Identification and Promotion of Industrial Investment Projects in the Electronics Industry

A.C. Abdelmoneim/ac
16 November 1982

Annex E

TERMS OF REFERENCE

Note* for the File
on discussions between Mr. Saito and Mr. Abdelmoneim
regarding the Programme for Identification and
Promotion of Industrial Investment Projects in the
Electronics Industry

Selection of countries and of national consultants:

China, Senegal and the Philippines will definitely participate in the programme. Depending on the responses received from Sri Lanka, Jamaica and Mauritius, one country from amongst them will be selected in this order of preference.

In accordance with the project document the two national participants/consultants will have the following basic qualifications, in addition to ability to work in English: one will be an electronic or electrical engineer with some experience in electronics and the other will have had exposure to project oriented work preferrably in his country's national development finance institution or similar.

Consultant and/or Consulting firm

The attached Draft terms of reference (TOR) and tasks for the consultant and for consulting company was agreed upon. IPS Tokyo will discuss this in Tokyo and will advise Headquarters of who will undertake which task. These tasks or TOR will be elaborated, detailed and sent back to Headquarters in the form of job descriptions for individual experts or TOR for consulting firm in order that recruitment action can be taken at the earliest possible date.

(P.S.: The involvement of some of the Japanese trading companies which are active in electronics and/or in the four participating developing countries was briefly discussed).

Budget

IPS Tokyo will communicate to Headquarters an itemized estimate of the expenditures to be undertaken by Tokyo (consultant, consulting firm, Japanese and American secretary, etc...) so that MOD can be issued.

---

* This note took into consideration the contents of Mr. Saito's memorandum dated 2 November 1982.

cc: Mr. Becker-Boost, Mr. Wischeidt

Tentative Time Schedule

In accordance with the prodoc, it is tentatively proposed that the countries participating be visited early in January 1983 by Mr. Abdelmoneim. This visit will be preceded by discussions in Tokyo. The consultant is tentatively scheduled to travel to the four countries in mid-March and the Tokyo one month programme is tentatively scheduled for May/June 1983.

Project No. UF/INT/79/065/Rev. IV

Terms of Reference for and Tasks to be performed by the Consultant and/or Consulting Firm

1. In consultation with Japanese electronics manufacturers participating in the programme (Advisory Committee) and with IPS Tokyo, to prepare (a) a list of the electronics products to be covered by the programme. This will include brief technical description of each product in order to precisely define the coverage of the programme; (b) an annotated and detailed outline of the Country Paper (CP); (c) the Industrial Investment Project Questionnaire (IIPQ); as well as (d) and (e) detailed below.

The CP is intended to (i) faciliate the joint identification or generation of new project ideas, or the modification of those proposed by the developing countries' participants; and (ii) to identify bottlenecks, difficulties, etc., facing the local electronics industry branch and hampering further investments.

Therefore, the CP's outline should cover, interalia,:-
- all aspects relating to the establishment, operation and financing of industrial investment projects in the field of electronics in each developing country;
- all relevant pre-investment data such as imports, local production, exports and market potential (local and export), raw materials availability and cost, skilled manpower availability and cost, utilities availability and costs, plants already in operation and degree and causes of their success or failure, projects under implementation or under consideration, incentives extended through investment encouragement legislation or others, assessment of interest of public and private sectors in joint ventures, and availability of full or partial local financing.

The IIPQ should be designed to distinguish between the stages at which the project is: opportunity study, pre-feasibility study or feasibility study stages. The ICP Questionnaire can be revised to produce an IIPQ specially designed for electronics industry projects covering the products enumerated under 1 - (a) above.

In order to assist and guide participants in the preparation of the CP and IIPQ, the following will also be prepared:-
(d) a Paper describing the main general characteristics of the electronics industry and its requirements in terms of raw materials, skills, economic

sizes, etc. This paper will concentrate mainly on the range of electronic products to be covered by the programme as mentioned above. The paper will be similar to the UNIDO monographs. (e.g. ID/40/7 "Textiles Industry".)

(e) industrial profiles (similar to those prepared for ICP by the Japan Consulting Institute) on a selected number, say 15, of the more common types of products to be covered by the programme.

2. Around mid-March 1983, the consultant will spend about five working days in each of the four participating countries (who will by that time have completed and sent to the consultant the draft of CP and IIPQ) in order to review the draft and guide participants in the finalization of both CP and IIPQ. He will also obtain first hand knowledge of the circumstances in each country and discuss with participants the preliminary programme for their Tokyo visit.

3. The consultant will also assist IPS Tokyo in all organizational aspects of the four week Tokyo programme and accompany and guide national participants during same period in their detailed discussions with Japanese manufacturers participating in the programme.

4. Items 1-(a),(b) and (c) above should be completed by end 1982; item (d) by mid January 83; and item (e) by end February 1983.

5. The consultant will also participate with Headquarters, IPS Tokyo, national and Japanese participants in preparing a final evaluation of the entire programme.

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UNICO INT. CORPN.
2-2-, 2-CHOME HONCHO, NIHONBASHI
CHUO-KU
TLX 0252 2170
TOKYO (JAPAN)

HR53046 MIKAMI RE US/INT/79/065 PROGRAMME FOR THE IDENTIFICATION
AND
PROMOTION OF INDUSTRIAL INVESTMENT PROJECTS RELATING TO ELECTRONIC
INDUSTRY. FURTHER YR TELXES OF 12 JULY AND 2 AUGUST 1983 UNIDO
CONFIRM ACCEPTABILITY ICPB SELECTION OF INDUSTRIAL PROFILES

COL 2-2-, 2-CHOME 0252 2170 HR53046 US/INT/79/065 12 2 1983

UNIDO PAGE 02/05

FROM
CONTRACT (GARDELLIN UNIDO VIENNA)

COL NIL

NNNN

APPENDIX 2

Name of Representatives for TOKYO Programme

NAME OF REPRESENTATIVES FOR TOKYO PROGRAMME

Name	Country
DONG Yingie	The Peoples' Republic of China
CHEN Fuan-Li	The Peoples' Republic of China
ZHU Qunrong	The Peolpes' Republic of China
SAN GIL Arturo M	The Republic of the Philippines
GALVEZ Antonio	The Republic of the Philippines
WANE Mamadou	Senegal
DIOP Seydina-Issa	Senegal
PESTONJEE Ianthy Sriya Ranjani	Sri Lanka
ANIL Lasantha Michael Perera	Sri Lanka

COUNTRY REPRESENTATIVES
FOR
TOKYO PROGRAMME

11 July - 5 August, 1983

I. THE PEOPLES' REPUBLIC OF CHINA

1) Name: DONG, YINGJIE

Date Of Birth: December 15, 1940 (Age: 42)

Address: 49 Fuxing Road, P.O. Box 140
Beijing, China

Education: The University of Science and Technology
Beijing, China
Major: Radio Electronics, Engineer
8/1960 - 8/1965

Present Position: Deputy Manager
Dept. of Industrial Co-operation
China Electronics Import & Export Corporation

Relevant Experience: 1966-1970 Worked in Research Institute of Communication
1970-1982 Worked in the Ministry of Electronics Industry
1978-1982 Worked in Chinese Embassy in the USA dealing with technology imports

Proficiency in Working Language of Programme: GOOD

2) Name: CHEN, GUAN-LI

Date Of Birth: February 14, 1935 (Age: 48)

Address: P.O. Box 64
Beijing, China

Education: The Ministry of Electronics Industry
Beijing, China
Major: Electronics, Engineer
9/1960-1982

Present Position: Division Director
Dept. of Planning, Ministry of Electronics Industry

Relevant Experience: 1960-1979 Worked in the Planning Ministry of Electronics Industry
1979-1982 Worked in Technology Import Division of Planning Ministry of Electronics Industry

Proficiency in Working Language of Programme: GOOD

China, cont.

3) Name: ZHU, QUNRONG

Date Of Birth: October 9, 1939 (Age: 44)

Address:

Education: 1958-1963 Aeronautical engineering, Nanjing
1981-1982 Chartered accountancy, Hong Kong

Present Position: Engineer foreign investment administration, Ministry foreign economic relations and trade

Relevant Experience:

Proficiency in Working Language Of Programme:

II. THE REPUBLIC OF THE PHILIPPINES

1) Name: SAN GIL, ARTURO M.

Date Of Birth: May 2, 1951 (Age: 32)

Address: 3209 Imelda Avenue Pinagkaisahan, Makati, Metro Manila, Philippines

Education: University of the Philippines, 1980-present
Graduate Course, Business Administration

Mapua Institute of Technology, 1970-1975
College, B.S. Electrical Engineering

Present Position: Assistant Chief Investments Specialist-Coordinate the effective Implementation of BOI, supervision over BOI registered enterprises engaged in the semiconductor/electronics industry, and evaluate regularly BOI procedures on registration, supervision and incentive availment of registered enterprises for the purpose of simplifying the procedure.

Expectation of Programme: The training should concentrate in the field of semiconductor industry - improve the skills, abilities, and practical experience.

Proficiency in Working Language Of Programme: ENGLISH (Read/easily, Write/easily, Speak/fluently, Understand/easily

Philippines, cont.

2) Name: GALVEZ, ANTONIO

Date Of Birth: January 10, 1960 (Age: 23)

Address: 16 Rosario Drive, Dubao
Quezon City, Philippines

Education: Ateneo de Manila-Graduate of Business, 1982-Present
MBA
Ateneo de Manila University, 1980
Economics, AB

Present Position: Industry Development Analyst, Bureau of Industrial Development, Ministry of Trade and Industry
Trade and Industry Building
361 Buendia Ave. Ext. Makati,
Metro Manila, Philippines
Major duties and responsibilities: Coordinate and implement the sectoral development program for the electronics industry.

Expectation of Programme: The programme aims to identify and promote viable joint industrial projects in developing countries by strengthening the capability to independently identify viable investment projects. By exposing the participants to developed and in some of the more advanced developing countries, it is hoped that the participants will acquire the inter-disciplinary and complex know-how required for effection project identification. The Programme project "generation" methodology will bring in potential joint venture partners from developed and developing countries from the very early stages of project identification and this will automatically enhance the chances of more and better quality projects beign identified and promoted. The Programme also aims to enable small and medium size industries in the participating developed country to become well informed about the existing situations of the industrial branch in the participating developing countries as well as about future investment potential and areas where technic l assistance and other inputs from the developed country as well as from UNIDO are required and welcome.

Practical use to be made of this training upon returning home- The Ministry of Trade and Industry has undertaken a sector development program for electronics. We have found that the country possesses a comparative advantage on this industry. We are currently embarking on a plan to have additional and new investments for this particular industry. It is hoped that upon te participant's return, he will be able to assist foreign investors in identifying possible joint ventures in all aspects and phases of the industry. Furthermore, it is hoped that the skills he will acquire will be shared with other staff members working with the Ministry.

Proficiency in Working Language of Programme: ENGLISH (Read/easily, Write/easily, Speak/fluently, Understand/easily)

III. SENEGAL

1) Name: WANE, MAMADOU

Date of Birth: 22 September, 1943 (Age: 39)

Address:

Education:
Stanford University: CA U.S.A.: MA Degree 1980
Dakar University, Senegal: D.E.S. Degree in Management 1977
Dakar Institute of Technology: Diploma in Couputer Sciences 1974
Dakar University: Ecole Normale Superieure: CAECEM Teaching Degree in Mathematics and Physics 1967
Paris, I.I.P.E. Diploma in Planning 1977
Ecole Normale William Ponty, Senegal, C Baccalaureat (1 and 2

Present Position: Representative of Industrial Free Zone, Dakar

Relevant Experience:
1967 Professor in Mathematics and Physics
1968-1971 Director of College
1972-1976 Chief Office of Educational Cost
1976-1978 Chief of Planning and Research Division - Ministrey of Education
1981-1982 Research-Assistant National Institute for Educatic
April 1982 Managerial Staff of Free Industrial Zone

Proficiency in Working Language Of Programme:

2) Name: DIOP, SEYDINA-ISSA

Date of Birth March 12 1933 (Age: 50)

Address: B.P. 5009
Dakar, Senegal

Education:

Present Position: Director of private corporation (electronician engineer)

Relevant Experience:

Proficiency in Working Language Of Programme:
FRENCH: Read/easily, Write/easily, Speak/fluently, Understand/easily
ENGLISH: Read/easily, Write/easily, Speak/fluently, Understand/easily

IV. SRI LANKA

1) Name: PESTONJEE, IANTHY SRIYA RANJANI

Date Of Birth: January 4, 1940 (Age: 42)

Address: Greater Colombo Economic Commission No. 14
Sir Baron Jayatileke Mawatha
P.O. Box 1768
Colombo 1, SRI LANKA

Education:
1974 External Examination Institution, Economic History-Bachelor of Philosophy Arts Degree
1960-1962 Aquinas University College, Economics, International Law
1954-1960 CMS Ladies College, Colombo 7.

Present Position: Researcher
Employer-Greater Colombo Economic Commission

Relevant Experience:
1) Research and market intelligence covering company information investment promotion with special emphasis on Free Trade Zone.
2) Analysing and comparative studies on the behavioral patterns/trends in foreign investment of multi-nationals with special emphasis in the sphere of electronics
3) Industrial project identification and feasibility studies. Comparative analysis financial/economical
4) Liaison with state organizations and financial institutions to facilitate industrial information and expertise for potential investors.

Proficiency in Working Language of Programme: ENGLISH: Read/easily, Write/easily, Speak/fluently, Understand/easily.

2) Name: ANIL, LASANTHA MICHAEL PERERA

Date Of Birth: September 25, 1942 (Age: 40)

Address: N.E.R.D. Centre of Sri Lanka
Ekala, Jaela

Education:

1978-1979	Techno Economics	M. Sc. (Scotland)
1968-1969	Elect. Engineering	Dip. EE (U.K.)
1961-1964	Physical Science	B. Sc. (Colombo)

Present Position: Principal Reasearch Engineer and Head of the Department of Techno. Economies. Employer: National Engineering Research and Development Center of Sri Lanka

Proficiency in Working Language Of Programme: ENGLISH: Read/easily, Write/easily, Speak/easily, Understand/easily

APPENDIX 3

Letter from Mr. M. O. Abdelmoneim, Senior Industrial Development Officer, UNIDO/ICPO to Mr. M. Saito of UNIDO IPS TOKYO, dated 17 May, 1983

UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

VIENNA INTERNATIONAL CENTRE
P.O. BOX 300, A-1400 VIENNA, AUSTRIA
TELEPHONE: 26 310 TELEGRAPHIC ADDRESS: UNIDO VIENNA TELEX: 135612

MOA/at

REFERENCE:

Vienna, 17 May, 1983

SUBJECT : Programme for the identification and promotion of Industrial Investment Projects related to one specific industry sector (electronics) (US/INT/79/065)

Dear Mr. Saito,

I hope you have received a copy of our letter dated 19 May, 1983 to the Senior Industrial Development Field Advisors regarding the evaluation of the above programme. In addition to our receiving an evaluation from you, it is also felt that an evaluation should be obtained, either directly, or through UNICO or EIAJ or through other means, from the participating Japanese manufacturers. It is proposed to request these manufacturers to:

(1) Comment on the adequacy of the programme methodology (approach) to investment projects identification.

(2) Assess progress achieved in producing intended outputs of programme (projects identified, skills acquired by national participants, etc.)

- Were national participants sufficiently qualified for task of identifying and generating investment projects in their country
- Did the Country Papers and EIPQ's cover important aspects of the electronic industry in developing countries and did they produce specific proposals which could then be completely formulated during the Tokyo phase of the programme
- Did the Country Papers identify specific obstacles which hamper project implementation in developing countries
- Was your company able to assist national participants, in what way
- Were proposals from Country Papers elaborated further with your company, or were new proposals made by your company
- What are the prospects of having joint ventures undertaken with one or more of the participants or their countries.

(3) Suggest follow-up actions to programme activities, which should be undertaken by one or more of the parties involved in order to achieve the objective of increasing the number of viable investment projects in the developing countries.

(4) Give their views about this new approach by UNIDO to project identification and generation, its usefulness and likelihood of producing intended results. Proposed possible improvements of alternative approaches to identification and promotion of industrial investment projects.

I look forward to hearing from you in this respect. With my best regards

M. O. Abdelmoneim

Senior Industrial Development Officer
UNIDO/ICPO

Mr.MitsuoSAITO
Head of the UNIDO Investment Promotion Service

Shin-Aoyama Building, East-1009
1-1-1, Minamiaoyama,Minatoku
TOKYO
Japan

APPENDIX 4

Memorandum on the Arrangements for
Company/Factory Visits

IPS, Tokyo
19 July, 1981

MEMORANDUM ON THE ARRANGEMENTS

FOR COMPANY/FACTORY VISITS

1. Programme

(1) The arrangements for bilateral discussions between the participants and Japanese companies have been made in full collaboration with the Advisory Committee which consists of the representatives of the Electronics Industries Association of Japan (EIAJ) and five leading companies in Japan including two experts from the consulting company, UNICO.

(2) The attached programme was prepared individually for each country, taking into account the different contents of the projects among countries and, at the same time, the availability of Japanese companies to receive the participants.

(3) Please note that the participation of the Japanese companies are based on voluntary co-operation regardless of actual business consequences with the exception of projects which are of common interest for both parties for immediate business negotiations.

2. Suggestions for Bilateral Discussions

(1) To introduce just essential points described in the Country Paper focused on:

(a) The current situation of electronic industry e.g. domestic production, import, export, etc. and

(b) relevant policy measures being undertaken by the government e.g. incentives for foreign investment, training scheme, etc.

(2) To introduce:

(a) investment projects concerned in the line of the contents described in respective IIPQ (Industrial Investment Project Questionnaire).

(b) Project idea with brief comments.

(3) To hear views/feelings of company experts preferably through questions and answers concentrating on clarifying/identifying problems to be removed/improved for further business discussions rather than immediate business conclusions.

(4) To try to establish direct contact channels provided specific projects are of common interest for further detailed business negotiations.

APPENDIX 5

Textbooks for the Lecture on Four-week
TOKYO Programme

APPENDIX 5-1

Japan's consumer electronics industry and its outline, by Mr. K. Ishii, Director of Planning, Matsushita Electric Industrial Co., Ltd.

JAPAN'S CONSUMER ELECTRONICS INDUSTRY AND ITS OUTLINE

Kikuo Ishii

Matsushita Electric Industrial Co., Ltd.

1. Present Status of Japan's Electronics Industry

Production of consumer electronics in 1982 was valued at over ¥3.5 trillion, which was 4.4% lower than the value of the previous year's production, making 1982 the first year since 1978 for there to be a contraction of production value. This decline was primarily due to stagnation of exports, as export demand for audio equipment was weak, and overseas inventory of video tape recorders was drawn down. Domestic demand, however, grew by 4%, due to increased demand for video tape recorders, replacement demand and additional purchases of color TVs, and gradual increase in tape recorder demand. Of this total value, ¥2.5 trillion was exported, making the export ratio 77.1%. This included a trillion yen as the value for video tape recorders. Japan produced 10 million sets and continued to serve as the major source of supply for the world. Trade friction problems in Europe and especially in France, however, led to adoption of restraints on exports to that region.

Regarding technology, while its relevance extends beyond the area of consumer electronics, there was further development of equipment through advances in LSI and super-LSI technology. This promoted an increase in interest in what we call "new media."

The announcement of Information Network Systems (INS), by the Nippon Telegraph and Telephone Corporation, took place, and realization of this promising development appears to be 4 to 5 years away.

The number of business establishments in the industry, in 1979, was about 4,700, and they employed nearly 230,000 workers. The machinery industry accounts for about a third of Japan's total industry, and about one third of the machinery industry is comprised of the electronics industry. Also, about a third of the electronics industry is composed of the consumer electronics industry. In addition, there were nearly 230,000 persons employed in the distribution phase, namely wholesale and retail trade, of the industry.

A 21-company total of capital investment expenditures is higher than ¥200 billion (estimated actual expenditure in 1981).

The number of establishments engaged in production overseas, as of June 1980, was 328, a majority of these are in Southeast Asia, but they are distributed throughout the world. This total, however, is an over-estimation as there is some duplication in the tabulation because some of the establishments make more than one type of product, and the total was obtained by adding sub-totals for industrial electronics, consumer electronics and electronic parts. Total production by these establishments is estimated as exceeding ¥50 billion (estimated for 1979).

Moreover, the value of domestic production of the consumer electronics industry, in 1980, was US$16.2 billion, which is 42.4% of the world total of 38.2 billion.

2. History of Japan's Consumer Electronics Industry

Prior to World War II the nationally-owned Japan Broadcasting Corporation (NHK) had established a nationwide radio network and diffusion of home-use radio receivers was at a high level. Nevertheless, a large-scale market capable of supporting an electronics industry had not been formed, and trade--both imports and exports--was at a low level. In 1952, NHK commenced black-and-white television broadcasting, to be followed in the next year by the first commercial television station, making a total of two stations. Growth and development of Japan's electronics industry began after that. The development process in generally divided into three phases: 10 years starting in 1955, 9 years starting in 1965, and the years from 1974 on. During the first period, there was a rapid growth of both domestic and export demand for radios, black-and-white television sets, tape recorders and stereos, which made it possible to increase production during the period from ¥26.5 billion to ¥398.6 billion (a 15-fold increase), of which exports grew from ¥1.5 billion to ¥135.0 billion (a 90-fold increase) as the export ratio rose to 33.9%, making this an important export industry. In terms of technology, there was a rapid shift from vacuum tubes to transistors, enabling the size of radios and other products to be greatly reduced. Mass production techniques were adopted, and manufacturers grew in size while making swift development in the fields of management and marketing as they took on the form of modern business firms. Further, improvements were made in the distribution phase and, overall, modernization made rapid progress.

After a recession brought on by a weak domestic economy in 1965 and a peaking of demand, in 1974 production attained the level of ¥2.1 trillion of which exports were ¥1.1 trillion, for an export ratio of 50%. By this time Japan's electronics industry had become one of the most outstanding national electronic industries of the world. Thereafter, however, there was a political and social weakening of America's position, and a decline in the value of the dollar, leading to a stagnation of trade. Following the "Nixon shock" of 1971--abandonment of the gold standard--and the oil shock of 1974, the world economy entered a period of low-growth. During these years, maturation of management systems and distribution structures proceeded further while in the area of technology there was a rapid shift from transistors to ICs, and from ICs to LSIs.

During the recession of 1950 and 1951, as a result of a streamlining of corporate management and continued efforts at rationalization, improvement of price and non-price competitiveness was attained and the industry became one of the most outstanding in the world.

After 1971 the industry went through a period of low-growth, reflecting the low level of growth of the world and Japanese economies, and encountered the effects of the second oil shock, in 1979, after which gradual recovery has been attained.

During this period, despite the development of the video tape recorder and favorable conditions for supplying the world with that product, reduced growth of demand for other products hampered growth of the industry, and a high level of Japanese exports led to strong criticism of Japan overseas. While efforts are being made, in connection with change in world demand, to establish a suitable production and supply system on a worldwide basis, and attain a harmonious development in conjunction with Japan's position as a member of international society.

3. The Future of Japan's Consumer Electronics Industry

Japan's consumer electronics industry thus has grown to the extent that it has a share in world production exceeding 40%. At the same time that this imposes an obligation on us, it also shows that if that share can be maintained, Japan's consumer electronics industry can grow together with expansion of the world market. From this viewpoint, the report, "Medium Term Outlook for Consumer Electronics, issued by the Electronics Industries Association of Japan in May, 1983, provides useful indications of what we may expect. A summary of some of its main points is given below.

The study includes an estimation of world demand for consumer electronics in 1990, and a survey of key points related to the sound development of the Japanese industry. These points are:

(1) Growth of demand for existing products (market scale in 1980, ¥15.8 trillion) will average only somewhat less than 3% per annum through 1990, to about ¥20.7 trillion.

(2) The scale of demand of promising new products (VTRs, video cameras, videodiscs, CD players) in 1980 was ¥0.7 trillion, but can grow at an average annual rate of 13% to ¥4.3 trillion in 1990. Combined with the existing products, this means an annual growth of 4%.

(3) In addition from the viewpoint of market needs and technological seeds, the following products are expected to appear (market scale in 1990 given in parentheses).

   (a) Home-use information terminals (over ¥1.4 trillion)

   (b) Entertainment systems (over ¥6.3 trillion)

   (c) In-house communication systems (nearly ¥1.7 trillion)

   (d) Home office-study systems (¥3.2 trillion)

   (e) Hifi and audio equipment (over ¥2.2 trillion)

   (f) Pocketable devices (over ¥1.2 trillion)

These market scale figures are combined estimates for America, Canada, West Germany, England, France and Japan, and include some double counting. World demand (potential) for these products, excluding double counting, would exceed ¥19.8 trillion. On the assumption that his demand is realized, during the 10 years from 1980 to 1990 it is possible to expect market expansion at the average annual rate of 10%.

(4) Following recovery from the second oil shock, it is believed that the world can attain economic growth exceeding that of the 1970's. Japan's consumer electronics industry, which had a share of 42% of world production in 1980, possesses strong price and non-price competitiveness, and the world's best production technology at least for LSIs, displays, optoelectronics, robots, and other products.

(5) From the nature of the new products, which will account for half of the market in 1990, it is possible that unless suitable measures are taken, Japan's share will decline in those areas where the Japanese consumer electronics industry is relatively weak, namely software development, and development of information- and communications-related system equipment.

(6) Therefore, in the field of technological development, stronger efforts are desired in the following fields.

(a) Products and systems concepts for new media.

(b) Software and some applications software (graphics and pattern recognition) for microcomputer systems.

(c) Materials; design software for materials development.

(7) With the basic approach of seeking to maintain the system of free trade, and avert trade friction, points of caution are noted regarding the improvement of the environment of demand (media environment, electric power supply environment), improvement of the supply environment (free movement of capital, technology and goods), improvement of managerial infrastructure (technological and product development; production; international management); with the underlying intention of averting trade friction, recommendations are made on measures oriented toward the developed nations, the developing nations, and Japan itself. Desire is expressed for a systematic implementation of policy by the government regarding politics, diplomacy, economic cooperation, and domestic industry.

The path to greater development of the Japanese consumer electronics industry thus lies in the continuation of the development and supply of products matching the new needs of this Information Age (at home, in industry, and in society), and improvement of the hardware, software and systems technology needed for them.

Present status of Japan's consumer electronics industry

Production of consumer electronics products during 1982 exceeded 3.5 trillion Japanese Yen. This represented only 95.6% of the previous year's figures, and the first time since 1978 that overall production growth ratio had shown a decrease. We can attribute this drop mainly to the poor performance of electronics exports, which had until that time recorded a steady growth. In particular, the reasons for the halt in the growth exports were the lowered demand for audio products, and also the decrease in shipments of VTRs due to the need to adjust overstocked inventories abroad.

Audio sales, particularly in the industrialized nations of Europe and North America, were affected by such factors as the recession, rampant inflation, high unemployment, and growing pangs in consumer demand. Other factors behind the slump are believed to include saturation in the markets for home stereo and portable tape recorders; sales competition from VTRs and personal computers; and loss of consumer buying power. VTRs gained a very high end-user annual growth rate -- about 40 to 50 percent in Europe and 20 to 30 percent in the United States -- and Japanese manufacturers clamored for a share of these markets. As a result, from the end of 1980 through the spring of 1981, inventories in the above two regions soared rapidly, bringing in their wake problems in covering the interest burden on unsold goods. Fearing an uncontrolled price war, EC countries (France in particular) enacted import restrictions leading to trade friction with Japan. At the same time, the growth in shipments was considerably slowed by the manufacturers themselves, as they sought to make adjustments in the scale of their inventories.

Another factor which retarded exports of VTRs was the increased market share of inexpensive models priced for the mass-market. This caused the average share per unit to drop, therefore reducing the growth on a value basis to drop nearly 20 points, from 138.2 percent in 1981 to 118.8 percent last year.

In Japan domestic sales demand for VTRs has shown relatively stable growth; along with replacement and new sales of color TV and gradual increases in tape recorders, and depressed sales in audio continuing, the industry still showed an overall growth of around four percent. Production and export trends of major consumer products over the past 10 years are given on a separately attached sheet. Summing these up, we can make two conclusions:

1) As you can see, there was spectacular growth in 1976, 1980 and 1981. Other than that however, sales were quite depressed.

2) In 1976, exports showed a significant increase, and in '80 and '81 both export and domestic sales did well. Looking at these years by product category, we can see that other than the increases in component stereo from around '73 and '74, and the growth of VTRs, there is really no other sectors showing good growth performance.

I am by no means an expert in technical matters, so I can't really provide you with any sort of detailed explanation; furthermore, even if we limit the discussion to consumer products, I would still be hard-pressed to provide any sort of knowledgable information. However, it is safe to say that through advances in LSI and VLSI (microchip) production technology, a great many new products are being developed. Of these, the so-called "OA" or office-automation equipment, such as personal computers, facsimile machines, word processors and others in particular have developed rapidly. Using this technology as a springboard, the so-called "New Media" shows great promise. As the initial stage of the "Information Society" of the future, such new technology as the Information Network System (INS) announced by Nippon Telephone and Telegraph and others has already from this year begun to show a remarkable growth.

Neither the "New Media" nor INS have yet to reach the stage of practical operation. However the New Media should be well-established within three to five years, and the INS within seven to twelve. Now I'd like to give you a simple explanation of these two systems based on the information as it stood at the end of last year.

The term "New Media" is very likely what we in Japan call "Japanese English", and therefore is not necessarily understood by native English speakers in America or the U.K.. In essence this word pertains to data transmission systems entirely different from the forms of media that exist today. As can be seen in Table 1, it can be divided into three categories: wireless, cable and package systems.

Stated simply, the existing forms of media are, with the exception of the news media, limited from the standpoints of immediacy, availability, selectability, responsiveness, opportunity for the viewer to participate, and degree of data processing capability. This being the case, the study concluded that emergence of the "New Media" is inevitable. The particularities of the various forms of new media have been provided on a separately attached sheet, and if time permits I will go into an explanation afterwards. (Table 2 has been deleted.)

The basic structure of INS, an abbreviation for Information Network System, was announced by Nippon Telephone and Telegraph last Autumn. As with the New Media, INS begins with the presumption of the need to have access to data in all segments of daily life -- social, individual, family and business. Already in a position of total responsibility for owning, controlling and developing the communications network in Japan, NTT proceeded to develop its plans to maintain and expand this network to meet the needs of this future explosion of data access.

At present there are six different types of communications circuits in Japan: telephone; subscriber; data transmission; cable; facsimilie; and graphics. Each of these belongs to an independent network, and each employs some combination of digital and analog transmission system. These will be entirely converted to digital networks, with the target date having been set at sometime between the years 1995 to 2000. By use of optical cables they will also be able to be linked to computers, and it is conceived that the present data transmission capacity of 10,000 signals will be completely merged into a powerful communications network.

I could go on almost forever on this subject, but I would like to hold it to just a very simple introduction. On the other hand, I must also point out that over the past year the New Media and INS have not only made a strong impact on the consumer electronics industry, but in the printed news media, broadcasting, distribution, banking and other fields as well.

The number of business offices, factories and sales offices in the consumer electronics industry is not the actual number by which the industry is to be counted. The industry is ordinarily composed of offices having a mixed function. I'm afraid these figures are already a little bit dated, but in 1979 these offices numbered approximately 47 trillion employing slightly less than 230,000 people. The overall production value of Japanese industry in 1982 was approximately 140 trillion Yen; of this, the machinery industry accounted for one-third, or 47 trillion. The electronics industry made up less than one-third of machinery, or about 15.4 trillion Yen. Going further, electronics products for consumer use made up about one-third of all electronics

Table 1. Organization of Information Transmission Media

Category Transmission Method	Distribution Form	Existing Media	New Media	New Media Function
Radio waves	One-way (line (1:n type)	TV broadcasting	1) Satellite broadcasts	Multi-channel (Information search)
		Radio broadcasting	2) Teletext	High resolution
	Two-way (1:1 type)	Radio communications	3) HDTV	Pay TV
			4) STV	
	Two-way (1:n type)	CATV	5) CATV	Multi-channel
		Cable radio		Pay TV
	Two-way (1:n / 1:1) Type		6) Two-way TV	Multi-channel
				Information on demand
				Interactional Telemetric control
	Two-way Telephone circuit type (1:1 type)	Data transmission over telephone lines	7) Teletext	(Digitalization)
			8) Data base	Information processing service
		Telephone	9) Facsimile	Information search
			10) VRS	Electronic mail
			11) TV telephone	Telemetric control
			12) Computer (terminal)	Interactional
Package type	Stand-alone type	Recorded tapes	13) Videodisc	
		Records	14) VTR	(Information search)
	Two-ways (1:n type) (1:1 type)	(Personal computer)	15) (Personal computer)	
		Mail		

Source: "Technological Assessment of change Information Systems for Home Use," March 1982.

machinery, or about 3.5 trillion out of 11 trillion yen. Therefore we see that this industry which produces less than 2.5 percent of Japan's industrial output is nonetheless regarded as one of Japan's "leading industries" and is therefore under scrutiny from within and without, eagerly watched for signs of its expected high growth.

In addition, the number or workers employed in domestic distribution (wholesale and retail) are as I have said less than 230,300, and while official figures are not available it is supposed that approximately the name number of workers are employed overseas. I believe that this increasing number of personnel will be active in promoting the supply and sales of consumer electronics goods manufacturered in Japan. For a comprehensive look at the export statistics by country, breakdown of items, position of the electronics industry relative to other industries, external organization, ownership rate of principal products and related trends, outlays for R&D, number of workers employeed in research, trends in investments in equipment and others, I advise you to refer to the 1982 edition of ELECTRONICS INDUSTRIES IN JAPAN.

Overseas production, which is centered primarily in Southeast Asia, is being carried out worldwide. In June 1980 there were 328 facilities in operation. Production figures on some types of items overlap, but total output was estimated at approximately five hundred billion yen (500,000,000,000) in 1979.

Based on the results on a survey on the trends of overseas production by Japanese consumer electronics industries between 1979 to 1981, a report entitled "A Report on the Trend toward Internationalization of Electronics Industries and its Impact" was made public in the Spring of 1981. I would like to make reference only to its conclusion, which stated that in the future no rapid shift to production overseas can be envisioned; this does not rule out some new small-scale projects, but for the most part the gradual pace will continue. At this time no major changes are foreseen.

A History of Japan's Consumer Electronics Industry

Prior to World War II, NHK had set up a nationwide 2-channel radio broadcast network. Radio had become widely popularized among households, but was not of large enough scale to contribute to the development of an extensive electronics industry, and played an insignificant role in both imports and exports. By 1940, there were 38 broadcast stations throughout the country, with 5,668,000 subscribers. At the time NHK commenced TV broadcasting in 1952 radio had increased to 137 NHK and 21 commercial stations, with 10,539,000 subscribers to the former. Thus this period might be made analogous to the stirring of a fetus in its mother's womb prior to birth. Commercial TV broadcasts began in 1953, and within two years there were two commercial stations and six operated by NHK. However, the total number of TV subscribers numbered only 165,000, and for the great majority of Japanese TV was something that had to be seen not at home, but in plazas beside train stations or department store show windows. Programming offered little more than news, baseball and professional wrestling.

Nevertheless, by 1955 production levels in Japan's mining industry had finally returned to their prewar levels, just one indicator of many that showed that the difficult postwar recovery years were over. As the title of a much-heralded White Paper released that year by the government stated, "It is no longer the 'Postwar Period'".

To facilitate my explanation of the development process of the consumer electronics industry, I would like to divide the years from 1955 to the present into three chronological segments: the decade from 1955 to 1964; the nine years from 1965 to 1974; and from 1974 to the present. The first period, from 1955 to 1964 was one of initial expansion. The second period, after suffering serious setbacks, saw further expansion in the industry. The third period, which commenced from the so-called "Oil Shock", saw the end of two-digit annual growth. The first period was characterized as one of expanded exports; the second, the establishment of overseas sales networks; and the third the emergence as a "giant" industry with over 40 percent of total world production, leading in turn to today's problems of trade friction. In sum, the history of Japan's consumer electronic industry is one of parallel growth both in Japan and overseas.

Did the growth actually begin in 1955? At that time production of radio and black and white TV sets were 12.3 billion and 10.2 billion yen respectively, for an annual total of 22.5 billion yen. Add storage batteries, record players, tape recorders and others to this and the total increases to 25.2 billion (of which 500 million was in exports) -- only three days output at today's levels. However a new development -- the transistor radio -- was to change everything. Highly regarded for its light weight, compact size and rugged construction — important from the standpoints of good performance and modern design -- the transistor radio spurred exports leading to rapid growth.

TV meanwhile resulted in what was called the "Jimmu Boom". I have to go a long way back in history to explain this term. Jimmu you see was the semi-legendary first emperor of Japan. So people were now saying that business had never been better since this emperor of ancient times ascended the throne. Now according to another story that goes back even before Emperor Jimmu to the time when Japan was first created, the goddess Amaterasu Omikami was angry about something and hid in a cave. The huge rock used to close off the entrance of the cave was known as the "stone door" -- which gave birth to the name "Stone Door Boom" for the period of expanded economic growth. This all must seem very complicated, I know.

Anyway, in 1959 Crown Prince Akihito was married Princess Michiko, and this famous event resulted in domestic demand for TV playing a "Doubles Game", meaning that the demand each year was twice the previous one. Looking back at the transistor radio once again, consumers in the U.S. -- the main export market for this item -- came to regard it so highly that the label "Made in Japan" lost its previous amibivalent image to become regarded as "Good, inexpensive products". The popularity of the transistor radio in overseas markets led to a rush for these by the younger generation in Japan, and before long young people could be seen walking almost everywhere with radios against their ears.

This slide shows production and exports of various items in 1960.

At this time, exports of black & white TV was only 45,000 units, with a value of less than one billion yen. Export value of color and black & white TV combined were not to overtake that of radios until 1968. However to confirm the old Japanese saying, where there are peaks there must be valleys ..... in 1962 and '63, the rate of growth slipped badly, and compounded by the domestic recession in 1965 consumer electronics suffered a major recession. This appears to be one fatal characteristic of durable consumer goods; that is, as long as products with the same functions continue to be sold, when the market becomes saturated, demand drops and growth comes to a halt, creating these cycles of expansion and contraction. In 1964 for example it was expected that the Tokyo Olympics held that year would serve as a fuse to ignite the increase in demand for color TVs. However, the production base halted at 570,000 thousand units and 8.2 billion Yen. Black & white TVs meanwhile momentarily regained their popularity.

Production and Exports in 1960

(1,000 sets; ¥ million)

Production			Exports		
B&W TV sets	3,578	sets	Radios	12,207	sets
	¥142,600			¥49,900	
Radios	12,851	sets	Tape recorders	266	sets
	¥69,900			¥3,400	
Tape recorders	467	sets	Radio-recorder combinations	178	sets
	¥9,300			¥2,100	
Radio-recorder combinations	493	sets	B&W TV sets	45	sets
	¥9,200			¥1,000	

We supposed the reason for this is that black & white units became affordable to people in the lower income bracket at that time, and the purchases represented a last spurt before the 1965 recession.

Nevertheless, the scale of consumer electronics production during the first period increased 15.5 times, from 25.2 billion yen to 389.5 billion yen. Exports meanwhile rose from 500 million yen to 125.9 billion yen, a 252-fold increase! Such was the rise in exports that its overall share of by 1964 has risen to 32.3 percent, making it a major export industry. Numerous firms began to receive awards from the government for being "Enterprises contributing to exports".

From the technical standpoint, this period saw the revolutionary leap from the vacuum tube to the transistor, making possible miniaturization, high-volume production, improved product reliability and advancements in mass-production technology. The transisitor itself underwent further development from low-capacity germanium material to high-capacity silicon.

There was also rapid change in such sectors as management and marketing. Factories changed from wood-frame urban buildings to modern concrete and steel structures; sales offices showed similar improvements. In personnel, accounting and other organization areas feudalistic practices gave way to more modern business methods.

Distribution channels also underwent great change. Radio repair shops, the first type of electric retailer, came to be replaced by large stores selling radio, TV, refrigerators, washing machines, lighting fixtures and other items which contributed to raised the level of social culture and modern family life. These stores brought with them methodical planning and rationalization. Subsequent to these changes was the applying of knowhow to such important factors in the infrastructure of distribution as delivery, storage, technology and sales.

During this period the saturation rate for TV, refrigerators and washing machines in Japan rose to 92, 47 and 65 percent respectively -- a ratio which had taken about 30 years for the U.S. -- in only a fraction of the time. And although the differences between a large country on the the one hand and a small one on the other may seem obvious, there is no other word to define this tempo of increase other than "explosive".

The second growth period began with domestic demand for color TVs. By this time, the production base was 5,085,000 black & white TV units (164.5 billion yen); 27,017,000 radios (97.5 billion yen); 5,969,000 tape recorders (61.5 billion yen); and 520,000 color TVs (56.2 billion yen). From its position in fourth place in 1966, color TVs had, within three years, become the number one consumer electronics product in terms of value. By 1969 the number of color TV units reached 4,834,000, with a value of 503.7 billion yen. Next was 18,353,000 tape recorders valued at 206 billion yen; then black & white TVs at 7,284,000 units and 192.4 billion yen. Last was radios at 36,298,000 units and 168.3 billion yen.

For exports, the order of 1) radios, 2) black & white TVs, 3) tape recorders and 4) color TVs did not show any fundamental change, but as you can see in the next table there was some movement in the top three items in terms of percentages.

Just prior to the 1974 "oil shock", exports of tape recorders showed a dramatic rise, with color TVs and radios also making strong gains. Black & white TV sets fell to 4th place. Radios had shifted from inexpensive models which fell under increasing competition from Taiwan, Hong Kong and S. Korea to high quality types. Concurrent to this overseas production began. Black & white TVs showed a similar pattern.

Also in 1979, the ratio of exports to total production, which had fallen from 44.9 percent in 1966 to 39.2 in 1969, leaped back to over half -- 51.9 percent, making the consumer electronics industry both in name and fact an export-oriented industry and advancing the pace of internationalization.

Overseas production also picked up at this time, and rather than aiming at relatively inexpensive costs such reasons for producing outside Japan were to circumvent import restrictions high tarrifs and others in problem areas. Use of overseas factories as production points to ship to third countries was another phenomenon showing the changes in these operations.

Exports

	1966	1969	1974
			(1,000 sets; ¥ million)
Radios			
Sets	29,855	25,329	17,230
Value	¥87,800	¥129,000	¥153,300
B&W TVs			
Sets	2,095	4,291	3,638
Value	¥52,700	¥126,800	¥721,000
Tape recorders			
Sets	5,376	12,491	36,474
Value	¥43,500	¥112,400	¥413,600
Color TVs			
Sets	252	1,003	2,289
Value	¥16,500	¥58,000	¥167,800

In the domestic market, the preference for color TVs over black & white continued, moving from 13.9 and 10 percent at the launching period in 1969 to 26 .3% in 1970; 42.3% in 1971; 61.1% by 1972 and 85.9% by 1979.

On the technical side, the development of solid state and all transistorized TV models made it possible to rationalize chassis design and lower costs, with the resulting success making many think of the words "Japan" and "television" as being synonymous, or at least interchangable.

However, this internationalization and firming up of both cost and non-cost types of competitiveness drew strong reactions from TV manufacturers in Europe and the U.S., including dumping and other suits leading to serious trade friction problems. This then was the beginning of the drop in demand, and the start of a difficult era for the Japanese consumer electronics industry.

On the domestic market, the manufacturer-affiliated retailer which had been the traditional keystone of distribution came to receive far less influence from manufacturers. This resulted in the emergence of independent, large-volume low profit retailers which followed the new, so-called mass sales route.

At the start of the third period, it was obvious to all that the worldwide recession brought on by the 1974 oil shock was creating major changes. Among was a move to the unstable currency which resulted in the so-called "Nixon Shock" in 1971. The Nixon Shock growth rate was the result. Looking only at export figures, VTRs began to take off in 1976, with 139,000 units (31 billion yen); by 1980 exports were up to 3,444,000 million (443.6 billion). In 1982 10,652,000 units (1,079.4 billion yen) were exported at a value exceeding one trillion yen - remarkable for a single product category. This incidentally, accounted for more than one-third of the entire 3.5 trillion yen value of all consumer electronics production, far above the second and third place products, tape recorders (840 billion yen) and color TV (683 billion yen respectively.

Therefore it can be said that the role in growth played by black & white TV, color TV, tape recorders and so on in the 1960s and 1970s is now being played by VTRs. At the same time, it is plain that for both business and industry, the development and popularization of new product lines is extremely vital to survival.

Well, I think I have already gone on too long on the subject of the development of Japan's consumer electronics industry. History it is said has a tendency to repeat itself, but that does not necessarily mean that it repeats itself under the same conditions. However, to those of you here today who are yourselves part of newly-developing industries, I believe Japan's experiences can serve as a useful comparison and guide.

In general, what lessons can we draw from what I have just said about the development and growth of electronics in Japan? From an international standpoint, I think there have been three favorable conditions for our good performance, which are:

was of course the devaluation of the dollar and United States' refusal to exchange its currency for gold, which was brought on by America's dissatisfaction over its foreign trade deficit. After having been able to depend on fixed currency exchange rates for nearly 30 years since the end of the war, exporters found themselves completely unprepared for the confusion. Thus the export industries which had shown tremendous growth of 20 to 40 percent in the years from 1966 to 1970 now found themselves with practically no growth at all. In 1973 for example, export performance was only 103 percent of the previous year.

The first Oil Shock brought with it price inflation, stagnant consumer demand and instability of exports. However, it did force Japan's manufacturers to attempt to overcome the effects of the Oil Shock through rationalization. TV receivers adopted more integrated circuitry, and management, while not laying off workers, made every attempt at cost reduction in the designs of new facilities. In Europe and the U.S., manufacturers took the easy route of merely laying off workers, which did little more than reduce production. Thus in international markets Japan-made products came to hold an overwhelming competitive advantage. In 1976 this advantage was able to account for a large increase in exports, but almost immediately trade friction resulted, and by 1980 and '81 the additional growth resulted in such constraints as import restrictions. When instigated against such items as VTRs, an area in which Japan has a virtual monopoly, a negative

1. The industrialized nations have been at peace for more than three decades, enabling improvement in their economies and livelihoods.
2. After the war, realization of the need for human development through peaceful cooperation led to the establishment of such international economic organizations as GATT, the IMF, United Nations, etc. There has been criticism that these might have originally acted to the benefit of the United States, but they nevertheless have had far-reaching effects.
3. Through the efforts of the above, consumption and purchasing has increased all over the world, and development of commerce and trade has been smooth.

The above are the international environmental conditions which have worked to Japan's advantage.

On the domestic front, there were another set of factors at work:

4. In Japan, the dissolution of the zaibatsu (the prewar military-industrial complex), agricultural reforms, organization of labor unions and other factors promoted by the U.S. military occupation led to democratization, reduced the differences in living standards between city and country, and aided the emergence of independent business enterprises.
5. There was an ideal enviroment for radio and television media, as well as electrification.
6. The above effects were aided by realization of high economic growth and policies designed to raise worker income.

7. There was only a minimal burden of military armanents, and in the other direction, more investment directed toward human and economic resources aimed at developing industry and raising levels of technology.

8. There were very effective government policies toward developing industry

9. Japan had a diligent populace with high literacy rate and high level of education.

10. By having the United States as a standard by which to adopt technology or develop products, Japan had a goal, which was to catch up with and then overtake the leader. With virtually the entire population supporting this goal, raising technical levels was comparatively easy.

11. There was parallel high growth and development of peripheral parts industries.

Of course, without the existence of a democratic political structure, it never would have been possible to create the proper environment for participatory efforts from the entire population. Also because of this:

12. Even with simple, repeated tasks, dirty or dangerous operations there were always efforts to imporve the working environment. Workers performed their manufacturing jobs enthusiastically and with a high degree of effort.

13. At the initial stage of development, salesmen made efforts to introduce their products throughout Japan; in the second and third periods, they made their sales trips all over the world.

14. Since the basic fund of technology was limited, Japan's manufacturers stressed application and development, as well as production technology. By so doing, Japan's engineers and technicians achieved a level of technical ability which is now praised throughout the world.

15. Managers and corporate leaders made strong efforts to organize and regiment their plants to achieve high levels of production efficiency.

16. All of the above received the efforts of personnel, accounting, administration, planning and other staff.

Therefore you can see that whatever success the consumer electronics industry has achieved, it has been accomplished by the efforts of many individuals who responded correctly to external factors.

Some of the conditions I have just given may be lost in the future, or it may be that Japan's consumer electronics industry will move from its present position to play some other, newer role. At the same time, some of the above conditions are in a state of constant change. However, whatever responses are needed, I am very optimistic that there will be a favorable environment in the future.

Now we come to the final part of my presentation, which will be a brief summary of expected future developments.

A look at what's coming in image-data media transmission

Coming to home users in the future

(By Junko Kobayashi)

Image-data transmission of new media

Data transmission media

To help explain the new media, we should first examine the pattern of how the existing media system became established.

Data transmission media can be divided into three categories according to its system of networks, its methods of delivery and its type of user. The first category consists of wireless communications systems, cable communications systems and package systems. (Package refers to combinations using recorded tape, records, printed materials and so on.

Methods of delivery must also be divided into their own separate categories by the direction of transmission: one-way (which means a fixed arrangement by which the source transmits and the user receivers the data); two-way (both sides may communicate); or stand-alone (the data is available independently to the user). The source and user may be further defined by specified and unspecified.

One example of an unspecified media user would be of the mass media; media in which the transmitter aims at a specific user is also referred to as "personal media". There are a number of types of this system, just as you have become well-acquainted with the existing types of media, these new forms will become more easily understandable later on.

The types of new media may be classified in the area of data transmission media.

The new technology which supports image-data transmission

Before introducing the new media per se, I would like to touch for a moment on the rapid progress in electronics, data processing and data communications technology which have made it all possible. In electronics, the progress in very large scale integration has greatly contributed to raised computer performance and widened applications. Data communications has used these advancements in electronics to develop digital communications -- a system which converts signals to numbers for transmission, after which the receiver reconverts the numbers back to understandable form. By using digital communications, it has become easier to apply the processing of data to computers and perform high-speed communications between separate units, even simultaneously with many differnt types of data. Optical fiber cables and communications satellite technology also play important roles in realizing long-distance transmission.

New image-data transmission media

The new forms of advanced technology can be expected to become developed for popular, mass-user applications. Some examples will be:

1) Satellite broadcasts -- television signals from the earth will be amplified by satellite and returned to viewers using parabola antennas. This will make possible multi-channel viewing.

2) Teletext -- employing gaps in current TV broadcast frequencies, this will transmit character or pattern data which will be viewed on the receiver's home TV screen. Also known as character transmission. At present the U.K., France and other European countries are actively developing this format. The U.K. commenced test broadcasts in 1975, and France is also carrying out government-financed tests.

3) High-definition TV -- TV broadcasts with better, more detailed TV picture and high-quality sound. Japan's NHK Research Center is now studying. It involves increasing the present 525-line TV pattern currently in use in Japan and the U.S. to 1,125 lines -- more than double.

4) Pay TV -- wireless TV broadcasts that the viewer must pay to see.

5) Cable TV -- this will be initiated to overcome the problems of signal interference in big cities or mountain areas.

6) Interactive cable TV -- users will not only be able to receive, but will also have the means to transmit their own images or sound. This will enable program "attendance" or response to TV questionnaires, as well as perform various services. Such a system, called HI-OVIS, is already in experimental use in Ikoma City, Nara Prefecture.

7) Videotext -- upon reqests from the user, this system uses the telephone circuits to supply character information or images from data bank files to the home TV screen. In Japan, this is called the CAPTAIN system and is already in operation. It will also have message transmission capability, and many other uses are foreseen.

8) Data base -- this is a system by which various types of information are assembled and stored, then made available to users upon request.

9) Facsimile -- communications machines which can transmit the reproduced image of characters, graphs, and pictures, such as documents, photographs, newspapers, etc., to a distant receiving unit.

10) VRS (VIDEO RESPONSE SYSTEM) -- this uses the telephone lines to supply moving or still patterns on the TV screen as per the users' request. NTT began research on this system in 1977.

11) TV telephone -- combining image with voice. As broadband transmission is necessary, this is not possible with the present telephone system.

12) Computers — after the specific data is obtained and processed, the results are supplied to the user or automatically routed to another computer which controls the process.

13) Videodisc -- shaped like a conventional record, this uses electronic or optical pickup to reproduce stored images, music, etc. on a TV screen.

13) VTR (Video tape recorder) -- these magnetically record TV images and sound on tape for playback on TV screen.

15) Personal computer -- computers for individual use. They contain computer logic circuitry, memory, etc. Thanks to large-scale integration they have become very compact and very affordable. A wide range of software programs for office work, accounting, graphics, statistics and sales management has been developed, and many other applications exist, such as for analyzing research, storing namelists, planning household budgets, counting calories, games, etc.

(An illustration of the chronology of appearance of the various forms of new media follows.)

APPENDIX 5-2

The Japanese Electronics Industry how it has attained its present position? by Mr. T. Takai, Executive Vice President, Electronic Industries Association of Japan

THE JAPANESE ELECTRONICS INDUSTRY

HOW IT HAS ATTAINED ITS PRESENT POSITION?

Toshio Takai

Executive Vice President

Electronic Industries Association of Japan

1. Introduction

The total production of Japan's electronic industries amounted to 44 (fourty four) billion dollars last year. This figure demonstrates that in the last ten years, the Japanese electronics industry has increased 2.9 times in scale, and that it has achieved an average growth rate of 11.2 percent per year. The Japanese economy has shown an unparalleled growth in the last two decades; and the mainstay of this rapid growth has been our electronic industries. (See Table II-2-1)

2. Formation of the National Consensus on Need to Develop Electronic Industries

In 1957, the Japanese government passed the "Provisional Law to Promote the Electronic Industries". The aim of this law was to help develop our electronic industries as the core industry of our national economy. I must say this Provisional Law was a necessity when we consider the social and economic conditions of Japan. As you know, the electronic industries are labour-intensive and technology innovative and here the maximum output can be expected from minimum input. Furthermore, then, the time was ripe for rapid expansion of the electronic industries: there were strong signs of recovery of world economy and increase in national income; and the technology-intensive character of the industry was expected to bring forth steadily increasing demand for their products.

When the "Provisional Law" was established, the annual production of Japanese electronic industries was less than 400 million dollars: their technological level and production scale were at least 20 years behind those of America. Based on this "Provisional Law", representatives from both the government and private sectors formed special committees. These committees dealt with three sectors of the electronic industries; namely, consumer electronics, electronics for industrial use, and parts and components. Each of these three sectors were then classified into the following three categories:

(1) Items for which production technology had to be developed rapidly, through research and development efforts.

(2) Items for which production was to be started or increased on commercial basis.

(3) Items whose quality and performance were to be improved and production costs were to be reduced.

Concerning each item under these three categories, the committees specified the concrete details regarding R&D, the total amount of necessary funds, as well as the target year for the realization of these objectives. These detailed programmes covered both long-term and short-term commitments. Of course, since the electronic industries are of very dynamic nature, necessary modifications were made, from time to time, in the programmes in accordance with the changing circumstances. These programmes were nothing but a kind of guideline or a blueprint, suggesting the future course to be followed by our industries. To those companies whose projects met this guideline, the Japanese government gave preferential treatment both in taxation and financing.

However, here I would like to make it quite clear that the most important objective of this "Provisional Law" was to form a solid national consensus which acknowledged the electronic industries as the industry best suited to be the core industry of Japan. Thus, it became possible through this law to induce the private sector to focus various national resources on this industry with top priority. I would like to emphasize here that the formation of such a national consensus is absolutely necessary for the development of electronic industries in any country. I would also like to add that competitive electronic industries will hardly develop in such countries where (for example) to textile or shoe industries carry as much weight as the electronic industries do.

Contrary to the common belief in European countries and America, as far as consumer electronics were concerned, the electronic industries of Japan did not receive much direct assistance from the government. The dominant opinion in those days was that as long as such national consensus had been established it would be possible for consumer electronics to improve technology and to expand production solely through open competition among manufacturers, without much assistance from the government.

Indeed, such national consensus facilitated the expansion and strengthening of the faculties of electronics in Japanese universities and colleges. As a result, many excellent engineers graduated and joined our enterprises. Also, financial institutions became more willing to finance and invest in the electronic industries, in expectation of their growth in long-term perspective. Thus, it is natural that the formation of such a national consensus and its effects contributed immeasurably to the future rapid growth of the Japanese electronic industries, which were then still at their infant stages.

3. Strategy of Japanese Electronic Industries: Intensification of Consumer Electronics

(1) One of the most distinct characteristics of Japanese electronic industries is that they have consumer electronics as their core. Even today, consumer electronics account for a higher percentage in our electronic industries than in any other industrially advanced nations. I would like to explain why Japan decided on a strategy which placed greater importance on consumer electronics when our electronic industries had just begun to develop. There are both passive and positive reasons.

To begin with the passive reasons, one must consider the different features in consumer and industrial electronics. First, consumer electronics require a relatively small amount of initial investment compared with electronics for industrial use. Second, consumer electronics are more labour intensive. Third, their basic technologies have already been weel established. In addition, another passive reason is that in both American and European countries more importance had been placed on electronics for industrial use.

As for the positive reasons; consumer electronic industries is a mass-production, assembling industry at which Japanese people are relatively skillful and therefore, by taking advantage of the synergetic effects of less cost and more demand, high-speed growth could be expected.

Furthermore, as the well-developed and established basic technology of consumer electronics in America and Europe were readily available to us, we were sure that we would be able to develop highly competitive consumer electronics in a comparatively short period of time by means of commercial applications of those basic technologies through active R&D investment, daring product innovations and aggressive marketing.

Such expectation on our side proved to be quite right. The demand for consumer durables such as consumer electronics, is highly elastic with regard to both income and price, and so we could take full advantage of scale merit of production, developing our huge domestic market, at first, as the base market and then gradually developing overseas markets. Thus, at present our consumer electronic industries have grown to be one of the most competitive industries in the world.

At present, the scale of Japanese electronic industries is second to none but the United States. Our success is an indication that the strategy we took was a very fortunate as well as very insightful choice. Not only that, the capital and technological resources thus accumulated through our experiences in the field of consumer electronics, have now begun to benefit and strengthen our electronics for industrial use as well. Nowadays industrial electronics surpass consumer electronics in their output.

(2) Japanese electronic industries used the basic technologies transferred from Europe and America, and also concentrated the main efforts of R&D on their commercial applications, as well as on achievement of mass-production technology. From the initial stages of R&D, the R&D groups keep close contacts with the manufacturing and marketing people. Such contacts are always a great help for the R&D groups in their efforts to innovate consumer-oriented products.

(3) Next, I would like to lay stress on the fact that in our consumer electronics industry, a typical assembling industry, the manufacturers of the sets and the manufacturers of parts and components always work in close cooperation. The manufacturers of electronic parts and components thereby can make highly reliable products which are designed for use in specific sets. The makers of electronic parts and components are also known to be quite punctual in their delivery schedules. The makers of electronic parts have thus played a vital role in making consumer electronics what it is today. Since recently, most colour TV set makers in Japan do not perform "acceptance tests" on parts purchased from vendors--this is how much the makers of sets and parts trust each others. Competitive consumer electronic industries need competent parts and components manufacturers and their relationship must be based on mutual trust. Japanese parts and components are now famous for their high reliability, and their makers are known for their punctuality of delivery. These days, electronic parts of Japan are not only highly esteemed by domestic set makers, but also by foreign makers as well. Last year, we exported about 40 per cent of electronic parts produced in our country.

4. Quality Control System and Increase of Productivity in Japanese Electronic Industries

(1) I would like to comment now on the decisive factor which led electronic industries to become internationally competitive. Japanese electronic industries including consumer electronics and ICs, have achieved their present quality level through a very strict quality control system, unique to Japan. Both the management and the labour join forces in

order to make this quality control system work. It is mistaken to assume that the electronic products manufactured in Japan are of high quality simply because the products are tested many times during their manufacturing process and that only products of good quality are put on the market. Thus it is also absolutely mistaken to think that the cost per unit should consequently rise under such system. Unit cost will certainly decrease, if quality is improved through correct quality control of producing less rejects, because raw materials, labour and energy, will all be converted into the value of manufactured goods with little waste, and the production facilities can be utilised to their full capacity.

The final goal for quality control is to decrease the reject rate to zero. Once this goal is achieved, testing of products will become unnecessary. One would be putting the cart before the horse if he tries to improve the quality of products just by increasing the number of tests and making the test more severe. Presently, many electronic manufacturers of Japan employ a method of quality control to decrease the reject rate to units of PPM--parts per million, and not of one hundred. That is to say that these manufacturers are employing the PPM system instead of the Acceptable Quality Level or AQL system in quality control. Japan's quality control differs from the American method of "defect detection". Ours is "defect prevention".

If you cannot rely solely on quality control engineers to achieve desired quality, then it is necessary to create a climate or a system where all the workers involved in production process are responsible for quality of their own work. Thus, so-called "total quality control system" has been adopted by most Japanese electronic industries. This system involves all workers of all departments in the improvement of quality of manufactured goods. I might also add that there are more than 100,000 "quality control circles" which support this system.

(2) You may doubt whether it is at all possible for the management to motivate the entire labour force to improve quality. I understand that in European and American factories, they give job description manuals to the workers. There, these workers may be breaking the rules set in the manuals if they become interested in improving the manufacturing process, or make suggestions concerning improvement of the products' quality to the management.

In fact, some time ago a foreign engineer visiting a plant in Japan, expressed such doubts and asked a female worker why she was involved in matters which should only concern the management. She answered in the following words: "Day after day I work here. I know about my work more than anyone else in this factory. I found a weak point in the manufacturing method. In thought of a tangible way to overcome this weak point, and suggested it to the management. The management adopted my idea, and as a result of that the reject rate dropped down to one third of what it used to be. Is there anything strange in what I did?

Employees of the manufacturing factories are usually given manuals in Japanese enterprises. However, the manual does not set clear-cut limits to the sphere of the employees' duty. If the manual clearly and definitely describes the employees' duty, the Japanese employees would most probably complain that their abilities are too under-estimated as if they were school children. It may sound strange to many of you here today, but Japanese workers tend to perform their jobs much better when the sphere of duty is flexible and not clearly defined. When their bosses instruct them to do their best according to their own judgement and responsibilities, the workers usually perform marvellously, because they become highly motivated. The established concept in Europe and America is that each individual should actively contribute to society as a whole through their job, in order to form democracy. This concept is marvellously put in practice in the Japanese manufacturing enterprises.

(3) Along with the "quality control", another major element necessary to make the electronic industries internationally competitive is increase of productivity. Higher productivity means more competitive prices in the opposite direction to becoming of the products. A rise in productivity is achieved by maximum automation of the whole production and assembling process, thus taking the whole process in the opposite direction to becoming labour intensive. It is needless to say that automated manufacturing will also lead to production of better quality. However, please note that it would be meaningless to introduce automation before the quality control has been successfully implemented and the reject rate has been minimised. If you try to improve quality chiefly by means of automation, the automation machinery will only produce heaps of inferior products quite efficiently.

5. The Japanese Workers' Sense of Participation in Management

(1) The "total quality control system," of which I have just spoken, is practised successfully in Japan. The main reason for its success is the manufacturing workers' positive cooperation with the management in quality control. Now the questions are, "why are Japanese workers so cooperative towards quality control?" and, "why do they identify themselves with the enterprise? I think the answer to these questions lies in the seniority payment, and lifelong employment systems. These two systems have been practised by most enterprises in our country, and electronics enterprise is not an exception. I understand they are known only to career soldiers and clergymen in the western world. I will attempt to explain the reason why these two systems, quite unfamiliar to most of you, are employed in Japanese enterprises.

You may think that these two systems have been existing in Japanese economic society for a long time, and we took full advantage of them in order to achieve high economic growth. But, contrary to this common belief, they are one of the outcomes of the high economic growth of 10% per annum attained over the last 30 years, and various favourable conditions contributed to such a record-making rapid growth. In other words, these two systems are not at all deeply rooted in the Japanese history. They are not something special or unique to our society and economy. Therefore, I consider they are universally applicable to any country with potential for high economic growth. In the 1980's, Japan is faced with various problems. A gradual decrease in growth rate seems inevitable and there are some indications of a possible fade-out of these two systems. However, I firmly believe that these systems have become too ingrained in our society to easily disappear, even if Japan shows a low growth rate in the future.

(2) I would also like to mention something about the Japanese workers' attitude towards their jobs. Japanese workers do not mind at all when asked to change to a different post. This kind of attitude is somewhat particular to Japanese workers. This flexible attitude of Japanese workers is very advantageous to the management of the Japanese electronic industries which has to operate quite flexibly according to changing market conditions. By experiencing various jobs, the workers become well versed in many different production processes or machinery operations. Thus, the workers feel that they are participating in the whole operation of the factory. Again, flexible shifting of jobs will not only prevent the workers from opposing automation, or introduction of new production process, but will also induce them to welcome it. Furthermore, it becomes easier to increase output of certain products with larger demand while decreasing others with declining demand. The level of technical skills of workers in Japan are uniform which means that a worker is capable of learning different new skills in short training time, and to work efficiently in his or her new job.

Adjustment and changes in production lines according to market situation is relatively easy to achieve in Japan, because the workers accept job-shifting without any difficulties. In Japan as well as in America and Europe, the management and the labour are basically in opposition with each other. However, the management endeavours to avoid lay offs as much as possible, and the labour unions are apt to accept a relatively small wage increase because of the sense of their participation in the management. Thus, the Japanese management cannot, and will not, lay off workers easily simply because of recession.

6. Characteristics of the Management of Japanese Electronic Industries

(1) Unlike other advanced nations who have focused their economic policy on increase in demand, Japan has focused her policy on the growth of supply, for the past 30 years. In times of inflation, we place more weight on reduction of production cost by the increased productivity and expansion of output, rather than on reduction of monetary flow or the hike in interest rates. Similarly, when we face deflation, we do not always decrease production but try to create demand by decreasing the production cost through rationalisation, or by introducing new innovative products, even at the expense of profits for the enterprise. Such behaviour on the side of the management can be observed most clearly in the electronic industries.

Demand for electronic products is not something given to us, but what we should endeavour to create by ourselves. We can create markets, because we have the strong weapons of technological innovation. Unlike European and American banking systems and stockholders who attach much importance to the short-term growth and profit perspective, Japanese financial circles strongly support the strategy of our management that endeavours to achieve profit and growth on a long-term basis. This is why we can invest in production facilities and in what seems to be highly risky R&D, which preempt future demands.

(2) Another notable feature in the strategy of the Japanese electronic industries is that the management maintains a close contact with the labour. Thus, the management keeps the labour well informed of their policies.

In 1974, a Japanese television enterprise purchased the TV division of an American electronics company. The Japanese enterprise then introduced those Japanese management strategies which they considered applicable to the American factory and then that factory showed remarkable results. The Japanese social and economic structure is not a prerequisite for the strategies employed by Japanese electronic industries. I would like to assert my belief that many of the aforementioned strategies of Japanese electronic industries can be applied successfully to electronic industries in other countries as well.

7. The Dynamics of Electronic Industries

However, many domestic and foreign factors which favoured Japanese electronic industries during the 1960's and 1970's are gradually disappearing since we entered the 1980's. It is quite obvious that Japan is now moving into mature economy and mature society from her growing economy and growing society. The biggest problem our electronic industries face today is how to adapt themselves to the changing society without losing its dynamics vital to the industries. In other words, the question is how to grow out of "growing society" which was characterised by development, expansion and competition, and then shift into a "mature society" characterised by interchange, coexistence and harmony. I am afraid the answer to this question is not an easy one to find.

An active investment in R&D, in production facilities and in innovation of products, aggressive market development and output-oriented management, are the dynamics which support the electronic industries. I must emphasise that we can never afford losing those dynamics under any circumstances. As long as we maintain those dynamics, electronic industries will never cease to expand its horizons in 1980's when low economic growth is forecast.

8. Some Conclusions

(1) Electronic components are the foundation upon which the whole electronic industries should be built in a country.

(2) Domestic market should be a base market for electronic products.

(3) Which process is more desirable to adopt in the initial stage of development of electronic industries? Comparatively labour intensive manufacturing and assembling processes, or comparatively capital intensive and automated ones?

(4) Quality control comes first. Then enhancement of productivity.

(5) Competitive electronics can not be produced in an environment where one thinks it is up to engineers to take care of quality control.

(6) To motivate all workers on the shop floor and make them quality-conscious is most important.

(7) It is necessary to pay attention to international trends of "Product Life Cycle". (See attached Fig. II-2-1)

(8) We can not expect leap-frog development of electronic industries, but must seek step by step development.

(9) We have to bring up and secure as many electronic technicians and engineers as possible.

Table II-2-1 Production (Factory Sales) of Electronics in Japan & USA

($ Million)

1957			
	Japan	USA	
Consumer	174	1,805	
Industrial	79	5,430	
Components	122	2,384	
Total	375	9,619	
1982			
	Japan	USA	
Consumer	14,187	11,150	(4,438)
Industrial	15,835	79,650	
Components	14,055	24,720	
Total	44,077	115,520	(108,808)
Total Electronics			
	1957	1982	
Japan/USA	3.9%	38.1% (40.5%)	
USA/Japan	25.7 times	2.6 times (2.5 times)	
Consumer Electronics			
Japan/USA	9.6%	127.2% (319.6%)	
USA/Japan	10.4 times	78.6% (31.2%)	

Figures and percentages in parentheses = Factory sales - Imports

Sources: MITI and EIA

Fig. II-2-1 Change of Product Life Cycle

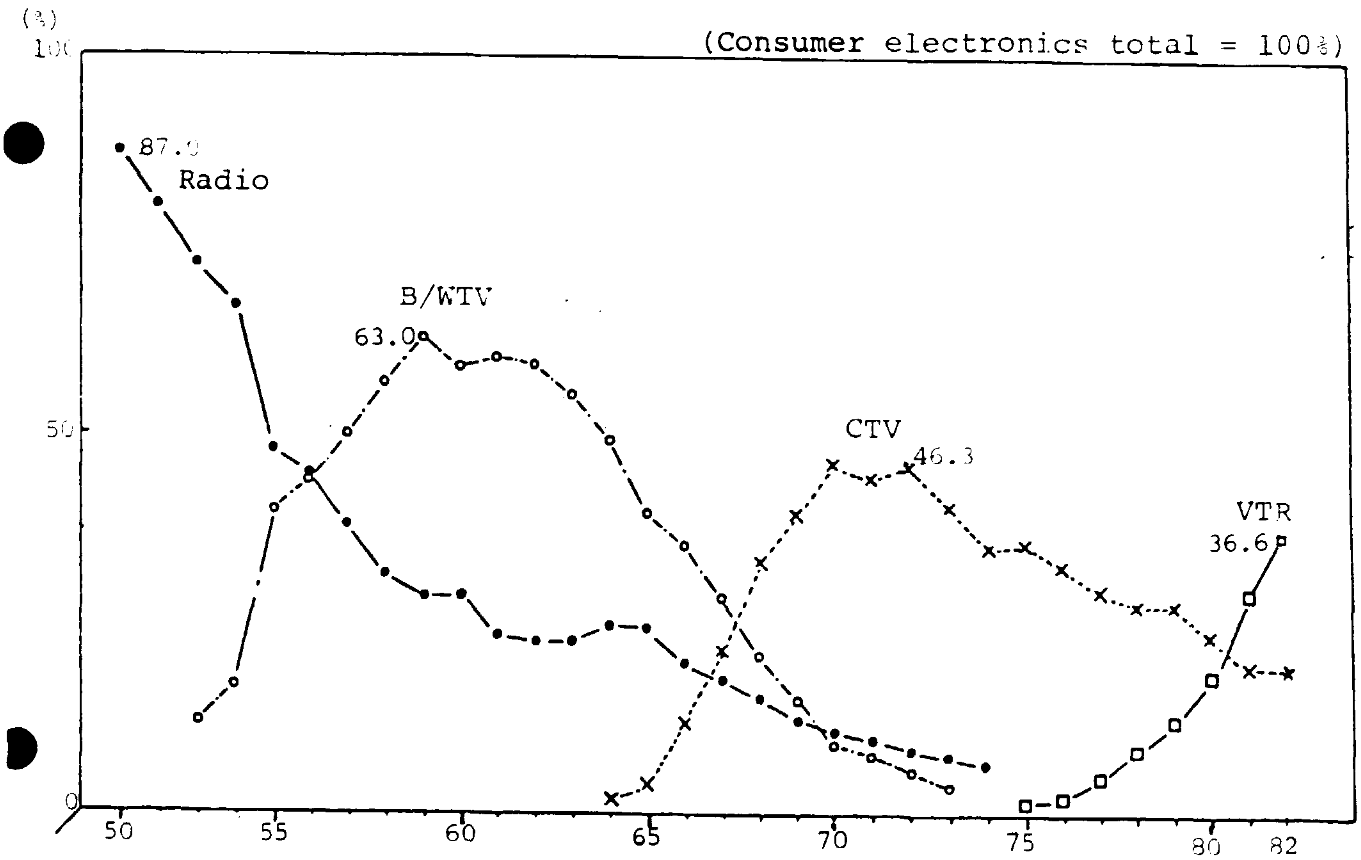


Table II-2-2 Actual Production and Export of Electronic Industires in 1982

* In comparison with the same period of the previous year (%).

Unit: ¥ million; the figures in parentheses in thousands; (%).

Item	Production	*	Exports	*
TV and Video	2,006,926	106.6	1,448,729	113.5
Color TV	683,147	92.4	333,628	93.5
(In quantity)	(12,166)	96.2	(5,969)	95.5
Home VTR	1,291,007	118.8	1,079,411	126.5
(In quantity)	(13,122)	138.2	(10,652)	144.8
Monochrome TV	32,772	57.4	35,690	53.6
(In quantity)	(1,739)	52.4	(1,912)	49.6
Audio	1,260,584	77.6	979,110	79.9
Tape recorder	841,327	83.1	704,303	86.2
(In quantity)	(55,576)	84.4	(53,322)	96.3
Stereo	419,257	68.5	274,807	67.2
Phonograph	67,985	68.3	46,109	68.3
(In quantity)	(2,270)	71.6	(1,465)	78.5
Component stereo	351,272	68.5	228,698	67.0
Others	255,771	142.4	90,573	78.1
Consumer electronics	3,523,281	95.6	2,518,411	96.2
Wired communication equipment	822,904	116.8	196,805	157.4
Radio communication equipment	471,769	109.4	312,354	111.7
Electronic application equipment	2,096,536	118.7	459,148	157.6
Computer	1,733,295	118.0	344,528	174.6
Electric testing & measuring equipment	391,604	109.0	151,666	120.9
Electronic desk-top calculator	149,686	95.7	131,607	97.5
Electronics for ind. use	3,932,499	115.0	1,251,580	130.9
Passive/mechanical components	1,855,124	105.9	1,083,745	106.7
Active components	1,592,274	106.0	668,126	113.9
Electron tubes	396,563	91.1	175,148	89.4
Semiconductor devices	360,474	95.3	70,034	95.7
ICs	835,237	121.3	285,112	142.8
Others			137,832	117.0
Others	42,921	125.1		
Electronic components	3,490,319	106.1	1,751,871	109.4
Grand Total	10,946,099	105.3	5,521,862	106.7

Production = Primarily based on and partially revised the Dynamic Statistics on Production by the Ministry of International Trade and Industry.
Export = Customs-clearance Statistics by the Ministry of Finance.

* TV includes chassis kits. Components are FM tuners, Hi-Fi amplifiers, record players, and Hi-Fi speaker systems. Others in consumer electronics are radios, transceivers, special electric gramophones, speakers, and hearing aids. Electric measuring instruments do not include electric meters. Others in electronic components (production) are liquid crystal devices. Others in active components (export) are microassembly, piezoelectric crystal device, and parts.

APPENDIX 5-3

Technology and development of components production and assembly, by Mr. S. Ogasawara, Managing Director, Alps Electric Co., Ltd.

TECHNOLOGY AND DEVELOPMENT OF COMPONENTS PRODUCTION AND ASSEMBLY

Shoji Ogasawara
Managing Director
Alps Electric Co., Ltd

1. **Electronic** Components

(1) Electronic Components Classification

General Components

1) Passive Components (Resistors, Condensers, etc.)
2) Audio Components (Speakers, Microphones, Magnetic Heads, etc.
3) Mechanical Components (TV Tuners, Connectors, Switches, etc.)

Active Components

a) Electron Tubes
b) Semi-conductor Devices
c) Integrated Circuits
d) Others

(2) Use

Fig. II-3-1 Composition of Shipments of Electronics Components (Total Electronics Components Shipments = 100))

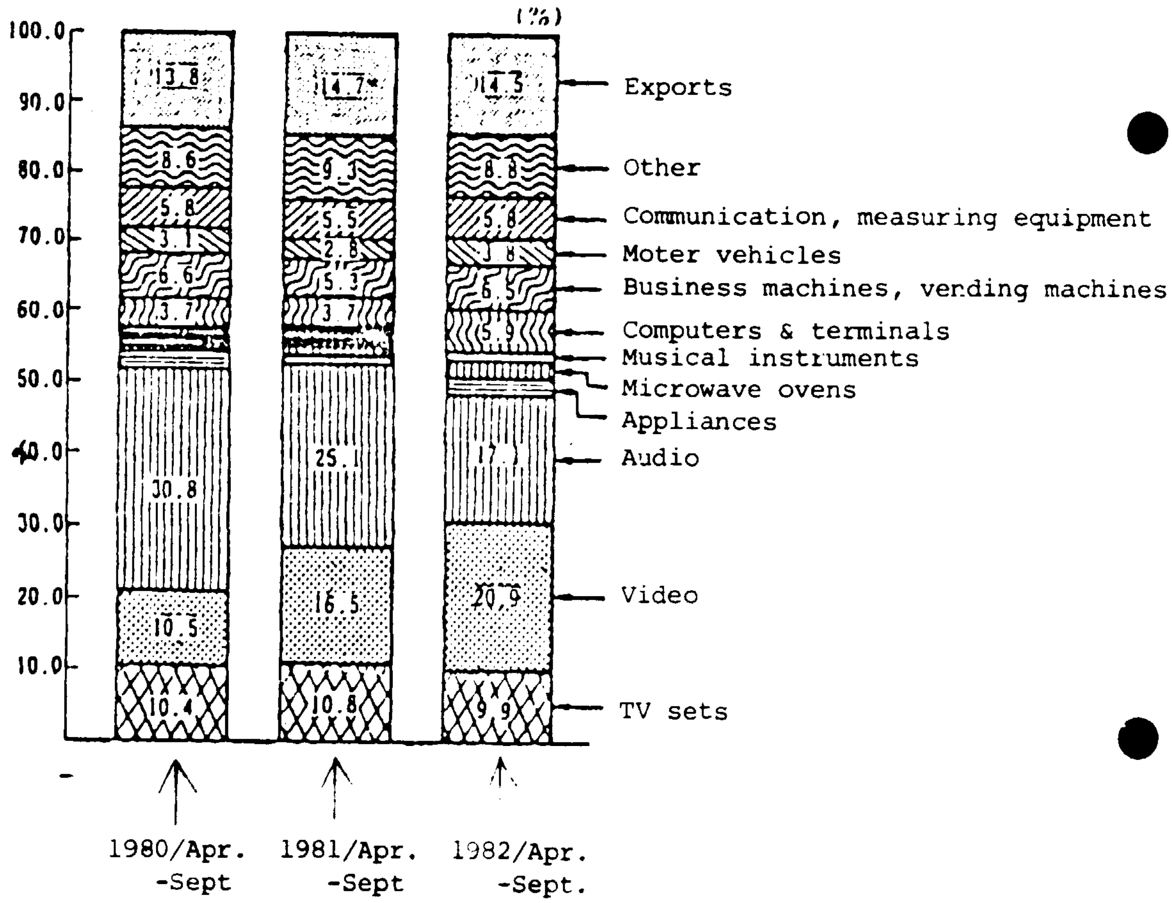
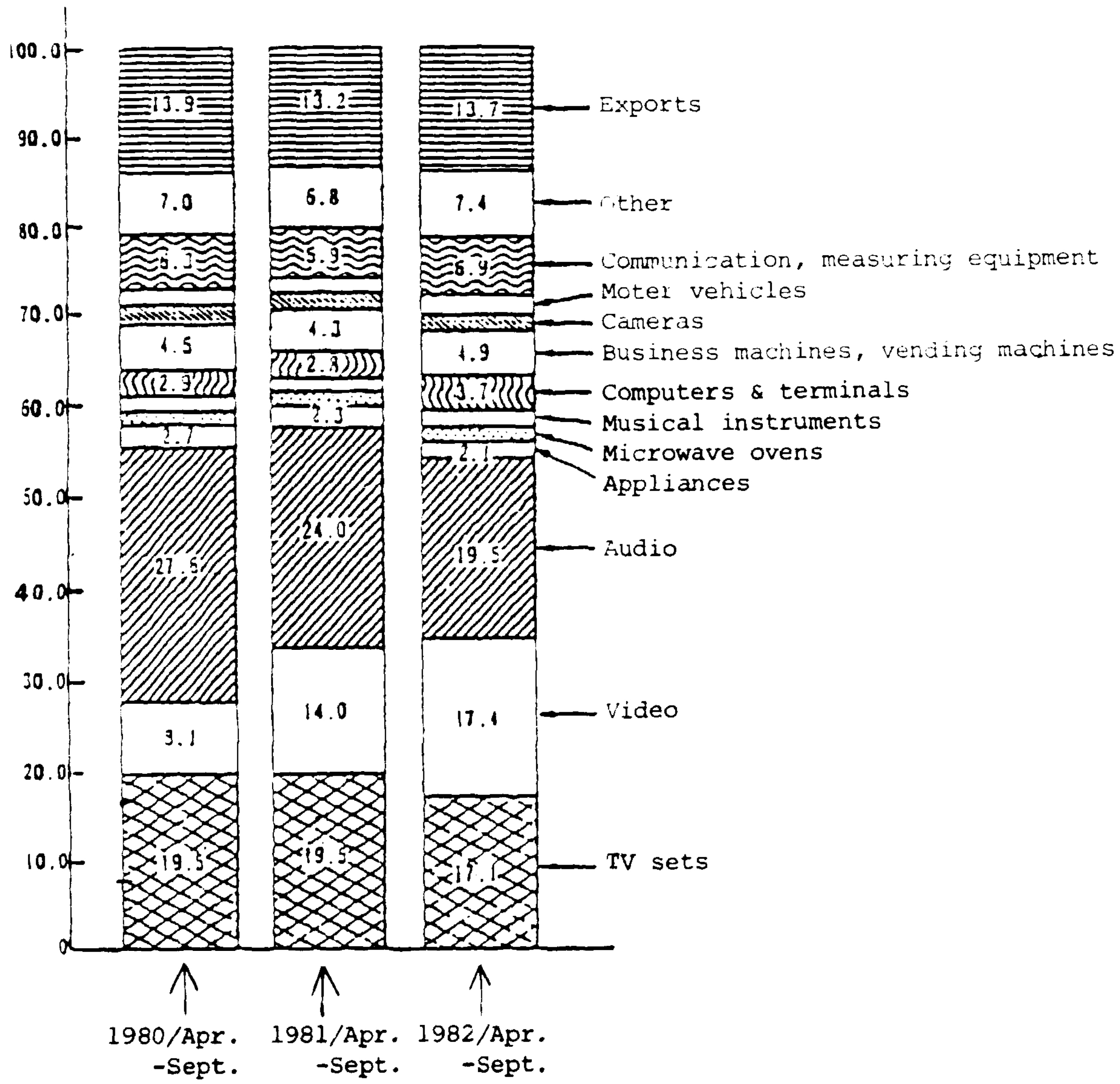


Fig. II-3-2 Composition of Shipments of Mechanical Components



(3) Trends

1) Lighter, thinner, shorter, smaller
→ Miniaturization.

2) Automation of assembly
→ Of small mechanical Components, and not only chip Components.

2. Examination of Typical Mechanical Components

3. Screening of Videotape on Components Production Technology (using Alps Electric Co., Ltd. as typical of the industry)

4. R&D, and Production

(1) QC (PPM, AQL)

(2) R&D defined

(3) Production

1) Need for Total Technological Ability based on fundamental technology for electronics Components production (die making, press molding, plating and other technology)

2) Automatization of production and testing

Table II-3-1 R&D of Industrial Companies

	R&D Expenses in the Companies (100 million yen)	Ratio of R&D Expenses to Sales (%)	Itemized R&D Expense Shares (%)			R&D Staff (No. of Persons)	R&D Expenses per Capita of R&D Staff (¥10,000)
			Basic Research	Applications Research	Development Research		
All industries	31,423	1.54	5.0	19.5	75.5	184,889	1,700
Manufacturing	28,956	1.74	5.0	19.3	75.6	175,088	1,654
Machinery	2,189	1.90	0.9	11.6	87.5	15,390	1,422
Electric Machinery	8,172	3.71	3.9	18.9	77.3	58,873	1,388
Electric Equipment	2,812	3.35	4.1	16.4	79.6	20,043	1,403
Communications and Measuring Equip.	5,360	3.94	3.8	20.2	76.0	38,830	1,380
Transport Equipment	5,105	2.34	3.9	16.6	79.5	17,682	2,887
Motor Vehicles	4,198	2.38	3.6	14.7	81.7	13,541	3,100
Precission Machinery	993	2.12	3.4	15.5	81.2	7,061	1,407

APPENDIX 5-4

Japan's economic and technical cooperation,
by Mr. H. Suzuki, Director, Technical
Cooperation Division, MITI

JAPAN'S ECONOMIC AND TECHNICAL COOPERATION

Hideo Suzuki
Director, Technical Cooperation Division, MITI

1. History and Background

(1) In 1955 Japan began to supply economic cooperation through reparations, and technical cooperation through participating in the Colombo Plan.

(2) Thereafter the scheme of Japan's economic and technical cooperation underwent swift diversification.

(3) During this period, the amount of Japan's Official Development Aid (ODA) increased rapidly, parallel to the rapid growth of the Japanese economy, and as shown in the table below, whereas it was $244 million in 1965, it increased to $3,170 million in 1981.

Table II-4-1 Japan's Official Development Aid

	($ million)
1965	243.7
1970	458.0
1975	1,147.7
1980	3,303.7
1981	3,169.8

(4) Japan now recognizes economic cooperation as an effective measure for remedying the North-South problem, and earnestly desires that while self-help efforts by developing countries are continued, that continued progress will be made in improving economic cooperation in order to promote true economic and social development, and that by implementing this cooperation Japan will continue to live up to its obligations as a member of international society. We also believe that this is an effective path to contribute to peace and stability of the international social order.

In order to make this a reality, the Japanese government made a public declaration to double the amount of ODA provided in 1977, $1,420 million, three years later, and attained that target. Moreover, at present, the five-year cumulative total of ODA for 1976-1980 has reached the level of $10,680 million, and progress is now being made to double that as the cumulative figure for the five-year period 1981-1985.

2. Content of Japan's ODA

(1) The content of Japan's ODA in 1981, $3,169.8 million, by scheme, is as shown in Table 2.

Table II-4-2 Government Development Aid by Japan, 1981

			($ million)	
Official Development Assistance			3,169.8	(100%)
Bilateral Assistance	Grants		810.4	(26%)
		Financial Grants	432.0	(14%)
		Technical Co-op.	378.4	(12%)
	Loans, etc.		1,450.0	(45%)
	Subtotal		2,260.4	(71%)
Contributions to multilateral organizations			909.4	(29%)

Note: Classification is that of the DAC.

The $3,169.8 million of development aid in 1981, in terms of its scale, accounted for 12% of the DAC total, and was at a level comparable to that of the United States ($5,783 million), France ($4,177 million) and West Germany ($3,181 million). However, (1) in terms of the ratio of ODA to the GNP, Japan, with 0.28%, was below the DAC average of 0.35% and

(2) the share of loans, etc., at 45%, was higher than the DAC average of 25%, indicating that there is further room to improve the quality of Japan's aid.

However, despite this, (1) whereas the ODA ratio to the GNP was about 0.20% in 1977, it was increased to 0.28% in 1981, and (2) the share of grants in the ODA rose from 16% in 1977 to 26% in 1981, demonstrating the sustained efforts by Japan to improve the quality of her aid.

Table II-4-3 Major DAC Nations' ODA (1981)

	($ million)	
U.S.A.	5,783	(23%)
France	4,177	(16%)
W. Germany	3,181	(12%)
Japan	3,170	(12%)
England	2,195	(9%)
Holland	1,510	(6%)
Canada	1,189	(5%)
.	.	
.	.	
DAC 17-nation total	25,635	(100%)

(2) The geographical pattern of distribution of the $2,260 million bilateral component of Japan's ODA in 1981 in as shown in the following table.

Table II-4-4 Regional Distribution of Japan's Bilateral ODA (1981)

	($ million)	
Total	2,260	(100%)
Asia	1,604	(71%)
Africa	317	(14%)
Latin America	177	(8%)
Europe	49	(2%)
Mideast	32	(1%)
Oceania	19	(1%)

Note: The ranking of Asian countries for which Japan's aid amounts to a high level, in descending order, is Indonesia, S. Korea, Thailand, Philippines, Bangladesh, Burma, and Pakistan.

While there occasional criticism of Japan's aid being excessively concentrated in the Asian region, Japan has been diversifying the regional distribution of her aid recently, in accordance with globalism. As of 1970, the concentration of Japanese ODA in Asia was at the level of 98.3%.

(3) Aid provided by Japan, by sector, in terms of shares of ODA for 1981, excluding technical aid, was as in the following table.

Table II-4-5 Composition of Japan's ODA (excluding technical aid), 1981

($ million)

Infrastructure	1,113	(51.1%)
Industry	399	(18.3%)
Agriculture, forestries, fisheries	360	(16.5%)
Health	168	(7.7%)
Education	65	(3.0%)
Others	75	(3.4%)

Because of the understanding that improvement of infrastructure in vital as the foundation for development of developing countries, and that it has strong multiplier effects or repercussion effects, more than half of Japan's ODA is provided for roads, railroads, ports and harbors, communications and other aspects of infrastructure.

3. The Importance of Technical Cooperation Based on the Japanese Experience

(1) Japan pursued a policy of national isolation for 200 years up to 1850, and up to that date was by European standards a completely undeveloped, poor country. It was a little over 100 years ago, in 1868, that Japan opened herself to the West and began to pursue a policy of introducing Western culture and technology in order to modernize and catch up to the advanced nations.

(2) In comparison to those times, Japan, now a modern power, through industrialization in particular has caught up to the other nations.

(3) As reasons which may be noted for Japan's have been able to attain this development, fundamentally what we may state on the basis of Japan's experience is that there have been ceaseless efforts at developing human resources to sustain technological progress in the broad sense, including therein not only matters of production technology but also those of institutional and organizational innovation. It was this drive to develop human resources which powered the development process expenced through the present day.

(4) Judging from Japan's experience, it is abundantly clear that technical cooperation is of paramount importance, and it is thought to be an international duty of Japan to promote it.

(5) On the part of the developing countries, it is necessary to pay the greatest attention not to merely making use of technical cooperation because there is a system whereby it is made available, but to clarify what it is which is desired of Japan, and to continue to make self-help efforts, while making effective use of Japan's technical cooperation scheme.

4. Outline of Japan's Technical Cooperation Scheme

(1) Japan's technical cooperation is provided through two channels, according to implementing agency, namely government-base and private-base. Government-base cooperation is subclassified into bilateral cooperation, and cooperation provided through multilateral or international agencies.

(2) The major forms of technical cooperation are (1) implementation of development planning studies, (2) dispatch of experts, on long-term or short-term

assignments, (3) training in Japan, and (4) cooperation in R&D.

(3) Technical cooperation on a bilateral base is provided when the Ministry of Foreign Affairs or Ministry of International Trade and Industry (the latter generally acting through the Japan International Cooperation Agency, JICA), acting on the basis of an official request from the government of the recipient country, supplies funds to that government.

(4) Private-base cooperation by the many non-governmental organization (NGO) in Japan is provided at the initiative of the private sector; technical cooperation of this kind can be supported by MITI to the extent of 50-75% of the required funds.

(5) While Japan's cooperation is provided across a very broad range of fields of activity, including agriculture, fisheries, mining, manufacturing, construction, health care, education, and others, the main concern of MITI lies in the fields of industry--and expencially mining and manufacturing--and energy including both hydropower and thermal power.

5. Government-Base Technical Cooperation

(1) Implementation of development project research: On the basis of official requests from developing countries, JICA forms a study team consisting of consulting experts, dispatches it to the country and project site in questions, and has it formulate a development plan, determine the feasibility of the project, and when necessary undertake the basic design. This work is summariz[illegible] report which is submitted to the governme[illegible] that country.

(2) Dispatch of experts on long-term and short-term assignments

JICA disptaches experts on the basis of official requests from developing countries or international organizations. These experts are disptached to any of a large number of developing countries and governmental organizations, where they provide assistance in policy formation, research, human resources development for industry, technical guidance, etc. The period of their assignments may be from several months to several years.

(3) Training in Japan

JICA has training centers at 7 locations in Japan. After providing training and orientation, including language training, the participants are sent to private firms for in-plant training.

(4) Cooperation for R&D

MITI makes use of the research and development capability of the experiment stations operated by the Agency for Service and Technology, by inviting research fellows from developing countries so that they may undertake joint research and development work on new technology and other matters, so that the resources of their countries can be better utilized.

(5) Other

Because of the high importance of development of human resources in the developing countries, Japan provides cooperation by sending experts to or supplying materials and facilities to tracing centers in the developing countries.

6. Private-Base Technical Cooperation

(1) Cooperation for carrying out feasibility studies

When an enterpreneur in a developing country intends to establish a new small or medium scale production facility he can apply to the Japan Consulting Institute (JCI), with the recommendation of a local public organization such as a chamber of commerce and industry, for conducting of a feasibility study. The cost of this study is jointly borne by JCI's own funds and a subsidy from MITI. Upon completion of the study, a report is submitted. Recently those studies have come to include the rehabilitation of existing plants.

(2) Dispatch of experts

When a request is received from a developing country, and it has been endorsed by a local public body such as the chamber of commerce and industry, the Overseas Trade Development Association, in receipt of a MITI subsidy, will dispatch anexpert on a long- or short-term assignment. In this case it is necessary for the host company to bear 25% of the costs. This arrangement is primarily used for operational guidance for manufacturing, and technical guidance.

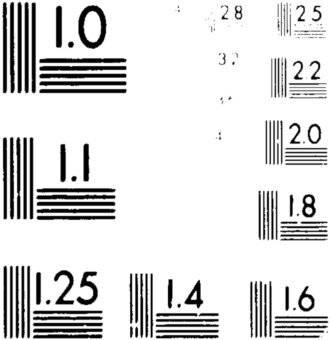
(3) Training in Japan

The principal means of providing open training opportunities in Japan (is the activities of the Overseas Association for Training. All of the trainees are concerned with industrial technology, and are accepted through applications made to private Japanese firms. MITI subsidizes 50-66% of the cost of training; the remaining cost is borne by the Japanese company providing the training. To utilize this system it is necessary for the related persons overseas to contact private Japanese firms. Four training centers are in operation. The same as in the case of JICA, orientation and in-plant training are provided.

The foregoing describes the main features of private-base technical cooperation. There are many instances of commercial-base activities by Japanese electric and electronics goods producers in the developing countries, and Japanese governmental agencies as yet have had little experience in responding to requests for assistance in these fields. It therefore seems advisable to make maximum use of private-sector opportunities for technical cooperation.

7. Summary

The main points of emphasis in technical cooperation now being provided by the Japanese government are (1) cooperation for human resources development, (2) cooperation for small business, (3) cooperation in the field of energy, and (4) rehabilitation and renovation of existing facilities. It is expected that there will be an increase hereafter in developing countries' requests for aid for productivity improvement and in the field of information.



MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS

STANDARD REFERENCE MATERIAL 1010a

(ANSI and ISO TEST CHART No. 2)

APPENDIX 5-5

International cooperation, by Mr. N. Fuse,
Deputy Director, Ministry of Labour,
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INTERNATIONAL COOPERATION

Naoharu Fuse
Deputy Director
Ministry of Labour
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INTERNATIONAL COOPERATION

Major forms of international cooperation by the Ministry of Labour on behalf of developing countries are:

(1) Bi-lateral technical cooperation

- Training of officials, vocational training instructors and others

- Cooperation for establishing and managing vocational training centers

(2) Fellowships through the International Skill Development Program

- Annual average of fellowships is now about 125

(3) Multi-bi Technical Cooperation (through the Asian and Pacific Skill Development Program)

(4) Assistance for vocational training by private enterprises

INTERNATIONAL COOPERATION

1. Technical Cooperation in the Field of Vocational Training

It is an important mission for Japan, an industrially developed country, to strengthen assistance and cooperation towards the developing countries for their economic and social development, and expand and maintain friendly cooperative relationships with these countries. Especially, technical cooperation aims at transferring technology and skills to the developing countries and at contributing to the development of human resources upon which the social and economic development of the developing nations depends. This is a field to which Japan should assign great importance.

From this viewpoint, the Ministry of Labour is actively carrying out technical cooperation in various forms, of which the most pertinent are as follows:

(1) Bi-lateral Technical Cooperation (Cooperation based on agreements or commitments between the Japanese Government and the governments of the developing countries).

The Vocation Training Bureau of the Ministry of Labour in cooperation with the Ministry of Foreign Affairs and the Japan International Cooperation Agency carries out such technical cooperation through vocational training for the developing nations in the world as:

1) Training of government officials, vocational training instructors and persons in the leading positions in the training of skilled manpower in their countries;

2) Cooperation for the establishing and management of vocational training centers for developing skilled labour required in developing countries (project type technical cooperation which is composed of such three factors as training of counter-part staff in Japan, dispatch of vocational training experts to train counter-part staff on the spot and to assist in the preparation of training software, and provision of materials and equipment, etc.).

Table II-5-1 Training of Overseas Fellows

Type \ Contents		Training institutions	Period	Trade area, annual capacity
Group training	Training course for vocational training instructors	Institute of Vocational Training University	11 months	Machinery 10 Electricity 10 Electronics 6 Woodworking 10 Automobile 6 Sheet/metal welding 8 Total 50
	Training course for highly skilled machinist	Higashi Yodogawa Advanced Vocational Training Center, Osaka	12 months	Mechanical 10
	Training course for die making technology	Kyoto Skill Development Center	12 months	Mould 6
	Supervisory training seminar	Vocational Training Bureau, Ministry of Labour	2 months	30
	Vocational training seminar I/II	Vocational Training Bureau, Ministry of Labour	2 months and 1.5 months	30
	Automechanic training course based on the Japan Mexico Exchange Program	Kimitsu General Advanced Vocational Training Center	10 months	Automobile maintenance 4
Individual training	Training of vocational training administration and technology	Ministry of Labour, Vocational Training Centers, etc.	Average about 6 months	About 60 persons
Total				About 175 persons

Table II-5-2 Cooperation for the Overseas Vocational Training Center
Centers presently in operation (12 centers)

Name	Start of cooperation	Number of expert dispatched (cumulative)	Type of job trained
1. SENATI Arequipa Vocational Training Center (Arequipa, Peru)	Jan., 1975	13	Electricity, electronics (TV, automatic control), sheet metal/ welding, machinery maintenance of automobiles, vocational training administration
2. Shoubra Vocational Training Center for Machinery Maintenance (Cairo, Egypt)	Jan., 1977	19	Metalworking, textile machinery, electricity
3. Khonkaen Institute for Skill Development (Khonkaen, Thailand)	Dec., 1977	11	Auto-mechanics, Agro-mechanics, welding/sheet metal, machinery, electricity, electronics, building and constructions
4. Japan-Singapore Training Center (Singapore)	Jun., 1978	15	Instrumentation, machinery, electricity and electronic
5. SENAI Electrical and Electronic Vocational Training Center (Delo Horizonte, Brazil)	Mar., 1979	7	Electricity, industrial electronics
6. Samuel Jackman Prescod Polytechnic (Bridgetown, Barvados)	Aug., 1980	2	Electronics, automobile maintenance
7. Vocational Industry Training Board (Singapore)	Nov., 1981	1	Millwrite (curriculum design)
8. Japan Mexico Technological Education Center (Celaya, Mexico)	Apr., 1982	4	Electricity, electronics, metal processing machinery
9. Nee Ann Polytechnic (Singapore)	Aug., 1982	1	Welding (curriculum design)
10. Center for Instruction and Advanced Skill Training (Shah Adam, Malaysia)	Aug., 1982	0	Training of instructors, training of supervisors, training for highly skilled workers (automobile, machinery and tool/die making, heavy industry, electricity/ electronics, instrumentation and automatic control, metal processing)
11. Japan-Panama Vocational Training Center (Panama, Panama)	Aug., 1982	0	Welding, automobile maintenance, electricity, electronics, refrigeration and airconditioning
12. Center for Vocational and Extension Service Training (Bekasi, Indonesia)	Feb., 1983	0	Training of instructors (automobile, electricity, machinery, welding, sheet/metal, pipe fitting, refrigeration and air-conditioning, electronics)

(2) Fellowships through the International Skill Development Program

The Vocational Training Bureau, Ministry of Labour, since 1972, has carried out "the International Skill Development Program (Bridge over the world)" by subsidizing the Japan ILO Association Inc.

This program, with the cooperation of the private sector, aims at training skilled personnel and instructors from developing countries and thus assisting in the development of human resources and industries for the purpose of contributing to promote international relations.

It involves carried out of orientation (3 months) for Japanese language and basic vocational training, and practical skill training (6 months) at private enterprises.

Classification / Year	Number of successful applicants
Before 1977	455
1978	94
1979	146
1980	124
1981	124
1982	98 *
Total	1,041

Note: No. of trainees admitted in the 1st and 2nd terms, 1982. (Three times in the year)

(3) Multi-bi Technical Cooperation (Through APSDEP: Asian and Pacific Skill Development Program)

1) This program, with the target of contributing to the improvement of skills, increase of employment opportunities and promotion of social and economic development in the Asian and Pacific Region, promotes technical cooperation in the field of vocational training in the Region by mutually exchanging knowledge, experience, etc. among the developing countries of the same level. This program was started October, 1978. The members of this program are 25 countries in the Asian and Pacific Region.

(a) Documentation and referral services training related materials;

(b) Development of effective training programs and methods of evaluation;

(c) Offering cooperation and assistance for promoting rural training;

(d) Developing training materials and providing them to the member countries;

(e) Assisting and cooperating with the member countries in developing skill standards testing and certification systems;

(f) Assisting and cooperating with the member countries in the development and improvement of apprenticeship training and in-plant training;

(g) Studying the method of supervisory training and cooperating in its development and improvement in the member countries.

3) The cooperation of the Government of Japan to APSDEP primarily is as follows:

(a) Cash Contribution;

(b) Participating in the Technical Committee Meeting of APSDEP;

(c) Participation of Japanese experts in the APSDEP activities (experts meeting, seminar, etc.);

(d) Providing vocational training materials developed in Japan.

(4) Assistance systems for overseas technical cooperation in the vocational training field by private enterprises

1) The Vocational Training Bureau, Ministry of Labour, promotes assistance for overseas technical cooperation in the vocational training field by private enterprises by utilizing the existing Central Skill Development Center as well as newly establishing the Overseas Vocational Training Cooperation Center. The Overseas Vocational Training Cooperation Center will be operated by the Overseas Vocational Training Association.

2) The following activities will be undertaken from April, 1984.

(a) Collection, development and supply of materials and data for overseas vocational training, and consultation and guidance services for training programs of industries;

(b) Personnel training to promote technical cooperation in the private sector such as training of vocational training instructors capable of training/local foreign workers in their language by commission of enterprises.

(c) Basic skill training for "workers expected to play a leading role in localities" as commissioned by private interests.

2. International Exchange in the Vocational Training Field

(1) International exchange of vocational training instructors in industries.

1) Dispatch of vocational training leaders in industries (to U.S.A., Federal Republic of Germany).
About 10 persons are dispatched for about one month every year to each of the two countries.

2) Receiving vocational training instructors of the Federal Republic of Germany.
About 20-30 persons are received every year for about 1 month.

(2) Dispatch of vocational training specialists.
About 2-3 specialists are dispatched to the U.S. every year for about 2 months.

3. **Receiving Foreign Students in the Institute of Vocational Training Universities**

Students from China and Singapore are received in the long term instructor training course at the Institute of Vocational Training (35 students as of March, 1983).

APPENDIX 5-6

Marketing policy, by Mr. O. Hayama and Mr. M. Kobayakawa. Electronics Industries, Industrial Economics Department, Nomura Research Institute Co., Ltd.

MARKETING POLICY

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Japan's Eelctronics Industry And Promotion Policy

Japan's policy for the electronics industry may be said to have been started with passage of the Law on Extraordinary Measures for the Promotion of the Electronic Industry (Denshinho) in 1957. For Japan, a country deficient in natural resources and dependent on processing materials into export goods, the electronics industry appeared as a high value-added industry which also had a labor-intensive aspect, and as a growth industry characterized by technological innovation, in addition to being an industry capable of making a major contribution to exports through the expansion of world markets, and therefore it has been developed as one of the select core group of Japanese industries.

As the major feature of the Denshinho, three sectors were designated: that where experimentation and research should be promoted for the electronics industry, that where the start of industrial production should be promoted, and that where rationalization of production should be promoted. This was in effect the setting down of guidelines, and these guidelines had the effect of guiding the energy of private industry in the direction of participating in the electronics industry.

At the same time that direct funding was provided for subsidies and loans, and indirect funding was provided by guaranteeing the debt of government-related financial institutions, there were tax measures, and for those companies which undertook work on development subjects which conformed to the guidelines, there were financial and tax incentives. For Japan, which would have experienced great difficulty both financially and institutionally, if an effort had been made, similar to that by the United States, involving massive procurement by the government, and large-scale funding by the government of research and development, it was beneficial to provide strong support from the side by facilitating private-sector leadership in basic technological development, product development, establishing production systems, rationalizing production, and promoting sales.

Further, by means of the above-mentioned subsidies, low-interest financing, and tax incentives, the government vigorously promoted the acquisition of technology from overseas, so as to narrow the technological gas between Japan and Western Countries, in order to thereby develop domestic technology, and domestic firms. Also, a phased liberalization of foreign investment was carried out, to improve the international competitiveness of the Japanese electronics industry.

The Denshinho was automatically extended in 1964, and reformulated in 1974 as the law on Extraordinary Measures for the Promotion of Specific Electronic and Machinery Industries (Kidenho), which was supplanted in 1978 by a law with a similar English name but commonly called Kijoho by the Japanese. The major features of the policies of these laws were as follows. The Denshinho has a strong tone of establishing the foundation for Japan's electronics industry, but it had the nature of combining two previous laws, one for promotion of the electronics industry and one for promotion of the machinery industry and the Denshinho thereby sought to integrate and improve the policy framework, wherein special importance was assigned to the computer industry, which was still in an early developmental stage. The Kijoho recognized the importance of the software industry and the need to promote its development.

1957	Passage of the Denshinho
1964	Extension of the Denshinho
1971	Passage of the Kidenho
1978	Passage of the Kijoho

Industrial policy for the electronics industry can be better understood by taking the example for the Kidenho. The framework of the specific policies based on the Kidenho was the designation of specific fields in the electronics industry, formulation of a program for improving the level of those fields, and the specific policies.

Designation of areas in the electronics industry

↓

Specification and announcement of the improvement program

↓

Concrete policies

As the areas of the electronics industry selected by the law there were: promotion of experimentation and research on electronic equipment for which there was need to promote development; promotion of industrialization, and promotion of rationalization of production. Equipment types for each of these three numbered 17, 5 and 15, for a total of 37 types. These are identified in Table II-6.

Table II-6-1 Equipment Designated as Suitable Objectives for Improvement

Types for which experimentation and research is to be promoted

1. Electronic measuring devices and testing equipment
2. X-ray devices and radiation equipment
3. Medical electronic equipment
4. Communications equipment
5. Avionics
6. Electronic devices for rockets and satellites
7. High-energy cyclotrons
8. Ultrasonic equipment
9. High-performance digital computers
10. High-performance automatic control devices
11. Electron beam equipment; laser equipment
12. Educational and training equipment
13. Circuit parts, printed circuits and mechanical parts
14. Electron tubes
15. Semiconductor devices

16. Integrated circuits
17. Materials for electronic equipment

Types for promotion of industrialization

1. EVR tape
2. Laser equipment
3. Magnetic disk equipment
4. Semiconductors; ICs
5. Compound semiconductor materials

Types for promotion of rationalization

1. Measuring equipment
2. Medical electronics, measuring equipment, medical treatment equipment
3. Facsimile equipment
4. Color TV tape recorders
5. Digital type computers
6. VTR magnetic tape for measuring equipment
7. Resistors
8. Ultrasonic device
9. Multi-layer PCBs
10. Connectors
11. Compound semiconductor devices
12. Ceramic devices
13. ICs
14. High-purity silicon
15. Ferrite products

The program for improvement of electronics, by being of basic importance in MITI's policy for promotion of the electronics industry, was an important guideline for private corporations. It was by this means that targets were set for research and development, technological development, industrialization, and so on. The improvement program specified three areas, namely types of equipment (1) for which experimentation and research were to be promoted, (2) for which industrialization was to be promoted, and (3) for which the rationalization of production was to be promoted, and thereby it made possible for adoption of policies having points of emphasis and spanning the development and production phases.

Contents of the improvement program
o Targets for R&D, and technological development o Targets for industrialization o Improvement of reliability of parts standardization of product parts; adoption of industrial standards for same o Improvement of the organization of the industry o Targets for improvements of quality and performance, and reduction of production cost

The content of the policy which comprised the base for supply of subsidies, low-cost financing and tax incentives was as follows.

Policy content
o Supply of subsidies for key technological research and development on items for which promotion of experimentation and research is necessary

The system for subsidizing the cost of R&D for key technological subjects is defined by the Law for Promotion of Corporate Rationalization and is for supporting experimentation and research, which cannot be easily attempted by a company acting on its own, and which would greatly contribute either to improving the level of industrial structure or to improving international competitiveness.

Ordinarily the rate of subsidization is 50% and it is ebligatory to repay the subsidy conditional upon attainment of success.

- o For items for which it is necessary to promote industrialization (the start of production) or rationalize production, special financing at low interest rates is to be made available from the Japan Development Bank and the Small Business Finance Corporation.

- o Application of anti-monopoly laws is to be waived when a joint effort is made by companies on behalf of rationalization of production.

- o On the basis of the Special Provisions for Taxation Law and the Law for Promotion of Corporate Rationalization, in the event that there is an increase in the cost of experimentation and research, special measures are to be taken in connection with tax exemptions, special depreciation for machinery and equipment for commercialization of new technology, special depreciation for "first in Japan" attainments, special accounting methods for industrial technology research ventures (joint research by 3 or more companies), technology export income tax exemption, etc.

Although there is some overlapping with the above, there was also implementation of a finely-detailed, large-scale policy in the field of computers, spanning from the development of technology to the establishment of production systems and sales systems, according to which much was accomplished in promoting the development of the computer industry.

Factors in the development of Japan's electronics industry. The development of Japan's electronics industry may be explained by referring to three general factors, namely (1) government policy, (2) activities by the private sector, and (3) the market environment.

The following points are believed to be of importance regarding the contribution made by government policy to the development of Japan's electronics industry (see Fig. II-6-1(1) and II-6-1(2)).

Fig. II-6-1(1) Japan's Policy for the Computer Machinery Industry

Information processing industry

- Subsidies for the Information Processing Promotion Assoc. (1970-)
- Financial measures for promotion of information processing (1970-)
- Program security reserve authorization (1972-)
- Subsidies for promotion of the information processing industry (1975-)

Software; hardware: support for the computer industry

- Designation of No.3 type computer (1982)
- JDB financing for JECC (1961-)
- Buy-back system for computers (1968)
- Designation of No.8 type computer (1971)
- JDB financing for structural improvement of computers (1972-)
- JDB financing for software development (1970-)
- Development program for software industry technology (1976-80)
- Designation of No.1 type computer (1957)
- R& Dfor high-performance large computers (1962)
- Designation of No. A type computer (1971)
- Subsidies for promotion of basic technological development of next-generation computers (1979-83)
- Subsidies for development of computers (1972-76)
- Subsidies for promotion of development of peripherals (1972-76)
- Subsidies for development of LSIs for next-generation computers (1976-78)

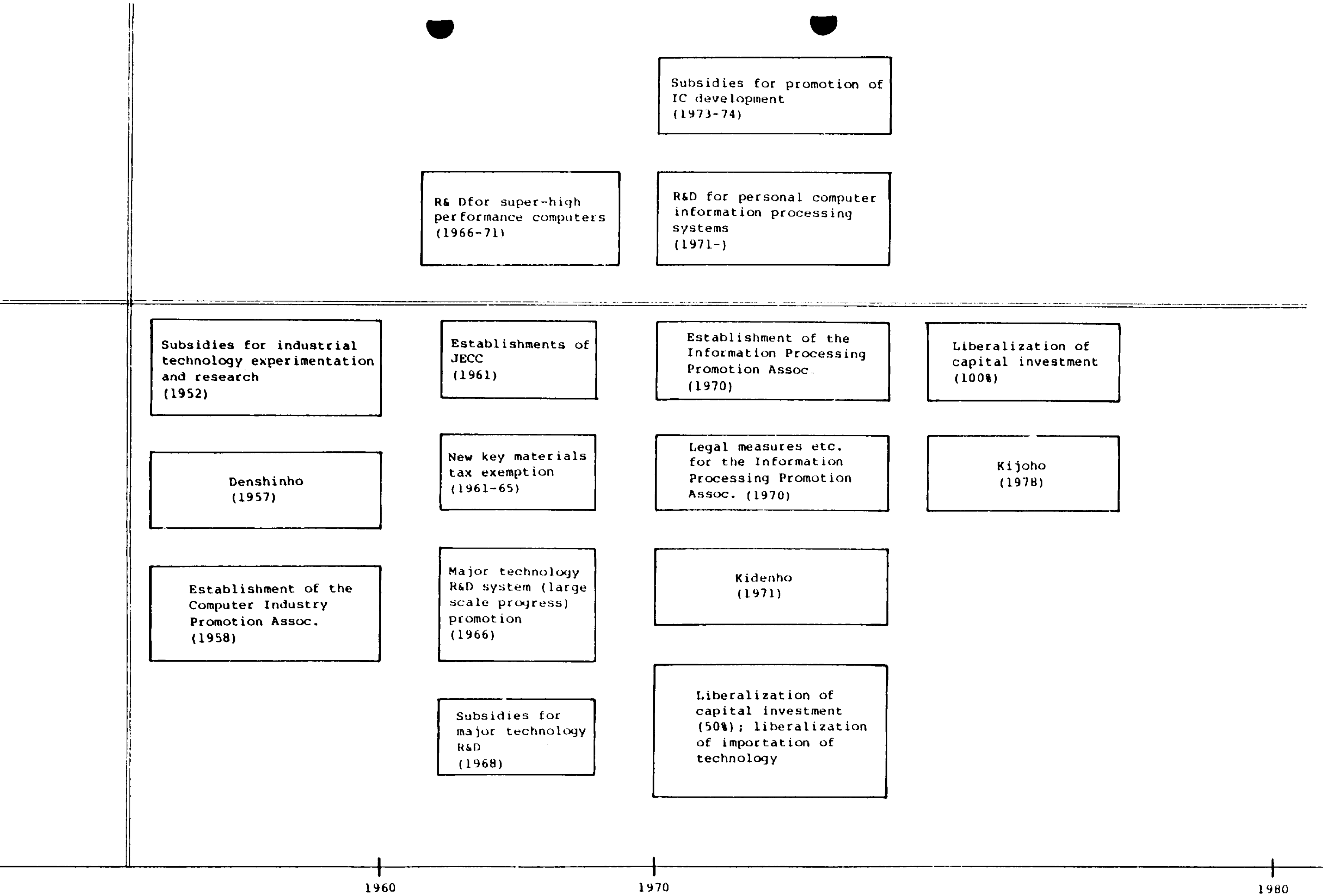

Subsidies for promotion of IC development (1973-74)
R& Dfor super-high performance computers (1966-71)
R&D for personal computer information processing systems (1971-)
Subsidies for industrial technology experimentation and research (1952)
Establishments of JECC (1961)
Establishment of the Information Processing Promotion Assoc. (1970)
Liberalization of capital investment (100%)
Denshinho (1957)
New key materials tax exemption (1961-65)
Legal measures etc. for the Information Processing Promotion Assoc. (1970)
Kijoho (1978)
Establishment of the Computer Industry Promotion Assoc. (1958)
Major technology R&D system (large scale progress) promotion (1966)
Kidenho (1971)
Subsidies for major technology R&D (1968)
Liberalization of capital investment (50%); liberalization of importation of technology
1960
1970
1980

Fig. II-6-1(2) Industrial Policy for Integrated Circuits

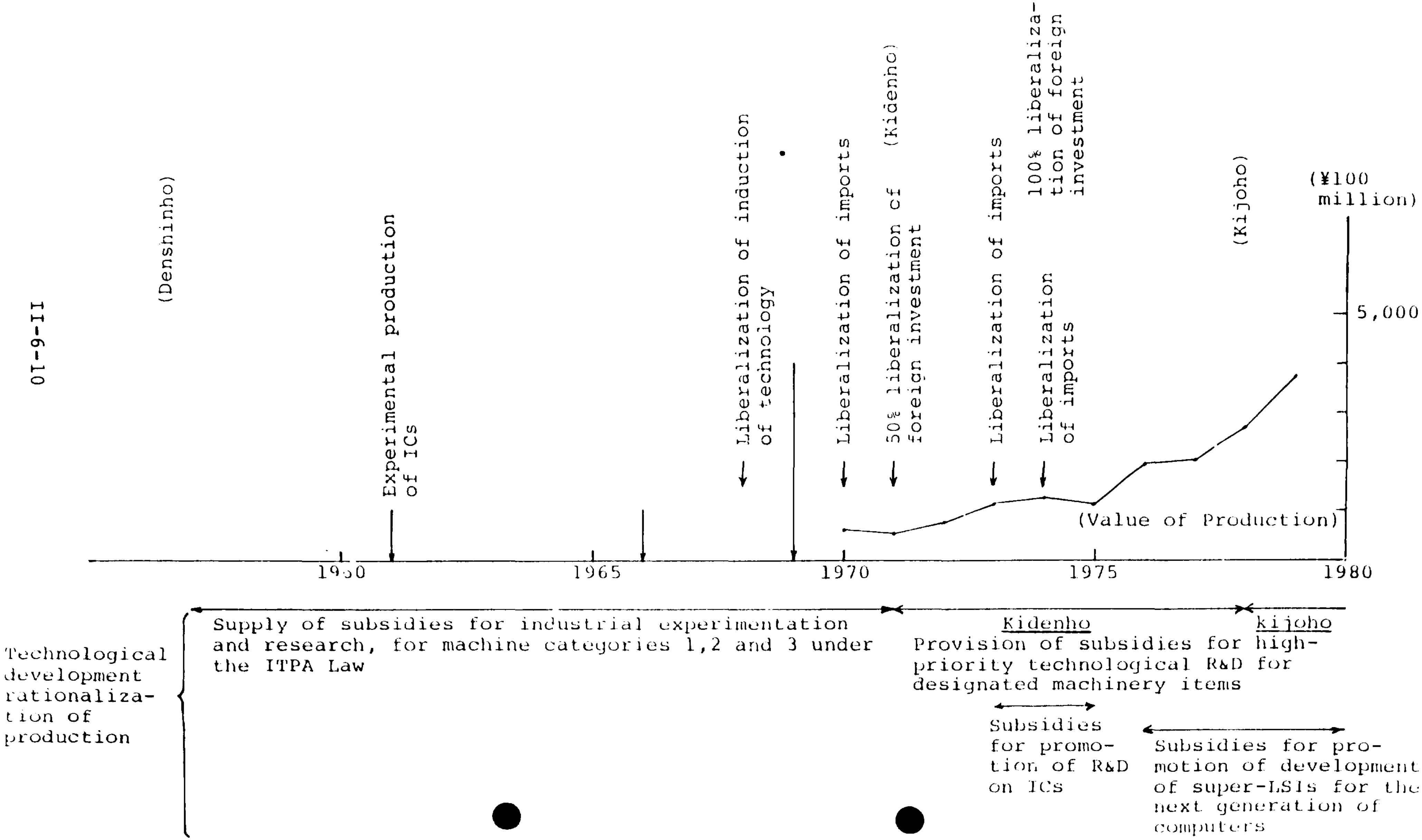
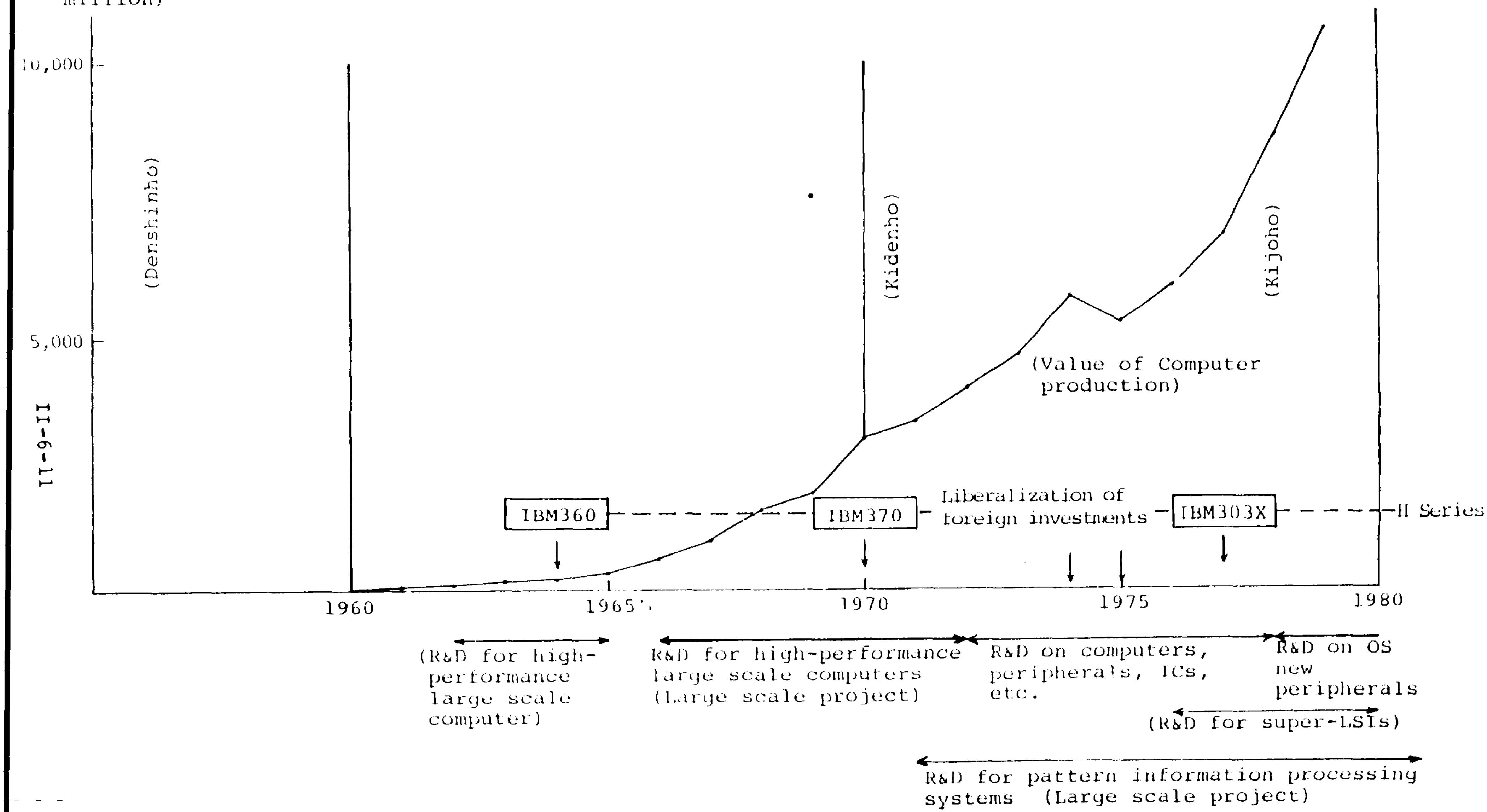


Fig. II-6-2 Industrial Policay for Computers



World Electronics Industry Structure

Table II-6-2 Structure of the World's Electronics Industry*

(Unit: $/billion)

	Demand		Production	
(United States)				
Consumer electronics	12.4	(32.5)	5.0	(13.1)
Information industry equipment	56.8	(48.3)	70.9	(60.3)
Total	69.2	(44.4)	75.9	(48.7)
(Europe)				
Consumer electronics	14.0	(36.6)	9.0	(23.6)
Information industry equipment	32.3	(27.5)	28.0	(23.8)
Total	46.3	(29.7)	37.0	(23.7)
(Japan)				
Consumer electronics	6.0	(15.7)	16.2	(42.4)
Information industry equipment	15.4	(13.1)	17.8	(15.1)
Total	21.4	(13.7)	34.0	(21.8)
(Others)				
Consumer electronics	5.8	(15.2)	8.0	(20.9)
Information industry equipment	13.1	(11.1)	0.9	(0.8)
Total	18.9	(12.1)	8.9	(5.7)
(Total)				
Consumer electronics	38.2	(100.0)	38.2	(100.0)
Information industry equipment	117.5	(100.0)	117.8	(100.0)
Total	155.8	(100.0)	155.8	(100.0)

Source: NRI

Note: *Excludes centrally-planned economies

Fig. II-6-3   Growth of World Demand for Consumer Electronics

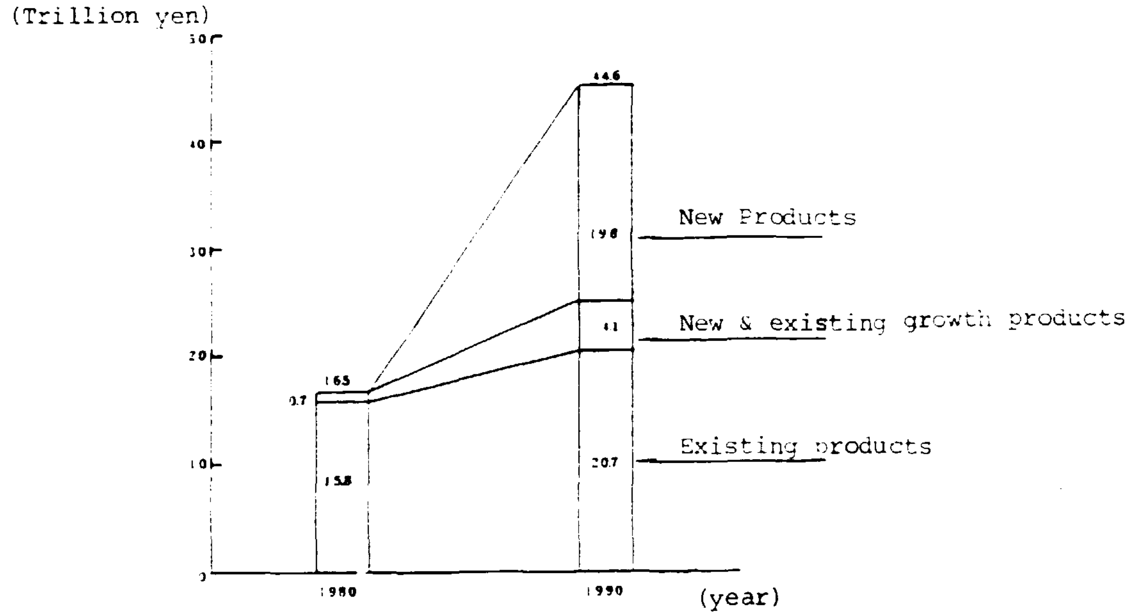
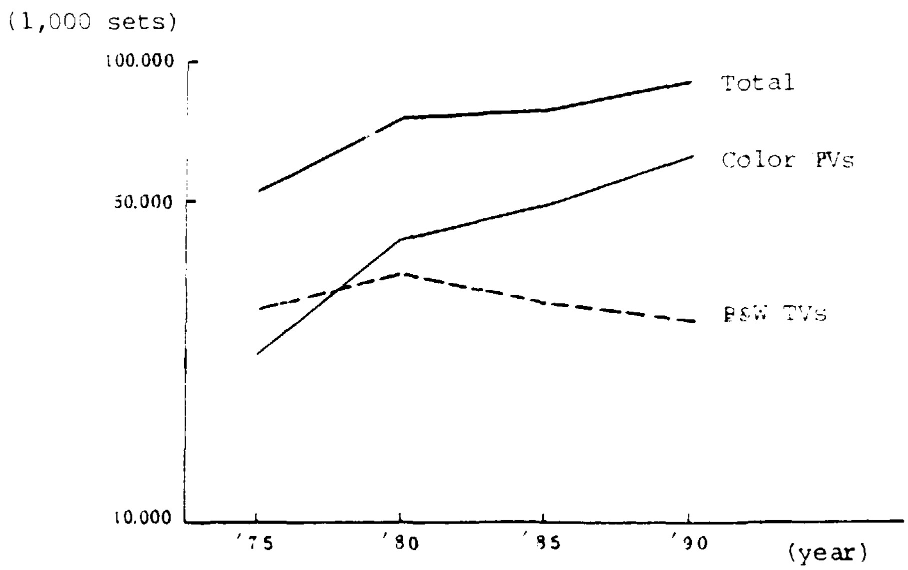
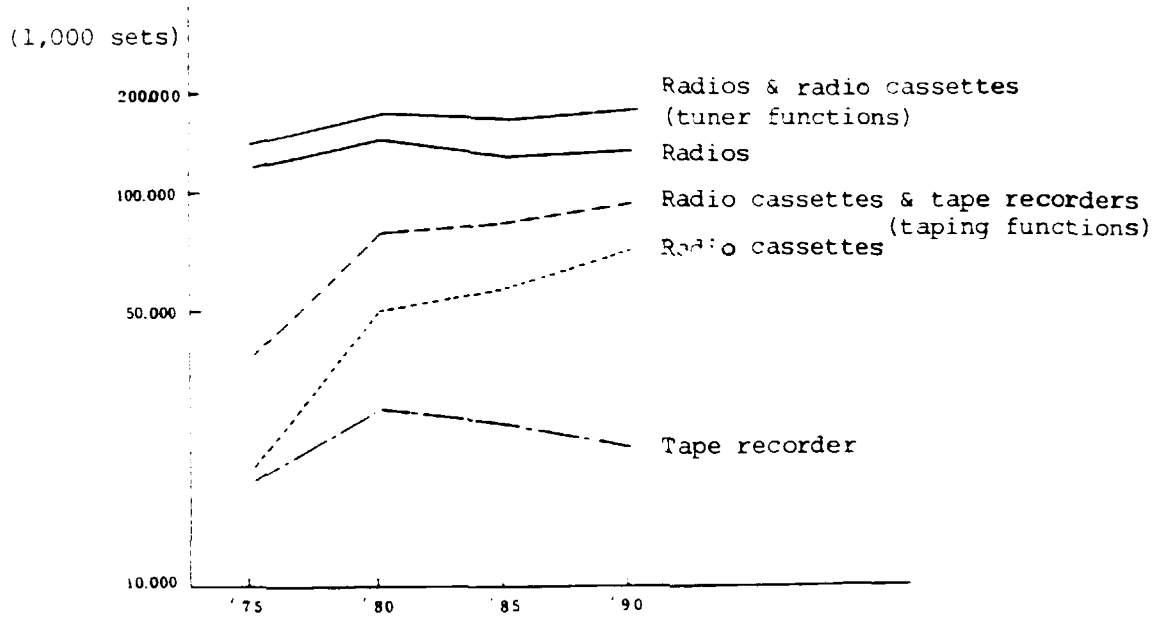


Fig. II-6-4   World Television Set Demand



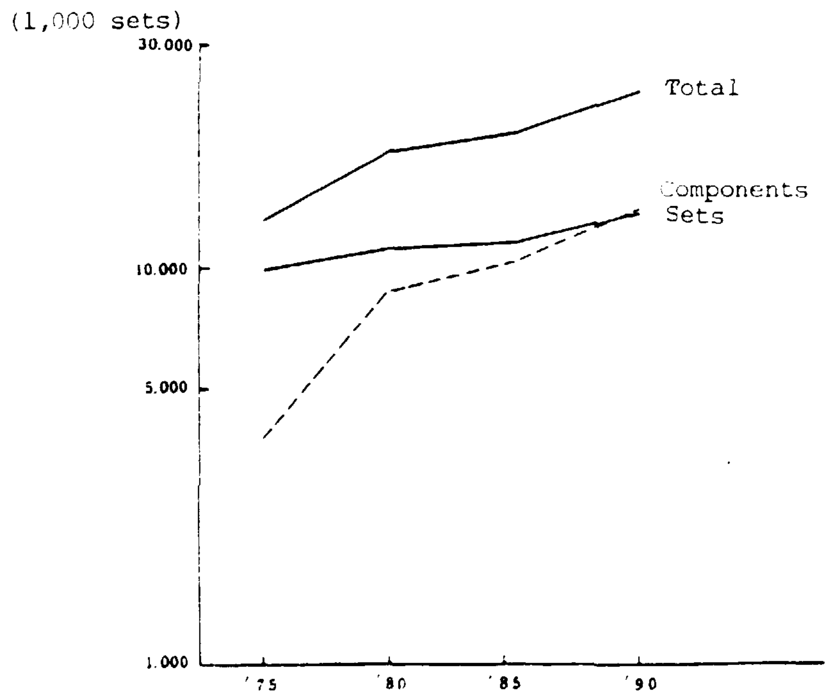
Source: NRI

Fig. II-6-5 World Audio Demand



Source: NRI

Fig. II-6-6 World Stero Demand



Source: NRI

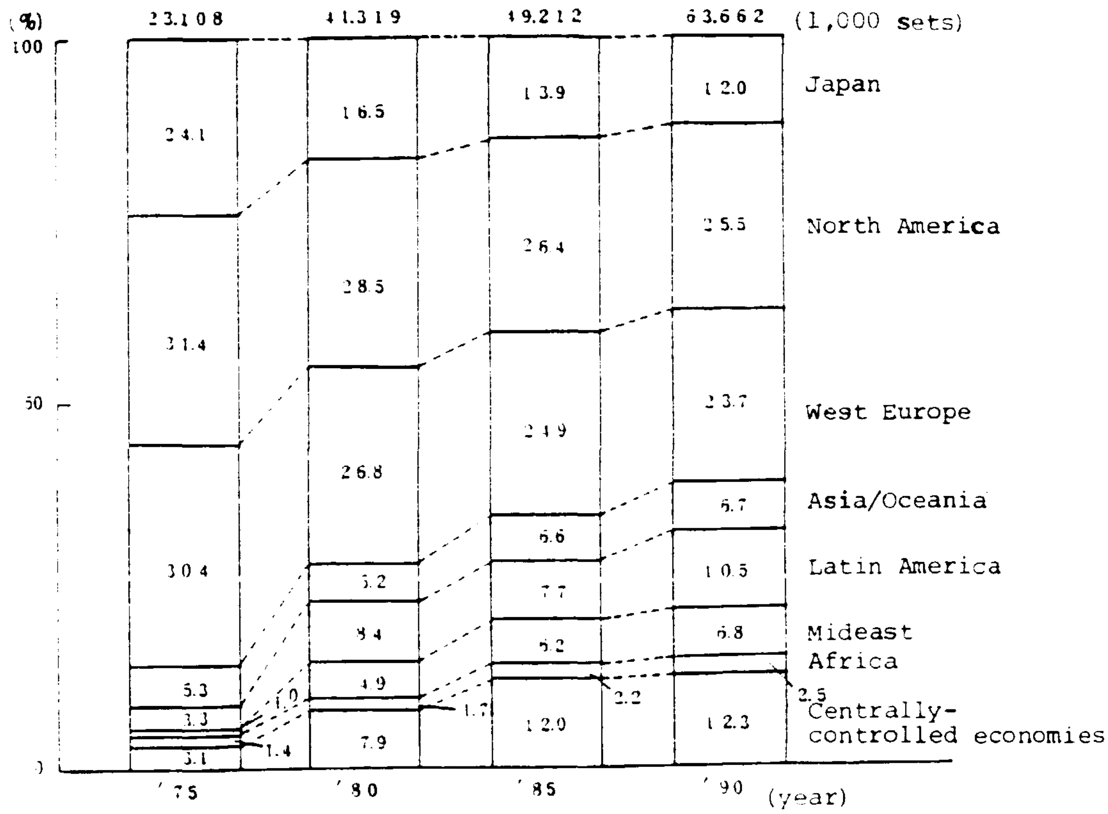
Table II-6-3 Comparison of Growth Rates by Electronic Product by Region

(Unit: %)

	Color TVs	B & W TVs	Radios	Radio-cassettes	Tape recorders	Stereo sets	Stereo components
Japan	1.1	-1.8	3.9	1.6	0.6	10.2	1.6
North America	3.2	-5.1	-0.3	7.2	-2.6	-0.9	6.4
West Europe	3.2	-8.5	-2.3	4.0	-3.8	3.8	4.3
Asia/Oceania	7.0	1.0	0.0	1.9	-3.8	5.1	7.2
Latin America	6.8	-0.5	-1.6	5.9	-4.4	0.6	10.1
Mideast	8.0	-1.8	0.4	1.3	0.2	12.1	0.1
Africa	8.3	3.8	2.0	9.1	3.6	5.8	3.7
Centrally Controlled Economics	9.2	-1.3	-0.5	3.5	-2.3	2.2	4.7
World Total	4.4	-2.4	-0.6	3.5	-2.3	2.2	4.7

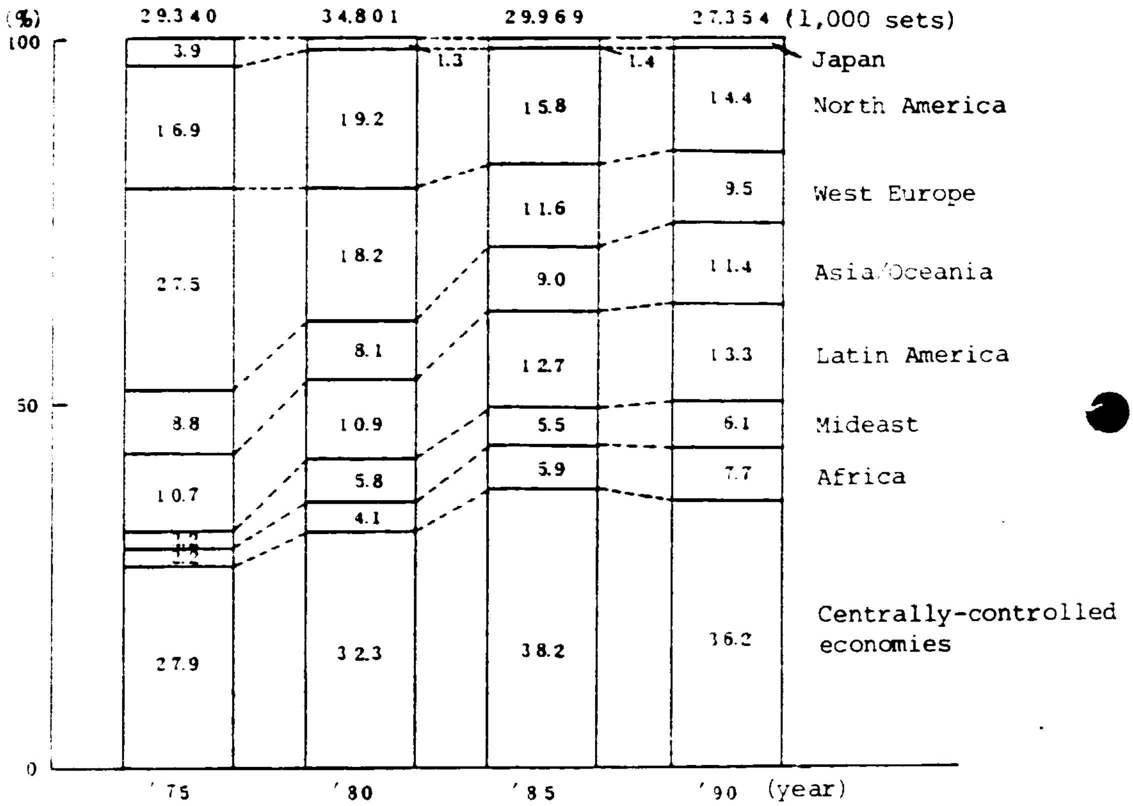
Source: NRI

Fig. II-6-7 Regional Composition of Demand for Color TVs



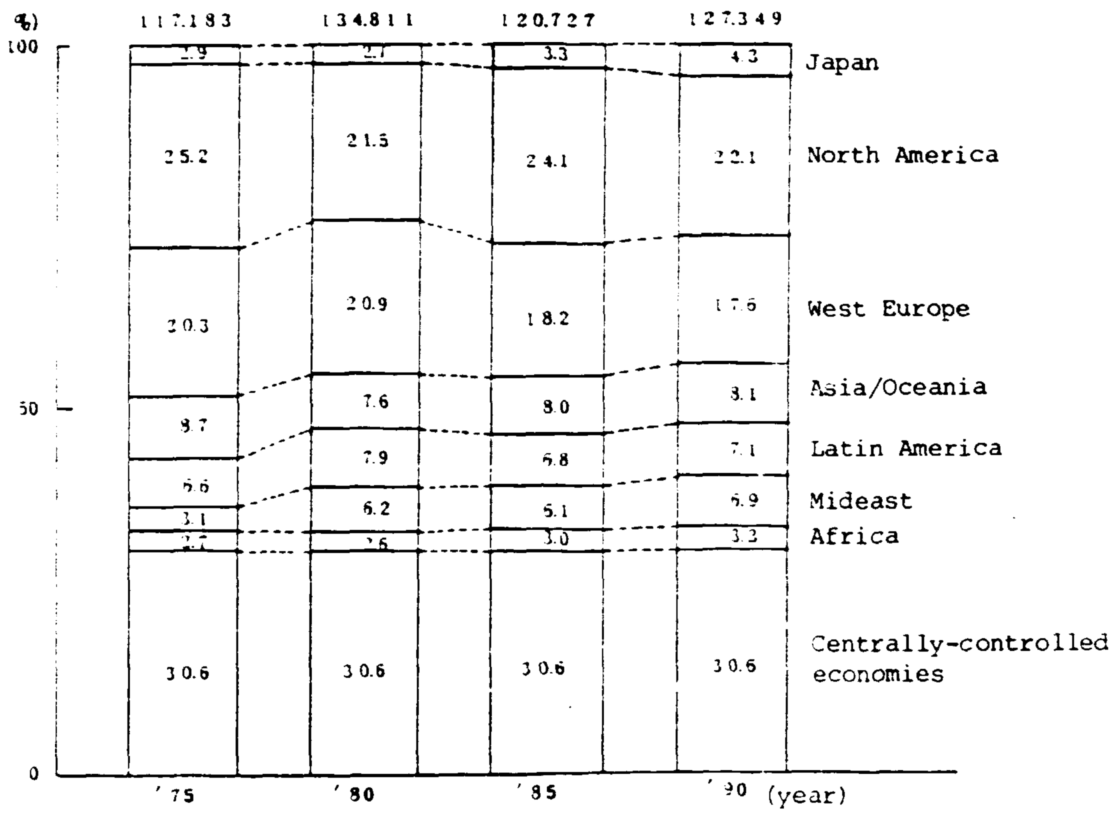
Source: NRI

Fig. II-6-8 Regional Composition of Demand for B&W TVs



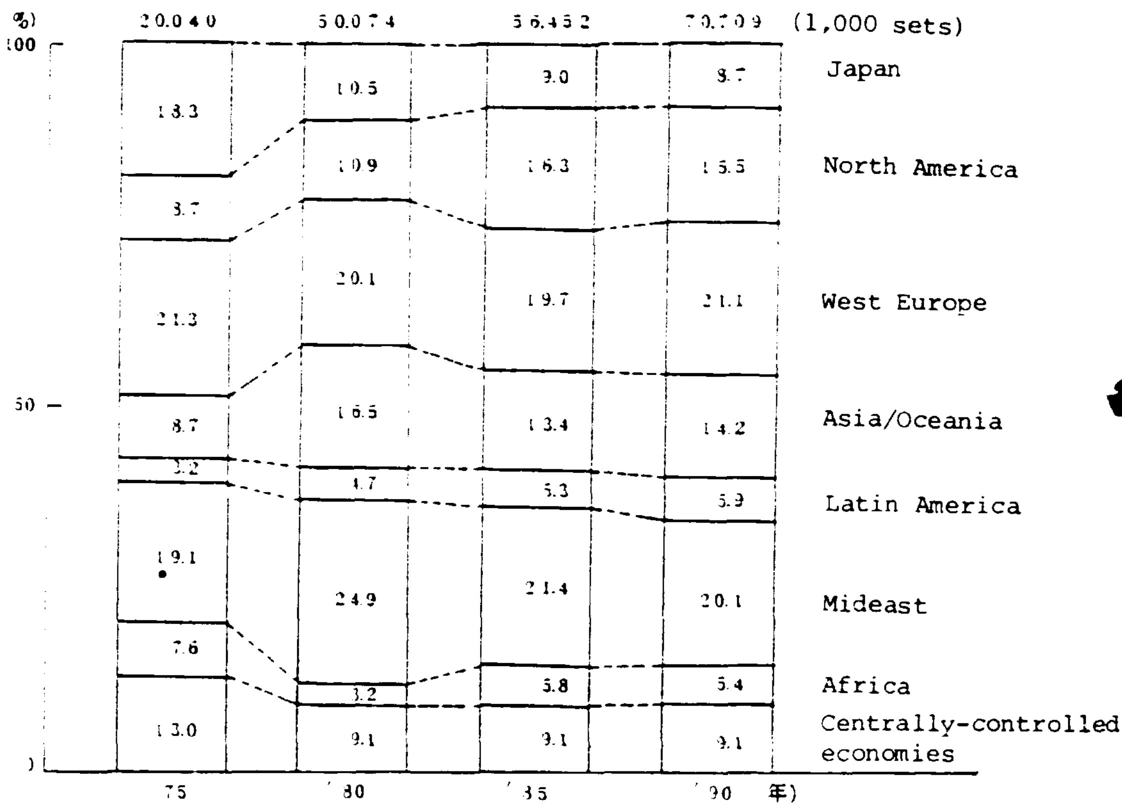
Source: NRI

Fig. II-6-9 Regional Composition of Demand for Radios



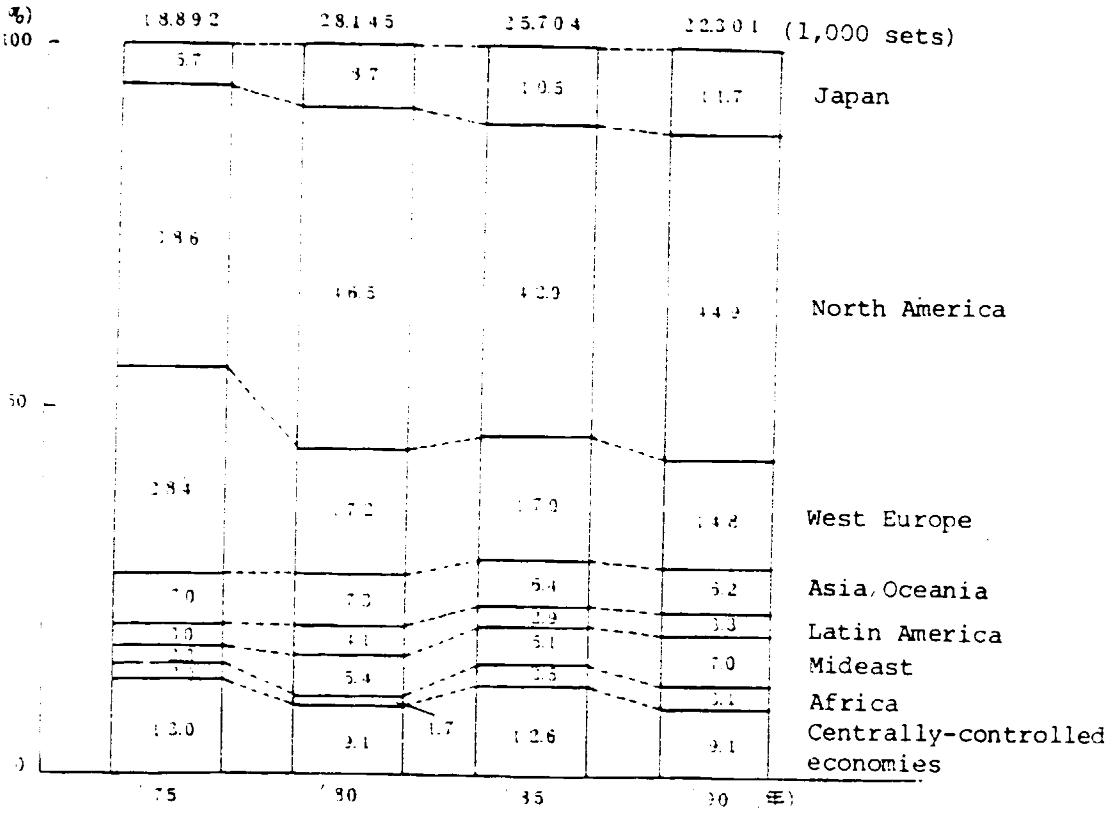
Source: NRI

Fig. II-6-10 Regional Composition of Demand for Radio-cassettes



Source: NRI

Fig. II-6-11 Regional Composition of Demand for Tape recorders



Source: NRI

Table II-6-4 Developmental Characteristics of Major Industrialized Countries, and Classification of Those Countries by Stage of Development of Their Consumer Electronics Market

			Stage of development of the consumer electronics market		
			Maturity[1]	Developing[2]	Infancy[3]
Characteristic of Industrial Development	Industrially advanced countries		North American Countries; West European countries; esp. including England; France; W. Germany; Belgium; Holland; Oceania countries	Italy A	
	Newly industrializing countries	Export-oriented (consumer electronics industry)		S. Korea; Taiwan; Hong Kong; Singapore; Malaysia B	
		Import-substitution (consumer electronics industry)		Ireland; Argentina; Chile; Portugal; Spain; Turkey; Greece; Israel; Yugoslavia; Mexico; Brazil; Venezuela	Thailand; Philippines C
	Developing countries	Resources-possessing countries	Kuwait; Qatar; Oman; U.A.E.	Saudi Arabia; Libya D	Indonesia; Iran; Algeria; Nigeria E
		Other countries			Egypt; Morocco; Kenya

Source: NRI

Notes: The countries and regions whose household diffusion rate of color TVs are expected to be by the end of 1979;

1) Over 50%

2) Between 40 to 50%

3) Less than 40%

Overseas Investment of
Japanese Electronies Industry

Table II-6-5 **Overseas Corporations Established by Japanese Electronics Makers**

(Unit: Number of companies)

	Consumer Electronics	Electronic Parts	Industrial Electronics	Total
West Europe	15	4	2	21
North America	15	7	9	33
Latin America	14	14	6	27
Asia	61	138	13	207
Others Regions	23	9	4	37
Total	128	172	34	325

Source: NRI

Note: Some companies produce more than one type of product, so line totals do not add to Total column figures.

Factors influencing the regional pattern of overseas investment by Japan's electronics industry

The motives, over time, for overseas investment by companies in Japan's electronics industry are as shown in Table 5-2. Investment from the middle of the Sixties to 1970, in both the consumer and industrial electronics fields, was motivated particularly by the expansion of domestic markets (this factor was cited for 78% of the instances), and by difficulty in exporting products from Japan to those countries (particularly to LDCs and NICs). During this period, availability of low-cost labor was a compelling factor in 34.2% of the instances, and the motive of becoming able to supply parts to third-country markets (especially to Taiwan and Southeast Asia) was also important. During the second half of the Seventies, there was an increase in the attractiveness of low-cost labor overseas, because of a labor shortage in Japan accompanying the rapid economic growth prior to the oil shock, and there was a decline in the importance of expansion of domestic markets to 50.3% of the cases cited. During the period following 1976, there was another decline in the attractiveness of low-cost labor overseas, and in response to protectionist trends in industrialized countries, there was an increase in expansion overseas for production of equipment in those countries. At the same time there was a relative increase in the importance of the growth of local markets, against the background of desire to supply parts to the Southeast Asian market from local points of supply.

Table II-6-6 Motives for Overseas Expansion, by Period

(Unit: cases; percentages in parentheses)

	To 1970		1971-1975		1976 on	
	Rank	(%)	Rank	(%)	Rank	(%)
Low cost of materials & arts	3	3.7	9	6.0	3	3.5
Good quality of materials & parts	1	1.2	5	3.4	2	2.3
Stable supply of materials & parts	2	2.4	8	5.4	3	3.5
Low-cost labor	28	34.2	78	52.4	31	35.6
Good-quality labor	6	7.3	30	20.1	10	11.5
Stable supply of labor	16	19.5	43	28.9	14	16.1
Ready availability of capital	1	1.2	7	4.7	4	4.6
Easy to cooperate with local investors	17	20.7	17	11.4	15	17.2
Aid from host government	38	46.3	62	41.6	27	31.0
Local investment made by related production firms	13	15.9	35	23.5	26	29.9
Difficult to export from Japan	33	40.2	40	26.9	29	33.3
Local market expected to expand	64	78.1	75	50.3	51	58.6
Third-country market expected to expand	22	26.8	59	39.6	33	37.9
Exportation to Japan	3	3.7	21	14.1	6	6.9
Royalty income	2	2.4	5	3.4	1	1.2

Source: NRI

Table II-6-7 Motives for Overseas Investment, by Country (Consumer, Parts and Industrial Electro

		Low Cost of Materi-al & Parts	Good Qual-ity of Materials & Parts	Stable Supply of Materials & Parts	Low-cost Labor	Good-Quality Labor	Stable Supply of Labor	Ready Avail-ability of Capital	Easy to Cooperate w Local
1. Norway	(0)								
2. Sweden	(0)								
3. Finland	(0)								
4. Denmark	(0)								
5. England	(5)					1(20.0)	2(40.0)		1(20.0)
6. Holland	(0)								
7. Belgium	(3)								
8. France	(2)								
9. W. Germany	(3)					1(33.3)			
10. Portugal	(0)								
11. Spain	(6)				1(14.3)		1(14.3)		2(28.6)
12. Italy	(1)								1(100.0)
13. Austria	(0)								
14. Greece	(1)								
15. Yugoslavia	(0)								
16. America	(30)	1(3.3)	2(6.6)	2(6.6)	1(3.3)	1(3.3)	4(13.3)	3(10.0)	1(3.3)
17. Canada	(3)								1(33.3)
18. Mexico	(7)				1(14.3)		1(14.3)		1(14.3)
19. Venezuela	(3)								2(33.3)
20. Chile	(0)								
21. Brazil	(15)				1(6.7)		1(6.7)		3(20.0)
22. Argentina	(2)								
23. S. Korea	(54)	2(3.7)	2(3.7)	2(3.7)	41(75.9)	16(29.6)	20(37.0)		8(14.1)
24. R. China	(66)	7(10.6)	1(1.5)	3(30)	48(72.7)	11(16.7)	22(33.3)		19(15.1)
25. Hongkong	(7)				3(42.9)	1(14.3)		1(14.3)	1(14.3)
26. Thailand	(7)	1(14.3)			2(28.6)		1(14.3)		3(42.9)
27. Singapore	(39)	5(12.8)	21(5.6)	3(7.7)	21(53.9)	10(25.6)	9(23.1)	8(20.5)	2(5.6)
28. Malaysia	(21)				12(57.1)	2(9.5)	7(33.3)		4(19.1)
29. Philippines	(10)				3(30.0)	1(20.0)	2(20.0)		2(20.0)
30. Indonesia	(3)								1(33.3)
31. Others	(37)			2(5.4)	5(13.5)	2(5.4)	4(10.8)		7(18.9)
Total	(325)	16(4.9)	7(2.2)	12(3.7)	139(42.8)	46(14.2)	74(22.8)	12(3.7)	49(15.1)

Source: EIAJ

SECTION 1

arts and Industrial Electronics)

Unit: responses (%)

Ready Avail- ability of Capital	Easy to Cooperate with Local	Aid from host Government	Local Investment Made by Related Production Firms	Difficult to Export from Japan	Local Market Expected to Expand	Third-country Market Expected to Expand	Exporta- tion to Japan	Royalty Income
	1(20.0)	2(40.0)	1(20.0)	4(800)	5(1000)	5(1000)		
				1(333)	1(333)	2(667)		
				2(1000)	2(1000)	1(500)		
		1(33.3)			3(1000)	1(333)	1(333)	
	2(28.6)			4(571)	5(714)	3(429)		
	1(100.0)			1(1000)	1(1000)	1(1000)		
					1(1000)	1(1000)		
3(10.0)	1([illegible].3)	4(13.3)	3(10.0)	10(300)	26(867)	4(133)	1(33)	1(33)
	1(33.3)	1(33.3)		2(667)	2(667)	2(333)		
	1(14.3)	1(43)		3(429)	5(713)	3(429)		
	2(33.3)			3(100.0)	3(100.0)			
	3(20.0)	4(26.7)	4(26.7)	12(800)	12(80.0)	5(33.3)		
				2(1000)	2(1000)			
	8(14.1)	19(35.2)	14(25.9)	10(185)	18(33.3)	15(27.8)	14(259)	2(37)
	19(15.1)	36(54.6)	24(36.4)	6(91)	32(485)	24(36.4)	10(151)	2(30)
1(14.3)	1(14.3)		1(14.3)		4(571)	2(256)		
	3(42.9)	4(57.1)		5(714)	6(857)	1(143)		
8(20.5)	2(5.6)	24(61.5)	23(59.0)	6(154)	16(410)	26(667)	2(56)	1(26)
	4(19.1)	16(76.2)	3(14.3)	7(333)	11(524)	14(667)	3(429)	
	2(20.0)	1(10.0)		5(500)	6(600)	2(200)		
	1(33.3)	2(66.7)		3(100.0)	3(100.0)			
	7(18.9)	12(32.5)	1(2.7)	17(460)	28(757)	5(162)		1(27)
12(3.7)	49(15.1)	127(39.1)	74(22.8)	103(31.7)	192(591)	117(360)	31(95)	7(22)

SECTION 2

Table II-6-8 Motives for Overseas Investment, by Country (Consumer Electronics)

		Low Cost of Material & Parts	Good Quality of Materials & Parts	Stable Supply of Materials & Parts	Low-cost Labor	Good-Quality Labor	Stable Supply of Labor	Ready Availability of Capital	Easy to Cooperate with Local
1. Norway	(0)								
2. Sweden	(0)								
3. Finland	(0)								
4. Denmark	(0)								
5. England	(5)				1(200)	2(400)		1(200)	2(400)
6. Holland	(0)								
7. Belgium	(1)								
8. France	(2)								
9. W. Germany	(1)				1(1000)				
10. Portugal	(0)								
11. Spain	(5)						1(200)		2(40.0)
12. Italy	(1)								1(100.0)
13. Austria	(0)								
14. Greece	(0)								
15. Yugoslavia	(0)								
16. America	(13)			1(77)	1(77)	3(7.7)	3(23.1)	1(77)	1(7.7)
17. Canada	(2)								1(50.0)
18. Mexico	(3)								
19. Venezuela	(3)								
20. Chile	(0)								1(33.3)
21. Brazil	(6)							3(167)	1(16.7)
22. Argentina	(2)								
23. S. Korea	(8)	1(125)	2(250)	2(250)	7(875)	5(625)	2(25.0)		1(125)
24. R. China	(13)	3(293)		2(182)	8(727)	3(27.3)	2(18.2)		1(91)
25. Hongkong	(2)				1(500)	1(500)			
26. Thailand	(6)	1(167)		1(167)					2(333)
27. Singapore	(15)	4(267)	2(67)	2(133)	10(167)	5(333)	4(267)	3(200)	2(133)
28. Malaysia	(7)				2(285)	1(143)			2(286)
29. Philippines	(7)								1(143)
30. Indonesia	(3)								1(333)
31. Others	(23)			1(43)	2(87)	1(43)	2(87)		6(261)
Total	(128)	9(70)	3(23)	8(625)	34(26.6)	19(148)	14(109)	5(39)	25(195)

Source: EIAJ

SECTION 1

...er Electronics)

Unit: responses (%)

...ty Availity of ...tal	Easy to Cooperate with Local	Aid from host Government	Local Investment Made by Related Production Firms	Difficult to export from Japan	Local Market Expected to Expand	Third-country Market Expected to Expand	Exportation to Japan	Royalty Income
...200)	2(400)	1(200)	4(800)	5(1000)	5(1000)			
				2(1000)		1(1000)		
				2(1000)	2(1000)	2(500)		
					1(1000)	1(1000)	1(100.0)	
	2(40.0)			3(600)	4(800)	2(400)		
	1(100.0)			1(1000)	1(1000)	1(1000)		
... 77)	1(7.7)	3(23.1)	2(15.4)	3(615)	12(923)	3(231)		
	1(50.0)	1(50.1)		1(500)	2(1000)	1(500)		
				2(667)	3(1000)	2(667)		
				3(1000)	3(1000)			
	1(33.3)							
...167)	1(16.7)	2(33.3)	1(16.7)	5(833)	6(1000)			
				2(1000)	2(1000)			
	1(125)	2(250)	4(500)		1(125)	6(755)	7(125)	
	1(91)	6(545)	2(18.2)	4(364)	5(455)	7(636)	1(91)	
			1(500)		1(500)	1(500)		
	2(333)	3(500)		4(667)	6(1000)			
...200)	2(133)	9(600)	5(333)	4(267)	3(200)	11(733)	1(67)	1(67)
	2(286)	5(714)		4(571)	5(714)	4(571)	1(143)	
	1(143)	1(143)		5(714)	6(857)	1(143)		
	1(333)	2(667)		3(1000)	3(1000)			
	6(261)	8(348)		14(607)	21(913)	4(174)		
... 39)	25(195)	43(336)	16(125)	71(555)	92(719)	46(359)	5(39)	2(16)

SECTION 2

Table II-6-9 Motives for Overseas Investment, by Country (Electronics Parts)

	Low Cost of Material & Parts	Good Quality of Materials & Parts	Stable Supply of Materials & Parts	Low-cost Labor	Good-Quality Labor	Stable Supply of Labor	Ready Availability of Capital	Easy to Cooperate w Local
1. Norway (0)								
2. Sweden (0)								
3. Finland (0)								
4. Denmark (0)								
5. England (0)								
6. Holland (0)								
7. Belgium (1)								
8. France (0)								
9. W. Germany (1)								1(1000)
10. Portugal (0)								
11. Spain (0)				1(1000)				
12. Italy (0)								
13. Austria (0)								
14. Greece (1)		1(1000)	1 (1000)					
15. Yugoslavia (0)								
16. America (7)						1(143)	1(143)	
17. Canada (0)								
18. Mexico (4)				1(250)		1(250)		1(250)
19. Venezuela (1)								
20. Chile (0)								
21. Brazil (8)				1(125)		1(125)		2(250)
22. Argentina (1)								
23. S. Korea (41)	1(24)			33(805)	11(268)	17(415)		7(170)
24. R. China (50)	4(80)	1(20)	2(40)	41(820)	8(160)	19(380)		8(160)
25. Hongkong (5)				2(400)			1(200)	1(200)
26. Thailand (2)				11(500)		1(500)		1(500)
27. Singapore (21)	1(48)	1(48)	1(48)	11(524)	4(191)	3(149)	4(149)	
28. Malaysia (13)				9(692)	1(77)	6(762)		2(153)
29. Phillipines (5)				3(600)	1(200)	2(400)		1(200)
30. Indonesia (1)								
31. Others (9)			1(111)	3(333)	1(111)	2(222)		1(111)
Total (172)	6(35)	3(24)	5(29)	106(624)	26(153)	53(312)	6(353)	24(141)

Source: EIAJ

SECTION 1

:tronics Parts)

Unit: responses (%)

ty Avail- lity of ital	Easy to Cooperate with Local	Aid from host Government	Local Investment Made by Related Production Firms	Difficult to export from Japan	Local Market Expected to Expand	Third-country Market Expected to Expand	Exporta- tion to Japan	Royalty Income
	1(1000)				1(1000)			
						1(1000)		
(143)		2(286)	1 (143)	2(143)	6(857)	2(286)		
	1(250)			2(250)	2(500)	1(250)		
				1(1000)	1(1000)			
	2(250)	1(125)	3(375)	6(750)	5(625)	4(500)		
				1(1000)	1(1000)			
	7(170)	16(390)	10(264)	8(195)	15(366)	9(270)	14(342)	2(49)
	8(160)	28(560)	21(420)	3(68)	25(50.0)	18(360)	8(160)	1(20)
(200)	1(200)				3(600)	1(200)		
	1(500)	2(1000)		2(1000)	1(500)	1(500)		
(149)		14(667)	15(714)	3(149)	11(524)	13(619)		
	2(153)	10(769)	3(231)	2(154)	6(546)	9(69.2)	2(154)	
	1(200)			2(400)	2(46.2)	2(400)		
		1(1000)		1(1000)	1(1000)			
	1(111)	3(333)		2(22.2)	3(333)	1(111)		1(111)
(253)	24(141)	78(459)	53(312)	33(19.4)	83(48.8)	62(38.5)	24(141)	4(24)

SECTION 2

Table II-6-10 Motives for Overseas Investment, by Country (Industrial Electronics)

		Low Cost of Material & Parts	Good Quality of Materials & Parts	Stable Supply of Materials & Parts	Low-cost Labor	Good-Quality Labor	Stable Supply of Labor	Ready Availability of Capital	Easy to Cooperate with Local
1. Norway	(0)								
2. Sweden	(0)								
3. Finland	(0)								
4. Denmark	(0)								
5. England	(0)								
6. Holland	(0)								
7. Belgium	(0)								
8. France	(0)								
9. W. Germany	(1)								
10. Portugal	(0)								
11. Spain	(0)								1(1000)
12. Italy	(0)								
13. Austria	(0)								
14. Greece	(0)								
15. Yugoslavia	(0)								
16. America	(9)	1(111)	1(111)	1(111)				1(111)	
17. Canada	(0)								
18. Mexico	(1)								
19. Venezuela	(0)								
20. Chile	(0)								
21. Brazil	(5)								
22. Argentina	(0)								
23. S. Korea	(4)				2(50.0)		1(250)		
24. R. China	(6)	1(167)		2(333)	4(667)	3(167)	3(500)		
25. Hongkong	(0)								
26. Thailand	(0)								
27. Singapore	(1)					1(1000)	1(1000)	1(1000)	
28. Malaysia	(2)				1(300)		1(500)		
29. Phillipines	(0)								
30. Indonesia	(0)								
31. Others	(4)	4(1000)							1(25.0)

		Low Cost of Material & Parts	Good Quality of Materials & Parts	Stable Supply of Materials & Parts	Low-cost Labor	Good-Quality Labor	Stable Supply of Labor	Ready Availability of Capital	Easy to Cooperate with Local
Total	(34)	6(17.6)	1(29)	3(88)	7(206)	2(59)	6(17.6)	2(59)	2(59)

Source: EIAJ

SECTION 1

··onics)

Unit: responses (%)

...ail- ...of	Easy to Cooperate with Local	Aid from host Government	Local Investment Made by Related Production Firms	Difficult to export from Japan	Local Market Expected to Expand	Third-country Market Expected to Expand	Exporta-tion to Japan	Royalty Income
					1(1000)			
	1(1000)			1(1000)	1(1000)			
·)				1(111)	8(889)		1(111)	1(111)
		1(1000)			1(1000)			
		3(600)		5(1000)	5(100.0)	1(20.0)		
		1(250)		2(500)	3(750)	1(250)	1(250)	
		4(167)	2(333)	1(167)	3(500)	2(333)		1(167)
·)		1(1000)	1(1000)			1(1000)	1(1000)	
		2(1000)		2(1000)	1(50.0)	1(500)		
	1(25.0)	1(25.0)		2(500)	4(1000)			
·)	2(59)	13(382)	3(88)	14(418)	27(79.4)	6(177)	3(88)	2(59)

SECTION 2

Table II-6-11 Estimation of Regional Distribution of Overseas Production by Japanese Companies (1978)

	Overseas production (1,000 units)	Regional Distribution (%)			
		West Europe	North America	Asia	Other
Color TVs	3,223	7.6	52.6	30.9	8.7
B & W TVs	3,222	(1)	0	84.6	15.3
Radios	10,551	(1)	0	93.0	6.9
Radio-cassette tape recorders	6,602	(1)	0	94.7	5.3
Car radios, car stereos	-	-	-	-	-
Stereo sets	704	(1)	0	67.6	32.4
Speaker systems	704	-	-	-	
Other hifi, amps	367	(1)	0	93.5	6.5

Source: EIAJ

Note: (1) included in "Other"

Table II-6-12 Estimation of Regional Distribution of Overseas Production by Japanese Companies (1979)

	Overseas production (1,000 units)	Regional Distribution (%)			
		West Europe	North America	Asia	Other
Color TVs	4,029	7.8	52.8	29.0	10.4
B & W TVs	3,979	(1)	(1)	84.6	15.3
Radios	10,565	(1)	0	92.5	7.5
Radio-cassette tape recorders	10,103	(1)	0	95.3	4.7
Car radios, car stereos	406	(2)	(2)	(2)	(2)
Stereo sets	1,138	(1)	(1)	67.6	32.4
Speaker systems •	1,047	(3)	80.5	19.5	(4)
Other hifi, amps	653	(1)	0	97.1	2.9

Source: EIAJ

Notes: (1) Included in "Other" category
(2) Not separable by region
(3) West Europe included in "Asia"
(4) "Other" included in North America

Table II-6-13 Estimation of Regional Distribution of Overseas Production by Japanese Companies (1980)

	Overseas production (1,000 units)	Regional Distribution (%)			
		West Europe	North America	Asia	Other
Color TVs	5,744	10.3	60.8	13.3	15.7
B & W TVs	4,192	(1)	0	85.3	14.7
Radios	11,844	(1)	0	92.8	7.2
Radio-cassette tape recorders	11,586	(1)	0	93.9	6.1
Car radios, car stereos	581	(1)	0	42.3	57.7
Stereo sets	839	(1)	(1)	47.2	52.8
Speaker systems	1,551	9.9	81.4	8.7	(2)
Other hifi, amps	602	7.6	0	92.4	(2)

Source: EIAJ

Notes: (1) Included in "Other"
(2) Included in "Asia"

Table II-6-14 Estimation of Regional Distribution of Overseas Production by Japanese Companies (1981)

	Overseas production (1,000 units)	Regional Distribution (%)			
		West Europe	North America	Asia	Other
Color TVs	6,486	12.9	58.0	14.7	14.5
B & W TVs	4,108	(1)	0	84.0	16.0
Radios	14,146	(1)	0	93.6	6.4
Radio-cassette tape recorders	11,586	(1)	0	94.1	5.9
Car radios, car stereos	730	(2)	0	(2)	(2)
Stereo sets	906	(1)	(1)	57.5	42.5
Speaker systems	1,510	14.0	76.5	9.5	(3)
Other hifi, amps	650	12.2	0	80.8	7.1

Source: EIAJ

Notes: (1) Included in "Other"
(2) Not separable
(3) Included in "Asia"

Asian Electronies Industry
of Japanese Investment

Table II-6-15 Characteristics of the Electronics Industry in Selected Developing Countries (Asia, 1979)

	Value of production ($1 mil.)	Composition of production (%)	Export dependency (Exports/production)	Scale of employment (1,000 workers)	Dependency on foreign capital	Stage of development; notes
R. of Korea	3,300	Consumer products: 40 Industrial products: 10 Parts: 50	70%	180	25% (50% of joint venture are included)	Export base for consumer electronics and electronic parts
Taiwan	3,200	Consumer products: 45 Industrial products: 6 Parts: 49	80%	230 *	45% (including joint venture)	Export base for consumer electronics and electronic parts
Hongkong	2,000	Consumer products: 68 Industrial products: 2 Parts: 30	90% or more	90	about 10%	Export base for medium- and low-grade consumer electronics
Philippines	320	Parts: 65 Most of the remainder is consumer products	90%	34	Very high	Import substitution for sets; export base for some parts
Singapore	1,850	Consumer products: 39 Industrial products: 2 Parts: 59	90%	66	Very high (more than 80% of all industries)	Export base for consumer electronics. (Higher dependency on imported parts than in Korea and China.)
Indonesia	541	More than 90% is consumer products	2%	43	High (While there are some fields where participation by foreign interests is prohibited, most local manufacturers are receiving technical assistance from overseas.)	Substitution of imports by assembly of imported parts.
Malaysia	990	90% is parts	75%	61	Very high. (Over 90% for all industries.)	Export base for medium-grade consumer products and some parts.
Thialand	106	90% is consumer electronics	10%	40	Very high.	Substitution of imports by assembly of imported parts.
Sri Lanka	slight	Some production of radios	0	N.A.	Low.	Substitution of some imported products by assembly of imported parts.

Source: EIAJ

Table II-6-16 Scale of World Production and Demand (1980)

(Unit: 1,000 sets, percentage in parentheses)

	R. Korea		Taiwan		Hongkong		Philippines		Singapore		Malaysia		Indonesia		Thailand		Sri Lanka	
	Unit production	Unit demand	Unit production	Unit demand	Unit production	Unit demand	Unit production	Unit demand	Unit production	Unit demand	Unit production	Unit demand	Unit production	Unit demand	Unit production	Unit demand	Unit Production	Unit demand
	Japan Maker Share	Japan Makar Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share	Japan Maker Share
B & W TVs	5,800 (10)	544 (0)	4,500 (25)	77 (25)	96 (0)	130 (90)	216 (80)	230 (95)	2,400* [1,540] (55)	9 (40)	72 (40)	30 (80)	700 (25)	650 (50)	111 (60)	130 (55)	neg (0)	20 (NA)
Color TVs	947 (5)	230 (0)	1,350* [1,050] (30)	555 (25)	24 (0)	180 (65)	18 (60)	22 (90)	2,700* [780] (20)	65 (70)	96 (60)	150 (65)	190 (10)	150 (70)	30 (70)	35 (70)	0 (0)	15 (NA)
Radios	2,300 (0)	180 (0)	4,000 (NA)	170 (40)	42,000 (8)	730 (1)	300 (10)	405 (15)	1,200 (25)	220 (40)	2,400 (25)	115 (NA)	1,500 (15)	1,200 (15)	660 (7)	680 (5)	62 (0)	116 (NA)
Music Center (incd. stereo sets)	410 (22)	90 (0)	4,500 (50)	30 (20)	120 (0)	20 (70)	51 (80)	55 (90)	240 (100)	9 (85)	60 (100)	30 (NA)	45 (50)	15 (80)	15 (0)	20 (NA)	0 (0)	neg (NA)
Car radios	400 (0)	110 (0)	60 (0)	100 (5)	600 (0)	10 (1)	0 (0)	30 (NA)	720 (50)	8 (80)	60 (100)	30 (95)	72 (90)	45 (90)	18 (85)	25 (95)	0 (0)	0.7 (NA)
Car stereos	2,000 (4)	30 (0)	1,200 (0)		540 (0)	100 (20)	0 (0)	20 (NA)	1,320 (60)	15 (85)			48 (60)	5 (90)			0 (0)	
Radio cassettes	5,283 (35)	700 (20)	8,000 (50)	240 (30)	8,400 (8)	2,300 (90)	0 (0)	166 (NA)	7,640 (70)	265 (80)	1,160 (78)	180 (NA)	780 (20)	650 (50)	0 (0)	170 (NA)	0 (0)	20 (NA)
Other tape recorders	3,600 (80)	80 (0)	2,000 (25)	20 (0)	3,600 (20)	150 (70)	0 (0)	30 (NA)	2,640 (70)	72 (90)	300 (100)	40 (NA)	600 (40)	450 (25)	0 (0)	50 (NA)	neg (0)	neg (NA)

Source: NRI

Note: * Indicates inclusion of chassis; completed products value shown in brackets.

Table II-6-17 (1) Polices Related to the Electronics Industry, and Outlook for the Industry, in Selected Asian Countries

	Republic of Korea	Taiwan
Development stage of the electronics industry	Export base for consumer electronics devices and parts	Export base for consumer electronics devices and parts
Characteristics and outlook of industrial policy related to the electronics industry	- On basis of Electronics Industry Promotion Law: (a) Treasury subsidies (b) Grants (c) Extended-term, low-interest financing (d) Tax incentives - Preferential treatment for the industry in connection with financing systems - Easing upon liberalization of imports - Easing upon regulations related to foreign investment	- In offing: Six-Year Plan for Development of Electronics Industry, and Development Program for the Electronics Industry Sector, through which: (a) Setting of targets for self-sufficiency in parts and materials (b) Investment incentives legislation - Foreign investment attraction policy: (a) Emphasis on market-related technology rather than capital (b) Movement away from imposing obligation to export - Xin Zhu science & industry zone Establishment of a high-technology center; preference for inclusion in this center - Enforcement of an R & D ratio (0.5% of sales)

(Continued)

	Republic of Korea	Taiwan
Requirements of the host Government and society	- Improvement of the trade balance at the level of the firm - Promotion of transfer of technology - Enforcement of domestic parts procurement	- Improvement of the trade balance at the level of the firm - Enforcement of domestic parts of procurement - Enforcement of domestic reinvestment of profits - Promotion of transfer of technology
Medium-term outlook and Problems of the electronics Industry	- Rising wage costs - Weak materials industry - Weak non-price competitiveness relative to Japan (esp. in marketing, quality, design) - Low level of investment in R & D - Stagnation of growth of the electronics industry due to the above - Excessive dependence on Japan for advanced parts	- Rising wage costs - Weak materials industry - Weak non-price competitiveness relative to Japan (esp. in marketing, quality, design) - Low level of investment in R & D - Weakness of firms - Stagnation of growth of the electronics industry due to the above

Table II-6-17 (2) Polices Related to the Electronics Industry, and Outlook for the Industry, in Selected Asian Countries

	Philippines	Singapore	Indonesia
Development stage of the electronics industry	Substitution for imports of sets, and export base for certain parts	Export base for consumer electronics devices and parts	Substitution for imports of sets, by assembly of imported parts
Characteristics and outlook of industrial policy related to the electronics industry	- Electronics industry is included in IPP and EPP frameworks (a) Tax exemptions (b) Accelerated depreciation etc. - Reduction of tariff on imports of electronic parts - Promotion of development of export industry	- As high-priority industry categories designated by the Economic Development Board there are: (a) Electronic devices for industrial use (b) High-grade appliances (c) Electronic parts (d) Electronic materials	- "Electronic parts" is on the printing list, of the DSP industries - Restrictions on parts imports, to promote domestic industry - Foreign investment is prohibited in the fields of radios, stereos, tape recorders, TVs.
Requirement of the host government and society	- Increase in domestic procurement of parts - Effort for exportation of parts and products	- Improvement of level of products - Integration of production; promotion of automation - Increasing R & D activities in-country	- Improvement of local parts procurement ratio - Development of local subcontractors - Effort for exportation of parts and products
Medium-term outlook and problems of the electronics industry	- Under-developed infrastructure (a) Power outages (b) Low level of reliability of telephone and mail service (c) Immature state of supporting industry - Low level of local procurability of parts	- Rising wage costs - High worker turnover	- Low quality of work force - Immature state of supporting industry - Further restriction on parts imports - Foreign investment is prohibited in the fields of radios, stereos, tapes, recorders, TVs

Table II-6-17 (3) Polices Related to the Electronics Industry, and Outlook for the Industry, in Selected Asian Countries

	Malaysia	Thailand	Sri Lanka
Development stage of the electronics industry	Export base for medium-grade consumer electronics and some parts	Import substitution by importation of parts	Substitution for imports of sets, by assembly of imported parts
Characteristics and outlook of industrial policy related to the electronics industry	- "Electronics" is one of the areas receiving beneficial treatment under the Development Promotion Law - Promotion of employment of ethnic Malays - Development of export industry	- "Radio transmitters and receivers" and "electronic parts" are categories of industry to which the Investment Promotion Law applies - Tariff reduction for imported modules - Development of export industry	- "Electronics products" are one of the categories for which foreign investment is welcome - Attraction of foreign investment to export processing zones and other locations, and continuation of strong efforts to attract industry
Requirement of the host government and society	- Creation of jobs for ethnic Malays and opportunities for their advancement to managerial	- Increase in rate of local procurement of parts - Creation of jobs for Thais and opportunities for their promotion to managerial parts - Improvement of the trade balance at the level of the firm - Promotion of transfer of technology	- Increased investment

(Continued)

	Malaysia
Medium-term outlook and problems of the electronics industry	- Increase in wages cost - Increase in electric power rates - Need to employ ethnic Malays in all positions in accordance with their percentage of the population

Source: NRI

Thailand	Sri Lanka
- Uncertainty of policy related to electronics industry - Immaturity of supporting industry - Low quality of work force - Limitation on numbers of foreign nationals employed, due to desire to promote transfer of technology	- Under-developed infrastructure - Infration - Under-developed industrial infrastructure

Table II-6-18 Local Procurability of Parts for Tape Recorders and Color TVs, in Eight Asian Countries

(A) Tape recorder (cassette type) parts	Taiwan					R. of Korea					Hongkong					Singapore				
	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future
1. Carbon film resistor	o					o							o			o				
2. Chemical condenser	o						o							o		o				
3. Mylar capacitor	o					o									o	o				
4. Ceramic condenser	o					o									o	o				
5. Power transformer	o					o							o			o				
6. Choke coil	o					o									o	o				
7. Speaker element	o					o								o		o				
8. Printed circuit board	o					o					o					o				
9. Rod antenna	o					o									o		o			
10. Switches, connectors		o					o								o			o		
11. Cassette mechanism (KD)		o						o							o		o			
12. Cassette mechanism (integrated production)			o					o							o		o			
13. Magnetic head		o						o							o	o				
14. Micromotor	o						o								o		o			
15. Transistor				o				o					o				o			
16. IC								o							o			o		

(A) Tape recorder (cassette type) parts (cont.)	Malaysia					Philippines					Thailand					Indonesia				
	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future
1. Carbon film resistor		o																		
2. Chemical condenser	o					o														
3. Mylar capacitor	o							o				o								
4. Ceramic condenser	o																			
5. Power transformer		o				o						o								o
6. Choke coil		o				o														
7. Speaker element		o						o				o								o
8. Printed circuit board		o				o						o								
9. Rod antenna			o									o								o
10. Switches, connectors				o																
11. Cassette mechanism (KD)			o																	
12. Cassette mechanism (integrated production)			o																	
13. Magnetic head			o																	
14. Micromotor			o																	
15. Transistor			o						o											
16. IC				o																

(Continued)

Source: EIAJ.

(5) Color TV parts (cont.)

	Malaysia					Philippines					Thailand					Indonesia				
	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future
1. Carbon film resistor			o																	
2. IFT, choke coil			o			o								o						
3. Power transformer				o		o						o								o
4. Ceramics condenser		o										o								
5. Mylor capacitor		o						o				o								
6. Chemical condenser		o					o													
7. Speaker element		o						o					o							o
8. Printed circuit board		o				o							o							
9. Rod antenna			o									o								o
10. Switch, connector				o								o								
11. Flyback transformer				o				o						o						
12. Tuner			o					o					o							o
13. Deflecting yoke			o							o					o					
14. Color braun tube										o										
15. Transistor			o						o				o							
16. IC										o										

Source: EIAJ.

Note: Lack of a circle indicates that the relevant item is not expected to become locally procurable. A "x" mark indicates parts which are thought to be being supplied from Malaysia.

(B) Color TV parts	Taiwan					R. of Korea					Hongkong					Singapore				
	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future	About 100% locally procurable	About 75% locally procurable	About 50% locally procurable	About 25% locally procurable	Will be locally procurable in near future
1. Carbon film resistor	o					o							o				o			
2. IFT, choke coil	o						o							o		o				
3. Power transformer	o					o								o		o				
4. Ceramics condenser	o					o									o	o				
5. Mylor capacitor	o						o								o	x				
6. Chemical condenser		o					o									x				
7. Speaker element	o					o								o		o				
8. Printed circuit board	o						o								o	o				
9. Rod antenna	o					o						o					o			
10. Switch, connector		o						o							o			o		
11. Flyback transformer			o				o								o				x	
12. Tuner		o				o									o			o		
13. Deflecting yoke			o			o									o				x	
14. Color braun tube			o					o							o		o			
15. Transistor				o				o						o					o	
16. IC									o						o				o	

APPENDIX 5-7

Integrated circuits, its technological trend and future, by Mr. O. Fujii, Director Electronics Devices Division, Electronic Industries Association of Japan

INTEGRATED CIRCUITS,

ITS TECHNOLOGICAL TREND AND FUTURE

Otomi Fujii
Director Electronics Devices Division
Electronic Industries Association of Japan

- IC Industry -

1. What is integrated circuit?
2. History of ICs
3. How to manufacture ICs?
4. Classification of ICs
5. Applications of ICs
6. IC industry in Japan
7. IC industry in the world
8. Technology trend
9. Related industry
10. Future of the IC industry

Electronics Industries
Association of Japan

Table II-8-1 Applications of Semiconductor Devices

(Unit: %)

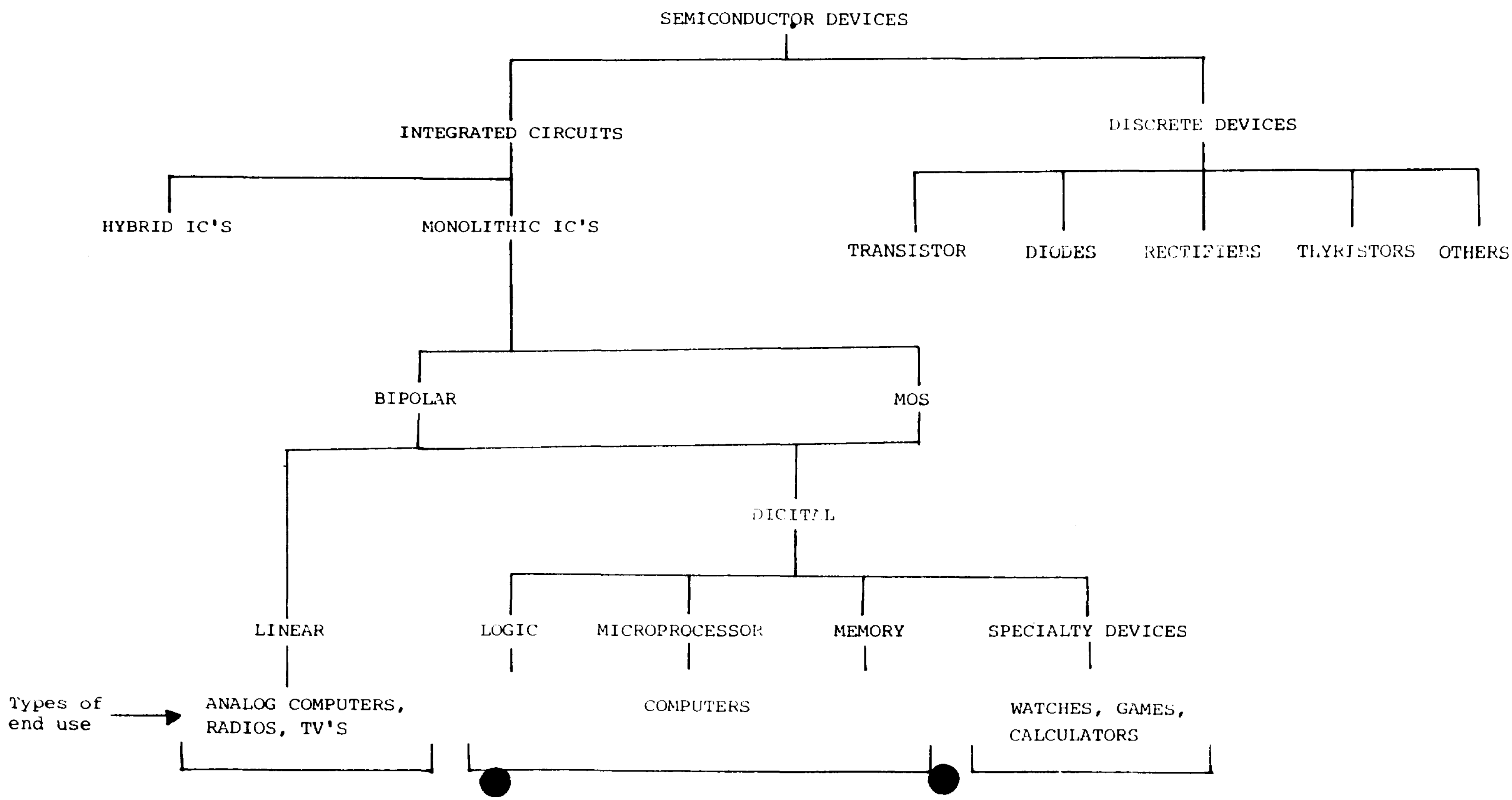
	Composition (1982)	
	in Japan	in U.S.
Consumer electronics	52.8	11
Television receivers	8.9	
Video tape recorders	16.2	
Audio equipment	13.9	
Musical instruments	1.1	
Home appliances	1.7	
Cameras	2.1	
Watches & clocks	2.0	
Games	4.3	
Others	2.6	
Industrial electronics	47.2	72
Office machines	3.7	
Calculators	3.3	5
Facsimiles	1.6	
Personal computers & World processors	3.5	
Office Computers	2.0	
Computers and peripherals	9.4	40
Communications	7.6	15
Control & Measurements	3.7	6
Medical equipment	0.3	
Automotive	3.5	
Robots	0.6	
Vending machines	0.4	6
Transceivers	0.2	
Power supplies	2.0	
Others	5.4	
Military & Space	-	17

Table II-8-2 World Semiconductor Production (1982)

(Unit: Millions of Dollars)

Location	Production
Japan	
IC	3,480
Discrete	1,500
Total	4,980
U.S.A.	
IC Merchant	6,300
IC Captive	3,000
IC Total	9,300
Discrete	1,870
Total	11,170
Europe (west)	
IC	790
Discrete	710
Total	1,500
Rest of world	
IC	160
Discrete	190
Total	350
Total IC	13,730
Total Discrete	4,270
Total Semiconductor	18,000

Fig. II-8-1 "Family Tree" of Semiconductor Technology and End Uses



RECENT TRENDS
IN THE ELECTRONIC COMPONENTS INDUSTRIES
OF
JAPAN

MAY 9, 1983

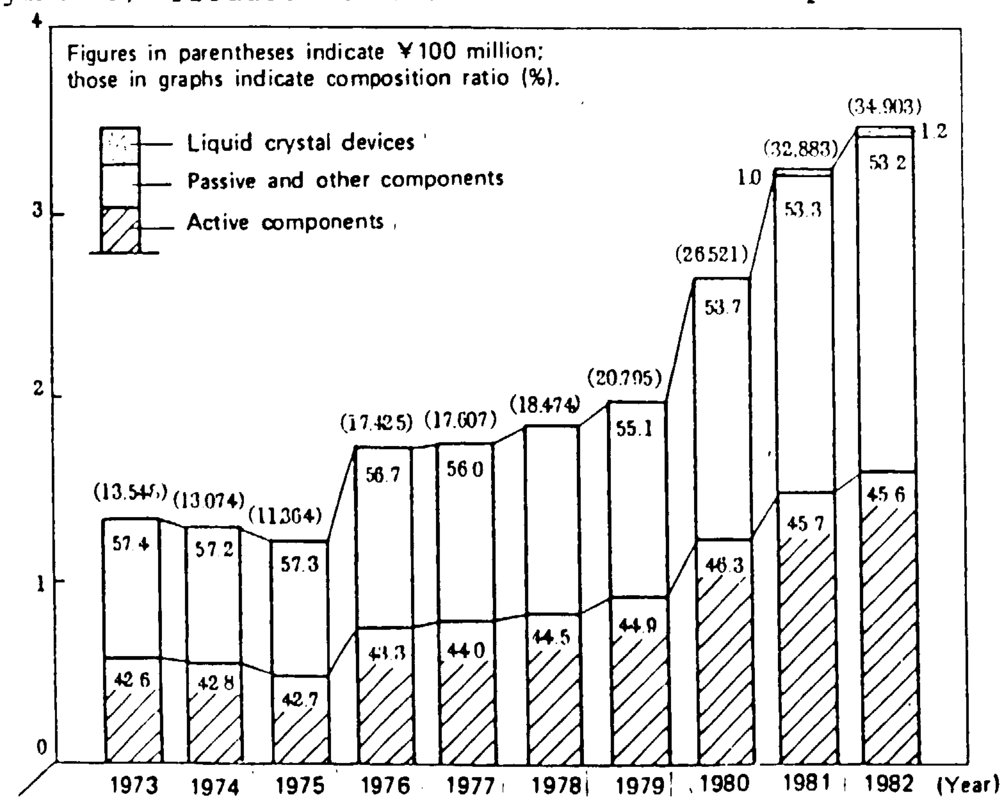
ELECTRONIC INDUSTRIES ASSOCIATION OF JAPAN

The production of electronic components in 1982 amounted to ¥3,490.3 billion, or 106.1% of that of the previous year. By item, passive and other components registered ¥1,855.1 billion, or 105.9% of that of the previous year while active components recorded ¥1,592.3 billion, or 106.0% in the same comparison. Consequently, identical growth rates were seen.

On one hand, the 6% increase during the current period of sluggish growth is an indication of a stable trend, but on the other hand, when analyzing the situation by product, the growth of passive and other components was dependent on the high growth of magnetic tapes. Similarly, the growth rate of active components was dependent on integrated circuits. Furthermore, it should not be ignored that most other products registered growth rates lower than those of the previous year. Moreover, the growth rates exceeding the 20% level in 1980 and 1981 suddenly slowed down during 1982, and uncertainty over the future was seen in certain industrial sectors. Production of consumer electronics equipment, which is a factor heavily depended upon, turned to become sluggish. As a result, a declining trend was observed.

On the other hand, during the current well-known age of electronics, electronics technology and electronic components have found their way into most all households and the respective industries. Such development seen in the area of electronics represents a positive move in improving our society, economy, and industry. The current world recession would have been much worse without the influence of the development of electronics.

(Figure 29) Production Trends of Electronic Components



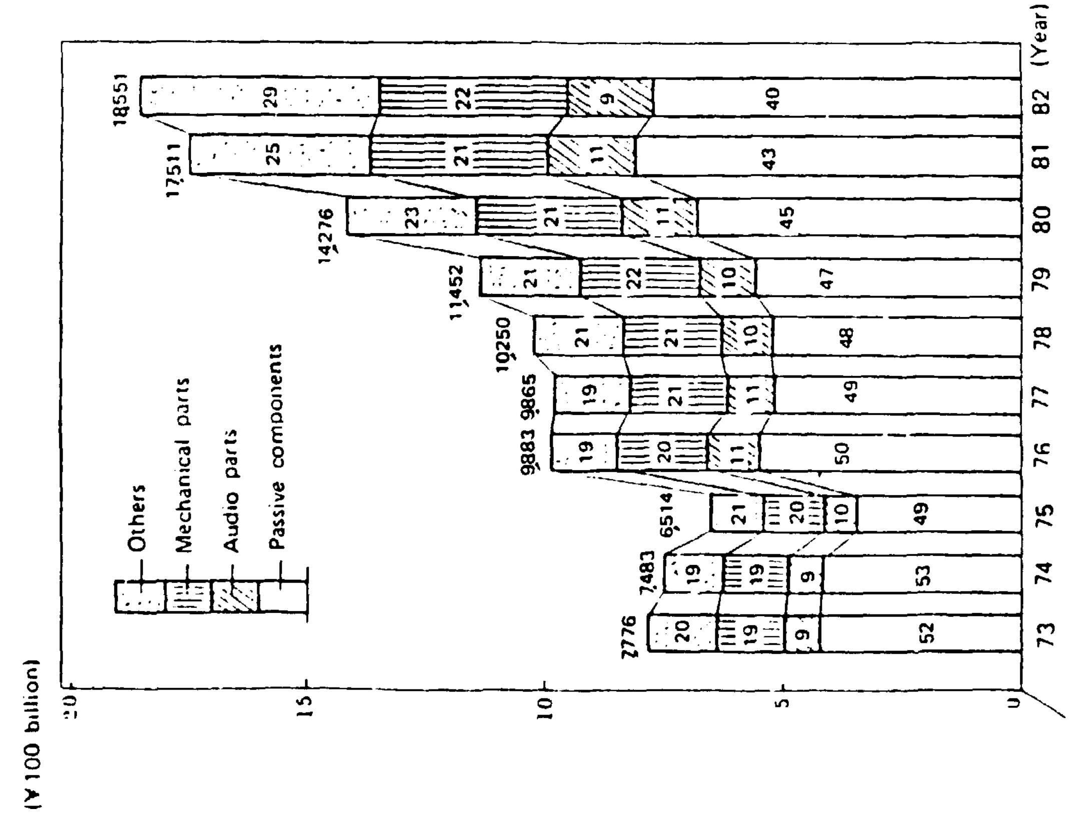
(1) Passive and Other Components

The production of passive and other components in 1982 amounted to ¥1,855.1 billion, or 105.9% of that of the previous year. When compared to the 1981 figure, the growth rate had undergone a sharp drop. The production of passive and other components, excluding magnetic tapes which exhibited a favorable trend along with the diffusion of VTRs, amounted to ¥1,430.9 billion. Resultantly, a negative growth or 99.2% of that of the previous year was recorded.

The major market for passive and other components has been the consumer electronics market, and passive and other components have shown a growth similar to the pace of consumer electronics. Recently, however, together with the introduction of electronics to areas other than the electronic industries, the markets underwent diversification and demand grew. This was especially true for information-related equipment in the area of industrial electronics such as computers, communication equipment, and so on. Although there is a trend of market expansion, the high-level dependency on consumer electronics has persisted. As a result, together with such trends observed since the latter half of 1981 including the stagnant situation of audio equipment and color TVs, and especially, the slackened growth of VTRs and the decline in the number of components per set, the future outlook of the electronics industry is not an optimistic one.

In addition to active technological development, the creation of demand and adaptability to the market trends represent the key to the future.

(Figure 30) Production Trends of Passive and Other Components



Exports of passive and other components amounted to ¥1,083.7 billion, or 106.7% of that of the previous year. When magnetic tapes are excluded, these figures represent a decline similar to the situation of the production trend. Although Japanese products are high in quality and reliability, and have subsequently received a high evaluation throughout the world, stagnant demand and the worldwide recession have caused the growth rate to drop over the successive periods. By destination, exports to Asia, accounting for 35% of the total exports, and exports to North America, second in terms of volume behind Asia, recorded a levelling-off trend of 101.6% and 102.1% in comparison to the previous year, respectively. On the whole, a declining trend was observed. On the other hand, although the scale is small, imports registered ¥144.8 billion, or 114.2% of that of the previous year, showing a two-digit growth. By product, components primarily for industrial electronics, including resistors, connectors and associated radio equipment, exhibited a high growth rate. By destination, the U.S. proved to be the major country, accounting for 60.5% of all imports, registering a growth of 27.7%.

(1)-1 Passive Components

Production of passive components amounted to ¥777.4 billion, or 96.0% of that of the previous year, indicating a decline for the first time in five years since 1977. Although the production value of passive components indicates the highest composition ratio among passive and other components, a declining trend is observed annually as a result of the rapid growth of magnetic tapes and the increased number of solid state products. When studying the trend by product, there is a strong tendency towards compactness, integration, and high performance. The changing situation of production and demand among indivisual items has been remarkable. Passive components by item are described below. (See Table 12 and Basic Statistics.)

Both variable and fixed resistors recorded growth rates lower than those of the previous year. This is mainly attributable to the stagnant situation of audio equipment. As for variable resistors, carbon and wire-wound resistors exhibited a sharp drop, but other items registered two-digit growth rates. Included among such other items are small chip components, whose production is still small in terms of scale, but which are increasingly being substituted for conventional components made of lead. Among fixed resistors, the sales of carbon resistors became stagnant, but that of metal film, network items, and others exhibited a favorable trend. Metal film fixed resistors have an advantage in terms of performance, and their growth replaced that of carbon fixed resistors in both the industrial and consumer electronics fields. Network items and others represent those products corresponding to demand for high density mounting. Among these, those which have achieved compactness, integration, and high performance show favorable trends. The export of resistors (including components) amounted to ¥479 million, or 98.5% of that of the previous year, reflecting the impact of the two-digit decline in exports to Asia, which account for approximately half of all exports. Imports registered ¥6.6 billion, or 113.5% of that of the previous year, among which special-use equipment from the U.S. amounted to ¥4.1 billion, or 137.6% of that of the previous year.

As can be seen in Table 12, capacitors turned to show a stagnant trend. When analyzing the trends of major products, the production of aluminum capacitors, which show the largest scale, recorded a decrease of 6.7% from the previous year. Aluminum electrolytic capacitors, characterized by reasonable cost and a high storage capacity, showed a satisfactory trend in both the industrial field and exports, which carry relatively significant weight. However, due to a declining trend in the consumer field, a decrease has been registered on the whole. Moreover, while a trend fowards employing chips has become evident, the production of aluminum electrolytic capacitor chips, which was once thought to be difficult, was made possible after continuous efforts. The production of ceramics (porcelain) registered an increase of 9.6% over that of the previous year, showing a satisfactory trend. The market for ceramics is mainly the consumer market, but ceramic chip technology has been developed at an early stage, thus absorbing the traditional demand for tantalum and film; and exports also show a favorable two-digit growth. The production of tantalum registered a decrease of 5.8%. Due to the high performance of tantalum, demand has been consistent, but since its price varies according to the trends of the related raw materials, some products for consumer use and industrial use have been replaced by aluminum electrolytic capacitors and ceramics, respectively. Furthermore, in the area of films, the differentiation of growth and decline was apparent between plastic film capacitors mainly for consumer use and metallized plastic film capacitors for industrial use.

The production of composite parts registered a decrease of 1.57% from the previous year. Due to the trend fowards integration, prices are increasing, but since the usage of composite parts is concentrated in the consumer-use field and since they have been substituted by hybrid ICs, a decline of 42.7% was registered c volume basis.

Transfc ers which are heavily dependent on consumer demand, showed a severe trend in 1982, similar to that of all other components. On the other hand, as a result of the system of production where various types of items are manufactured but where small orders for each item are received, automation has been delayed. However, due to positive facility investments and subsequent cost reductions, an increase of 7.4% was registered on a volume basis.

As seen in Table 12, when classifying passive components into major types, only crystal vibrators recorded an increase in terms of value. The usage of crystal vibrators is expanding considerably, and they indicate a favorable trend based on a consolidated production system to cope with various fields. However, together with the decline seen in watch prices and other items, the trend toward a quantitative boom is gaining strength.

(Table 12) Actual Production of Passive Components in 1982

* In comparison to the previous year — Unit: 1,000 units, ¥million, %

Products	Volume	*	Value	*
Passive components			777,369	96.0
Resistors	44,516,874	99.8	192,133	94.8
Capacitors	39,709,141	104.0	296,883	96.6
Composite parts	308,662	57.3	28,777	84.3
Transformers	2,069,317	107.4	230,216	97.3
Crystal vibrators	386,359	127.1	29,360	101.3

Source: Ministry of International Trade and Industry, Statistics on Production Trends

(1)-2 Audio Parts

The production of audio parts amounted to ¥176.6 billion, or 98.0% of that of the previous year, which shows a severe condition reflecting the stagnancy in the field of audio equipment. When observing the trends by period, a decrease of 3.7% in the January-March period, a decrease of 8.6% in the April-June period, an increase of 0.8% in the July-September period, and an increase of 3.2% in the October-December period were recorded, thus indicating a bottoming out trend. Exports show an opposite trend, and a clear trend of recovery remains to be seen. When analyzing production by item, magnetic heads registered ¥71.1 billion, or 116.5% of that of the previous year, supporting audio parts on the whole through the sales of magnetic VTR heads, whose price per unit is high. On the other hand, speakers, pick-ups, etc., which are essential audio components, showed a two-digit decrease. The unit price of stereo headphones, which had been showing a favorable trend in 1981, also declined. The production of audio parts, when magnetic heads are excluded, declined by 11.5%.

(Table 13) Actual Production of Audio Components in 1982

* In comparison to the previous year — Unit: 1,000 units, ¥million, %

Products	Volume	*	Value	*
Audio parts			176,570	98.0
Speakers	140,339	86.5	62,396	89.5
Microphones	20,538	90.7	21,068	101.7
Stereo headphones	11,875	91.3	14,084	73.3
Pick-ups	8,146	78.4	7,972	83.2
Magnetic heads	177,718	108.6	71,050	116.5

Source: Ministry of International Trade and Industry, Statistics on Production Trends

(1)-3 Mechanical Parts

The production of mechanical parts amounted to ¥402.1 billion, or 105.9% of that of the previous year, indicating a stable trend. By product, switches registered a decrease while others maintained an increasing trend.

The production of TV tuners amounted to ¥71.1 billion, or 106.9% of that of the previous year. Exports of color TVs and tuners decreased, but domestic demand for TV and VTR tuners showed a favorable trend.

The production of connectors amounted to ¥100.9 billion, or 108.0% of that of the previous year, but when compared to the average two-digit growth of 23.2% for six consecutive years since 1976, the figure indicates a sharp decrease. The usage of connectors is most likely to expand in the field of optic communication and other high technology areas. In 1982, due to the stagnancy observed in consumer electronics and the decrease in the volume used as a result of the trend towards solid state, the growth of connectors decelerated. Connectors were developed by the U.S. for military purposes, and resultantly U.S. technology and productivity are high. This has caused Japan to be exceptionally very dependent on imports for this product in comparison to other consumer electronics. Imports in 1982 amounted to ¥28.4 billion (custom clearance code 85.19-270: which primarily indicates a classification of connectors), or 119.7% of that of the previous year, among which imports from the U.S. registered ¥22.8 billion, or 121.2% of that of the previous year.

The production of printed circuit boards amounted to ¥160.0 billion, or 112.4% of that of the previous year. Demand for wiring boards has increased considerably, because such boards contributes to an improvement of wiring efficiency for the internal part of machines, and consequently, production indicated a two-digit growth for seven consecutive years. Generally, many types of printed circuit boards are manufactured, but in small quantity. Therefore, because of this characteristic of labor-intensive production, most printed circuit boards are manufactured by small manufacturers, thus registering an actual production value of about ¥300.0 billion. On the other hand, this area is the most advanced field in terms of design, manufacturing and inspection, all of which are computer-controlled.

(Table 14) Actual Production of Mechanical Parts in 1982

* In comparison to the previous year   Unit: 1,000 units, 1,000 m^2, ¥ million, %

Products	Volume	*	Value	*
Mechanical parts			402,086	105.9
TV tuners	39,690	100.1	71,149	106.9
Connectors	1,821,118	125.4	100,940	108.0
Switches	869,706	95.8	70,037	90.6
Printed circuit boards	11,121	94.4	159,960	112.4

Source: Ministry of International Trade and Industry, Statistics on Production Trends

The production of other electronic components amounted to ¥499.1 billion, or 130.7% of that of the previous year. By type, wired communication equipment components amounted to ¥58.2 billion, or 102.7% of that of the previous year; TV antennas amounted to ¥16.7 billion, or 107.7% of that of the previous year; and magnetic tapes to ¥424.2 billion, or 137.0% of that of the previous year. Among these, magnetic VTR tapes amounted to ¥286.4 billion, or 165.1% of that of the previous year. Magnetic tapes represent the supporting factor of electronic components in 1982, registering a production volume 2.2 times that of resistors.

(2) Active Components

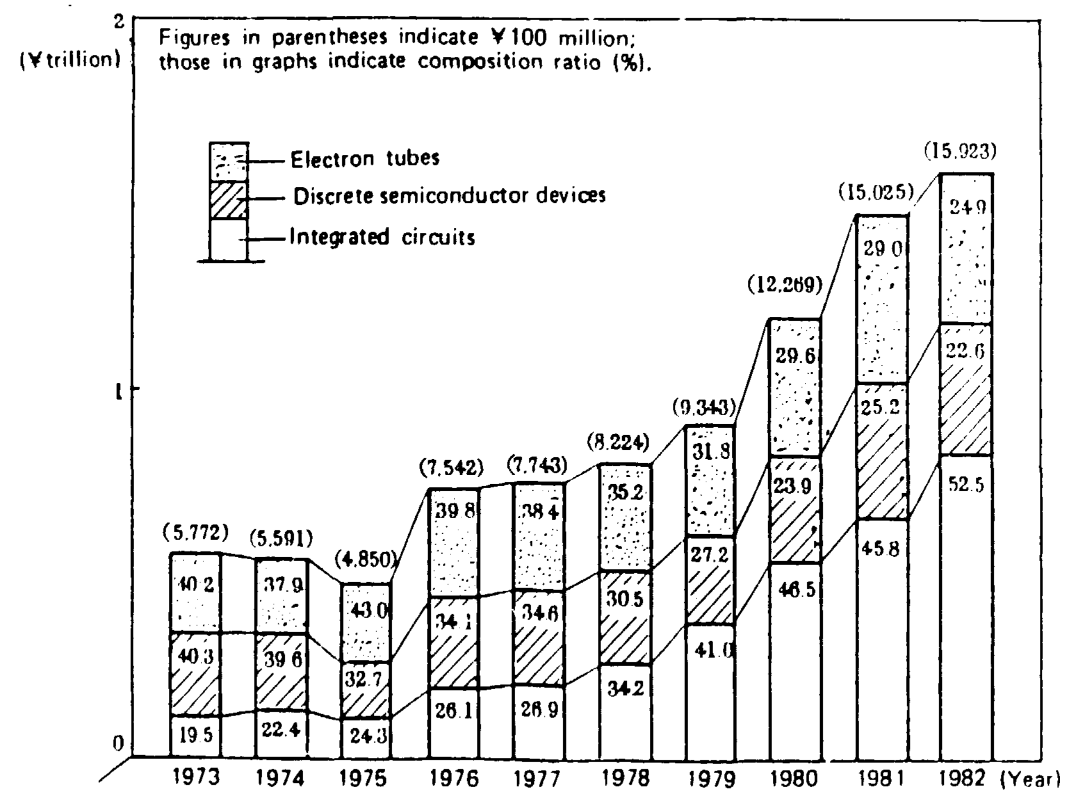
The production of active components in 1982 amounted to ¥1,592.3 billion, or 106.0% of that of the previous year, indicating a mere one-digit increase for the first time in the past four years since 1978. This shows a sudden shift from the recent trend of high growth.

By type, electron tubes amounted to ¥396.6 billion, or 91.1% of that of the previous year; semiconductor devices amounted to ¥360.5 billion, or 95.3% of that of the previous year; and integrated circuits to ¥835.2 billion, or 121.3% of that of the previous year. Electron tubes and semiconductor devices registered negative growth rates, reflecting the stagnancy of consumer electronics, which they heavily depend on.

The use of semiconductors is very extensive, and demand is increasing in the various fields. Japanese products are accepted by markets throughout the world for their high quality, and the exports are increasing. But, due to the criticism by the U.S. and other developed countries against the Japanese exports, overseas production by Japanese manufacturers in Europe and the U.S. is being actively promoted. Furthermore, foreign manufacturers, taking notice of the size of the Japanese markets and their productivity, have entered Japan, thus recently eliminating national boundaries, particularly in the seminconductor industry. Moreover, other characteristics of the semiconductor is that since it is a product of the most advanced technology, it requires severe adjustments for technological innovation, huge research development and facility investments, and effective and positive use of funds.

Both the domestic and foreign situation surrounding the semiconductor industry are severe, but since the semiconductor represents the basis of the electronics industry, it plays an important role in the future development of the electronics industry. Its role has been increasing more and more as a promotor of the revolution of the whole industry, because semiconductors have been widely used in other industries and have technological and economic rippling effects.

(Figure 31) Production Trends of Active Components



(2)-1 Electron Tubes

The production of electron tubes in 1982 amounted to ¥396.6 billion, or 91.1% of that of the previous year, indicating a decrease for the first time in four years. Furthermore, exports amounted to ¥175.1 billion, or 89.4% in the same comparison.

Cathode-ray tubes which account for 75.8% of the production of electron tubes recorded ¥300.5 billion, or 90.1% of that of the previous year. When analyzing the demand trends, European markets became sluggish, and self-production increased in Southeast Asia. As a result, exports experienced a sharp drop. Domestic shipments of color TVs indicated the highest increase ever in comparison to the past, but the increase was not able to compensate for the sharp decline in exports.

The production of black and white picture tubes amounted to 4,605 thousand units, or a 63.6% decrease from that of the previous year. Exports to China, a major destination, were reduced to half and production in Southeast Asia increased, thus resulting in a decrease in exports on the whole. Moreover, the domestic production of black and white picture tubes has continuously declined, and demand is most likely to decrease further.

On the other hand, concerning the production of industrial tubes, those for office automation and other displays amounted to 3,407 thousand units, or 136.4% of that of the previous year, indicating a favorable trend. In the case of other electron tubes, display tubes registered 54,225 thousand units due to the development of electronic games and computers, recording 118.4% of that of the previous year, subsequently indicating a favorable trend. Image pick-up tubes registered 1,552 thousand units, or a decrease of 88.2% from that of the previous year as a result of the stagnant demand for portable VTRs.

(Table 15) Actual Production of Cathode-Ray Tubes in 1982

* In comparison to the previous year

Unit: ¥million, 1,000 units, %

Products	Volume	*	Value	*
Cathode-ray tubes	29,997	88.8	300,495	90.1
Picture tubes	26,590	85.0	284,570	88.8
Color picture tubes	21,985	91.5	272,777	90.2
Black/white picture tubes	4,605	63.6	11,793	65.5
Industrial tubes	3,407	136.4	15,925	121.3

Source: Ministry of International Trade and Industry, Statistics on Production Trends

(Table 16) Actual Exports of Cathode-Ray Tubes in 1982

* In comparison to the previous year — Unit: 1,000 units, ¥million, %

Products / Destinations	Cathode-ray tubes for color TVs				Cathode-ray tubes for black/white TVs			
	Volume	*	Value	*	Volume	*	Value	*
Asia	2,064	70.7	28,981	77.7	1,643	66.9	4,818	75.9
Europe	4,006	91.5	63,529	92.1	122	207.3	633	222.3
North America	765	62.2	11,128	74.0	374	163.1	1,840	222.9
Latin America	954	103.1	15,289	97.6	7	16.4	34	25.3
Africa	186	91.9	3,549	76.9	453	130.0	1,904	131.8
Oceania	305	72.8	6,241	72.4	1	35.6	11	43.8
Total	8,281	82.2	128,716	85.7	2,600	82.8	9,239	102.0

Source: Ministry of Finance, Customs-clearance Statistics

(2)-2 Semiconductor Devices

The production of semiconductor devices in 1982 amounted to ¥360.5 billion, or 95.3% of that of the previous year. In 1981, being led by the favorable growth of consumer electronics, especially that of VTRs, production out-paced the growth rate of integrated circuits. However, in 1982, due to a decrease in the number of components used in VTRs and the stagnant situation of audios, semiconductor devices turned to record a negative growth. However, while most products indicated a decline, field-effect transistors and light emitting diodes showed an active trend. Field-effect transistors grew as a result of increasing demand for not only those for consumer use, but also for such fields as measurement and control. Moreover, growth in terms of value (up 47.5%) surpassed that of volume (up 10.8%) due to the growth of high performance and expensive products made from gallium arsenic.

Exports of semiconductor devices amounted to ¥70 billion, or 95.7% of that of the previous year. Exports destined to Asia, which represent a high composition ratio, indicated a two-digit decline.

(Table 17) Actual Production of Semiconductor Devices in 1982

* In comparison to the previous year

Unit: ¥million, 1,000 units, %

Products	Volume	*	Value	*
Semiconductor devices	21,555,291	95.1	360,474	95.3
Diodes	7,980,714	90.5	51,501	87.4
Germanium diodes	388,940	57.6	1,788	54.6
Silicon diodes	7,591,774	93.2	49,713	89.3
Rectifiers (over 100mA)	2,408,362	95.6	53,204	91.6
Silicon rectifiers	2,387,575	95.6	50,507	91.9
Others	20,787	92.8	2,697	86.8
Transistors	8,371,872	96.3	143,456	91.8
Germanium transistors	19,115	43.3	837	47.0
Silicon transistors	8,068,187	96.1	130,029	89.1
Field-effect transistors	284,570	110.8	12,590	147.5
Thermistors	124,328	90.3	6,289	105.8
Varistors	313,964	87.2	6,788	97.2
Thyristors	173,216	108.7	20,003	96.5
Optoelectronic devices	2,113,487	114.8	68,391	107.2
Light emitting diodes	1,953,889	115.1	49,778	109.3
Others	159,598	110.3	18,613	101.9
Other semiconductor devices	69,348	54.5	10,842	140.8

Source: Ministry of International Trade and Industry, Statistics on Production Trends

(2)-3 Integrated Circuits

In 1982, the production of integrated circuits amounted to ¥835.2 billion, or 121.3% of that of the previous year, accounting for more than 50% of the production of all active components.

When analyzing semiconductor integrated circuits, linear circuits which are heavily dependent on consumer products registered ¥176.7 billion, or 94.1% of that of the previous year, indicating a decrease. Meanwhile, digital circuits recorded ¥567.1 billion, or 130.6% of that of the previous year, indicating a favorable trend. Among these, MOS ICs increased due to demand from industry, in general, such as for office automation and information related equipment; in addition, they have been more extensively used in electronic games and music instruments, and others. Furthermore, the full-scale production of the 64K memory began. Bi-polar ICs are highly dependent on consumer products, and the production of those for consumer products has been levelling off. However, substantial increases were seen in new fields such as office automation related products, and so on.

The production of hybrid integrated curcuits amounted to ¥91.4 billion, or 136.9% of that of the previous year, indicating sudden growth. This is attributable to design and production technologies, which have met the rapidly changing needs for machines.

(Table 18) Actual Production of Integrated Circuits in 1982

* In comparison to the previous year

Unit: 1,000 units, ¥million, %

Classification / Products	Volume	*	Value	*
Integrated circuits	4,392,157	125.7	835,237	121.3
Semiconductor integrated circuits	4,173,534	125.2	743,813	119.6
Linear circuits	1,651,801	106.0	176,674	94.1
For industrial use	376,716	–	41,777	–
For consumer use	1,275,085	–	134,897	–
Digital circuits	2,521,733	142.0	567,139	130.6
Bi-polar ICs	963,244	156.9	130,493	138.4
Logic devices	934,791	–	104,232	–
Memory devices	28,453	–	26,261	–
MOS ICs	1,558,489	134.1	436,646	128.5
Logic devices	1,021,072	–	208,177	–
Memory devices	537,417	–	228,469	–
Hybrid integrated circuits	218,623	136.0	91,424	136.9
Thin film integrated circuits	11,101	130.6	8,746	114.8
Thick film integrated circuits	207,522	136.3	82,678	139.7

Source: Ministry of International Trade and Industry, Statistics on Production Trends

The production of integrated circuits has been registering favorable growth. When reviewing the growth in the past, according to the Statistics of the Ministry of International Trade and Industry, the average growth since 1970 is 25.8%. The average growth of computers during the same period is 14.4%. At the beginning, the scale of integrated circuits was one-sixth that of computers, but at the present, the scale rose to one-half of that of computers.

In terms of trade, exports amounted to ¥285.1 billion, or 142.8% of that of the previous year, registering an increase of 111 times in terms of scale over the past ten years. Among these, unmounted ICs recorded ¥61.4 billion, or 146.8% of that of the previous year, indicating a significant increase. This implies the fact that assembling activities outside Japan have been active. On the other hand, imports amounted to ¥127.4 billion, or 111.5% of that of the previous year. As a result, the balance of trade registered ¥157.7 billion, indicating a black figure. In 1979, exports surpassed imports for the first time, registering a balance of ¥9.8 billion. Since then exports expanded to ¥74.4 billion in 1980 and ¥85.4 billion in 1981; thus indicating that highly reliable Japanese products, reflecting superior design and production technologies, have been widely accepted throughout the world.

When studying the bilateral trade balance with the U.S., exports from Japan recorded positive growth amounting to ¥116.8 billion, or 164.0% of that of the previous year. This is due to the extremely active demand and to the increase in exports by U.S. manufacturers in Japan. Imports amounted to ¥83.5 billion, or 118.5% of that of the previous year.

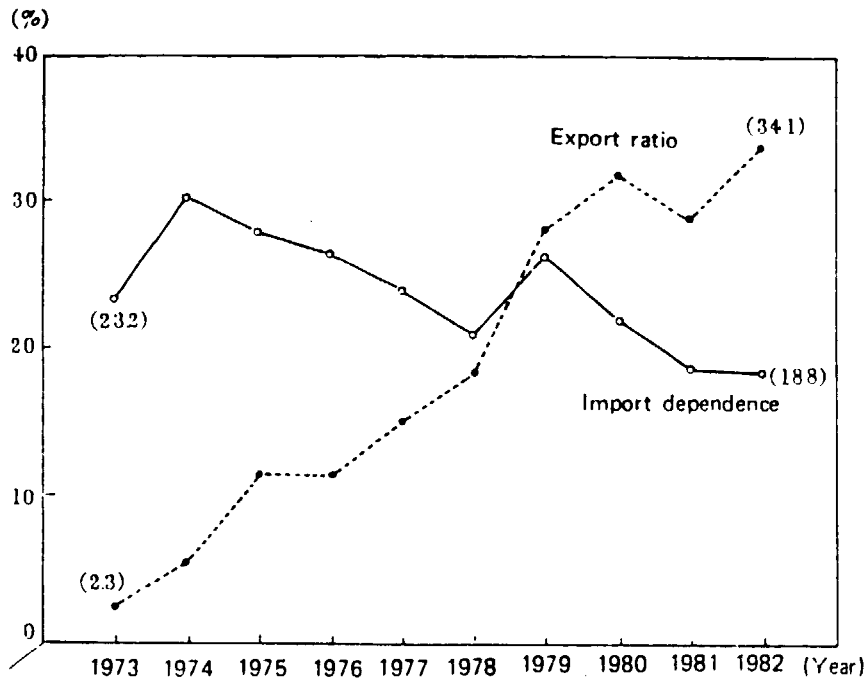
(Table 19) Export Trends of Integrated Circuits

* In comparison to the previous year (Unit: ¥million, %)

Destination	Asia		Europe		North America		Latin America		Africa		Oceania		Total	
		*		*		*		*		*		*		*
Exports	107.992	129.1	46.995	143.8	117.312	163.6	10.413	104.6	689	86.9	1.711	193.0	285.112	142.8
Imports	31.165	107.3	12.012	87.1	84.173	117.9	31	177.5	0	—	0	—	127.382	111.5

Source: Ministry of Finance,
Customs-clearnace Statistics

(Figure 32) Trends in Export Ratio and Import Dependence of Integrated Circuits



$$\text{Import dependence} = \frac{\text{Import}}{\text{Production} - \text{Exports} + \text{Imports}}$$

$$\text{Export ratio} = \frac{\text{Export}}{\text{Production}}$$

APPENDIX 5-8

Industry; project appraisal process, by Mr. S. Hiraki, Manager, Project Committee and Business Development Dept., the Industrial Bank of Japan

INDUSTRY; PROJECT APPRAISAL PROCESS

Schunichi Hiraki
The Industrial Bank of Japan, Ltd.

Introduction of the Lecturer

June 1941	Born in Kobe, Japan
March 1965	Graduated from University of Tokyo B.E.
April 1965 —	Joined Industrial Bank of Japan as an economist and worked for Economic and Industrial Research Depts
June 1969	Graduated from Harvard University Graduate School of Business Administration M.B.A.
April 1973 — June 1976	Investment Officer of International Finance Corporation: I.B.R.D., Washington D.C., U.S.A.
June 1976	Fellow of Economic Development Institute, I.B.R.D. (World Bank)
July 1980 — October 1982	Seconded to Japan Coal Development Corp. and engaged in evaluation of overseas development of coal mining as a manager
November 1982 —	Project Committee and Business Development Dept., Industrial Bank of Japan as a manager

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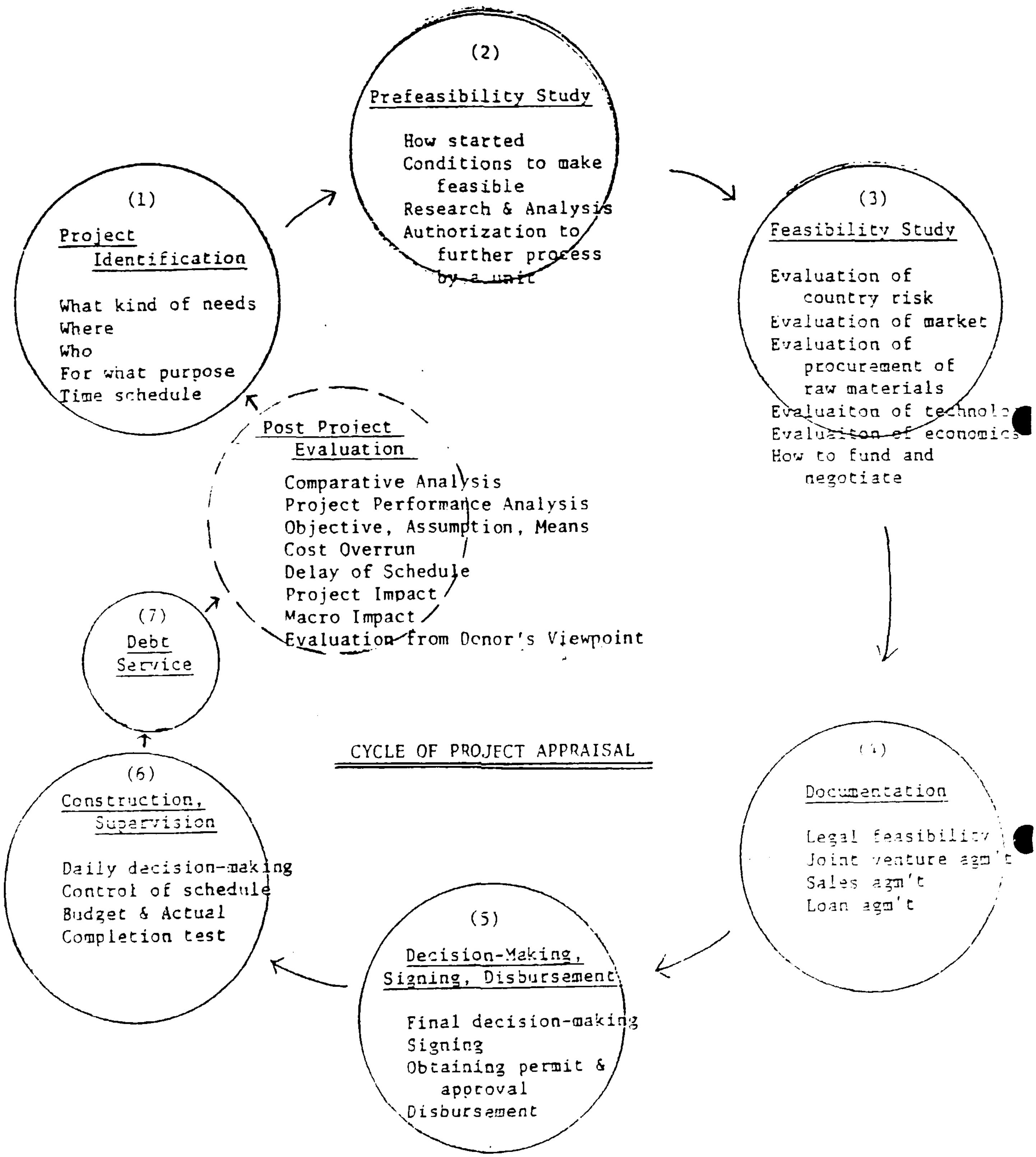
Engaged in project evaluation in the line of Agro-industries (coconut oil, silk manufacturing), financial institution building (leasing, security transaction, merchant bank) and energy development (LNG, Coal, Oil, Nuclear) in various countries.

Married with Michiko and a daughter



CYCLE OF PROJECT APPRAISAL

Experts with Deep Professional Knowledge and Experience

---A Task Force Approach

---Lead Bank or Not is related to whether the lender uses In-House or Outside Expert

(1) Specialist Economist;

to analyze and forecast the economy of the project country

to assess the country risk including political risk

to evaluate the economic impact of the project

(2) Financial Analyst;

to forecast profitability of the project

to analyze debt-service capacity and R.O.I.

to analyze and negotiate the debt funding

(3) Market Analyst;

to anlyze and forecast the demand-supply situation of output and input

to analyze and forecast the prices of output and input

(4) Engineers (Reservoir Engineer and Geologist);

to appraise technical feasibility as to commercially being proven

to estimate capital costs

(5) Lawyer;

to establish the legal feasibility

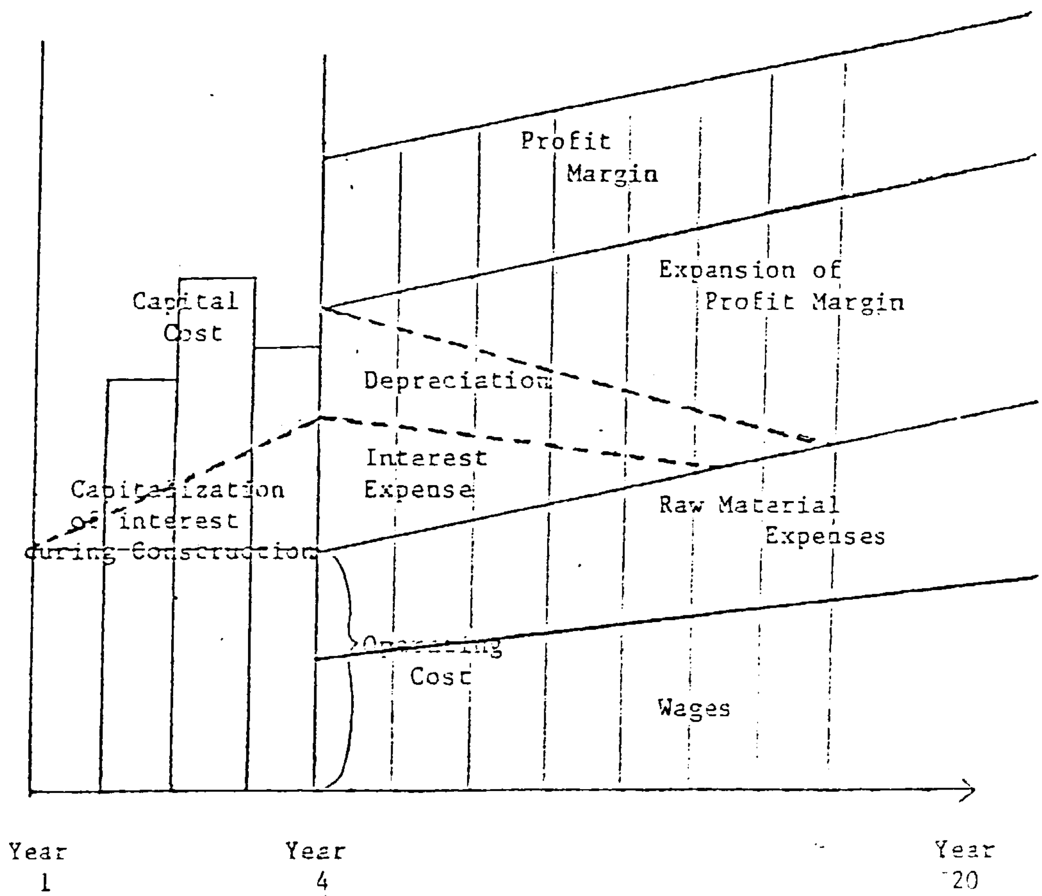
to check the contractual rights and obligations

to prepare documentation

SOME FIGURES
OF THIS DOCUMENT
ARE TOO LARGE
FOR MICROFICHING
AND WILL NOT
BE PHOTOGRAPHED.

Schematic Approach for Profitability

(based on inflation accounting)



Projected Profit & Loss Statement

Projected Cash Flow Statement

Projected Balance Sheet

---→ Sensitivity Analysis (Down-Side Risk Analysis

Price ↓ Sales Volume ↓

Capital Cost ↑ Operating Cost

Delay of Start of Operation →

APPENDIX 5-9

Quality control, QC circle and productivity,
by Mr. H. Karatsu, Managing Director,
Matsushita Communication Industiral Co., Ltd.

QUALITY CONTROL, QC CIRCLE AND PRODUCTIVITY

Hajime Karatsu
Managing Director
Matsushita Communication Industrial Co., Ltd.

What should be done

In May of last year when I was privileged to address a Joint Economic Committee breakfast meeting at the Capitol in Washington, D. C., I underscored the point that successful QC in Japan was based on knowledge acquired in the United States. I also noted that not all QC were successful, and failures have occured. In conclusion, I stressed that the success or failure of QC is determined by the decisions and actions of top managers and not by cultural factors.

After making this speech, a question was raised by one of the participants. The question was, "Do you really believe that the cultural gap between Japan and the United States does not affect the success of QC?" I responded by describing a small incident that I experienced in Chicago prior to coming to Washington, D. C. In Chicago, I attended the Consumer Electronics Show. There were many products from our company on display at that show. When the items arrived packed in crates, it was the work of the Carpenter's Union to remove nails from the crates. However, simply extracting the nails was not enough to remove the entire wooden frame since there were some remaining nuts and bolts.

The man from the Carpenter's Union said that removing the nuts and bolts was not his assigned job and that he would not do it. Finally the frames were removed, but here again, the work stopped because the rest was to be done by a worker from another Union. Then we learned that pamphlets ordered from Japan had arrived. I went down to see them but the Union worker to unload the packages was not there. We waited and looked for this person for two hours but he failed to appear. The driver of the truck who had delivered the packages gave up and went back without unloading them. In these circumstances, I suggested that there is no possibility of increasing work productivity. However, in the American game of baseball, I have never seen the unions of first basemen and second basemen discussing who should field the ball if the ball is hit between the two bases. When I said this, everyone in the hall broke out in laughter. If relevant cultural differences exists between the U. S. and Japan, I think it can be found in what I have just mentioned. In Japanese companies, people work in a manner similar to the teamwork seen in the game of baseball.

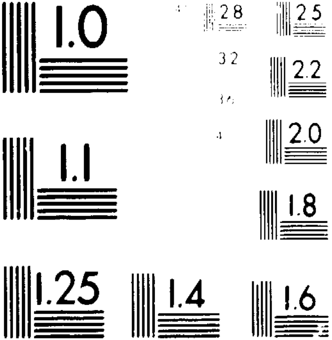
Recently, many books have been published regarding the success of the Japanese economy and the reasons for this success.

When I went to Milan, Italy last March to deliver a talk, I was asked my opionion on the issue of cultural gaps.

I responded by saying that 20 years ago, a professor at Columbia University published a book on Japanese management. In that book, as I remember, factors now claimed to have led to the present success of Japan were all interpreted as negative factors such as life-time employment and "ringi" system and so on. However, today they are pointed out as positive factors which contributed to the success. My belief is that the cultural factors are not as important as claimed.

In Japan, the bankruptcy rate is rather high. Companies applying Quality circles have sometime failed.

Prof. Robert H. Hayes, Harvard University, in an article published in the Harvard Business Review of July 1981, reported on Japanese management following a six month period of investigation. He said that Japanese success is attributable to the fact that Japan has commonly done what should properly be done, and that this is not due to any cultural factor. In Japan, when you go into a plant, you will find that everything is kept neat and clean. The maintenance of machines are kept in good condition and employees are working with utmost effort. The



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

report mentions that these points are the keys for Japan's success with which I quite agree. I once visited a plant in Italy. The inside was very dirty, machines were greasy and in a poor condition, and workers smoked while they worked.

This is absolutely not the way to maximize worker efficiency. When I said this, to my surprise, 200 people in the audience showed their agreement by applauding. This made me feel really happy. Every country knows what should be done. What is considered bad is bad no matter where you are. The people who listened to my talk were managers of a plant and university scholars. They probably applauded because I frankly pointed out the problems that they had in their minds.

Currently, many countries in the world are suffering from recession and unemployment. Japan, in comparison, has been managing its economy somewhat better. Price inflation in Japan is below 4%, the GNP growth rate is maintained at the level of 4% - 5%; and the unemployment level has been held at about 2%. These facts are largely responsible for success of the Japanese industries in manufacturing good products. In the past 10 years, the price inflation on Japanese industrial products has been kept at the lowest rate of increase in the world. Regarding automobiles, a maximum increase of 30% has been observed. On the other hand, the price of television sets, and watches have declined. Even the price of steel materials, that have low added value have only doubled. High quality, low cost products are what all consumers appreciate the most. That is one reason why people prefer Japanese products. It is my belief that the so-called non-tariff barrier contributing to the trade imbalance is the quality gap.

Better the quality, lower the cost

In the process of rebuilding Japanese industries destroyed during the war, a large part of our efforts was concentrated on improving the quality of our products. Some of them achieved top-level quality in the world before we knew it. Quality products will always sell, because good quality best serves the consumer. Through our experience, we have learned another important thing. That is the fact that, as quality control forms an integral part of the manufacturing process to improve product quality by reducing production of defective goods, the cost of production will decrease without exception.

"The better the quality, the lower the cost?" Many people might think this is too good to be true. While this seems to be a contradiction in terms, it is a very natural consequence in the view of Q. C. experts. Walter A. Shewhart, who first proposed "Statistical Quality Control," pointed out this fact in his first book "Economic Control of Manufactured Products" published in 1931.

As inferior products are eliminated through innovation in the manufacturing process, materials, labor and energy otherwise used can be saved while producing an equivalent amount of product value, which means lower costs. In addition, when a large volume of inferior goods is produced, a machine must be stopped frequently for adjustment or the material must be replaced often to produce satisfactory products. This reduces the operation rate. If inferior products can be eliminated, the machine, once started in the morning, can be run until closing time, making the total production larger. As the rate of inferior products is reduced, the cost is made lower and lower.

Many of you might have some questions. You might ask, "The reduction of inferior products will require additional equipment and cost for that purpose. What are their effects on the total cost?" Before answering the question, I would like to make a more important observation at this point which happens to be the theme of my talk today.

Quality control as an effective means of controlling inflation

Please look at the figure on table I. This shows the changes in prices for various goods gathered from advertisements in newspapers and the figures in the economic sections in Japan for the last decade from 1970 to 1980. You will see from the figures that there are substantial differences in the price changes over the decade. Some prices climbed steeply, but others dropped, and still others were flat.

First of all, look at cars. The most popular class of cars in Japan is equipped with a 1300-cc engine. The price of these cars rose as little as 30%. Furthermore, the present cars have better performance than the cars made a decade ago and are equipped with various devices to meet the Japanese Automobile Emissions Regulations which are the strictest in the world.

The price of TV sets dropped by about 40%. The price of single lens reflex cameras went down by about 8% owing to intensifying competition in new model development. The price of wristwatches went down rapidly over the last two decades. These products, being highly manufactured goods, easily lend themselves to a variety of technical innovations. Consequently, on the basis of these figures above, the validity of this proposition may still be open to some doubt. Tq answer such an argument, I direct your attention to certain other articles requiring fewer manufacturing processes. Let's start with steel. Its price has not more than doubled over the decade. This is surprising since the price of oil was up 10 times during the same period. The price of Portland cement also almost doubled. Food prices in Japan are high in part, but these prices vary with the kind of food. Egg prices rose only about 10%, and pork prices went up 30%.

While the Japanese wage quadrupled over the decade, some prices for goods were stable or even went down! I think you know already the reason why such things were possible. This is because an increase of productivity offsets a cost rise. The productivity of Japanese electrical industries increased 4.9 times over the decade, and that of the transportation machinery industry was 4.1 times higher than a decade ago. Since the productivity was 4.9 times as high over a decade, it was possible to cut the price even though the worker's wage was quadrupled. The prices for TV sets and camera dropped in the same way.

In recent years, the spectre of inflation has threatened the world's economy. To counter inflation, it has been proposed to raise productivity, and various counter measures have been worked out. However, I am told that these measures are not as effective as expected. Inflation raises people's anxiety about their future, particularly when the vigor of the economy weakens. This could lead to a crisis as serious as the depression in 1929. Accordingly, we all must work together to counter this amorphous yet pervasive enemy--inflation. In this battle, one of the most effective weapons is increased productivity. Although many measures have been proposed, I would suggest, based on our experience in Japan, a particular emphasis on quality control.

Three ways to increase productivity

While there are many ways to increase productivity, I hope I can make them simple in the following three ways:

The use of machines is one of them. If a man carries a load on his back, the maximum load is more or less 100 pounds. But, if you use a handcart, you can carry it faster and finish the work with ease. One of the factors in increasing the productivity of Japanese manufacturers is their sustained heavy investments in mechanization. This is a well-known fact. The graph (Figure I) shows the change of a labor-equipment ratio in the Japanese manufacturing industry. Mechanization not only has increased productivity and reduced cost, but, in doing so, it also has created new demand. The ripple effect of stimulation extended to associated industries.

Another way to increase productivity involves the quality of workers who operate the machines. There is a substantial difference in productivity between the output of a well-educated and trained worker and that of an unskilled worker. This needs no explanation.

The third way involves the most efficient combination of machines and workers to achieve maximum results. Even if the same machines and workers are used, the output achieved varies with their combination and manner of operation.

Last March, I was in Washington D. C. in U. S. and met a Congressman at a meeting. He said, "You are right to say that there is no short cut to depress the inflation of the U. S. other than to increase productivity of industries. But it is not so easy because it requires a vast sum of money." Then I said, "Of course there is a way requiring much money. But we have another way which requires only little money."

He asked me, "What is the other way?" It may need much money to install automatic machines or robots to increase productivity. But improvement can be done by way of operation of machines also.

For example, when you drive a car, you may have the following experience: Your car stops at every crossing by red signal. But it will be unnecessary to stop if the signal timing is adjusted to meet only the green signal synchronized to the speed of your car. It will take only half the time to arrive at your destination. Then productivity is increased twofold. The way to synchronize signals to the speed of the car is called systematic control of traffic signals, and it requires only little money.

The congressman said, "Oh, yes. You mean we can do it by software." He was correct. We have three ways to increase productivity. One is by hardware, another by humanware and, the other by software.

A certain auto maker bought a large press to form car doors from a West German company. However, the press maker advised that when shifting from pressing left to right doors, the stamping die change operation would take eight hours. Eight hours means the loss of a full day's work. So, the auto maker decided to change the stamping die on Sunday and start pressing operations on Monday. After left-side doors were finished, the stamping die had to be replaced to press right-side doors. So, the stamping die was replaced the next Sunday to press right doors. In this way, it was necessary to store half-finished goods until both doors were completed, which required a large warehouse. For this reason, the auto maker began research into how to shorten the time for replacing the press stamping die. As a result, the time for the replacement became shorter and shorter, and now takes only 20 minutes to change. This has made it possible to change the stamping die every day, resulting in a considerably lower cost. This is a good example of how the software works. In general, a certain method is used to compare or to measure the productivity of a factory to see the capacity or ability of the machine installed in it. But this is not sufficient, because the output of the machine shows quite different figures according to how these machines are operated and what kind of products are manufactured by them.

Recently, the high productivity of Japanese industries is in the limelight all over the industrial world, and study missions travel around the plants in Japan: auto, electronic, steel, shipbuilding, and so on. However, what they find in these factories is just the same kind of machines and robots used in western countries, in principle and in usage. Nevertheless, generally speaking, in this figure of productivity there is a great deal of difference compared with Japan.

You can easily tell the reason why the difference is brought up: according to software, as the forementioned congressman said.

However excellent a car, it would become a most dangerous machine when operated by a poor driver. On the other hand, it can be changed into quite a different vehicle, a very comfortable and convenient one when handled by a careful, well-trained driver.

The method for improvement

By the way, you may wonder how they shortened the time required to change the stamping die.

It may be easily accepted as common sense when I explain it as follows, which is like the story of Columbus and the egg.

The auto makers in question discussed about the reason why it takes such a long time to change the dies.

The crane is required to change the stamping die, but there were only two cranes in the shop at that time. Therefore, only two press machines were able to work at the same time to change the dies. Of course the others were left untouched.

What is the work done by a crane? It is only to hang up the heavy die. Do we have another machine to do so? Oh yes, the forklift! Then the workers gathered as many forklifts as can be used in the shop. The work to change the die became possible to start everywhere in the press machine shop.

Therefore, the time to change the die was shortened to 4 hours.

To change the die, many screw nuts must be turned by use of the wrench. They welded the wrench to every nut. Then, to change the die, workers turned the nuts all together at one time.

The next idea was to prepare the deck equipped with rollers to support other dies to be changed. In doing this, dies can be changed only by pushing laterally without using the crane.

Such kind of new ideas were proposed one after another. The time required to change the dies was cut to only 20 minutes, half a year after the press was installed in the shop.

And almost all these kinds of ideas came from QC Circle activity of the shop.

In general, QC method was developed as the technology to improve the quality of products in the manufacturing plant.

But, today, in Japan, QC is accepted not only as the method to improve the quality but also to level up all kinds of jobsite: manufacturing plants, savingbanks, departmentstores, the government and even restaurants and so on. Multipling the effect of each other realized high productivity of Japanese economical power.

I made a series of TV programs concerning QC about 20 years ago. That period was just the dawn of QC in Japan, and when the last program was over, a party was held at a restaurant near by the studio. I still remember the impressive words expressed by the producer of this program at the party.

He said "Almost all of this program was no other than common sense.

It is a very natural matter. But I am impressed at one point in QC. The procedure to solve the problem and to improve the quality is arranged very skilfully; that means QC theory is not the knowledge but the way to get better result in the shop-floor easily, even by each blue collar worker.

He was right and gave me quite a new view of Quality Control.

QC as the way for improvement

First of all, it must be understood that people have different understanding of the definition of the term "QC" (quality control). Needless to say, the purpose of QC lies in supplying good quality products to the consumers. But there are many ways of accomplishing this task. One example may be the comprehensive inspection of finished goods and shipping only quality products while disposing of defective ones as scrap. Another example, known as QC until some decades ago, is the repairing of defective items prior to shipment. For this reason, still today, there are many people who believe that QC involves only inspecting or screening products. Thus, when the success story of the QC circle in Japan was publicized overseas, there were many people who misunderstood it as a group of inspectors.

On the contrary, "QC" in Japan has a different significance. In other words, it refers to the manufacture of only good quality products and the nonmanufacture of defective ones. When this happens, the defective rate is zero, which, in turn, makes inspection and screening futile. This implies that quality control in Japan refers to the ultimate delition of the inspection process. Factories carrying out strict detailed inspection are considered to be inferior and something not to be proud of.

Moreover, the successful introduction of the Japanese process of quality control, that is, to guarantee quality by not manufacturing defective products, would lead to a continuous lowering of costs. This point is even more important.

To exemplify this point, the case of the semiconductor industry may be mentioned. A semiconductor is made by printing numerous chips on a circular silicon wafer and repeatedly processing it chemically. In this case, quality control here refers to the task of increasing the yield (increasing the number of chips obtained from a single wafer). When the yield is increased, the costs decrease. Because increased yield implies the absence of defects in a chip, this inevitably is accompanied by increased reliability when actually used. In other words, increased yield leads to lowered costs and an improved defect rate during usage. A chip produced through a low yield process almost always suffers from an increased defect rate during usage regardless of repeated testing and screening during inspection.

Consequently, it follows that the better the quality of a product, the lower the costs. This same principle is shared commonly not only among semiconductors but among all manufactured goods.

Although this may, at first, appear inconsistent, it is a fact concerning quality control. Thus, Japanese management, correctly understanding the concept, proceeded to introduce this scheme on a full-scale basis.

To reduce the defective rate in production shop floor, the cause of bringing such inferior products should be detected and eliminated.

QC experts originated and cultivated the art to improve the quality and matured it. Finally the generalized way for improvement of quality was established. This is when I received the idea from a TV producer, as I have mentioned earlier.

Today in Japan, QC is accepted as the methodology for improvement. Everywhere on the jobsite of enterprise there are many problems to overcome. QC spread company-wide in Japan.

Where there is a job, there is a problem to be solved.

TQC (Total Quality Control)

Nevertheless, it is not a very easy task for a factory to actually stop the manufacture of defective products and merely begin producing quality products. This is due to the fact that there are numerous causes for a defect. The first of such sources is miscalculation in planning. An innovated facility would serve no good, if a machine is not well designed; it would not operate effectively and the defective rate would rise. But, on the other hand, even if the design is good, if the designated machine type in the specifications is not supplied, defective goods will once again be manufactured as a consequence. Thus, it is also important to execute TQC even with the suppliers. Adequate care of manufacturing facilities to process the purchased machinery also influences the defective rate. The laborers' quality of work is also another factor which may give birth to defective products. Moreover, even if there is nothing wrong with the finished product, if the explanatory note does not sufficiently illustrate the correct handling process of the product, a user may mishandle it and result in problems. Thus, the method of after-sales-service is another important factor. The purpose of the design may be incorrect. There are also cases of trouble due to inadequate responses to questions by users over the phone.

In this way, in order to successfully supply genuinely satisfactory products to the users, the entire function of a company should systematically work to guarantee its products' quality.

It is from this concept that the currently common knowledge of TQC or total quality control originated; that without it quality control in its real sense could not be accomplished in Japan. And this concept served as one of the driving forces for the success of the Japanese economy today.

In Japan, there exists a system which presents an award known as the "Deming Award" to companies which have successfully and effectively introduced quality control. Many of the world-renowned first class Japanese companies have been awarded the "Deming Award." Such companies consist of various industries such as electrical, automobiles, steel, ship building, cameras, etc.

In the selection of candidates for this award, company presidents attend the judges' conference to explain the top policies of their respective quality control programs. The criteria consist of all aspects of a company, and a president is questioned on his factory, its design, management and labor policies, accounting, etc. Thus, in Japan, the "Deming Award" is significant for a company's efficient TQC operation and the award improves the company's image. Likewise, the receiving of this award is utilized extensively in a company's publicity activities.

<u>QC circle</u>

The QC circle is one of the conspicuous elements of TQC in Japan. It is a voluntary group engaged in discovering and drawing up solution plans for problems at the working level.

On the occasion of an international conference on quality control held in Tokyo in 1969, some representatives visited our factory. Following presentations by our four circles on improvement measures, one foreigner brought up a question to a female worker, one of the speakers, during the question and answer session. He asked her, "What you presented on the improvement of the factory is the work of technicians and not of a common laborer like you. Isn's this interfering with the boundaries of the division of labor? What is your opionion on this?" To this, one of the members of the circle replied, "I understand your question. Nevertheless, we are best versed on the work within the factory. In the course of our daily work, we discovered a problem in the process, discussed it among ourselves and came up with a countermeasure which lowered the defect rate by 1/3. Is there anything wrong with this?".

This is the very attitude of the QC circle. Its members often stay late even after working hours to carry heated discussions on improving their work efficiency. They seem to be enjoying solving difficult problems. It is one of their pleasures, and may be termed as "A game for improvement." This situation is comparable to volleyball players of a company who do not demand extra pay for practicing after work hours.

They would study data on the quality of their daily work and are able to actually see the effects of their efforts. This may imply a return to the days of craftsmanship.

Scientific managemnet for Taylor and Gilbraith was effective for the aims of mass production, but has deprived the laborer of the pleasure of "making" things. The QC circle has now rediscovered this pleasure.

Another important element to point out here is also statistical quality control which allows the QC circle to come up with improvement measure. In Japan, this is known as the "paraphernalia" for improvement. Although the science of statistics is very difficult, it was the Japanese statistical specialists who facilitated and summarized the scientific procedure for novices and educated QC circles.

A tool is indispensable. It was with the important tool of the telescope that enabled Galieo Galilei to discover the rings arouna planet Saturn. And it was the statistical means which served as paraphernalia that now enables a member of the QC circle, be it a young girl with only a high school education, to come up with an improvement measure that even a specialized technician may have never thought of. This certainly was very exciting for these girls and this is "the" reason for an extensive infiltration of the QC circle among Japanese companies.

Technical analysis and statistical anaysis

If you see female Japanese assembly line workers without any technical background whatsoever making suggestions even engineers haven't been able to think of, you will ask what makes it possible for those wormen to acquire their technical knowledge. The answer is statistical methods.

We have two methods of analyzing and eliminating trouble in the manufacturing shop. One is by technological analysis; the other is by statistical analysis. QC uses statistical methods to analyze and improve the quality of products.

In the color TV factory of our company, a female employee of the Quality Assurance Section found that the failure rate of TV tuners differs depending on the type of TV, even when the same type of TV tuner is installed in the sets.

She thought that there must be some reason for this difference in failure rates of TV tuners. Therefore she drew diagrams which showed the relation between the failure rate of the tuner and the length of the shaft, the temperature of the set, the diameter of the tuner knob, size of the cabinet and so on. At last she discovered a correlation between the failure rate and the distance from tuner to speaker; in other words the failure rate of the tuner is quite low when the tuner is attached far from the speaker. On the other hand, when the tuner is attached near the speaker the set doesn't work well.

Such a conclusion would be hard to draw through technical analysis alone. But by accumulating market data we can discover such a phenomenon. We call this the law of large numbers.

Therefore, you may understand that we have two ways to find out the cause of defectives, one is by the use of analysis based on technology and the other is through statistics.

One of QC's specialties is the use of statistical methods to eliminate trouble in the shop.

In order to find causes for a defect, you don't need sophisticated technical experience. What you need to do is analyze data. And quality control circles have learned to use statistical tools; this is what makes the circles so successful. Statistical analysis can be used to solve problems not only in manufacturing but also in sales, accounting, personnel management and service.

Spurred on by this method, QC circles are in demand among various fields including manufacturing, construction, financing, restaurants and department stores. The same thing may produce varying degrees of the results. Companies introducing the method seem to get better results in their work.

Automation and QC

During the first oil shock, every Japanese company suffered from the double pinch of falling sales and rising wages. Each company had to help itself because there was no one else to help it. Companies made desperate efforts to improve their productivity, and one way to do this was, naturally, to make an automatic and unmanned plant. In the course of their efforts, they discovered an important rule, and that rule has become generally accepted. That is, in order to have successful automatic operations, it is necessary to drastically reduce the rejection rate.

A high rate of substandard products indicates that we have not yet discovered a way to produce only excellent ones. If machines are automated without first reducing the rejection rate, these machines will efficiently produce a mountain of inferior goods. According to my experience, if the rejection rate is more than a few percent, mechanization will produce very poor results.

Some people might think that automation itself reduces the rejection rate. On the contrary, a reduction of the inferior rate prior to automation raises productivity, making it possible to eliminate many workers completely. And since automation eliminates the errors caused by worker mistakes, the inferior rate is further decreased after automation.

Automation has certainly helped Japanese industry raise productivity. Wages increased four-fold during the ten year period from nineteen-seventy to nineteen-eighty. Furthermore, Japan successfully held prices of industrial products to a minimum during the period as I have mentioned.

Hearing about automation, some people instantly link it with unemployment. This, however, is too short-sighted. People are now able to live in comfort thanks to a rise in productivity due to automation. Nowadays, everyone can use commodities which even noblemen could not afford in the past. People today also enjoy more leisure time, producing new waves of artistic activity. Japanese industry has witnessed a more than three-fold increase in productivity over the last ten years, while at the same time, the jobless rate has remained about two percent. The jobless rate is low because so many new types of occupations have been created. This also substantiates the theory that productivity growth creates new employment. In a country where there is no growth in productivity, inflation inflicts great hardship upon the people while pushing up the rate of unemployment. It is important, therefore, to understand correctly the importance of productivity. This is why Japan has been able to raise the income level and absorb oil price hikes while at the same time holding the influation rate low. Japan was more successful in doing this than any other country of the world during the two oil crises of the 1970's. What made that success possible was increased automation, and higher productivity. For that purpose, quality control served as a most powerful weapon.

Conclusion

Japan recorded a GNP of ¥255,000 billion in 1981 or a 10.7% share of that of the world. The land area of this nation is a mere 0.3% of that of the world, but its population amounts to 2.7% of the total world population. This country currently has a strong economy. Following World War II in 1945, however, Japan was left with a starving population of 70 million, burned down cities and ruined factories. Having witnessed the situation, the present prosperity we now enjoy is like a dream for me. We sincerely appreciate the allies, for the invaluable support to recover this dilapidated nation. The method of quality control as well as its execution was actually introduced by the Occupation Forces.

To this, Japan loyally followed orders, further refined such a method and was able to win the present level of prosperity.

TQC will more than likely continue to function effectively for Japan. Automation is part of the current of history and cannot be changed or hampered. And Japan proves the dire necessity of TQC for the success of this automation.

For the realization of tomorrow's prosperous society and for the purpose of increasing productivity and improving quality, I hope that Japan's experience functions effectively not only in the industrial nations but also in starving and suffering developing nations.

And for this very cause, I am convinced that it is Japan's duty to transfer its technology.

Change of Price

Item	1970	1980	(%) '80/'70
Car(1,300 cc)	520,000	670,000	129
TV(B/W 12")	42,000	28,000	67
Refrigerator(170l)	113,000	104,000	92
Reflex camera(F 1.8)	60,000	50,000	83
35mm Film(Color)	580	730	126
Rice Price(60kg)	8,256	17,279	209
Whisky	1,900	2,350	124
Cheese(1/2Pound)	168	257	153
Egg(1kg)	214	275	129
Pork(1kg)	433	550	127
Sardine(1kg)	301	1,870	621
Steel Sheet(Ton)	45,000	98,000	205
Staple Fiber(453g)	117	238.1	204
Portland Cement(Ton)	8,060	17,550	219
Barber	498	2,040	419
Electric Rate(1kW/h)	10.7	18.7	184
Telephone	7	10	142
Train Fare(1km)	4.2	10.7	255
Post Card	7	20	285
Newspaper(month)	660	2,000	303
Weekly manazine	70	180	257
National Theater	2,000	4,000	200
Apartment House(3DK)	7,000,000	21,000,000	300
Wage(Monthly)	60,000	230,000	383

Units in yen. Table 1

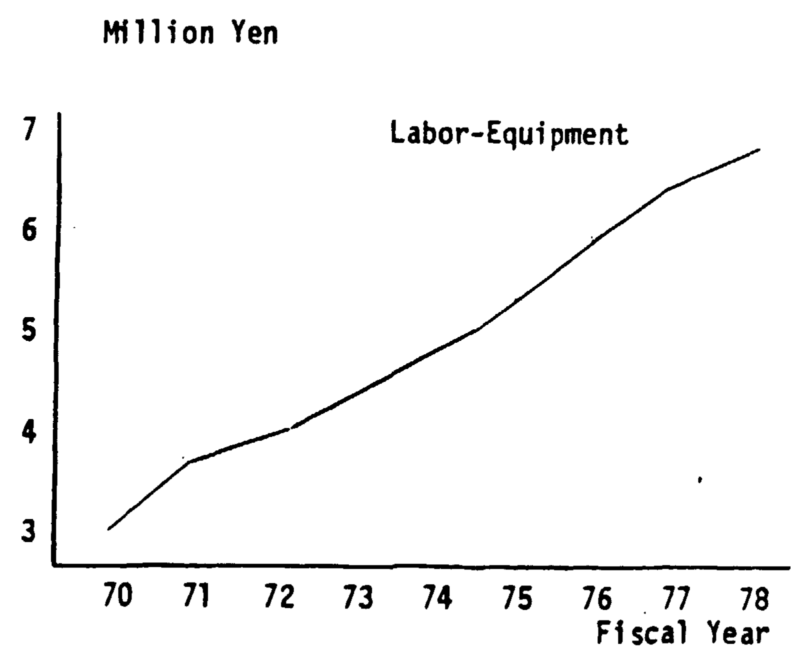


Fig. 1

APPENDIX 6

Major Group 63-Rotating Electrical Machinery, Except Auxiliary Equipment for Internal Combustion Engine

MAJOR GROUP 63—ROTATING ELECTRICAL MACHINERY, EXCEPT AUXILIARY EQUIPMENT FOR INTERNAL COMBUSTION ENGINE

中分類63－回転電気機械（内燃機関補助装置を除く。）

63 1	発電機	Generators
63 11	直流発電機	DC generators
63 111	一般用直流発電機	DC generators for industry
63 112	車両用直流発電機	DC generators for rolling stock
63 113	船用直流発電機	DC generators for marine
63 114	航空機用直流発電機	DC generators for aircraft
63 119	その他の直流発電機	Miscellaneous DC generators
63 12	交流発電機	AC generators
63 121	水車発電機	Water-wheel generators
63 122	蒸気タービン発電機	Turbo-generators
63 1221	一般用蒸気タービン発電機	Turbo-generators for industry
63 1222	船用蒸気タービン発電機	Turbo-generators for marine
63 123	ガスタービン発電機	Gas turbine generators
63 1231	一般用ガスタービン発電機	Gas turbine generators for industry
63 1232	船用ガスタービン発電機	Gas turbine generators for marine
63 124	エンジン発電機	Engine generators
63 1241	一般用エンジン発電機	Engine generators for industry
63 1242	船用エンジン発電機	Engine generators for marine
63 1243	航空機用エンジン発電機	Engine generators for aircraft
63 1249	その他のエンジン発電機	Miscellaneous engine generators
63 129	その他の交流発電機	Miscellaneous AC generators
63 2	電動機	Electric motors
63 21	直流電動機（70W以上）	DC motors (70W and over)
63 211	一般用直流電動機	DC motors for industry
63 212	車両用直流電動機	DC motors for rolling stock
63 213	船用直流電動機	DC motors for marine
63 214	航空機用直流電動機	DC motors for aircraft
63 219	その他の直流電動機（70W以上）	Miscellaneous DC motors (70W and over)
63 22	交流電動機	AC motors
63 221	標準単相誘導電動機	Single phase induction motors for general purpose
63 222	非標準単相誘導電動機（70W以上）	Single phase induction motors (70W and over)
63 223	標準三相誘導電動機	Three phase induction motors for general purpose
63 224	非標準三相誘導電動機（70W以上）	Three phase induction motors (70W and over)
63 2241	かご形三相誘導電動機	Squirrel-cage rotor type three phase induction motors
63 2242	巻線形三相誘導電動機	Wound rotor type three phase induction motors
63 225	同期電動機（70W以上）	Synchronous motors (70W and over)
63 226	整流子電動機	Commutator motors
63 229	その他の交流電動機	Miscellaneous AC motors
63 2291	ブレーキモータ	Brake motors
63 2292	ギヤードモータ	Geared motors
63 2293	クラッチモータ	Clutch motors
63 2294	モータプーリ	Motor pulleys
63 2299	他に分類されない交流電動機	AC motors, n.e.c.
63 23	リニアモータ	Linear motors
63 24	変速電動機（サイリスタモータを含む。）	Variable speed motors (including thyristor motors)
63 25	サーボモータ	Servomotors
63 26	振動電動機	Vibrating motors
63 27	小形電動機（70W未満）	Small capacity motors (70W under)
63 271	超小形電動機（入力3W以下）	Micromotors (input 3W and under)
63 272	シンクロ電機（セルシンモータ）	Synchros (Selsyn motors)
63 273	特殊小形電動機	Small capacity motors for special purpose
63 29	その他の電動機	Miscellaneous electric motors
63 3	調相機及び回転変換装置	Phase modifiers and rotary converting machinery
63 31	調相機	Phase modifiers
63 32	電動発電機	Motor-generators
63 39	その他の回転変換装置	Miscellaneous rotary converting machinery
63 8	回転電気機械の部分品及び附属品	Parts and accessories for rotating electrical machinery
63 9	その他の回転電気機械（内燃機関補助装置を除く。）	Miscellaneous rotating electrical machinery (except auxilialy equipment for internal combustion engine)

中分類64ー配電及び制御装置

MAJOR GROUP 64—ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT

64 1	整流器	Rectifiers
64 11	水銀整流器	Mercury-arc rectifiers
64 12	セレン整流器	Selenium rectifiers
64 13	シリコン整流器	Silicon rectifiers
64 19	その他の整流器	Miscellaneous rectifiers
64 2	サイリスタ応用変換装置	Thyristor applied conductor apparatus
64 21	インバータ，コンバータ	Inverters, converters
64 22	自動電圧調整装置	Automatic voltage regulators
64 23	定電圧定周波調整装置	Constant voltage constant frequency regulating apparatus
64 29	その他のサイリスタ応用変換装置	Miscellaneous thyristor applied conductor apparatus
64 3	変圧器及び計器用変成器	Transformers and instrument transformers
64 31	電力用変圧器	Power transformers
64 311	標準変圧器（200kVA以下）	Power distribution transformers (200kVA and under)
64 312	非標準変圧器	Power transformers
64 3121	油入変圧器	Oil immersed power transformers
64 3122	非油入変圧器	Non-oil immersed power transformers
64 32	特殊目的変圧器	Transformers for special purpose
64 321	昇圧器	Boosters
64 322	炉用変圧器	Furnace transformers
64 323	整流器用変圧器	Transformers for recitifier
64 324	信号用変圧器（ベル用を含む。）	Signal transformers (including bell transformers)
64 325	ネオン変圧器	Neon sign transformers
64 329	その他の特殊目的変圧器	Miscellaneous transformers for special purpose
64 33	誘導電圧調整器	Induction voltage regulators
64 34	計器用変成器	Instrument transformers
64 341	計器用変圧器	Potential transformers
64 342	変流器	Current transformers
64 343	変圧変流器	Metering outfits
64 4	コンデンサ（通信機用を除く。）	Static capacitors (except communication use)
64 41	電力用コンデンサ	Power capacitors
64 411	特別高圧電力用コンデンサ	Power capacitors for extra high voltage
64 412	高圧電力用コンデンサ	Power capacitors for high voltage
64 413	低圧電力用コンデンサ	Power capacitors for low voltage
64 42	機器用コンデンサ	Capacitors for electrical appliance
64 49	その他のコンデンサ（通信機用を除く。）	Miscellaneous capacitors (except communication use)
64 5	リアクトル	Reactors
64 6	避雷装置	Arresting equipment
64 7	開閉制御装置	Switchgears and controlling equipment
64 71	配電盤	Switch boards
64 72	分電盤	Cabinet panels
64 73	箱小形変開閉装置	Metal enclosed type minature sub-station equipment
64 74	制御装置	Controlling equipment and apparatus
64 741	一般用制御装置	Controlling equipment for industry
64 742	車両用制御装置	Controlling equipment for vehicles
64 743	船用制御装置	Controlling equipment for marine
64 75	開閉・制御機器	Switching and controlling apparatus
64 751	継電器	Relays
64 7511	制御継電器	Controlling relays
64 7512	保護継電器	Protection relays
64 752	低圧開閉器	Low voltage switches
64 7521	電磁開閉器	Magnet switches
64 7522	制御器	Controllers
64 7523	始動器	Starters
64 7524	マイクロスイッチ	Micro-switches
64 7525	操作スイッチ	Operating switches
64 7526	検出スイッチ	Detecting switches
64 753	低圧しゃ断器	Low voltage circuit breakers
64 7531	配線用しゃ断器	Circuit breakers for wiring device
64 7532	漏電しゃ断器	Earth leakage breakers
64 7533	安全ブレーカ	Safety breakers
64 7539	その他の低圧しゃ断器	Miscellaneous low voltage circuit breakers
64 754	高圧開閉器	High voltage switches
64 7541	断路器	Disconnecting switches
64 7542	柱上開閉器	Pole mounting switches
64 7543	高圧配電箱	High voltage enclosed switchboxes
64 7549	その他の高圧開閉器	Miscellaneous high voltage switches
64 755	高圧しゃ断器	High voltage circuit breakers
64 7551	油しゃ断器	Oil circuit breakers
64 7552	磁気しゃ断器	Magneblast circuit breakers
64 7553	空気しゃ断器	Airblast circuit breakers

中分類64－配電及び制御装置

真空しゃ断器	Vacuum circuit breakers
ガスしゃ断器	Gasblast circuit breakers
その他の高圧しゃ断器	Miscellaneous high voltage circuit breakers
その他の制御器具	Miscellaneous controlling apparatus
抵抗器	Resistors
低圧ヒューズ	Low voltage fuses
表示器具	Indicators
他に分類されない制御器具	Controlling apparatus, n.e.c.
配線器具並びに配電及び制御装置の部分品	Wiring devices and parts for distribution and controlling equipment
配線器具	Wiring devices
小形開閉器	Small switches
点滅器	Local switches
接続器	Connectors
電球保持器	Lampholders
配電箱及び配電用部分品	Distributing boxes and parts
パネルボード	Panelboards
小形配電箱	Small distributing boxes
電線管接続附属品	Connecting accessories for conduit tube
その他の配電箱及び配電用部分品	Miscellaneous distributing boxes and parts
配電及び制御装置の部分品	Parts for electrical distribution and controlling equipment

中分類65－民生用電子電気機械器具

MAJOR GROUP 65－CONSUMER ELECTRONIC AND ELECTRIC APPLIANCES

65 1	音声周波装置及び関連機器	Audio frequency and related equipment
65 11	ラジオ受信機（ラジオ付電気蓄音機及びラジオテレビ受像機を除く。）	Radio receivers. (except radio-phonographs and radio-television receivers)
65 111	卓上形ラジオ受信機	Table type radio receivers
65 1111	ラジオ機能のみをもつもの	Without any other function
65 1112	テープレコーダ付のもの（再生専用機付のものを含む。）	With tape-recording/reproducing function
65 1113	時計付のもの	With builtin clock
65 1114	ワイヤレス機能付のもの（トイ・トランシーバ付のものを含む。）	With other wireless function
65 1119	その他の卓上形ラジオ受信機	Miscellaneous table type radio receivers
65 112	ポータブル形ラジオ受信機	Portable type radio receivers
65 1121	ラジオ機能のみをもつもの	Without any other function
65 1122	テープレコーダ付のもの（再生専用機付のものを含む。）	With tape-recording/reproducing function
65 1123	時計付のもの	With builtin clock
65 1124	ワイヤレス機能付のもの（トイ・トランシーバ付のものを含む。）	With other wireless function
65 1129	その他のポータブル形ラジオ受信機	Miscellaneous portable type radio receivers
65 113	自動車用ラジオ受信機	Radio receivers mounted on motor vehicle
65 1131	1バンド	With 1 receiving band
65 1132	2バンド以上	With 2 or more receiving band
65 1133	テープレコーダ付のもの（再生専用機付のものを含む。）	With tape-recording/reproducing function
65 12	トイ・トランシーバ	Toy transceivers
65 13	磁気録音再成機器	Magnetic audio recording/reproducing equipment
65 131	オープンリール式テープレコーダ	Open reel type taperecorders
65 1311	テープデッキ	Tape decks
65 1312	アンプ及びスピーカ又はアンプを備えたテープレコーダ	Taperecorders with amplifiers and speakers or with amplifiers
65 132	2リールカセット式テープレコーダ	2-reel cassette type taperecorders
65 1321	テープデッキ	Tape decks
65 1322	アンプ及びスピーカ又はアンプを備えたテープレコーダ	Taperecorders with amplifiers and speakers or with amplifiers
65 133	1リールカートリッジ式テープレコーダ	1-reel cartridge type taperecorders
65 1331	テープデッキ	Tape decks
65 1332	アンプ及びスピーカ又はアンプを備えたテープレコーダ	Taperecorders with amplifiers and speakers or with amplifiers
65 134	シート式磁気録音機	Sheet type recorders
65 14	電気蓄音機（チューナ付のものを含む。）	Phonographs, (including those having radio tuners)
65 141	床置形電気蓄音機（1体形，2点式，3点式を含む。）	Floor type phonographs (separate type or console type)
65 1411	2チャンネル以下	Monaural and 2-channel
65 1412	3チャンネル以上	Multi-channel
65 142	卓上形電気蓄音機（1体形，2点式，3点式を含む。）	Table type phonographs (separate type or console type)
65 1421	2チャンネル以下	Monaural and 2-channel
65 1422	3チャンネル以上	Multi-channel
65 143	組合せ形電気蓄音機	Packaged component type phonographs
65 1431	2チャンネル以下	Monaural and 2-channel
65 1432	3チャンネル以上	Multi-channel
65 144	ポータブル形電気蓄音機	Portable type phonographs
65 1441	モノラル	Monaural
65 1442	ステレオ	Stereophonic
.. ..	電子楽器（95262）	Electronic musical instruments
.. ...	電子オルガン（952621）	Electronic organs
.. ...	電子弦楽器（※952629）	Electronic stringed instruments
.. ...	その他の電子楽器（952629）	Miscellaneous electronic musical instruments
65 16	レコードプレーヤ（ピックアップの附属していないものを含む。）	Record phayers with or without pickups
65 161	手動操作式レコードプレーヤ	Manual
65 162	半自動操作式（アーム操作のみ自動化された）レコードプレーヤ	Semi-automatic (with automatic tone arm)
65 163	自動式（レコード交換及びアーム動作が自動化された）レコードプレーヤ	Automatic (with record changer)
65 17	ハイファイ用アンプ及び関連機器	Hi-Fi amplifiers and related equipment
65 171	プリアンプ	Pre-amplifiers
65 1711	2チャンネル以下	Monaural and 2-channel
65 1712	3チャンネル以上	Multi-channel
65 172	メインアンプ	Power amplifiers

65 1721	2チャンネル以下	Monaural and 2-channel
65 1722	3チャンネル以上	Multi-channel
65 173	プリメインアンプ	Integrated amplifiers
65 1731	2チャンネル以下	Monaural and 2-channel
65 1732	3チャンネル以上	Multi-channel
65 174	チューナ付プリメインアンプ（チューナ付メインアンプを含む。）	Integrated amplifiers (including power amplifiers with radio tuner)
65 1741	2チャンネル以下	Monaural and 2-channel
65 1742	3チャンネル以上	Multi-channel
65 175	チューナ（スピーカ接続用出力端子を備えていないもの）	Radio tuners (without power amplifiers)
65 179	その他のハイファイ用アンプ及び関連機器	Miscellaneous Hi-Fi amplifiers and related equipment
65 18	スピーカシステム	Speaker system
65 181	据置形スピーカシステム	Floor type speaker system
65 1811	1ウエイ	1-way
65 1812	2ウエイ以上	Multi-way
65 182	ブックシェルフ形スピーカシステム（4側面が仕上げられているもの）	Book shelf type speaker system
65 1821	1ウェイ	1-way
65 1822	2ウェイ以上	Multi-way
65 189	その他のスピーカシステム	Miscellaneous speaker system
65 19	その他の音声周波装置及び関連機器	Miscellaneous audio frequency and related equipment
		Video frequency and related equipment
65 2	映像周波装置及び関連機器	Television receivers
65 21	テレビ受像機（テレビ受像機能のみのもの）	Television receivers
65 211	カラーテレビ受像機	Color television receivers
65 2111	据置形カラーテレビ受像機	Floor type
65 2112	卓上形カラーテレビ受像機	Table type
65 2113	ポータブル形カラーテレビ受像機（自蔵電池で動作可能なもの）	Portable type (operated by battery)
65 2119	その他のカラーテレビ受像機	Miscellaneous color television type
65 212	白黒テレビ受像機	Black/white television receivers
65 2121	据置形白黒テレビ受像機	Floor type
65 2122	卓上形白黒テレビ受像機	Table type
65 2123	ポータブル形白黒テレビ受像機（自蔵電池で動作可能なもの）	Portable type (operated by battery)
65 2129	その他の白黒テレビ受像機	Miscellaneous black/white television receivers
65 22	ビデオテープレコーダ（放送用，業務用を除きテレビチューナ付のものを含む。）	Video tape recorders, including those having television taperecorders (including those having television except those for broadcast or professional use)
65 221	カラービデオテープレコーダ	Color video taperecorders
65 2211	オープンリール式	Open reel type
65 2212	カセット・カートリッジ式	Cassette type or cartridge type
65 222	白黒ビデオテープレコーダ	Black/white video taperecorders
65 2221	オープンリール式	Open reel type
65 2222	カセット・カートリッジ式	Cassette type or cartridge type
65 23	その他の録画再生機器（再生専用機を含む。）	Other video recording/reproducing equipment
65 231	フイルム式録画再生機	Film type
65 232	ディスク式録画再生機	Disc type
65 239	他に分類されない録画再生機器	Video recording/reproducing equipment, n.e.c.
65 24	付加機能付テレビ受像機	Television receivers with any other auxiliary function
65 241	映像周波装置付テレビ受像機（ビデオテープレコーダ付きのものを除く。）	With other video frequency equipment (except VTRs)
65 242	音声周波装置付テレビ受像機	With other audio frequency equipment
65 249	その他の附加機能付テレビ受像機	Miscellaneous television receivers with any other auxiliary function
65 29	その他の映像周波装置及び関連機器	Miscelaneous video frequency and related equipment
65 291	ドア監視装置	Visitor watchers
65 299	他に分類されない映像周波装置及び関連機器	Video frequency and related equipment n.e.c.
65 3	民生用電子機器の関連機器	Related equipment for consumer electronics
65 31	イヤホン及びヘッドホン	Earphones and headphones
65 311	イヤホン	Earphones
65 3111	マグネチック形イヤホン	Magnetic earphones
65 3112	クリスタル形イヤホン	Crystal earphones
65 3119	その他のイヤホン	Miscellaneous earphones
65 312	ヘッドホン	Headphones
65 3121	ダイナミック形ヘッドホン	Dynamic headphones
65 3122	コンデンサ形ヘッドホン	Electro-static headphones
65 3129	その他のヘッドホン	Miscellaneous headphones
65 32	マイクロホン	Microphones
65 321	圧電形マイクロホン	Piezo-electric microphones

中分類65－民生用電子電気機械器具

65 322	リボン形マイクロホン	Ribbon microphones
65 323	コンデンサ形マイクロホン	Electro-static microphones
65 324	ムービングコイル形マイクロホン	Moving coil microphones
65 328	マイクロホン関連機器	Related devices for microphone
65 3281	マイクロホンカートリッジ	Microphone cartridges
65 3282	マイクロホンスタンド（放送用，業務用を除く。）	Microphone stands (except broadcast or professional use)
65 3289	その他マイクロホン関連機器	Miscellaneous related devices for microphone
65 329	その他のマイクロホン	Miscellaneous microphones
65 33	ホノモータ及び駆動モータ	Record turntables and driving motors
65 331	ホノモータ	Record turntables
65 3311	単一スピード形ホノモータ	Mono-speed
65 3312	複スピード形ホノモータ	Multi-speed
65 332	駆動モータ	Driving motors
65 34	ピックアップ，ピックアップカートリッジ及びその部分品	Pickups, pickup cartridges and their parts
65 341	ピックアップ	Pickups
65 3411	マグネチック形ピックアップ	Magnetic pickups
65 3412	クリスタル形ピックアップ及びセラミック形ピックアップ	Crystal pickups and ceramic pickups
65 3413	ムービングコイル形ピックアップ	Moving coil pickups
65 3419	その他のピックアップ	Miscellaneous pickups
65 342	トーンアーム	Tone arms
65 343	ピックアップカートリッジ	Pickups cartridges
65 3431	マグネチック形ピックアップカートリッジ	Magnetic pickup cartridges
65 3432	クリスタル形ピックアップカートリッジ及びセラミック形ピックアップカートリッジ	Crystal pickup cartridges and ceramic pickup cartri
65 3433	ムービングコイル形ピックアップカートリッジ	Moving coil pickup catridges
65 3439	その他のピックアップカートリッジ	Miscellaneous pickups cartridges
65 344	スタイラス	Styli
65 349	その他のピックアップカートリッジ及びその関連部分品	Miscellaneous pickups, pickup cartridges and their
65 35	スピーカ	Speakers
65 351	コーンスピーカ	Cone speakers
65 3511	マグネチック形コーンスピーカ	Magnetic cone speakers
65 3512	ダイナミック形コーンスピーカ	Dynamic cone speakers
65 3519	その他のコーンスピーカ	Miscellaneous cone speakers
65 352	ホーンスピーカ	Horn speakers
65 353	コンデンサスピーカ	Electro-static speakers
65 359	その他のスピーカ	Miscellaneous speakers
65 36	アンテナ（業務用を除く。）	Antennas (except professional use)
65 361	ＦＭ受信アンテナ	FM radio receiving antennas
65 3611	八木形ＦＭ受信アンテナ	Yagi type
65 3612	折返形ＦＭ受信アンテナ	Folded type
65 3613	対数周期形ＦＭ受信アンテナ	Logarithm periodic type
65 3614	室内形ＦＭ受信アンテナ	Indoor type
65 3619	その他のＦＭ受信アンテナ	Miscellaneous FM radio receiving antennas
65 362	ＶＨＦテレビ受信アンテナ	VHF television receiving antennas
65 3621	八木形ＶＨＦテレビ受信アンテナ	Yagi type
65 3622	対数周期形ＶＨＦテレビ受信アンテナ	Logarithm periodic type
65 3623	室内形ＶＨＦテレビ受信アンテナ	Indoor type
65 3629	その他のＶＨＦテレビ受信アンテナ	Miscellaneous VHF television receiving antennas
65 363	ＵＨＦテレビ受信アンテナ	UHF television receiving antennas
65 3631	八木形ＵＨＦテレビ受信アンテナ	"Yagi" type
65 3632	対数周期形ＵＨＦテレビ受信アンテナ	Logarithm periodic type
65 3633	室内形ＵＨＦテレビ受信アンテナ	Indoor type
65 3639	その他のＵＨＦテレビ受信アンテナ	Miscellaneous UHF television receiving antennas
65 364	ＳＨＦテレビ受信アンテナ	SHF television receiving antennas
65 3641	ヘリカル形ＳＨＦテレビ受信アンテナ	Helical type
65 3642	スロット形ＳＨＦテレビ受信アンテナ	Slot type
65 3643	パラボラ形ＳＨＦテレビ受信アンテナ	Parabola type
65 3649	その他のＳＨＦテレビ受信アンテナ	Miscellaneous SHF television receiving antennas
65 365	ＶＨＦ，ＵＨＦテレビ受信アンテナ	VHF/UHF television receiving antennas
65 3651	八木形ＶＨＦ，ＵＨＦテレビ受信アンテナ	Yagi type
65 3652	対数周期形ＶＨＦ，ＵＨＦテレビ受信アンテナ	Logarithm periodic type
65 3653	室内形ＶＨＦ，ＵＨＦテレビ受信アンテナ	Indoor type
65 3659	その他のＶＨＦ，ＵＨＦテレビ受信アンテナ	Miscellaneous VHF/UHF television receiving antenna
65 366	ＦＭラジオ，ＶＨＦテレビ受信アンテナ	FM redio-VHF television receiving antennas

中分類65－民生用電子電気機械器具

65 3661	八木形ＦＭラジオ，ＶＨＦテレビ受信アンテナ	"Yagi" type
65 3662	対数周期型ＦＭラジオ，ＶＨＦテレビ受信アンテナ	Logarithm periodic type
65 3663	室内形ＦＭラジオ，ＶＨＦテレビ受信アンテナ	Indoor type
65 3669	その他のＦＭラジオＶＨＦテレビ受信アンテナ	Miscellaneous FM radio-VHF television receiving antennas
65 367	ＦＭラジオ，ＶＨＦ，ＵＨＦテレビ受信アンテナ	FM radio-VHF/UHF television receiving antennas
65 3671	八木形ＦＭラジオ，ＶＨＦ，ＵＨＦテレビ受信アンテナ	"Yagi" type
65 3672	対数周期形ＦＭラジオ，ＶＨＦ，ＵＨＦテレビ受信アンテナ	Logarithm periodic type
65 3673	室内形ＦＭラジオ，ＶＨＦ，ＵＨＦテレビ受信アンテナ	Indoor type
65 3679	その他のＦＭラジオ，ＶＨＦ，ＵＨＦテレビ受信アンテナ	Miscellaneous FM radio-VHF/UHF television receiving antennas
65 368	共聴用受信アンテナ	Master antennas for community reception
65 3681	八木形共聴用受信アンテナ	Yagi type
65 3682	対数周期形共聴用受信アンテナ	Logarithm periodic type
65 3689	その他の共聴用受信アンテナ	Miscellaneous master antennas for community reception
65 369	その他のアンテナ（業務用を除く。）	Miscellaneous antennas (except professional use)
65 3691	トランシーバ用アンテナ	Antennas for transceiver
65 3692	自動車用アンテナ	Antennas for motor vehicle equipment
65 3693	アマチュア無線用アンテナ	Antennas for amateur radio equipment
65 3699	他に分類されないアンテナ（業務用を除く。）	Antennas n.e.c. (except professional use)
65 37	伝送関連機器（業務用を除く。）	Related equipment and devices for line transmission (except professional use)
65 371	混合器	Mixers
65 3711	ＵＶ用混合器	U/V mixers
65 3712	ＶＶ用混合器	V/V mixers
65 3713	ＵＵ用混合器	U/U mixers
65 372	分波器	Frequency splitters
65 3721	ＵＶ用分波器	U/V frequency splitters
65 3722	ＶＶ用分波器	V/V frequency splitters
65 3723	ＵＵ用分波器	U/U frequency splitters
65 373	分配器	Distributors
65 374	分岐器	Branchers
65 375	直列ユニット	Series units
65 3751	ライン用直列ユニット	In line type
65 3752	端末用直列ユニット	Line terminal type
65 376	整合器	Impedance matching transformers
65 377	ブースタ	Boosters
65 378	コンバータ	Converters
65 3781	ＵＶ用コンバータ	U/V converters
65 3782	ＶＶ用コンバータ	V/V converters
65 3783	ＵＵ用コンバータ	U/U converters
65 379	その他の伝送関連機器（業務用を除く。）	Miscellaneous related equipment and devices for line transmission (except professional use)
65 39	その他の民生用電子機器の関連機器	Miscellaneous related equipment for consumer electronics
65 391	テレビジョンチューナ	Television tuners
65 392	シャーシ	Chassises
65 393	キャビネット	Cabinets
65 399	他に分類されない民生用電子機器の関連機器	Related equipment for consumer electronics, n.e.c.
65 4	電熱用品（理容用のものを除く。）	Electric heating appliances (except electric personal appliances)
65 41	電気アイロン	Electric irons
65 411	普通形アイロン	Automatic irons
65 412	スチームアイロン	Automatic steam irons
65 413	裁縫用電気こて	Flatirons
65 419	その他の電気アイロン	Miscellaneous electric irons
65 42	暖房用及び保温用電熱用品	Space heaters and warming appliances
65 421	暖房用電熱用品	Space heaters
65 4211	電気ストーブ	Electric radiant heaters
65 4212	電気温風機	Electric fan heaters
65 4213	電気式スペースヒータ	Electric space heaters (panel and radiator type)
65 4214	ベースボードヒータ	Electric baseboard heaters
65 4219	その他の暖房用電熱用品	Miscellaneous space heaters

中分類65－民生用電子電気機械器具

65 422	保温用電熱用品	Warming appliances
65 4221	やぐら式電気こたつ	Electric "Kotatsu" - table type
65 4222	あんか式電気こたつ	Electric "Kotatsu" - "anka" type
65 4223	電気毛布	Electric blankets
65 4224	電気布とん敷物類	Electric pads and mats
65 4225	電気足温器	Electric foot warmers
65 4226	電気被服	Electric jackets
65 4227	電気便座	Electric seats
65 4229	その他の保温用電熱用品	Miscellaneous warming appliances
65 43	ちゅう房用電熱用品	Cooking and kitchen appliances
65 431	電気こんろ	Hot plates
65 432	電気がま	Electric rice cookers
65 433	ジャー炊飯器	Electric rice cookers and rice jar combination
65 434	電子ジャー	Electric rice jars
65 435	電子レンジ	Microwave ovens
65 436	電気ポット	Electric pots
65 4361	酒かん器	"Sake" pots
65 4362	その他の電気ポット	Miscellaneous Electric pots
65 437	トースタ	Toasters
65 4371	オーブントースタ	Oven toasters
65 4379	その他のトースタ	Miscellaneous toasters
65 438	ロースタ	Roasters
65 439	その他のちゅう房用電熱用品	Miscellaneous cooking and kitchen appliances
65 4391	電気オーブン（天火）	Electric ovens
65 4392	電気なべ（フライパンを含む）	Electric pans (including frypans)
65 4393	テーブルグリル（ホットプレート）	Table griddles
65 4394	電磁誘導加熱式調理器	Induction heating cookers
65 4395	コーヒー沸し器	Coffee percolators
65 4396	食器乾燥機	Dish dryers
65 4397	卵ゆで器	Egg cookers
65 4399	他に分類されないちゅう房用電熱用品	Cooking and kitchen appliances, n.e.c.
65 44	電気温水器	Water heaters
65 49	その他の電熱用品	Miscellaneous heating appliances
65 491	衣類乾燥機	Clothes dryers
65 492	写真乾燥機	Photograph dryers
65 493	加湿器	Humidifiers
65 494	タオル蒸器（理容用のものを除く。）	Towel steamers (except for beauty and barber shop use)
65 495	エアタオル	Electric towels
65 496	ズボンプレッサ	Trouser pressers
65 499	他に分類されない電熱用品	Heating appliances, n.e.c.
65 5	電気冷蔵庫及び電気冷凍機応用製品	Electric refrigerators and refrigerating equipment
65 51	電気冷蔵庫（冷凍庫と一体のものを含む）	Electric refrigerators
65 511	1ドアタイプ電気冷蔵庫	Electric refrigerators - one door type
65 512	2ドアタイプ以上の電気冷蔵庫	Electric refrigerators - two door type
65 519	その他の電気冷蔵庫(冷凍庫と一体のものを含む)	Miscellaneous electric refrigerators
65 52	電気冷凍庫（電気冷蔵庫と一体のものを除く。）	Electric freezers
65 521	家庭用電気冷凍庫	Electric freezers for home use
65 529	その他の電気冷凍庫（ストッカを含む。）	Miscellaneous electric freezers (including stockers)
.. ..	ショーケース（46251）	Show cases
.. ...	冷蔵用ショーケース（462512）	Refrigerating show cases
.. ...	冷凍用ショーケース（462511）	Freezing show cases
.. ..	飲用冷水機（46222）	Water coolers
.. ...	プレッシャー式飲用冷水機（462221）	Drink water coolers
.. ...	ボトル式飲用冷水機（462222）	Bottle coolers
.. ..	エアコンディショナ（4621）	Room air-conditioners
.. ...	パッケージタイプエアコンディショナ（46211）	Room air-conditioners - package type
.. ...	ウインドタイプエアコンディショナ（46212）	Room air-conditioners - window type
.. ...	スプリットタイプエアコンディショナ（セパレートタイプ）（46213）	Room air-conditioners - split type
.. ...	除湿器（エアフイルタ）（46215）	Dehumidifiers
.. ..	製氷機（4627）	Ice cubic makers
65 6	扇風機・換気扇及び関連製品	Electric fans and related appliances
65 61	扇風機	Electric fans
65 611	卓上扇風機	Desk fans
65 612	床上（座敷）扇風機	Floor fans
65 613	天じょう扇風機	Ceiling fans
65 619	その他の扇風機	Miscellaneous electric fans
65 62	換気扇	Ventilating fans
65 621	ウインドファン	Window fans

中分類65ー民生用電子電気機械器具

5 629	その他の換気扇	Miscellaneous ventilating fans
5 63	冷風扇(水冷式クーラ)	Fan coolers
5 64	サーキュレータ	Circulators
5 7	電気洗たく機及び関連製品(業務用を除く。)	Electric washing machines and related appliances (home use only)
5 71	電気洗たく機	Electric washing machines
5 711	全自動洗たく機	Washing machines, automatic
5 712	二そう式自動洗たく機	Washing machines, twin tub
5 713	手絞り式洗たく機	Washing machines, wringer type
5 719	その他の電気洗たく機	Miscellaneous electric washing machines
5 72	脱水機(単体のもの)	Spin dryers
5 8	電気掃じ機	Electric cleaners
5 81	真空掃じ機	Vacuum cleaners
5 811	セントラル式真空掃じ機	Vacuum cleaners, central type
5 819	その他の真空掃じ機	Miscellaneous vacuum cleaners
5 8191	シリンダー形真空掃じ機	Vacuum cleaners, cylinder type
5 8192	ポット形真空掃じ機	Vacuum cleaners, pot type
5 8193	アップライト形真空掃じ機	Vacuum cleaners, upright type
5 8199	他に分類されない真空掃じ機	Vacuum cleaners, n.e.c.
5 82	床みがき機	Floor polishers
5 9	その他の民生用電子電気機械器具	Miscellaneous consumer electronic and electric appliances
5 91	電気井戸ポンプ	Electric well pump
5 911	ウエスコ式電気井戸ポンプ	Well pump, vesco type
5 912	ジェット式電気井戸ポンプ	Well pump, jet type
5 913	往復動式電気井戸ポンプ	Well pump, reciprocal type
5 92	理容用電気器具	Electric personal appliances
5 921	ヘアードライヤ	Hair dryers
5 9211	手持式ヘアードライヤ	Hair dryers - handy type
5 9219	その他のヘアードライヤ	Miscellaneous hair dryers
5 922	ヘアーカラ	Hair curlers
.. ...	電気マッサージ器具(電池式を除く。)(60164)	Electric massagers (except battery operated)
.. ...	低周波治療器(60164)	
5 925	電気かみそり(電池式を除く。)	Electric shavers (except battery operated)
5 926	電気バリカン	Electric hair clippers
5 927	美容用スチーマ	Electric steamers
5 928	マニキュアセット	Manicure sets
5 929	その他の理容用電気器具	Miscellaneous electric personal appliances
65 93	電気食器洗い機	Electric dish washers
65 931	超音波式電気食器洗い機	Electric dish washer - high frequency type
65 932	噴流式電気食器洗い機	Electric dish washers - zet type
65 94	食料品調理器(別に掲げるものを除く。)	Electric cooking and kitchen appliances (except otherwise classified)
65 941	ジュースミキサ	Juice blenders
65 942	ジューサ	Juicers
65 943	フードミキサ	Food mixers
65 944	コーヒー挽き機	Coffee mills
.. ...	アイスクリームフリーザ(4626)	Ice cream freezers
65 949	その他の食料品調理器(別に掲げるものを除く。)	Miscellaneous electric cooking and kitchen appliances (except otherwise classified)
65 95	くず処理関連機器	Waste disposers and related appliances
65 951	ディスポーザ	Disposers
65 952	トラッシュコンパクタ	Trash compactors
65 96	電動式刃物類	Electric cutlery
65 961	電気ハサミ	Electric scissors
65 962	電動式鉛筆削り機	Electric pencil sharpners
65 963	電気包丁	Electric knives
65 964	カンオープナ	Electric can openers
65 965	電気芝刈機	Electric lawn mowers
65 97	電池応用民生用電気機器(がん具を除く。)	Consumer appliances with battery operated
65 971	電気かみそり(電池式)	Dry shavers
65 972	ガス点火器	Gas ingniters
65 973	ブザー	Buzzers
65 974	電気歯ブラシ	Tooth brushes
.. ...	マッサージ器具(60164)	Massagers
65 976	保温用器具	Warming appliances
65 979	その他の電池応用民生用電気機器(がん具を除く。)	Miscellaneous consumer appliances with battery operated
65 99	他に分類されない民生用電子電気機械器具	Consumer electronic and electric appliances, n.e.c.
65 991	空気清浄機	Air freshers
65 992	タイムスイッチ(単体のもの)	Time switches

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65 993	電気くつみがき機	Shoe polishers
65 999	他に分類されないその他の民生用電子電気機械器具	Miscellaneous consumer electronic and elec n.e.c.

中分類66ーその他の電気機械器具

MAJOR GROUP 66—MISCELLANEOUS ELECTRIC EQUIPMENT AND APPARATUS

661	電球類	Electric lamps
6 11	照明用電球（ハロゲン電球を除く。）	Incandescent lamps for lighting (except tungsten halogen lamps)
6 111	一般照明用電球	General lighting service lamps
6 1111	６０ワット以下の一般照明用電球	60 watts and under
6 1112	６０ワットをこえる一般照明用電球	Above 60 watts
6 1113	街路灯用電球	Street lighting lamps
6 112	ボール電球	Ball-type lamps
6 113	小丸電球	Small round lamps
6 1131	Ｅ２６口金付小丸電球	With E26 type base
6 1139	その他の小丸電球	Miscellaneous small round lamps
6 114	装飾用電球	Decorative lamps
6 1141	シャンデリア用電球	Lamps for chandelier
6 1149	その他の装飾用電球	Miscellaneous decorative lamps
6 115	耐振電球	Rough and vibration service lamps
6 1151	鉄道車両用電球	Railway car lamps
6 1152	船用電球	Marine lamps
6 1159	その他の耐振電球	Miscellaneous rough and vibration service lamps
6 116	反射形投光電球（写真用，表示用，自動車用のものを除く。）	Reflector lamps (except photographic, indicator and lamps)
66 1161	シールドビーム形の反射形投光電球	Sealed beam type lamps
66 1162	屋内用反射形投光電球	Reflector lamps for indoor use
66 1163	屋外用反射形投光電球	Reflector lamps for outdoor use
66 117	非常灯用電球	Lamps for emergency lighting
66 119	その他の照明電球（ハロゲン電球を除く。）	Miscellaneous incandescent lamps for lighting (except tungsten halogen lamps)
66 12	特殊用電球（ハロゲン電球を除く。）	Incandescent lamps for special use (except tungsten lamps)
66 121	自動車用電球	Lamps for motor vehicles
66 1211	シールドビーム形自動車用電球	Sealed beam lamps for motor vehicle
66 1219	その他の自動車用電球	Miscellaneous lamps for motor vehicle
66 122	小形灯器用電球	Lamps for small light unit
66 1221	携帯電灯用電球	Lamps for flashlight
66 1222	自転車発電ランプ用電球	Lamps for bicycle dynamo light unit
66 1223	鉱山安全灯用電球	Lamps for miner's cap light unit
66 1224	家庭用ミシン電球	Household sewing machine lamp
66 1229	その他の小形灯器用電球	Miscellaneous lamps for small light unit
66 123	信号用電球	Signal lamps
66 1231	道路交通信号灯用電球	Traffic signal lamps
66 1232	鉄道信号用電球	Railway signal lamps
66 1239	その他の信号用電球	Miscellaneous signal lamps
66 124	表示用電球（Ｒ形のものを含む。）	Indicator lamps (including R-type)
66 1241	配電盤用電球	Indicator lamps for power switchboard
66 1242	ラジオパネル用電球	Radio and TV panel lamps
66 1243	電話交換機用電球	Indicator lamps for telephone switchboard
66 1244	サイン用電球	Sign lamps
66 1245	電光表示盤用電球	Indicator lamps for electric signboard
66 1249	その他の表示用電球（Ｒ形のものを含む。）	Miscellaneous indicator lamps (including R-type)
66 125	航空用電球	Aviation lamps
66 1251	航空機用電球	Aircraft lamps
66 1252	飛行場照明用電球	Airport and airway lamps
66 1259	その他の航空用電球	Miscellaneous aviation lamps
66 126	漁業用電球	Fishery lamps
66 1261	集魚灯用電球	Lamps for fish-luring light
66 1269	その他の漁業用電球	Miscellaneous fishery lamps
66 127	写真・映写用電球	Photographic and projection lamps
66 1271	写真用せん光電球	Photoflash lamps
66 1272	スタジオ用電球	Studio lamps
66 1273	映写用電球	Projector lamps
66 1279	その他の写真・映写用電球	Miscellaneous photographic and projection lamps
66 128	赤外線電球	Infrared lamps
66 1281	加熱用赤外線電球	Infrared lamps for heating
66 1282	暖房用赤外線電球	Infrared lamps for space heating
66 1283	医療用赤外線電球	Infrared lamps for medical use
66 1289	その他の赤外線電球	Miscellaneous infrared lamps
66 129	その他の特殊用電球（ハロゲン電球を除く。）	Miscellaneous incandescent lamps for special use (except tungsten halogen lamps)
66 13	ハロゲン電球	Tungsten halogen lamps
66 131	一般照明用ハロゲン電球	Tungsten halogen lamps for general lighting
66 132	スタジオ用ハロゲン電球	Tungsten halogen lamps for studio lighting

中分類66ーその他の電気機械器具

66 133	映写用ハロゲン電球	Tungsten halogen lamps for projector
66 134	自動車用ハロゲン電球	Tungsten halogen lamps for motor vehicle
66 135	複写用ハロゲン電球	Tungsten halogen lamps for copying machine
66 136	飛行場用ハロゲン電球	Tungsten halogen lamps for airport and airway
66 139	その他のハロゲン電球	Miscellaneous tungsten halogen lamps
66 14	クリスマス用電球及び電燈セット	Christmas-tree lamps and lamp sets
66 141	クリスマスツリー用電球	Christmas-tree lamps
66 142	電燈セット	Lamp sets
66 1421	ペッパーランプセット	Pepper lampsets
66 1429	その他の電燈セット	Miscellaneous lamp sets
66 15	けい光ランプ	Fluorescent lamps
66 151	一般照明用直管形けい光ランプ	Straight type for general lighting
66 1511	２０ワット未満の一般照明用直管形けい光ランプ	Under 20 watts
66 1512	２０ワットの一般照明用直管形けい光ランプ	20 watts
66 1513	４０ワット（予熱始動形の一般照明用直管形けい光ランプ	40 watts, pre-heat-start type
66 1514	４０ワット（ラピットスタート形の一般照明用直管形けい光ランプ	40 watts, rapid-start type
66 1515	高出力，超高出力形の一般照明用直管形けい光ランプ	High output and extra high-output type
66 1519	その他の一般照明用直管形けい光ランプ	Miscellaneous straight type for general lig
66 152	一般照明用環形けい光ランプ	Circular type for general lighting
66 1521	３０ワットの一般照明用環形けい光ランプ	30 watts
66 1529	その他の一般照明用環形けい光ランプ	Miscellaneous circular type for general lig
66 153	特殊用けい光ランプ	Fluorescent lamps for special use
66 154	スリムライン形けい光ランプ	Slimline-type fluorescent lamps
66 159	その他のけい光ランプ	Miscellaneous fluorescent lamps
66 16	ＨＩＤランプ（ナトリウムランプを除く。）	High intencity discharge lamps (except sodi
66 161	照明用水銀ランプ	High pressure mercury lamps for lighting
66 1611	２００ワット未満の照明用水銀ランプ	Under 200 watts
66 1612	２００ワット以上の照明用水銀ランプ	200 watts and above
66 1613	反射形照明用水銀ランプ	Reflector type
66 1614	安定器内蔵形の照明用水銀ランプ	Self-ballasted type
66 162	特殊用水銀ランプ	High pressure mercury lamps for special use
66 1621	複写用水銀ランプ	for copying machines
66 1629	その他の特殊用水銀ランプ	Miscellaneous high pressure mercury lamps : use, n.e.c.
66 163	メタルハライドランプ	Metal halide lamps
66 169	その他のＨＩＤランプ（ナトリウムランプを除く。）	Miscellaneous high intencity discharge lam sodium lamps)
66 17	放電ランプ（けい光ランプ及びＨＩＤランプを除く。）	Discharge lamps (except fluorescent lamps : intensity discharge lamps)
66 171	グロースタータ	Glow starters
66 1711	Ｅ形（ねじ）口金付グロースタータ	With E type base
66 1712	Ｐ形（差込）口金付グロースタータ	With P type base
66 172	ネオンランプ	Neon lamps
66 1721	ネオングローランプ	Neon glow lamps
66 1722	ネオンサイン管	Neon sign tubing
66 1723	けい光サイン管	Fluorescent neon sign tubing
66 1729	その他のネオンランプ	Miscellaneous neon lamps
66 173	殺菌ランプ	Germicidal lamps
66 174	ナトリウムランプ	Sodium lamps
66 1741	低圧ナトリウムランプ	Low pressure sodium lamps
66 1742	高圧ナトリウムランプ	High-pressure sodium lamps
66 175	キセノンランプ	Xenon lamps
66 1751	ロングアークキセノンランプ	Long-arc xenon lamps
66 1752	ショートアークキセノンランプ	Short-arc xenon lamps
66 1753	フラッシュチューブ形キセノンランプ	Xenon flash tubes
66 1759	その他のキセノンランプ	Miscellaneous xenon lamp
66 179	その他の放電ランプ	Miscellaneous discharge lamps
66 18	電球類の部分品	Parts for electric lamp
66 19	その他の電球類	Miscellaneous electric lamp
66 191	ＥＬランプ	Electroluminescent lamps
66 199	他に分類されない電球類	Electric lamps, n.e.c.
66-2	照明器具	Luminaires
66 21	白熱燈器具	Incandescent luminaires for incandescent lamp
66 211	屋内用白熱燈器具	Indoor type
66 2111	天じょう燈用白熱燈器具	Ceiling type

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66 2112	多灯形天じょう灯用白熱灯器具	Plural ceiling type
66 2113	ブラケット用白熱灯器具	Bracket type
66 2114	卓上スタンド用白熱灯器具	Table lamp type
66 2115	その他のスタンド用白熱灯器具	Miscellaneous stand type
66 2116	医療用白熱灯器具	Medical type
66 2117	非常用白熱灯器具	Emergency type
66 2119	その他の屋内用白熱灯器具	Miscellaneous indoor type
66 212	産業用白熱灯器具	Industrial type
66 2121	作業用白熱灯器具	Factory type
66 2122	集魚用白熱灯器具	Fishing-light
66 2123	防爆・防じん・耐しょく用白熱灯器具	Explosion proof, dust proof and corrosion proof type
66 2124	非常灯用白熱灯器具	Emergency-light
66 2129	その他の産業用白熱灯器具	Miscellaneous industrial type
66 213	投光用白熱灯器具	Flood lighting type
66 2131	一般投光用白熱灯器具	Flood lights
66 2132	探照用白熱灯器具	Search lights
66 2133	スポットライト用白熱灯器具	Spot lights
66 2139	その他の投光用白熱灯器具	Miscellaneous flood lighting type
66 214	屋外用白熱灯器具	Outdoor type
66 2141	道路及び鉄道用白熱灯器具	Road and railway type
66 2142	水上照明用白熱灯器具	Marine type
66 2143	飛行場照明用白熱灯器具	Airdrome type
66 2149	その他の屋外用白熱灯器具	Miscellaneous outdoor type
66 215	乗物用白熱灯器具	Vehicle
66 2151	自動車用白熱灯器具	Automobile
66 2152	船用白熱灯器具	Marine
66 2153	鉄道用白熱灯器具	Railway
66 2154	航空機用白熱灯器具	Aircraft
66 219	その他の白熱灯器具	Miscellaneous incandescent luminaires
66 22	けい光灯器具	Fluorescent luminaires
66 221	屋内用けい光灯器具	Indoor type
66 2211	一般屋内用けい光灯器具	Ordinary type
66 22111	40W未満けい光灯器具	40 watts under
66 22112	40W以上けい光灯器具	40 watts and over
66 22113	環形ランプ用けい光灯器具	Circular type
66 2212	家庭用つり下灯用けい光灯器具	Residential pendant type
66 2213	スタンド用けい光灯器具	Stand type
66 2219	その他の屋内用けい光灯器具	Miscellaneous indoor type
66 222	産業用けい光灯器具	Industrial type
66 2221	防爆・防じん・防しょく用けい光灯器具	Explosion proof, dust proof, corrosion proof type
66 2222	誘が灯器具用けい光灯器具	Insecticidal luminaires
66 2223	非常用けい光灯器具	Emergency lights
66 2224	誘導灯用けい光灯器具	Induce lights
66 2229	その他の産業用けい光灯器具	Miscellaneous industrial luminaires
66 223	屋外用けい光灯器具	Outdoor type
66 2231	道路及び鉄道用けい光灯器具	Road and railway
66 2239	その他の屋外用けい光灯器具	Miscellaneous outdoor type
66 224	乗物用けい光灯器具	Vehicle
66 2241	自動車用けい光灯器具	Auto-mobile
66 2242	船用けい光灯器具	Marine
66 2243	鉄道用けい光灯器具	Railway
66 2249	その他の乗物用けい光灯器具	Miscellaneous vehicle
66 229	その他のけい光灯器具	Miscellaneous fluorescent luminaires
66 23	水銀灯器具	Mercury vapour luminaires
66 231	屋内用水銀灯器具	Indoor type
66 2311	天じょう灯用水銀灯器具	Ceiling type
66 2319	その他の屋内用水銀灯器具	Miscellaneous indoor type
66 232	産業用水銀灯器具	Industrial type
66 2321	一般産業用水銀灯器具	For general
66 2322	防爆・防じん・防しょく用水銀灯器具	Explosion proof, dust proof, corrosion proof type
66 2329	その他の産業用水銀灯器具	Miscellaneous industrial type
66 233	屋外用水銀灯器具	Outdoor type
66 2331	道路用水銀灯器具	Read type
66 2332	鉄道用水銀灯器具	Railway type
66 2339	その他の屋外用水銀灯器具	Miscellaneous outdoor type
66 234	投光用水銀灯器具	Flood lighting type
66 239	その他の水銀灯器具	Miscellaneous mercury vapour luminaires
66 24	携帯電灯	Portable lamps
66 241	懐中電灯	Flash lights
66 242	自転車灯	Cycle lights

中分類66ーその他の電気機械器具

66 243	ポケットライト	Pocket lights
66 244	強力ライト	High intencity lights
66 249	その他の携帯電灯	Miscellaneous portable lamps
66 25	発電ランプ	Dinamo lights
66 28	照明器具の部品	Parts for luminaires
66 281	安定器	Ballasts
66 2811	けい光灯用安定器	For fluorescent lamp
66 2812	水銀灯用安定器	For high pressure mercury lamps
66 2813	ネオン灯用安定器	For neon tube
66 2819	その他の安定器	Miscellaneous ballasts
66 282	調光器	Dimmer
66 283	光電式自動点滅器	Phtoelectric controls
66 289	その他の照明器具の部品	Miscellaneous parts for luminaires
66 29	その他の照明器具	Miscellaneous luminaires
66 291	殺菌灯器具(治療用を除く。)	Germicidal lamp luminaires (except therapentic use)
66 292	ナトリウム灯器具	For low pressure sodium lamp
66 293	メタルハライド用器具	For metalhalaide lamps
66 294	ハロゲン用器具	For tungsten halogen lamp
66 299	他に分類されない照明器具	Luminaires, n.e.c.
66 3	電池	
66 31	一次電池	Primary cells and batteries
66 311	湿電池	Wet cells
66 312	マンガン乾電池	Manganese dioxide cells and batteries
66 3121	筒形マンガン乾電池	Round type manganese dioxide cells and batteries
66 31211	筒形マンガン乾電池のUM－1形電池	UM-1 sized cell
66 31212	筒形マンガン乾電池のUM－2形電池	UM-2 sized cell
66 31213	筒形マンガン乾電池のUM－3形電池	UM-3 sized cell
66 31219	その他の筒形マンガン乾電池	Miscellaneous cells and batteries consist of round type cells
66 3122	積層マンガン乾電池	Flat type manganese dioxide batteries
66 31221	積層マンガン乾電池の9V以下のもの	9 volts or less than
66 31222	積層マンガン乾電池の9Vをこえるもの	Over 9 volts
66 3129	その他のマンガン乾電池	Miscellaneous cell and batteries consist of manganese dioxide cells
66 313	アルカリ・マンガン電池	Alkaline-manganese dioxide cells and batteries
66 3131	筒形アルカリ・マンガン電池	Round type alkaline-manganese dioxide cells and batteries
66 31311	筒形アルカリ・マンガンAM1形電池	AM 1 sized cells
66 31312	筒形アルカリ・マンガンAM2形電池	AM 2 sized cells
66 31313	筒形アルカリ・マンガンAM3形電池	AM 3 sized cells
66 31319	その他の筒形アルカリ・マンガン電池	Miscellaneous cells and batteries consist of round type cells
66 3132	平形アルカリ・マンガン電池	Flat type alkaline-manganese dioxide cells and batteries
66 3139	その他のアルカリ・マンガン電池	Miscellaneous cells and batteries consist of alkaline-manganese dioxide cells
66 314	水銀電池	Mercuric oxide batteries (mercury batteries)
66 315	空気乾電池	Air-depolarized batteries
66 316	酸化銀電池	Silver oxide batteries
66 319	その他の一次電池	Miscellaneous primary cells and batteries
66 32	二次電池	Secondary batteries
66 321	鉛式蓄電池	Lead storage batteries
66 3211	自動車用鉛式蓄電池	For motor vehicle
66 32111	三・四輪車用鉛式蓄電池	For three and four wheelers
66 32112	二輪車用鉛式蓄電池	For motor cycle
66 3212	すえ置き用鉛式蓄電池	For stationary
66 3213	可搬用鉛式蓄電池	For portable
66 3214	船用鉛式蓄電池	For marine
66 3215	電気車用鉛式蓄電池	For battery vehicle
66 3216	列車用鉛式蓄電池	For train
66 3217	集魚灯用鉛式蓄電池	For fish gathering
66 3218	坑内安全灯用鉛式蓄電池	For safety mine cap lamp
66 3219	その他の鉛式蓄電池	Miscellaneous lead storage batteries
66 322	アルカリ式蓄電池	Nickel-alkaline batteries
66 3221	ポケット式蓄電池	Pocket type
66 32211	すえ置き用アルカリ式蓄電池	For stationary
66 32212	可搬用アルカリ式蓄電池	For portable
66 32213	船用アルカリ式蓄電池	For marine

中分類66ーその他の電気機械器具

12214	車両用アルカリ式蓄電池	For vehicle
12215	坑内安全燈用アルカリ式蓄電池	For safety mine cap lamp
12219	その他のポケット式アルカリ式蓄電池	Miscellaneous pocket type
1222	焼結式蓄電池	Sintered type
12221	すえ置き用アルカリ式蓄電池	For stationary
12222	可搬用アルカリ式蓄電池	For portable
12223	船用アルカリ式蓄電池	For marine
12224	車両用アルカリ式蓄電池	For vehicle
12225	密閉形ニッケル・カドミウムアルカリ式蓄電池	Sealed nickel-cadmium rechargeable batteries
12229	その他の焼結式アルカリ式蓄電池	Miscellaneous sintered type
3229	その他のアルカリ式蓄電池	Miscellaneous nickel-alkaline batteries
328	二次電池の部品	Parts for secondary battery
3281	極板	Battery plates
3282	隔離板	Separators
3283	電そう	Battery cases
3289	その他の二次電池の部品	Miscellaneous parts for secondary battery
329	その他の蓄電池	Miscellaneous storage battery
39	その他の電池	Miscellaneous battery
4	電気乾燥装置及び加熱装置	Electric drying and heating equipment
41	電熱乾燥装置	Drying equipment with electric heater
42	赤外線乾燥装置	Infrared drying equipment
43	抵抗加熱装置	Electric resistance heating equipment
44	誘導加熱装置	Induction heating equipment
45	誘電加熱装置	Dielectric heating equipment
48	電気乾燥装置及び加熱装置の部品及び附属品	Parts and accessories for electric drying and heating equipment
49	その他の電気乾燥装置及び加熱装置	Miscellaneous electric drying and heating equipment
50	電磁応用製品	Electro-magnetic appliances
51	つりあげ電磁石	Lifting electro-magnets
52	電磁チャック	Electro-magnetic chucks
53	電磁クラッチ	Electro-magnetic clutches
54	電磁ブレーキ	Electro-magnetic brakes
55	電動振動形圧縮機	Electro dynamic oscilation type compressors
58	電磁応用製品の部品及び附属品	Parts and accessories for electro-magnetic appliances
59	その他の電磁応用製品	Miscellaneous electro-magnetic appliances
60	内燃機関の電装品	Electrical equipment for internal combustion engines
61	点火用コイル	Ignition coils
62	スタータ（組立品及び部分品	Starters (assemblies and parts)
63	ディストリビュータ（組立品及び部分品）	Distributors (assemblies and parts)
64	充電発電機	Ignition dynamos
65	磁石発電機（組立品及び部分品）	Magnetos (assemblies and parts)
66	点火せん	Spark plugs
67	充電発電機用電圧調整器	Voltage regulators for ignition dynamo
68	内燃機関の電装品の取付具及び附属品	Attachments and accessories of electrical equipment for internal combustion engine
69	その他の内燃機関の電装品	Miscellaneous electrical equipment for internal combustion engine
[illegible]	他に分類されない電気機械器具	Electrical equipment and apparatus, n.e.c.

中分類67－通信装置及び関連装置
MAJOR GROUP 67－COMMUNICATION AND RELATED EQUIPMENT

67 1	電話装置	Telephone equipment,
67 11	電話機	Telephone sets
67 111	磁石式電話機	Magnet systems
67 112	共電式電話機	Common battery systems
67 113	自動式電話機	Automatic systems
67 1131	回転ダイヤル式自動電話機	Rotary dial systems
67 1132	押ボタンダイヤル式自動電話機	Push-button dial systems
67 1139	その他の自動電話機	Miscel'aneous automatic systems
67 114	公衆電話機	Public telephone sets
67 1141	卓上形公衆電話機	Desk public telephone sets
67 1142	ボックス形公衆電話機	Box public telephone sets
67 1149	その他の公衆電話機	Miscellaneous public telephone sets
67 115	宅内装置	In-door telephone systems
67 1151	ボタン電話装置	Key telephone systems
67 1152	留守番電話装置	Automatic answering device
67 1153	自動ダイヤル装置	Autodialer
67 1159	その他の宅内装置	Miscellaneous in-door telephone systems
67 119	他に分類されない電話機	Telephone sets, n.e.c.
67 12	交換機	Telephone switching systems
67 121	電子交換機	Electronic switching system
67 122	XB自動交換機	Crossbar system
67 123	SXS形自動交換機	Step-by-step system
67 1231	A形自動交換機	Strowger type automatic switching system
67 1232	H形自動交換機	Siemens halske type automatic switching system
67 124	自動式構内交換機	Private automatic branch exchange
67 125	手動交換機	Manual switchboards
67 1251	磁石式交換機	Magnet switchboard
67 1252	共電式市内交換機	Common-battery local switchboard
67 1253	共電式市外交換機	Common-battery toll switchboard
67 1254	共電式構内交換機	Common-battery PBX
67 126	交換機付属機器	Attached equipment for switching system
67 129	その他の交換機	Miscellaneous telephone switching system
67 19	その他の電話装置	Miscellaneous telephone equipment
67 191	テレビ電話装置	Video phone equipment
67 192	インターホン	Interphone
67 193	指令電話装置	Directive telephone equipment
67 193	有線放送電話装置	Wire broadcast and telephone system
67 199	他に分類されない電話装置	Telephone equipment, n.e.c.
67 2	電信装置	Telegraph equipment
67 21	モールス電信機器	Morse telegraph device
67 22	印刷電信装置	Teleprinter
67 221	テープ式印刷電信装置	Tape teleprinter
67 2211	自動送信機	Line transmitter
67 2212	印刷受信機	Printer
67 2213	鍵盤さん孔機	Keyboard perforator
67 2214	受信さん孔機	Reperforator
67 222	ページ式印刷電信装置	Page teleprinter
67 2221	自動送信機	Line transmitter
67 2222	印刷受信機	Printer
67 2223	鍵盤送信機	Key board transmitter
67 2224	印刷受信さん孔機	Printing reperforator
67 2225	受信さん孔機	Reperforator
67 223	加入電信宅内装置	Telex terminal equipment
67 224	電報受付装置	Phonogram information equipment
67 23	ファクシミリ	Facsimile
67 231	模写電送装置	Document facsimile
67 232	写真電送装置	Photo facsimile
67 2321	新聞ファクシミリ	Newspaper facsimile
67 2329	その他の写真電送装置	Miscellaneous telegraph equipment
67 24	電信交換装置	Telegraph switching relay equipment
67 241	通信中継交換装置	Telegraph switching equipment
67 242	加入電信交換装置	Telex switching equipment
67 25	電信用架及び装置類	Telegraph bays and equipment
67 251	回線用架類	Line bays
67 252	特殊装置類	Special equipment
67 2521	電信集信装置	Telegraph collectors
67 2522	電話託送装置	Phonogram
67 2523	無誤字伝送装置	Error correcting equipment
67 2529	その他の特殊装置類	Miscellaneous special equipment
67 29	その他の電信装置	Miscellaneous telegraph equipment

中分類67－通信装置及び関連装置

	搬送装置	Carrier supply equipment.
	対ケーブル搬送装置	Pair cable carrier equipment
	ＦＤＭ搬送装置	FDM carrier equipment
	端局装置	Terminal equipment
	中継装置	Repeater equipment
	ＰＣＭ搬送装置	PCM multiplex equipment
	端局装置	Terminal equipment
	中継装置	Repeater equipment
	同軸ケーブル搬送装置	Coaxial cable carrier equipment
	ＦＤＭ搬送装置	FDM carrier equipment
	端局装置	Terminal equipment
	中継装置	Repeater equipment
	電力給電装置	Power feeding equipment
	ＰＣＭ搬送装置	PCM carrier equipment
	端局装置	Terminal equipment
	中継装置	Repeater equipment
	電力給電装置	Power feeding equipment
	海底同軸搬送装置	Submarine coaxial cable carrier equipment
	端局装置	Terminal equipment
	中継装置	Repeater equipment
	電力給電装置	Power feeding equipment
	放送中継用搬送装置	Program transmission carrier equipment
	端局装置	Terminal equipment
	分岐装置	Repeater equipment
	映像搬送端局装置	Video carrier terminal equipment
	その他の同軸搬送装置	Miscellaneous coaxial carrier equipment
	基底周波伝送装置	Baseband frequency transmission equipment
	音声伝送装置	Voice frequency
	中継装置	Repeater equipment
	双方向中継装置	Two-way repeater equipment
	放送伝送装置	Program transmission equipment
	中継装置	Repeater equipment
	分岐装置	Branching equipment
	映像伝送装置	Video transmission equipment
	中継装置	Repeater equipment
	分岐装置	Branching equipment
	無線用搬送端局装置	Radio terminal equipment
	ＦＤＭ端局装置	FDM terminal equipment
	ＰＣＭ端局装置	PCM terminal equipment
	その他の無線用端局装置	Miscellaneous radio terminal equipment
	搬送電信端局装置	Carrier telegraph terminal equipment
	ＡＭ端局装置	AM terminal equipment
	ＦＳ端局装置	FS terminal equipment
	ＰＳ端局装置	PS terminal equipment
	その他の端局装置	Miscellaneous carrier telegraph equipment
	搬送装置用附属装置	Additional carrier equipment
	その他の搬送装置	Miscellaneous carrier equipment
	裸線搬送装置	Open wire carrier equipment
	電力線搬送装置	Power line carrier equipment
	他に分類されない搬送装置	Carrier equipment, n.e.c.
	無線通信装置	Radio communication equipment
	固定局通信装置	Radio communication equipment for fixed station
1	単一通信装置	Single channel radio communication equipment
11	長・中・短波送受信装置	Low/medium frequency transmitter-receivers
12	超短波送受信装置	Very high frequency (VHF) transmitter-receivers
13	マイクロ波送受信装置	Micro-wave transmitter-receivers
18	単一通信装置の附属装置	Related equipment for radio communication for fixed station
2	多重通信装置	Multi-channel radio communication equipment for fixed station
121	短波送受信装置	High frequency (HF) transmitter-receivers
122	超短波送受信装置	Very high frequency (VHF) transmitter-receivers
123	マイクロ波送受信装置	Micro-wave transmitter-receivers
124	ミリ波送受信装置	Mulli-meter wave transmitter-receivers
125	衛星通信用送受信装置	Satellite communication transmitter-receivers
128	多重通信装置の附属装置	Related equipment for multi-channel radio communication
19	その他の固定局通信装置	Miscellaneous radio communication equipment for fixed station
2	移動局通信装置	Radio communication equipment for mobile station
21	車両用通信装置	Vehicular radio communication equipment

中分類67－通信装置及び関連装置

67 4211	長・中・短波送受信装置	Low/medium/high frequency (LF/MF/HF) transmitter-receivers
67 4212	超短波送受信装置	Very high frequency (VHF) transmitter-receivers
67 4213	極超短波送受信装置	Ultra high frequency (UHF) transmitter-receivers
67 4218	車両用通信装置の附属装置	Related equipment for vehicular radio communication
67 422	船舶用通信装置	Marine radio communication equipment
67 4221	長・中・短波送受信装置	Low/medium/high frequency (LF/MF/HF) transmitter-receivers
67 4222	超短波送受信装置	Very high frequency (VHF) transmitter-receivers
67 4223	極超短波送受信装置	Ultra high frequency (UHF) transmitter-receivers
67 4228	船舶用通信装置の附属装置	Related equipment for marine radio communication
67 423	航空機用通信装置	Airborne radio communication equipment
67 4231	長・中・短波送受信装置	Low/medium/high frequency (LF/MF/HF) transmitter-receivers
67 4232	超短波送受信装置	Very high frequency (VHF) transmitter-receivers
67 4233	極超短波送受信装置	Ultra high frequency (UHF) transmitter-receivers
67 4238	航空機用通信装置の附属装置	Related equipment for airborne radio communication
67 424	衛星搭載用通信装置	Satellite radio communication equipment
67 4241	マイクロ波送受信装置	Miccro-wave transmitter-receivers
67 4242	ミリ波送受信装置	Milli-meter wave transmitter-receivers
67 4248	衛星搭載用通信装置の附属装置	Related equipment for satellite radio communication
67 425	携帯用通信装置	Portable radio communication equipment
67 4251	短波送受信装置	High frequency (HF) transmitter-receivers
67 4252	超短波送受信装置（ポケットベルを含む。）	Very high frequency (VHF) transmitter-receiver (incl ing pocket bell systems)
67 4253	極超短波送受信装置	Ultra high frequency (UHF) transmitter-receivers
67 4258	携帯用通信装置の附属装置	Related equipment for portable radio communication
67 426	簡易無線用通信装置	Citizen's radio communication equipment
67 4261	２６－２７ＭＨｚ帯用簡易無線用通信装置	26/27 MHz citizen's radio communication equipment
67 4262	１５０ＭＨｚ帯用簡易無線用通信装置	150 MHz citizen's radio communication equipment
67 4263	４００ＭＨｚ帯用簡易無線用通信装置	400 MHz citizen's radio communication equipment
67 429	その他の移動局通信装置	Miscellaneous radio communication equipment for mobil station
67 43	光通信装置	Optical communication equipment
67 431	ガスレーザ通信装置	Gas laser communication equipment
67 432	半導体レーザ通信装置	Semiconductor laser communication equipment
67 438	光通信装置の附属装置	Related equipment for optical communication
67 439	その他の光通信装置	Miscellaneous optical communication equipment
67 49	その他の無線通信装置	Miscellaneous radio communication equipment
67 491	救命艇用通信装置	Life boat radio communication equipment
67 492	携帯用非常無線装置	Portable emergency radio communication equipment
67 493	遭難自動通報装置	Distress automatic call equipment
67 494	緊急自動受信装置	Alarm signal automatic receivers
67 495	模型無線操縦用送受信機	Model radio control equipment
67 496	アマチュア用無線機	Radio communication equipment for amateur use
67 499	他に分類されない無線通信装置	Radio communication equipment, n.e.c.
67-5	無線応用装置	Associated radio equipment
67 51	航法装置	Radio navigation equipment
67 511	ロラン	Loran
67 512	デッカ	Decca
67 513	オメガ	Omega
67 514	ＮＮＳＳ	NNSS (navy navigation satellite system)
67 52	方向探知機	Radio directional finders
67 521	航空機用方向探知機	Airborne
67 522	船舶用方向探知機	Marine
67 523	陸上用方向探知機	Overland
67 53	標識装置	Beacon equipment
67 531	ＮＤＢ装置	Non-directional radio beacon equipment
67 532	回転ビーコン装置	Rotary beacon equipment
67 5321	送信装置	Transmitters
67 5322	受信装置	Receivers

:	30 kHz - 300 kHz	Low frequency
:	300 kHz - 3 MHz	Medium frequency
:	3 MHz - 30 MHz	High frequency
:	30 MHz - 300 MHz	Very high frequency
:	300 MHz - 1 GHz	Ultra high frequency
:	1 GHz - 30 GHz	Micro-wave
:	30 GHz -	Milli-meter wave

中分類67－通信装置及び関連装置

33	ＶＯＲ装置	VHF omni-directional radio range equipment
331	送信装置	Transmitters
332	受信装置	Receivers
34	距離測定装置	Distance measuring equipment
341	機上装置	Airborne
342	地上装置	Ground
35	タカン装置	Equipment for tactical air navigation system
351	機上装置	Airborne
352	地上装置	Ground
36	レーマーク装置	Equipment for remark beacon equipment
39	その他の標識装置	Miscellaneous beacon equipment
4	レーダ装置	Radar equipment
41	航空機用レーダ	Airborne radar equipment
411	気象用レーダ	Weather radar equipment
412	ドプラナビゲータ	Doppler radar equipment
413	標定用レーダ	Secondary radar equipment
42	船舶用レーダ	Marine radar equipment
421	航行用レーダ	Navigation radar equipment
422	標定用レーダ	Secondary radar equipment
43	地上用レーダ	Ground radar equipment
431	気象用レーダ	Meteorological radar equipment
432	航行用レーダ	Navigation radar equipment
433	着陸援助用レーダ	Approach and landing control radar equipment
434	標定用レーダ	Secondary radar equipment
44	衛星搭載用レーダ	Radar equipment for aboar satellite
5	誘導無線応用装置	Inductive radio applied equipment
9	その他の無線応用装置	Miscellaneous associated radio equipment
91	ＩＬＳ装置	Equipment for instrument landing system
911	機上装置	Airborre
912	地上装置	Ground
92	ラジオブイ	Radio buoyes
921	漁業用ラジオブイ	Fishery radio buoyes
922	救難用ラジオブイ	Rescue radio buoyes
929	その他のラジオブイ	Miscellaneous radio buoyes
93	電波高度計	Radio altimeters
94	速度測定器	Radio speed meters
95	気象観測装置	Meterological observatory equipment
99	他に分類されない無線応用装置	Radio communication equipment, n.e.c.
5	放送用装置（民生用を除く。）	Broadcasting equipment
51	映像用スタジオ装置（中継放送用を含む。）	Video studio equipment
511	カメラ装置	Camera equipment
5111	カメラヘッド	Camera heads
5112	カメラ制御器	Camera control units
5113	カメラ遠隔制御装置	Camera remote control units
5114	カメラ装置用附属装置	Accessories for camera equipment
512	フィルム映像装置	Film image producing equipment
5121	フィルム映写機	Film projectors
5122	オペーク映写機（テロップ装置）	Opaque projectors (telop)
5123	スライド映写機	Slide projectors
5124	フィルムカメラ装置	Film camera equipment
5125	フライングスポット装置	Flying spot scanners
5126	マルチプレクサー	Multiplexers
5127	フィルム録画装置	Film video recording equipment
613	録画装置	Video recording equipment
6131	白黒ＶＴＲ	Black/white video tape recorders (VTRs)
6132	カラーＶＴＲ	Color video tape recorders (VTRs)
6133	カラーＶＴＲ再生装置	Color video tape reproducers
6134	カラーＶＴＲ自動補正器	Color VTR automatic correctors
6135	スローモーションＶＴＲ	Slow motion VTRs
6136	ＶＴＲ自動編集装置	VTR automatic editors
6139	その他の録画装置	Miscellaneous video recording equipment
614	映像切換装置	Video signal switching equipment
615	監視装置	Monitors
6151	プログラムモニタ	Program monitors
6152	オシロスコープモニタ	Oscilloscope monitors
6153	マスタモニタ	Master monitors
616	番組自動送出装置	Automatic program senders
6161	自動運行制御装置	Automatic operation control equipment
6162	番組伝送制御装置	Program transmission control equipment

中分類67－通信装置及び関連装置

67 6163	遠方集中監視装置	Central monitors
67 617	主調整装置	Main mixers
67 6171	同期信号発生器	Synchronizing signal generators
67 6172	映像信号分配器	Video distribution amplifiers
67 6173	同期信号分配器	Synchronizing signal distributors
67 6174	映像安定化増巾器	Video stabilizing amplifiers
67 6175	同期信号結合装置	Synchronizing signal couplers
67 6176	波形等化器	Wave form equalizers
67 618	特殊効果信号発生装置	Special effect signal generators
67 619	その他の映像用スタジオ装置	Miscellaneous studio equipment
67 62	音声用スタジオ装置（中継放送用を含む。）	Audio studio equipment
67 621	マイク装置	Microphone equipment
67 6211	マイクロホン	Microphones
67 6212	集音器	Sound collectors
67 6213	マイク装置用附属機器	Accessories for microphone equipment
67 622	録音及び再生装置	Audio recorders and reproducers
67 6221	円盤再生機	Disc players
67 6222	円盤録音再生機	Disc recorders
67 6223	テープ録音再生機	Tape recorders
67 6224	ＴＶ用磁気フィルム録音再生機	TV magnetic film (audio) recorders
67 623	スタジオ調整装置	Mixing equipment
67 6231	前置増巾器	Preamplifiers
67 6232	ブースタ増巾器	Boosters
67 6233	出力増巾機	Output amplifiers
67 7234	制限増巾機	Limiters
67 6235	モニタ増巾器	Monitor amplifiers
67 624	監視装置	Monitor equipment
67 6241	モニタスピーカ	Monitor speakers
67 6242	モニタイヤホン	Monitor earphones
67 7243	ＶＵメータ	VU meters
67 625	主調整装置	Main mixing equipment
67 6251	入力線路増巾器	Input line amplifiers
67 6252	入力線路等化増巾器	Input line equalizers
67 6253	出力線路増巾器	Output line amplifiers
67 6254	入出力線路切換装置	Input/output line switching equipment
67 6255	変調計	Modulation meters
67 626	特殊効果用機器	Special effect equipment
67 6261	効果用フィルタ	Filters
67 6262	人工残響附加装置	Reverberation machines
67 63	中継放送	Field pickup and STL equipment
67 631	中継放送用無線送受信装置	Field pickup equipment
67 6311	超短波送受信装置	UHF transmitter-receivers
67 6312	マイクロ波送受信装置	Microwave transmitter-receivers
67 632	ＳＴＬ装置	STL equipment
67 64	放送機	Broadcasting transmitters
67 641	中波放送機	Medium-wave broadcasting transmitters
67 642	短波放送機	Short-wave broadcasting transmitters
67 643	超短波ＦＭ放送機	VHF-FM broadcasting transmitters
67 644	テレビジョン放送機	Television broadcasting transmitters
67 6441	映像送信機	Video broadcasting transmitters
67 6442	音声送信機	Audio broadcasting transmitters
67 645	空中線給電装置	Antenna coupling equipment
67 646	監視装置	Monitors
67 648	放送機の附属装置	Attachments of broadcasting transmitters
67 6481	前置補償増巾器	Compensating preamplifiers
67 6482	位相補償増巾器	Phase compensating amplifiers
67 6483	疑似空中線	Dummy antennas
67 6484	電力計	Power meters
67 6485	オフセット安定化発振器	Offset stabilizing generators
67 65	サテライト局装置・ブースタ局装置及び附属装置	Satellite station and booster station equipment
67 651	同調増巾器	Tuning amplifiers
67 652	周波数変換機	Frequency converters
67 653	自動制御装置	Automatic control equipment
67 658	附属装置	Attachments
67 6581	ＡＧＣ装置	AGC equipment
67 6582	入力検知装置	Input detectors
67 6583	ＡＦＣ装置	AFC equipment
67 6584	ＡＰＣ装置	APC equipment

中分類67－通信装置及び関連装置

CATV装置	Cable television systems
ヘッドエンド	Head ends
中継増巾器	Repeaters
幹線用中継増巾器	Trunk repeaters
延長用中継増巾器	Extension line repeaters
受配分配器	Distributors
保安器	Protectors
その他の放送用装置	Miscellaneous broadcasting equipment
音声及び映像周波装置（民生用及び放送用を除く。）	Audio and video frequency equipment, (except consumer and broadcast equipment)
拡声装置	Public address systems
固定形拡声装置	Fixed type public address systems
一般用固定形拡声装置	Public address system for general purpose
非常用固定形拡声装置	Public address system for emergency use
車載形拡声装置（船舶・航空機用を含む。）	Vehiclar type (including airborne and marine) public address systems
可搬形拡声装置	Portable type public address systems
携帯形拡声装置	Handy type public address systems
電気メガホン	Electro-megaphones
ショルダーマイク	Shoulder microphones
その他の携帯形拡声装置	Miscellaneous handy type public address systems
拡声装置の附属機器及び部分品	Accessories and parts for public address systems
ワイヤレスマイク	Wireless microphones
増巾器	Amplifiers
その他の拡声装置の附属機器及び部分品	Miscellaneous accessories and parts for public address systems
有線ラジオ放送装置	Wire broadcasting equipment
録音及び再生装置（再生専用機及び複製専用機を含む。）	Audio recording/reproducing equipment (including dubbing machines)
磁気録音及び再生装置	Magnetic audio recording and reproducing equipment
テープ式磁気録音及び再生装置	Tape recorders
フィルム式磁気録音及び再生装置	Film type recorder/reproducers
その他の磁気録音及び再生装置	Miscellaneous magnetic audio recording and reproducing
円盤録音及び再生装置	Disc recorder-reproducers
光学式録音及び再生装置	Optical audio recording-reproducing equipment
その他の録音及び再生装置（ジュークボックスを含む。）	Miscellaneous audio recording-reproducing equipment (including juke boxes)
録音応用装置	Audio recording application equipment
閉回路テレビジョン装置	Closed circuit television systems
カメラ装置	Camera unit
モニタ装置	Monitors
閉回路テレビジョン装置の附属装置	Accessories for closed circuit television
録画及び再生装置	Video recording/reproducing equipment
磁気録画及び再生装置	Magnetic video recording/reproducing equipment
カラー用磁気録画及び再生装置	Color magnetic video recording/reproducing equipment
白黒用磁気録画及び再生装置	Black/white magnetic video recording/reproducing equipment
その他の磁気録画及び再生装置	Miscellaneous magnetic video recording/reproducing equipment
テレビジョン応用装置	Television application equipment
投射形テレビジョン受像装置	Projector type television receivers
その他のテレビジョン応用装置	Miscellaneous television application equipment
音声及び映像周波装置の附属機器及び部分品	Accessories and parts for audio and video frequency equipment
その他の音声及び映像周波装置	Miscellaneous audio and video frequency equipment
通信装置の附属機器及び部品（民生用を除く。）	Accessories and parts for communication equipment, (except for consumer use)
有線通信装置用部品及び附属品	Parts and accessories for wire communication equipment
宅内用部品及び附属品	For subscriber's apparatus
ダイヤル	Dials
転換器	Switch box
その他の宅内用部品及び附属品	Miscellaneous parts and accessories for subscriber's apparatus
局内用部品及び附属品	For telephone office equipment
度数計	Call meter (counter)
時数計	Charging meter
表示器	Switchboard drops
避雷器弾器	Arrester spring
試験弾器	Test springs

中分類67ー通信装置及び関連装置

67 8129	その他の局内用部品及び附属品	Miscellaneous parts and accessories for telephone office equipment
67 813	線路用部品及び附属品	For line construction
67 8131	配線器	Cable beads
67 8132	端子	Terminal boxes
67 8133	保安器	Protectors
67 8139	その他の線路用部品及び附属品	Miscellaneous parts and accessories for line construction
67 814	送話器及び受話器	Transmitters and receivers
67 8141	送受話器	Micro telephones
67 8142	送話器	Transmitter microphone
67 8143	受話器	Receivers
67 8149	その他の送受話器用部品及び附属品	Miscellaneous parts and accessories for transmitters and receivers
67 819	その他の有線通信装置用部品及び附属品	Miscellaneous parts and accessories for wire communication equipment
67 82	無線通信装置用附属機器及び部品	Accessories and parts for radio communication equipment
67 821	アンテナ	Antennas
67 8211	長中波用アンテナ	Long/medium wave antennas
67 8212	短波用アンテナ	Short wave antennas
67 8213	ＶＨＦ用アンテナ	VHF antennas
67 8214	ＵＨＦ用アンテナ	UHF antennas
67 8215	ＳＨＦ用アンテナ	SHF antennas
67 8216	ミリ波用アンテナ	Millimeter-wave antennas
67 822	アンテナ関連機器（伝送関連機器を除く。）	Related equipment for antennas
67 8221	アンテナ共用装置	Diplexers
67 8222	アンテナ駆動装置	Antenna driving systems
67 8229	その他のアンテナ関連機器	Miscellaneous related equipment for antennas
67 823	伝送関連機器	Related equipment and devices for line transmission
67 8231	混合器	Mixers
67 8232	分波器	Frequency splitters
67 8233	方向性結合器	Directional couplers
67 8234	整合器	Impedance matching transformers
67 8239	その他の伝送関連機器	Miscellaneous related equipment and devices for line transmission
67 824	立体回路	Microwave transmission circuits
67 8241	導波管	Waveguides
67 8249	その他の立体回路	Miscellaneous microwave transmission circuits
67 89	その他の通信装置及び関連装置	Miscellaneous accessories and parts for communication equipment
67 9	その他の通信装置及び関連装置	Miscellaneous communication and related equipment

中分類68－電子応用装置（通信装置及び関連装置を除く。）

MAJOR GROUP 68－ASSOCIATED ELECTRONIC EQUIPMENT, EXCEPT COMMUNICATION AND RELATED EQUIPMENT

X線装置	X-ray equipment
医療用X線装置	X-ray equipment for medical use
X線発生装置	X-ray generators
X線管装置	X-ray tube equipment
X線発生器	X-ray generating equipment (assembled equipment with all necessary components in one tank for X-ray production)
変圧器式X線高電圧装置	X-ray high voltage generators, transformer type
コンデンサ式X線高電圧装置	X-ray high voltage generators, capacitor energy storage type
深部治療用X線高電圧装置	X-ray high voltage generators for deep therapeutic use
表在治療用X線高電圧装置	X-ray high voltage generators for surface therapeutic use
X線発生装置の附属品	Accessories for X-ray generators
保持装置	Supporting structures
床上式保持装置	Floor type supporting structures
天井一床上式保持装置	Ceiling-floor type supporting structures
壁掛式保持装置	Wall type supporting structures
天井式保持装置	Ceiling type supporting structures
X線透視撮影台	X-ray fluorescopic tables
蛍光板式X線透視撮影台	Fluorescent screen type X-ray fluoroscopic tables
XTV式X線透視撮影台	Television type X-ray fluoroscopic tables
特殊X線透視撮影台	Special purpose X-ray fluoroscopic tables
X線撮影台	Radiographic stands
直接X線撮影台	Direct radiographic stands
間接X線撮影台	Indirect radiographic stands
断層X線撮影台	Tomographic stands
特殊X線撮影台	Special purpose radiographic stands
X線治療台	X-ray therapeutic tables
医療用X線装置関連機器及び部品	Related equipment and parts for medical X-ray system
連続撮影用フィルムチェンジャー	Rapid film changers
造影剤注入装置	Contrast medium injectors
X線被曝低減装置	Low X-ray exposure controllers
自動黒化度調整装置	Automatic density controllers
シネパルス発生装置	Cine pulse generators
治療計画装置（線量計算機を含む。）	Therapy planning equipment (including radio-dosemetric equipment)
その他の医療用X線装置関連機器及び部品	Miscellaneous related equipment and parts for medical X-ray system
その他の医療用X線装置	Miscellaneous X-ray equipment for medical use
産業用X線装置	X-ray equipment for industrial use
照射装置	Irradiation equipment
計測装置	Measuring equipment
非破壊検査装置	Non-destructive testing equipment
携帯式X線装置	Portable type non-destructive testing equipment
すえ置式X線装置	Fixed type non-destructive testing equipment
その他の非破壊検査装置	Miscellaneous non-destructive testing equipment
異物検査装置（ハイジャック防止装置を含む。）	Alien checking equipment (including Hi-jack protective equipment)
分析装置（X線顕微鏡を含む。）	X-ray spectrometers
応力測定装置	X-ray stress measuring equipment
透過写真撮影装置	Radiographic equipment
その他の産業用X線装置	Miscellaneous X-ray equipment for industrial use
放射線管理測定器	Measuring equipment for radiation control
個人照射モニター（534341）	Personal exposure monitors
照射線量計（534344）	Radiation dosemeters
照射線量率計（534345）	Radiation doserate meters
X線障害防止用装置及び器具	Radiation hazard protective equipment and accessories
X線映像装置	X-ray image equipment
X線光電子増倍装置	X-ray image intensifying equipment
テレビジョン装置	Television equipment
X線カメラ（I.Iスポットカメラ・シーケンシャルスポットカメラを含む。）	X-ray cameras (including image intensifying spot cameras and rapid sequential spot cameras)
映画撮影装置	Cine photographic equipment
磁気記録装置	Magnetic recording equipment
CRTディスプレイ装置	CRT character displaying equipment
その他のX線映像装置	Miscellaneous X-ray image equipment
X線装置の関連機器及び部品	Related equipment and parts for X-ray equipment
X線フィルム自動現像装置	Automatic X-ray film developers
直接撮影フィルム用自動現像装置	Automatic X-ray film developers for direct radiographic use
間接撮影フィルム用自動現像装置	Automatic X-ray film developers for indirect radiographic use
ゼロラジオグラフィ	Zero radiographic equipment

中分類68ー電子応用装置（通信装置及び関連装置を除く。）

68 183	フィルム観察装置	Film viewers
68 184	蛍光板，増感紙	Flourescent screens and intensifying screens
.. ...	X線用写真フィルム（56312）	X-ray film
68 189	その他のX線装置の関連機器部品及び附属品	Miscellaneous related equipment, parts and accessories for X-ray equipment
68 19	その他X線装置	Miscellaneous X-ray equipment
68 2	粒子加速装置	Particle accelerators
68 21	直線加速装置	Linear accelerators
68 211	医療用直線加速装置	Linear accelerators for medical use
68 212	産業用直線加速装置	Linear accelerators for industrial use
68 22	ベータトロン	Betertrons
68 221	医療用ベータトロン	Betertrons for medical use
68 222	産業用ベータトロン	Betertrons for industrial use
68 23	サイクロトロン	Cyclotrons
68 24	シンクロトロン	Synchrotrons
68 25	シンクロサイクロトン	Synchro-cyclotrons
68 26	中性子発生装置	Neutron generators
68 28	粒子加速装置関連機器及び附属品	Related equipment and accessories for particle accelera
68 29	その他の粒子加速装置	Miscellaneous particle accelerators
68 3	放射性物質応用装置	Radio isotope equipment
68 31	医療用放射性物質応用装置	Radio isotope equipment for medical use
68 311	照射装置	Irradiation equipment
68 3111	遠隔照射治療装置	Tele-radio therapeutic equipment
68 3112	アフターローディング治療装置	After loading therapeutic equipment
68 3119	その他の照射装置	Miscellaneous irradiation equipment
.. ...	医療用計測装置（53436）	Measuring equipment for medical use
.. ....	シンチレーションカメラ（534361）	Scintillation cameras
.. ....	シンチレーションスキャナー（534362）	Scintillation scanners
.. ....	能動機能測定装置（534363）	Active function measuring equipment
.. ....	甲状腺摂取率測定装置（534364）	Thyroid glas uptake measuring equipment
	メディカルスペクトロメータ（534365）	Medical spectrometers
.. ....	医療用自動試料測定装置（534366）	Automatic sample measuring equipment for medical use
.. ....	放射能量測定装置（534367）	Radiation amount measuring equipment
.. ....	その他の医療用計測装置（534369）	Miscellaneous measuring equipment for medical use
68 32	産業用放射性物質応用装置	Radio isotope equipment for industrial use
68 321	照射装置	Irradiation equipment
68 3211	殺菌用照射装置	Irradiation equipment for sterilization use
68 3212	食品照射装置	Irradiation equipment for food
68 3213	高分子化学用照射装置	Irradiation equipment for high polymer chemistry
68 3219	その他の照射装置	Miscellaneous irradiation equipment
68 322	非破壊検査装置	Non-destructive testing equipment
.. ...	産業用計測装置（53435）	Measuring equipment for medical use
.. ....	厚さ計（534351）	Thickness gauges
.. ....	密度計（534352）	Density gauges
.. ....	レベル計（534353）	Level gauges
.. ....	水分計（534354）	Moisture meters
.. ....	硫黄計（534355）	Sulfur meters
.. ....	その他の産業用計測装置（534359）	Miscellaneous measuring equipment for industrial use
68 38	放射性物質応用装置関連機器及び附属品	Related equipment and accessories for radio isotope ec ment
68 381	マニピュレータ	Manipulators
68 382	照射試料搬送装置	Sample carriers for irradiation
68 383	遠隔監視装置	Tele-monitors
68 3831	遮蔽窓	Radiation protective windows
68 3832	ペリスコープ	Periscopes
68 3839	その他の遠隔監視装置	Miscellaneous tele monitors
68 389	その他の放射性物質応用装置関連機器及び附属品	Miscellaneous related equipment and accessories for r isotope equipment
68 39	その他の放射性物質応用装置	Miscellaneous radio isotope equipment
68 4	音波応用装置	Sonic equipment
68 41	水中聴音装置	Hydrophones
68 42	地震探鉱装置	Seismic wave survey equipment
68 43	超音波信号応用装置	Ultrasonic signal application equipment
68 431	測深機	Echo sounders
68 4311	航海用測深機	Echo sounders for navigational use.
68 4312	測量用測深機	Echo sounders for hydrographical use
68 432	海洋探知機	Marine detectors
68 4321	魚群探知機	Fish finders
68 4322	鯨探知機	Whale finders

中分類68－電子応用装置（通信装置及び関連装置を除く。）

4323	ソナー	Sonars
4329	その他の海洋探知機	Miscellaneous marine detectors
433	探傷機	Flaw detectors
434	診断装置	Diagnostic equipment
4341	パルス法診断装置	Pulse method diagnostic equipment
4342	ドプラ法診断装置	Doppler method diagnostic equipment
435	超音波応用計測装置	Ultrasonic measuring equipment
4351	レベル計	Level gauges
4352	流速流量計	Current/flow meters
4353	交通監視用探知機	Traffic watching detectors
4359	その他の超音波応用計測装置	Miscellaneous ultrasonic measuring equipment
439	その他の超音波信号応用装置	Miscellaneous applied ultra-sonic signal equipment
44	超音波動力応用装置	Ultrasonic power application equipment
441	超音波応用洗浄機	Washers
4411	医療用超音波応用洗浄機	Washers for medical use
4412	その他の超音波応用洗浄機	Miscellaneous washers
442	超音波応用溶接機	Welders
4421	超音波応用金属溶接機	Metal welders
4422	非金属用超音波応用溶接機	Non-metallic welders
443	超音波応用加工機	Processing equipment
444	超音波応用めっき装置	Plating equipment
445	超音波応用化学反応促進装置	Chemical reaction accelerators
446	超音波応用集じん装置	Dust collectors
447	超音波応用殺菌装置	Sterilizing equipment
448	超音波応用治療装置	Therapeutic equipment
449	その他の超音波動力応用装置	Miscellaneous ultrasonic power equipment
49	その他の音波応用装置	Miscellaneous sonic equipment
5	電磁応用探知装置	Applied electro magnetic detectors
51	磁気探知装置	Magnetic detectors
52	電気探知装置	Electric detectors
53	磁気探傷装置	Magnetic flaw detectors
59	その他の電磁応用探知装置	Miscellaneous applied electro magnetic detectors
6	電力応用装置、	Electronic power application equipment
61	低周波電力応用装置	Low drequency electronic power application equipment
62	高周波誘導加熱装置	High frequency induction heaters
621	焼入装置	Hardening equipment
622	焼鈍装置	Annealing equipment
623	溶解装置	Melting equipment
624	ハンダ付ろう付装置	Soldering equipment
625	半導体結晶精製装置	Semiconductor crystal refining equipment
626	誘導プラズマ装置	Induction plasma equipment
627	ボンダー	Bonders
628	誘導調理器	Induction cooking equipment
629	その他の高周波誘導加熱装置	Miscellaneous high frequency induction heaters
63	高周波誘電加熱装置	High frequency dielectric heaters
631	樹脂加工装置	Resin processing equipment
6311	ウエルダ	Welders
6312	プレヒータ	Preheaters
6313	高周波ミシン	High frequency sewing machines
632	乾燥機	Driers
633	木竹材成形接着装置	Plywood/bamboo-gluing machines
634	誘電プラズマ装置	Dielectric plasma equipment
635	ジアテルミー	Diathermic equipment
636	超短波治療装置	High frequency therapeutic equipment
637	電気手術器	Electro-surgical knives
638	電気焼灼器	Electric cauteries
639	その他の高周波誘電加熱装置	Miscellaneous high frequency dielectric equipment
64	高周波通電加工装置	High frequency energy processing equipment
641	高周波硝子旋盤	High frequency glass lathes
642	高周波焼結装置	High frequency sintering equipment
649	その他の高周波通電加工装置	Miscellaneous hight frequency energy processing equipment
65	マイクロ波加熱装置	Microwave heaters
...	電子レンジ(65435)	Microwave ovens
652	工業用食品加工装置	Industrial food processing equipment
653	岩石破砕機	Rock drills
654	マイクロ波治療器	Microwave therapeutic equipment
659	その他のマイクロ波加熱装置	Miscellaneous microwave heaters
69	その他の電力応用装置	Miscellaneous electronic power application equipment
7、	電子計算機	Electronic computers

中分類68－電子応用装置（通信装置及び関連装置を除く。）

68 71	中央処理装置（計数形）	Central processing units (digital type)
68 711	一般用（制御用を除く。）	For general use (except control use)
68 7111	演算処理装置	Arithmetic processing units
68 7112	入出力制御装置（チャネル）	Input-output channels units
68 7113	主記憶装置	Main internal memories units
68 7114	附加記憶装置	Add-on memories units
68 712	制御用中央処理装置	Central processing units for control use
68 713	通信制御装置	Communication control units
.. ...	マイクロプロセッサ（673311）	Micro processor
68 72	補助記憶装置	Auxiliary storage equipment
68 721	磁気ドラム記憶装置	Magnetic drum equipment
68 722	磁気ディスク記憶装置（ディスクが固定のもの）	Magnetic disc equipment (fixed disc)
68 723	磁気ディスク装置（ディスクが可換のもの）	Magnetic disc equipment (removable disc)
68 724	フレキシブルディスク装置（柔軟なディスクを用いるもの）	Flexible disc equipment
68 725	磁気テープ装置	Magnetic tape equipment
68 726	磁気カセットテープ装置	Magnetic cassette tape equipment
68 729	その他の補助記憶装置	Miscellaneous auxiliary storage equipment
68 73	入出力装置	Input-output units
68 731	印刷装置	Printers (including keyboard printers)
68 7311	インパクトシリアルプリンタ	Impact serial printers
68 7312	ノンインパクトシリアルプリンタ	Non-impact serial printers
68 7313	インパクトラインプリンタ	Impact line printers
68 7314	ノンインパクトラインプリンタ	Non-impact line printers
68 732	作図装置（プロッタ）	Drafting equipment (digital plotters)
68 733	読取・せん孔装置	Reader punches
68 7331	紙カード読取装置	Card readers
68 7332	紙カードせん孔装置	Card punches
68 7333	紙テープ読取装置	Paper tape readers
68 7334	紙テープせん孔装置	Paper tape punches
68 734	認識装置	Recognition equipment
68 7341	磁気インキ文字読取装置	Magnetic ink charactor readers
68 7342	光学文字読取装置	Optical charactor readers
68 7343	光学マーク読取装置	Optical mark readers
68 735	表示装置	Displays
68 7351	ＣＲＴ表示装置	Cathode ray tube displays
68 3559	その他の表示装置	Miscellaneous displays
68 736	図形入力装置	Graphic data input equipment
68 739	その他の入出力装置	Miscellaneous input-output equipment
68 74	はん（汎）用端末装置	Remote terminal (except special purpose)
68 741	印刷装置	Printers
68 742	作図装置	Drafter
68 743	読取せん孔装置	Reader punches.
68 744	磁気記録装置	Magnetic read wright equipment
68 745	認識装置	Recognition equipment
68 746	表示装置	Displays
68 747	リモートバッチターミナル	Remote batch terminals
68 748	インテリジェントターミナル	Intelligent terminals
68 749	その他のはん（汎）用端末装置	Miscellaneous remote terminals
68 75	専用端末装置	Special purpose remote terminals
68 751	ＰＯＳ端末装置	Point-of-sales terminals
68 752	銀行用窓口装置	Teller terminals
68 753	銀行用現金自動支払機	Cash dispensers
68 754	予約装置	Reservation terminals
68 755	データ収集装置	Data collectors
68 759	その他の専用端末装置	Miscellaneous dedicated remote terminals
68 76	オフライン装置	Off-line equipment
68 761	データ作成装置	Data entry equipment
.. ....	カードパンチ（※571）	Card punches
.. ....	カードベリファイア（※571）	Card verifiers
68 7613	テープパンチ	Tape punches
68 7614	テープベリファイア	Tape verifiers
68 7615	キーツーテープ	Key-to-tapes
68 7616	キーツーカセット	Key-to-cassettes
68 7617	キーツーディスク	Key-to-discs
68 7619	その他のデータ作成装置	Miscellaneous data entry equipment
68 762	データ変換装置	Data converters
68 7621	テープツープリンタ	Tape-to-printers
68 7622	ＯＣＲツーテープ	OCR-to-tapes
68 7623	カセットツーテープ	Cassette-to-tapes

中分類68－電子応用装置（通信装置及び関連装置を除く。）

68 7629	その他のデータ変換装置	Miscellaneous data converters
68 769	その他のオフライン装置	Miscellaneous off-line equipment
68 77	相似形電子計算機	Analog computers
68 771	一般用相似形電子計算機	For general use
68 7711	高速度計算機	High speed type
68 7712	低速度計算機	Low speed type
68 772	専用計算機	For special purpose
68 779	その他の相似形電子計算機（相似計数混合形を含む。）	Miscellaneous analogue computers (including hybrid computers)
68 78	電子計算機用部品及び附属品	Parts and accessories of electronic computers
68 781	磁気ディスクパック	Magnetic disc packs
68 782	磁気カセットテープ	Magnetic cassette tapes
68 783	磁気カートリッジテープ	Magnetic tape cartridge
68 784	フレキシブル・ディスク	Flexible disc
68 789	その他の電子計算機用部品及び附属品	Miscellaneous parts and accessories of electronic computers
68 79	その他の電子計算機	Miscellaneous electronic computers
.. ...	電子式卓上計算機（57213）	Desk top calculators
68 8	電子計算機応用装置	Applied electronic computer equipment
68 81	プロセス制御装置	Process control equipment
68 82	シミュレータ	Simulators
68 83	コントロールデータロガ	Control data laggers
68 84	工作機械制御装置	Machine tool controllers
68 85	ＣＡＩ装置	Computer assisted instruction equipment
68 86	自動作図装置	Automatic drafter
68 89	その他の電子計算機応用装置	Miscellaneous applied electronic computer equipment
68 9	その他の電子応用装置（通信装置及び関連装置を除く。）	Miscellaneous associated electronic equipment (except communication and related equipment)
68 91	電子ビーム応用装置	Electronic beam application equipment
68 911	電子顕微鏡	Electronic microscopes
68 912	電子ビーム溶接機	Welders
68 913	電子ビーム加工装置	Processing equipment
68 914	電子ビーム溶解装置	Smelting equipment
68 919	その他の電子ビーム応用装置	Miscellaneous electronic beam application equipment
68 92	電子冷却装置	Electronic cooling equipment
68 93	赤外線応用装置	Infrared application equipment
68 931	サーモグラフ	Thermographs
68 932	暗視装置	Noctovision equipment
68 939	その他の赤外線応用装置	Miscellaneous infrared application equipment
68 94	医療用電子制御装置	Medical electronic controlling equipment
68 941	ペースメーカ	Pace makers
68 942	除細動器	Defibrillators
68 943	電子式義手・義足	Electronic artificial extremities
.. ...	人工臓器（6042）	Artificial internal organs
.. ....	人工心肺装置（60421）	Artificial hearts and lings
.. ....	人工じん（腎）臓装置（60422）	Artificial kidneys
68 945	心拍動同期撮影装置	Heart beat synchronizing equipment for radiography
68 949	その他の医療用電子制御装置	Miscellaneous medical electronic controlling equipment
68 95	レーザ応用装置	Laser application equipment
68 951	レーザ応用加工装置	Processing equipment
68 9511	ウエルダ	Welders
68 9512	シーラ	Sealers
68 9513	ドリラ	Drillers
68 9514	カッタ	Cutters
68 9515	スクライバ	Scribers
68 9516	トリマ	Trimers
68 952	レーザ応用加熱装置	Heaters
68 953	レーザ応用核融合装置	Nuclear fusion equipment
68 954	レーザ応用光凝固装置	Optical coagulation equipment
68 955	レーザ応用計測装置	Measuring equipment
68 9551	レーザ応用測距装置	Distance measuring equipment
68 9552	レーザ応用流速計	Current meters
68 9559	その他レーザ応用計測装置	Miscellaneous measuring equipment
.. ...	レーザ応用通信装置（672）	Communication equipment
68 959	その他のレーザ応用装置	Miscellaneous laser application equipment
68 96	放電加工装置	Electrical discharge processing equipment
68 961	直流放電加工装置	Direct current discharge processing equipment
68 962	交流放電加工装置	Alternating current discharge processing equipment
68 963	高周波放電加工装置	High frequency electrical discharge processing equipment
68 969	その他の放電加工装置	Miscellaneous electrical discharge processing equipment
68 97	電源装置	Electrical power source equipment

中分類68－電子応用装置（通信装置及び関連装置を除く。）

68 971	直流安定化電源装置	Direct current stabilized power source equipment
68 9711	定電圧直流電源装置	Constant voltage power source equipment
68 9712	定電流直流電源装置	Constant current power source equipment
68 9719	その他の直流安定化電源装置	Miscellaneous direct current stabilized power source equipment
68 972	交流安定化電源装置	Alternating current stabilized power source equipment
68 9721	電圧安定化交流電源装置	Constant voltage power source equipment
68 9722	電流安定化交流電源装置	Constant current power source equipment
68 9723	周波数安定化交流電源装置	Constant frequency power source equipment
68 973	パルス電源装置	Pulse power source equipment
68 974	脈流電源装置	Ripple current power source equipment
68 979	その他の電源装置	Miscellaneous electrical power source equipment
68 98	電子複写機	Electronic copy machines
68 99	他に分類されない電子応用装置（通信装置及び関連装置を除く。）	Miscellaneous associated electronic equipment (except communication and related equipment)

中分類69－電子部品
MAJOR GROUP 69－EIECTRONIC COMPONENTS

	電子管	Electron tubes
1	受信管	Receiving tubes
2	送信管	Transmitting tubes
.21	自然冷却送信管	Air cooled transmitting tubes
.22	強制冷却送信管	Forced cooled transmitting tubes
.221	空冷形送信管	Forced air cooled transmitting tubes
.222	水冷形送信管	Water cooled transmitting tubes
.223	蒸発冷却形送信管	Vapor cooled transmitting tubes
.29	その他の送信管	Miscellaneous transmitting tubes
.3	マイクロ波管	Microwave tubes
131	クライストロン	Klystrons
1311	反射形クライストロン	Oscillator klystrons (reflex klystrons)
1312	直進形クライストロン	Amplifier klystrons
132	マグネトロン	Magnetrons
1321	連続波用マグネトロン	C.W. magnetrons
1322	パルス用マグネトロン	Pulsed magnetrons
133	アンプリトロン	Amplitrons
134	進行波管	Forward wave tubes
135	後進波管	Backward wave tubes
136	切換放電管	Switching discharge tubes
139	その他のマイクロ波管	Miscellaneous microwave tubes
14	ブラウン管	Cathode ray tubes
141	テレビジョン用ブラウン管（モニタ用を含む。）	Picture tubes (including TV monitor tubes)
1411	直視形カラーテレビジョン用ブラウン管	Color picture tubes
1412	直視形白黒テレビジョン用ブラウン管	Black/white picture tubes
1413	投射形テレビジョン用ブラウン管	Projection tubes
142	観測用ブラウン管	Oscilloscope tubes
143	レーダ用ブラウン管	Radar tubes
144	ディスプレイモニタ用ブラウン管	Display monitor tubes
145	記録管	Printing tubes
146	蓄積管	Memory tubes
149	その他のブラウン管	Miscellaneous cathode indicators
15	表示管	Indicator tubes
151	表示放電管	Indicator discharge tubes
1511	単管	Single digit indicator discharge tubes
1512	多けた管	Multi-digit indicator discharge tubes
152	けい光表示管	Indicator fluorescent tubes
1521	単管	Single digit fluorescent tubes
1522	多けた管	Multi-digit fluorescent tubes
153	フィラメント表示管	Filament omitting indicator tubes
159	その他の表示管	Miscellaneous indicator tubes
16	撮像管	Image pickup tubes (camera tubes)
161	光電面形撮像管（イメージオルシコン等）	Photo-emissive image pickup tubes (image orthicon, etc.
162	光導電面形撮像管（ビジコン等）	Photo-conductive image pickup tubes (videcon, etc.)
163	映像増倍管	Image intensifiers
164	X線けい光増倍管	X-ray fluorescent multiple tubes
165	固体撮像管	Solid-state image pickup tubes
169	その他の撮像管	Miscellaneous image pickup tubes (camera tubes)
17	放電管	Discharge tubes
171	整流管	Rectifier tubes
1711	ガス入り整流管	Gas filled rectifier tubes
1712	水銀蒸気入り整流管	Mercury-vapor-filled rectifier tubes
1719	その他の整流管	Miscellaneous rectifier tubes
172	熱陰極グリッド制御放電管	Hot cathode grid controlled discharge tubes
1721	水素入り熱陰極グリッド制御放電管	Hydrogen gas filled hot cathode grid controlled discharge tubes
1722	その他のガス入り熱陰極グリッド制御放電管	Other gas filled hot cathode grid controlled discharge tubes
173	イグナイトロン	Ignitrons
174	定電圧放電管	Voltage stabilizing tubes (voltage regulator tubes)
175	リレー放電管	Relay discharge tubes
176	ストロボ放電管	Strobo discharge tubes
177	GM計数管	Geiger-muller counter tubes
179	その他の放電管	Miscellaneous discharge tubes
18	X線管	X-ray tubes
181	診断用X線管	X-ray tubes for diagnostic use
1811	固定陽極形X線管	Fixed anode type X-ray tubes for therapeutic use
1812	回転陽極形X線管	Rotary anode type X-ray tubes for analytical use
182	治療用X線管	X-ray tubes for industrial use

69 183	分析用X線管	X-ray tube for analysis
69 184	工業用X線管	X-ray tube for industrial use
69 189	その他のX線管	Miscellaneous X-ray tubes
69 19	特殊電子管	Special purpose electron tubes
69 191	光電管	Photo-sensitive tubes
69 1911	真空光電管	Vacuum type photo-sensitive tubes
69 1912	ガス入り光電管	Gas filled photo-sensitive tubes
69 192	光電子増倍管	Photo-multipliers
69 193	ベータトロン	Betertron doughnuts
69 194	インコアモニタ管	In-core monitor tubes
69 195	イオンポンプ	Ion pumps
69 199	その他の特殊電子管	Miscellaneous special purpose electron tubes
69 2	半導体素子	Semiconductor devices,
69 21	ダイオード	Diodes
69 211	小信号ダイオード	Signal diodes
69 212	スイッチングダイオード	Switching diodes
69 213	定電圧ダイオード	Voltage regulator diodes (zenner diodes)
69 214	電圧可変容量ダイオード	Variable capacitance diodes
69 215	マイクロ波ダイオード	Microwave diodes
69 2151	トンネルダイオード	Tunnel diodes
69 2152	なだれ走行ダイオード	Avalanche transit-time diodes
69 2153	スナップオフダイオード	Snap off diodes
69 2154	ピンダイオード	Pin injection diodes
69 2155	ガン効果ダイオード	Gun diodes
69 2156	バラクタダイオード	Varactor diodes
69 2159	その他のマイクロ波ダイオード	Miscellaneous microwave diodes
69 219	その他のダイオード	Miscellaneous diodes
69 22	トランジスタ	Transistors
69 221	ゲルマニウムトランジスタ	Germanium transistors
69 2211	低周波用小信号ゲルマニウムトランジスタ	Low frequency signal transistors
69 2212	高周波用小信号ゲルマニウムトランジスタ	High frequency signal transistors
69 2213	低周波用パワーゲルマニウムトランジスタ	Low frequency power transistors
69 2214	高周波用パワーゲルマニウムトランジスタ	High frequency power transistors
69 222	シリコントランジスタ	Silicon transistors
69 2221	低周波用小信号シリコントランジスタ	Low frequency signal transistors
69 2222	高周波用小信号シリコントランジスタ	High frequency signal transistors
69 2223	低周波用パワーシリコントランジスタ	Low frequency power transistors
69 2224	高周波用パワーシリコントランジスタ	High frequency power transistors
69 223	電界効果形トランジスタ	Field effect transistors
69 2231	接合形電界効果形トランジスタ	Junction gate type field effect transistors
69 2232	MOS形電界効果形トランジスタ	MOS (Metal-oxide-semiconductor) type field effect transistors
69 224	リアクタンストランジスタ	Reactance transistors
69 229	その他のトランジスタ	Miscellaneous transistors
69 23	整流素子（整流電流容量100mA未満のダイオードを除く。）	Rectifier diodes (except diodes of current capacity less than 100 mA)
69 231	シリコン整流ダイオード	Silicon rectifier diodes
69 2311	小形シリコン整流ダイオード（整流電流容量が5A未満のもの）	Small capacity rectifier diodes (of current capacity less than 5 A)
69 2312	大形シリコン整流ダイオード（整流電流容量が5A以上500A未満のもの）	Large capacity rectifier diodes (of current capacity over 5A and less than 500 A)
69 2313	電力用シリコン整流ダイオード（整流電流容量が500A以上のもの）	Power type rectifier diodes (of current capacity over 500 A)
69 232	ゲルマニウム整流ダイオード	Germanium rectifier diodes
69 233	セレン整流素子	Selenium rectifier devices
69 234	亜酸化銅整流素子	Copper oxide rectifier devices
69 239	その他の整流素子（整流電流容量100mA未満のダイオードを除く。）	Miscellaneous rectifier devices (except diodes of current capacity less than 100 mA)
69 24	サイリスタ	Thyristors
69 241	逆阻止3端子サイリスタ	Reverse blocking triode thyristors
69 242	双方向3端子サイリスタ	Bi-directional triode thyristors
69 243	逆導通3端子サイリスタ	Reverse conducting triode thyristors
69 249	その他のサイリスタ	Miscellaneous thyristors
69 25	光電変換素子（半導体レーザ素子を除く。）	Photo-semiconductor devices (except semiconductor laser devices)
69 251	発光素子	Light emitting devices
69 2511	点発光素子	Point light emitting devices
69 2512	文字記号素子	Charactor indicator devices

2513	EL板	Electro-luminescence plates
2519	その他の発光素子	Miscellaneous light emitting devices
252	受光素子	Photo-electric devices
2521	ホトダイオード	Photo diodes
2522	ホトトランジスタ	Photo transistors
2523	光電池素子	Photo electric cells
2524	太陽電池素子	Solar battery elements
2525	光導電素子	Photo conductive devices
253	光結合素子	Photo couplers
259	その他の光電変換素子	Miscellaneous photo-semiconductor devices
26	半導体変換素子（半導体レーザ素子を除く。）	Semiconductor transducers (except photo-semiconductor devic and semiconductor laser devices)
261	ホール素子	Hall effect devices
262	熱電素子	Thermo-electric devices
263	感圧素子	Pressure-sensitive devices
269	その他の半導体変換素子	Miscellaneous semiconductor transducers
27	マイクロ波用半導体組立品（ガン発振器等）	Microwave semiconductor assemblies (gun oscillators, etc.)
28	サーミスタ及びバリスタ	Thermistors and varistors
281	サーミスタ	Thermistors
2811	負温度特性形サーミスタ	Negative temperature coefficient thermistors
2812	正温度特性形サーミスタ	Positive temperature coefficient thermistors
282	バリスタ	Baristors
29	その他の半導体素子	Miscellaneous semiconductor devices
3	集積回路（能動成分を含むもの。）	Integrated circuits (only those containing active component)
31	バイポーラデジタル	Bipolar digital ICs
311	バイポーラロジック	Bipolar logic circuits
3111	DTL（ダイオード・トランジスタ・ロジック）	DTL (Diode-transistor logic)
3112	TTL（トランジスタ・トランジスタ・ロジック）	TTL (Transistor-transistor logic)
3113	ECL（エミッタ・カップルド・ロジック）	ECL (Emitter coupled logic)
3119	その他のバイポーラロジック	Miscellaneous bipolar logic circuits
312	バイポーラメモリ	Bipolar memories
32	バイポーラアナログ	Bipolar analogue ICs
33	MOSデジタル	MOS digital ICs
331	MOSロジック	MOS logic circuits
3311	マイクロプロセッサ	Micro-processors
3319	その他のMOSロジック	Miscellaneous MOS logic circuits
332	MOSメモリ	MOS memories
3321	RAM（ランダム・アクセス・メモリ）	RAM (Randum access memory)
3322	ROM（リード・オンリー・メモリ）	ROM (Read only memory)
3323	SR（シフト・レジスタ）	SR (Shift registor)
3329	その他のMOSメモリ	Miscellaneous MOS memories
34	MOSアナログ	MOS analogue ICs
35	その他の半導体集積回路	Miscellaneous semiconductor ICs
36	混成集積回路	Hybrid ICs
361	デジタル混成集積回路	Digital ICs
362	アナログ混成集積回路	Analogue ICs
37	電荷転送デバイス	Charge transfer devices
371	CCD（電荷結合デバイス）	CCD (Charge coupled device)
372	BBD（バケット・ブリゲード・デバイス）	BBD (Bucket brigade device)
379	その他の電荷転送デバイス	Miscellaneous charge transfer devices
39	その他の集積回路（能動成分を含むもの）	Miscellaneous integrated circuits active component)
4	抵抗器，コンデンサ，コイル及びこれに類似する電子部品（配電制御装置用を除く。）	Resistors, capacitors, inductors and such electronic components (except those used in electrical distribution and control equipment)
41	抵抗器	Resistors
411	固定抵抗器	Fixed resistors
4111	炭素皮膜抵抗器	Carbon film resistors
4112	固定体抵抗器	Carbon composition resistors
4113	金属皮膜抵抗器	Metal film resistors
4114	酸化金属皮膜抵抗器	Metal oxide film resistors
4115	巻線抵抗器	Wire wound resistors
4116	ほうろう抵抗器	Vitreous enameled wire wound resistors
4117	磁器抵抗器	Ceramic resistors
4119	その他の固定抵抗器	Miscellaneous fixed resistors
412	可変抵抗器（半固定形のものを含む。）	Potentiometers (including preset type)

中分類69－電子部品

69 4121	炭素皮膜可変抵抗器	Carbon film potentiometers
69 4122	固定体可変抵抗器	Carbon composition potentiometers
69 4123	金属皮膜可変抵抗器	Metal film potentiometers
69 4124	巻線可変抵抗器	Wire wound potentiometers
69 4125	ほうろう可変抵抗器	Vitreous enameled wire wound potentiometers
69 4126	スライド形可変抵抗器	Slide type potentiometers
69 4127	可変減衰器	Variable attenuators
69 4128	精密巻線可変抵抗器	Precision wire wound potentiometers
69 4129	その他の可変抵抗器	Miscellaneous potentiometers
69 42	コンデンサ	Capacitors
69 421	固定コンデンサ	Fixed capacitors
69 4211	紙コンデンサ	Paper capacitors
69 4212	プラスチックフィルムコンデンサ	Plastic film capacitors
69 4213	磁器コンデンサ	Ceramic capacitors
69 4214	ガラスコンデンサ	Glass capacitors
69 4215	マイカコンデンサ	Mica capacitors
69 4216	アルミ電解コンデンサ	Aluminium electrolytic capacitors
69 4217	タンタル電解コンデンサ	Tantalum electrolytic capacitors
69 4218	半導体コンデンサ	Semiconductor capacitors
69 4219	その他の固定コンデンサ	Miscellaneous fixed capacitors
69 422	可変コンデンサ	Variable capacitors
69 4221	空気可変コンデンサ	Variable air capacitors
69-4222	油入可変コンデンサ	Variable oil-filled capacitors
69 4223	磁器可変コンデンサ	Variable ceramic capacitors
69 4224	ガラス可変コンデンサ	Variable glass capacitors
69 4225	マイカ可変コンデンサ	Variable mica capacitors
69 4226	プラスチックフィルム可変コンデンサ	Variable plastic film capacitors
69 4229	その他の可変コンデンサ	Miscellaneous variable capacitors
69 43	コイル及び変成器	Coils and transformers
69 431	コイル	Coils
69 4311	装荷コイル	Loading coils
69 4312	低周波そく流コイル	Low frequency choke coils
69 4313	高周波固定コイル	Fixed high frequency coils
69 4314	偏向コイル	Deffection yoke coils
69 4315	収束コイル	Convergence coils
69 4316	高周波可変コイル	Variable high frequency coils
69 4317	アンテナコイル	Antenna coils
69 4319	その他のコイル	Miscellaneous coils
69 432	変成器	Transformers (signal)
69 4321	中継コイル	Repeating coils
69 4322	誘導コイル	Induction coils
69 4323	可聴周波変成器	Audio frequency transformers
69 4324	搬送周波変成器	Carrier frequency transformers
69 4325	中間周波変成器	Intermediate frequency transformers (IFT)
69 4329	その他の変成器	Miscellaneous transformers
69 433	変圧器	Transformers (power)
69 4331	周波電源変圧器（商用周波電源変圧器を除く。）	Frequency power transformers
69 4332	商用周波電源変圧器	Transformers for 50/60 Hz r.m.s.
69 4333	フライバック変圧器	Flyback transformers
69 4339	その他の変圧器	Miscellaneous transformers
69 44	複合回路部品	Module circuits containing resistance/capacitance/ inductance component and not containing active component
69 441	薄膜複合回路部品	Thin film module circuits
69 442	厚膜複合回路部品	Thick film module circuits
69 45	メモリプレーン	Memory planes
69 451	コアメモリプレーン	Core memory planes
69 452	ワイヤメモリプレーン	Wire memory planes
69 459	その他のメモリプレーン	Miscellaneous memory planes
69 46	フィルタ及びディレイライン	Filters and delay lines
69 461	ＬＣフィルタ	L-C filters
69 462	メカニカルフィルタ	Mechanical filters
69 463	水晶フィルタ	Crystal filters
69 464	セラミックフィルタ	Ceramic filters
69 465	ＬＣディレイライン	L-C delay lines
69 466	水晶ディレイライン	Crystal delay lines
69 467	セラミックディレイライン	Ceramic delay lines
69 469	その他のフィルタ及びディレイライン	Miscellaneous filters and delay lines
69 47	振動素子	Electro-mechanical tranducers and such devices
69 471	発振子及び共振子	Oscillators and resonators

4711	ＬＣ発振子及び共振子	L-C oscillators and resonators
4712	メカニカル発振子及び共振子	Mechanical oscillators and resonators
4713	水晶発振子及び共振子	Crystal oscillators and resonators
4714	セラミック発振子及び共振子	Ceramic oscillators and resonators
472	電歪素子	Piezo electric devices
473	磁歪素子	Magneto-strictive devices
479	その他の振動素子	Miscellaneous electro-mechanical transducers and such devices
48	磁気ヘッド	Magnetic heads
9 481	オーディオ用磁気ヘッド	Audio recording/reproducing heads
9 482	ビデオ用磁気ヘッド	Video recording/reproducing heads
9 483	計測・電子計算機用磁気ヘッド	Data recording/reading heads
9 49	その他の抵抗器，コンデンサ，コイル及びこれに類似する電子部品	Miscellaneous resistors, capacitors, inductors and such electronic components
9 5	機構部品	Connecting or on-off functioning components
9 51	リレー	Relays
9 511	ワイヤスプリングリレー	Wire spring relays
9 512	有極リレー	Polarized relays
9 513	リードリレー（水銀リードリレーを含む。）	Reed relays (including mercury reed relays)
9 514	時間遅延リレー	Time delay relays
9 515	一般制御リレー	General control relays
9 516	メータリレー	Meter relays
9 517	密封形リレー	Sealed relays
9 519	その他のリレー	Miscellaneous relays
9 52	スイッチ	Switches
9 521	ロータリスイッチ	Rotary switches
9 522	トグルスイッチ	Toggle switches
69 523	マイクロスイッチ	Micro switches
69 524	プッシュスイッチ	Push switches
69 525	シーソスイッチ	Sea-saw switches
69 526	スライドスイッチ	Slide switches
69 527	キーボード	Key boards
69 529	その他のスイッチ	Miscellaneous switches
69 53	コネクタ	Connectors
69 531	印刷配線板用コネクタ	Connectors for printed wiring board
69 532	低周波用丸形コネクタ	Low frequency cylindrical connectors
69 533	低周波用角形コネクタ	Low frequency rectangular connectors
69 534	高周波用同軸コネクタ	High frequency coaxial connectors
69 54	接続部品（コネクタを除く。）	Connecting components (except connectors)
69 541	プラグ	Plugs
69 542	ジャック	Jacks
69 543	ソケット	Sockets
69 5431	電子管用ソケット	Electron tube sockets
69 5432	トランジスタ用ソケット	Transistor sockets
69 5433	集積回路用ソケット	IC sockets
69 5434	水晶振動素子用ソケット	Crystal device sockets
69 5439	その他のソケット（キャップを含む。）	Miscellaneous sockets (including caps)
69 549	その他の接続部品	Miscellaneous connecting components
69 55	プリント配線板	Printed wiring boads
69 551	片面プリント配線板	Single sided printed wiring boads
69 552	両面プリント配線板	Both sided printed wiring boads
69 553	多層プリント配線板	Multi-layer printed wiring boads
69 5531	層数が３以下のもの	Printed wiring boads of 3 or less conductive layers
69 5532	層数が４以上のもの	Printed wiring boads of 4 or more conductive layers
69 554	フレキシブル形プリント配線板	Flexible printed wiring boads
69 59	その他の機構部品	Miscellaneous connecting or on-off functioning components
69 6	特殊電子部品	Special electronic components
69 61	レーザ素子	Laser devices
69 611	ガスレーザ素子	Gas laser devices
69 6111	ヘリウムネオンレーザ素子	Helium neon gas laser devices
69 6112	アルゴンレーザ素子	Argon gas laser devices
69 6113	炭酸ガスレーザ素子	Carbonic acid gas laser devices
69 6119	その他のガスレーザ素子	Miscellaneous gas laser devices
69 612	固体レーザ素子	Solid laser devices
69 6121	ルビーレーザ素子	Ruby laser devices
69 6122	ガラスレーザ素子	Glass laser devices
69 6123	ＹＡＧレーザ素子	YAG laser devices
69 6129	その他の固体レーザ素子	Miscellaneous solid laser devices
69 613	半導体レーザ素子（変調器を含む。）	Semiconductor laser devices (including light modulators)

中分類69－電子部品

69 619	その他のレーザ素子	Miscellaneous laser devices
69 62	液晶素子	Liquid crystal devices
69 63	バブル素子	Magnetic bubble devices
69 64	磁性薄膜素子	Magnetic thin film devices
69 69	その他の特殊電子部品	Miscellaneous special electronic components
69 7	磁気記録媒体	Magnetic recording media
69 71	磁気テープ	Magnetic recording tapes
69 711	磁気録音テープ	Audio recording tapes
69 712	磁気録画テープ	Video recording tapes
69 713	計測・電子計算機用磁気テープ	Data recording tapes
69 72	磁気ディスク	Magnetic discs
69 73	磁気カード及び磁気シート	Magnetic cards and magnetic sheets
69 74	磁気ドラム	Magpetic drums
69 79	その他の磁気記録媒体	Miscellaneous magnetic recording media
69 8	電子部品の部分品及び材料	Parts and materials for electronic components
69 81	電子管用の部分品及び材料	Parts and materials for electron tube
69 811	シャドウマスク	Shadow masks
69 812	ガラスバルブ	Glass bulbs
69 813	電子銃	Electron guns
69 814	けい光体	Fluorescent materials
69 819	その他の電子管用の部分品及び材料	Miscellaneous parts and materials for electron parts
69 82	半導体素子・集積回路用の部分品及び材料	Parts and materials for semiconductor devices and ICs
69 821	ウエーハ	Wafers
69 8211	シリコンウエーハ	Silicon wafers
69 8212	ガリウムひ(砒)素ウエーハ	Gallium-arsenic wafers
69 8213	ガリウムりんウエーハ	Gallium-phosphor wafers
69 8219	その他のウエーハ	Miscellaneous wafers
69 822	基板	Substrates
69 823	ペレット	Pellets
69 8231	ダイオードペレット	Diode pellet
69 8232	トランジスタペレット	Transistor pellet
69 8233	集積回路ペレット	IC pellet
69 8239	その他のペレット	Miscellaneous pellets
69 824	ペースト	Paste
69 825	パッケージ	Packages
69 8251	セラミック	Ceramic packages
69 8259	その他のパッケージ	Miscellaneous packages
69 829	その他の半導体素子，集積回路用の部分品及び材料	Miscellaneous parts and materials for semiconductor device and IC
69 83	人工貴石	Synthetic jewels
69 84	機構部品用部分品	Parts for connecting or on-off functioning components
69 841	接点	Contacts
69 842	銅張積層板	Copper-clad laminate for printed circuits
69 8421	ガラス布基材エポキシ樹脂	Formed of epoxy resin on glass cloth base
69 8422	紙基材エポキシ樹脂	Formed of epoxy resin on paper base
69 8423	紙基材フェノール樹脂	Formed of phenolic resin on paper base
69 8429	その他の銅張積層板	Miscellaneous copper-clad laminates for printed print circuit
69 85	液晶	Liquid crystal
69 86	圧電セラミックス	Piezo electric ceramics
69 87	磁性材部分品	Magnetic materials and parts
69 871	永久磁石	Permanent magnets
69 8711	鋳造磁石	Cast metal magnets
69 8712	酸化物磁石	Ferrite magnets
69 8713	焼結金属磁石	Sintered metal magnets
69 8719	その他の永久磁石	Miscellaneous permanent magnets
69 872	ソフトフェライト	Soft ferrites
69 873	ダストコア	Dust cores
69 874	鉄しん(芯)	Iron cores
69 879	その他の磁性材部分品	Miscellaneous magnetic materials and parts
69 89	その他の電子部品の部分品及び材料	Miscellaneous parts and materials for electronic components
69 9	その他の電子部品	Miscellaneous electronic components