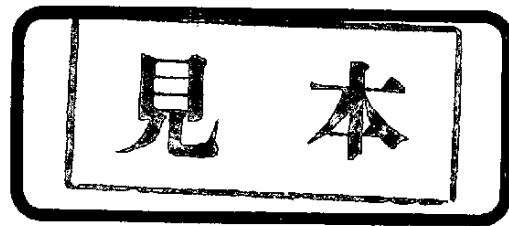


JIPDEC

1994

Informatization

Quarterly



*Informatization of
Home Life in Japan*

JIQ No. 96

JIPDEC Informatization Quarterly

1994

JIPDEC Informatization Quarterly (JIQ) is published quarterly by the Japan Information Processing Development Center (JIPDEC), Kikai Shinko Kaikan Bldg., 3-5-8 Shibakoen, Minato-ku, Tokyo 105 Japan.

Publisher: Eiji Kageyama, President
Editor: Yuji Yamadori, Director
Research & International
Affairs

JIPDEC is a non-profit organization founded in 1967 with the support of the Ministry of International Trade and Industry, the Ministry of Posts and Telecommunications and related industry circles for the purpose of promoting information processing and the information processing industry in Japan.

NOTE: The opinions expressed by the various contributors to the *JIPDEC Informatization Quarterly* do not necessarily reflect those views held by JIPDEC.

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Translated and Printed by The Translation Institute of Technology, Science & Culture
Printed in Japan, January, 1994.

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This work was subsidized by the Japan Keirin Association through its Promotion funds from KEIRIN RACE.

No. 96

From the Editor

The Industrial Structure Council studied the subject of "How informatization should take place in our country" from various aspects and made proposals between the end of 1992 and June 1993, based on the result of its study. In Japan, informatization has been introduced mainly to raise business efficiency and save labor in the industrial sector, such as the manufacturing, distribution, and financial industries. However, informatization is now entering our social and personal lives widely and deeply along with the rapid progress in information technology in recent years. The proposal by the Council emphasizes the following policy: "For our country to form a sound information oriented society in the future, we must not only promote the information industry and foster informatization personnel, but also positively promote informatization in the administration, education, and the home, areas which there has been a tendency to ignore."

Unlike Europeans and Americans, who have used typewriters in their daily lives for many years, Japanese

people had never directly touched Japanese typewriters for personal use until the late 1970s. In other words, only skilled professional typists were able to operate Japanese typewriters, which must handle the Japanese language's enormous variety of kanji, katakana, and hiragana, unlike the simpler writing system of English. Unlike Europe and America, keyboards were not an inseparable part of our lives until very recently in Japan. However, word processors began to disseminate rapidly in Japan during the 1980s owing to the development of the "kana-kanji conversion function". The application fields of PCs (personal computers), which had been limited mainly to business until now, are rapidly expanding in personal usage owing to the progress of information and telecommunication technology. Fax machines have begun to be installed at home because inexpensive and compact models have become available. High performance electric appliances, developed as a result of technological innovation, as represented by the answering machine, are appearing in the home in rapid succession. Thus, informatiza-

tion of home life is progressing rapidly in Japan as well.

Informatization of home life is increasing opportunities for people to come in contact with information equipment at home, whether they wish to do so or not. However, some elderly people and housewives who have never touched keyboards or electronic buttons feel menaced by the appearance of information equipment and tend to avoid them.

In contrast, young people have had many chances to come into contact with information equipment through TV games and Fami Con (or Family Computer). They can use information equipment without much resistance, and many are eager to use such equipment.

In Japan, videotex created a sensation as the most important technology for promoting the informatization of the home. However, the videotex service has only about 120,000 users at present, and it is used more widely for business than in the home. It seems that the slow increase in users is due to the cost for users and the range of the available menu rather than a technological problem. As of the end of June 1993, the number of PC communication network users has

reached about 2 million persons in Japan. The number of network stations has exceeded 2,000, up 333 stations from the previous year. PC-VAN and NIFTY-Serve are the two largest networks. These two have 1.08 million members, accounting for more than half of all the members. However, unlike videotex, PC communications consist mainly of character information and require more keyboard operation. Therefore, it is hard to disseminate them among housewives and the elderly at home.

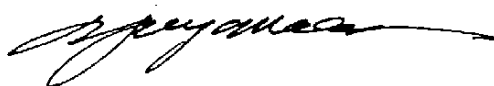
Multi-media, which is frequently been discussed recently, will have a major impact on the future informatization of the home. MITI is requesting budget appropriation for the establishment of a "Multi-media Information Center" in the revised budget for the 1994 fiscal year. The objective of this project is to construct databases of various regional information, such as information of a local industry, in specific areas, and to supply necessary information to homes, schools, companies and so on in multi-media form. Information at the center will be accessible as necessary.

Informatization of the home will proceed rapidly along with the progress of information technology. However, if young people stay home and spend

all their time with information equipment, their sound mental and physical growth could be inhibited. It will be important to study appropriate measures for techno-stress caused by excessive use of information equipment and for elderly people's and housewives' discomfort regarding technology.

The present issue of JIQ concerns

"Informatization of Home Life" in Japan. We hope that readers will find the articles useful. Finally, we would like to thank the writers of the articles.



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General Survey on Informatization of Home Life

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1. What Is Meant by Informatization of Home Life?

To find out how far informatization has progressed in Japanese homes, we must begin by examining the current state of our homes. It goes without saying that we must study what is meant by informatization even before that.

What is meant by information? What is meant by information at home? These are unexpectedly difficult themes for serious consideration. Let me explain this first. At present, I am teaching a course in "Information Management" at the University of the Air, which provides college education through TV. In my lectures, I distinguish information from so-called data (facts). I define information as follows:

"Information is data that has been evaluated in relation to a decision for a specific individual or organization."

In other words, data are facts themselves. Let me take stock investments as an example. Stock prices or the news that some enterprise has developed a new product are simply data. In contrast, the prices of the stocks I own and news (data) about a new product of the enterprise that I am considering investing in exert a large influence on my decisions called stock investments. In this sense, they are information for me. Information technology such as computers can be utilized for such information activities, as evaluating data, changing it to information, and making appropriate decisions by utilizing this information. The relationship with decision-making support is theoretically important for the issue of informa-

tization.

However, when we take up the theme of home informatization, theoretical discussions like the above lead to confusion. The important issue is the process by which electronic products built around microcomputer parts enter the home. Our immediate task is to examine the current situation of these products and study what motives or purposes have led to the installation of electronic products.

At my house, there are various products that use microcomputers. Some of them can be recognized instantly as microcomputer related products, but the others do not appear related to informatization. So-called information equipment belongs to the former group, while TV sets and refrigerators belong to the latter. My subsequent discussion will be concerned entirely with the former group. But let me briefly take up products of the latter group before that.

Microcomputers are used for such a great variety of products that they are called the bread of the industry. Microcomputers are used in almost all household electric appliances. Taking TV as an example, microcomputers are utilized for channel selection, automatic volume and tone adjustment, and various other process-

es. In the field of HDTV, which is disseminating gradually, microcomputers with advanced information processing functions are utilized for the image processing that is necessary for high-precision elongation of an enormous quantity of video images that are sent in a compressed form. Microcomputers in refrigerators are used for temperature control, humidity control, and various other control functions. All kinds of electric appliances, including washing machines, electric rice-cookers, vacuum cleaners, and air-conditioners, process data using microcomputers. Informatization in the home is progressing rapidly while we are unaware of it. The total data processing capacity of the microcomputers integrated into electric appliances must be easily equivalent to the processing capacity of an ordinary personal computer.

2. Informatization of My Home

Let me return to my original theme and look around in my own house for information equipment, such as word processors and personal computers, as the starting point of the subsequent discussion. I cannot say that my home is a standard Japanese home because there is information equipment related to my research activities. But my home is an ade-

quate sample for the enumeration of many kinds of information equipment found in the home. The information equipment found in my house includes a word processor, personal computer, electronic notebook, TV game machine, fax terminal, copy machine, scanner, and CD-ROM player. I will describe how the above equipment is used.

(1) Production of New Year's Cards

In Japan, it is a social custom to exchange New Year's cards on New Year's Day. My family sends about 300 cards. One of our annual rituals is to create words, add a simple illustration, and write the names and addresses. It is a pleasure, but takes up a lot of time and work during the busy year-end days. More and more people are using word processors or personal computers to make New Year's cards. The sales of word processors and personal computers peak at the year-end.

I receive five or six hundred New Year's cards. Cards printed with word processors have accounted for a large part of the total in recent years. Hand-written cards impress me as exceptional. The functions of word processors are more and more sophisticated every year. For example, they can

print characters in many different styles, including brush writing, and print characters and illustrations in color. Addresses can be printed automatically by combining a word processor with database software. For example, those who are in mourning can be excluded from the printing list (it is taboo to send New Year's greetings to such persons) and different titles can be attached to different names by means of database processing.

(2) Utilization for Community and PTA Activities

The percentage of housewives who work outside their home has been increasing rapidly. But there are still many who participate in community activities and PTA activities at school. At my home, we must often prepare documents and bulletins for such activities. Word processors and database software are convenient for such purposes. Informatization of the home plays an important role by providing equipment that supports housewives' outside activities.

We have a copy machine at my house. It is used by my children for their study, and for copying bulletins and so on for the aforementioned activities outside the home. It has become a necessity. People can easily use copy

machines at convenience stores even if they have no copy machine at home.

(3) Fax Machines as a Means of Communications

Of course, telephones are widely disseminated. At present, there is nearly one telephone per capita because of extension telephones and the like. However, the telephone is a means of simultaneous voice communication, and the recent diversification of lifestyles is making simultaneous communication difficult. Reflecting this trend, telephone sets with answering machines have become commonplace. Beepers are also becoming popular. Cellular phones may be the successors of beepers, but they are not yet widely used by individuals because of the high prices of both the equipment and the communication charges. We have neither a beeper, nor a cellular phone. The expenses for a beeper are small, but my family is reluctant for a psychological reason: they would feel as if they were being watched constantly.

Fax machines are convenient information equipment. More and more of my children's friends are beginning to have fax machines at home. These are often used for exchanging homework information and so on. They are used by housewives for the afore-

mentioned social activities as well. I also need it to send manuscripts.

(4) TV Game Machines

We have all kinds of TV game machines at my house. In Japan, Nintendo, Sega, and NEC are the major manufacturers of game machines. An enormous quantity of game software for their models has been accumulated. New software is also released constantly. We have already collected more than 100 titles of game software at my house. Since a great variety of games is available, especially action games and simulation games, players never get tired of them.

TV game machines are used not only as game machines, but also as stock trading tools. A home trading system is constructed by adding a communication function to a game machine and connecting it to the computer of a securities firm. Since my family does not invest in stocks, we do not subscribe to this service. However, this shows one of the possible forms of future home informatization. At present, game machines are in a period of rapid technological development. For example, 64 bit game machines and game machines with RISC chips, functionally far above personal computers, have already appeared. Since these new game machines are

closely related to multi-media, they will probably exert a large influence on the informatization of home life in the near future. For example, new game machines can reproduce full motion video images on the full screen. It may become possible to watch video or news or to obtain various types of information by connecting a game machine to a TV set, a video machine, or a communications network. This reflects the fact that these machines are drawing attention in the U.S. in connection with the so-called information highway concept on the CATV infrastructure.

(5) Electronic Notebooks

An electronic notebook is information equipment in notebook size. It contains the desktop functions that are needed for individual activities, such as an address book, a calendar, a schedule table, a memo, a desk calculator, and a clock, in a compact case. Sharp and Casio are the two largest manufacturers of electronic notebooks. Each has sold several million units. I have used five or six models sold by these two manufacturers in the past and at present. At present, I am also using Toshiba's personal information equipment. It is nearly as large as B5-size paper and weighs almost 1 kg. Although it is rather hard to carry around, I find it con-

venient to use because of its word processing function and the built-in floppy disc. Electronic notebooks are popular even among primary school students. Some models are geared to children in appearance and functions.

(6) Personal Computers

About two million personal computers are sold in Japan yearly. This is an order smaller than the number sold in the U.S., about 15 million units. In view of the scale of the Japanese economy and the educational standards, yearly sales of about 10 million units in Japan as well would not be a wonder. One main reason that yearly sales are only about 2 million units is that personal computers are not disseminating as rapidly as expected at home.

We have five or six personal computers at home because of my research activities. NEC's PC9800 Series, which operate on MS-DOS, occupy a large share in the Japanese personal computer market. Apple Co.'s Macintosh has approximately a 15% share. IBM compatible machines that are popular in Europe, the U.S., and other Asian countries have recently become available in Japan as well. Software that supports Japanese can be run on IBM compatible machines by installing DOS/V, which is a type

of MS-DOS software. Of course, I have all of these types at home.

The fact that personal computers are not so widely used in Japanese homes can be explained partly by the dissemination of single-purpose word processor machines. As seen above, the main usage of personal computers at home is document production using word processing software. Word processors can be regarded as personal computers developed exclusively for document production. Home users often select word processors instead of personal computers.

Almost American PC users also use word processing software. Spreadsheet software and accounting and financial software for personal users are widely used as well. I use such software at home for calculating income tax (final income tax return) every year, but ordinary employees do not have to do this. It is reported that the requirement of income tax declaration by individuals is an important motive for personal computer use in the U.S.

Word processing software and spreadsheet software are not the only types of PC software available. A greater quantity and variety of software than we can imagine is marketed including database, PC communi-

cations, graph and illustration production, picture drawing, and PC game software. However, children are busy with classes they attend after school and other lessons. Housewives do not have the time or enthusiasm to learn to fully utilize the various types of PC software. These are the reasons why personal computers such as general-purpose computers are not so widely disseminated at home.

(7) CD-ROM Players and Scanners

A CD-ROM player is connected with a personal computer and used for enjoying PC software available in CD form, like the form of a compact disc for music. The prices of CD-ROM players have been falling rapidly while processing speed rises. More and more software is being made available in CD-ROM form for all PC series.

A CD-ROM has a memory capacity of 550 MB. In other words, one CD-ROM is equivalent to 500 floppy discs. CD-ROMs are used for applications that require this large memory capacity, especially for supplying multimedia software. At my house, CD-ROM players are connected to PCs of various models so that we can enjoy music software, encyclopedias, collected works of art, games and so on.

For example, all twenty volumes of an encyclopedia can be stored in one CD-ROM. The information obtained from the encyclopedia includes colorful photographs, voice, animation, and video. For example, a list of the animals of all the families can be displayed by looking up "animal". We can even enjoy the songs of small birds. When we look up historical events, video images of various events are reproduced on the PC screen.

I myself store a computer-related database in a CD-ROM. I can retrieve information from a gigantic database even at home by taking home one CD from my office. CD-ROMs in which various PC software is stored are marketed as well. Using such a CD-ROM, we can watch demonstrations of software functions or look at examples of screens without actually buying the software. Recently, equipment for producing private CD-ROMs has become available, allowing the user can print text, photographs or video on a CD-ROM. Although I cannot foresee that such equipment will be owned by individuals, it has the potential to become a useful means of personal publication.

In Japan, the service of printing photographs on CDs began in 1993. When we send film to a processing laborato-

ry, they print photographs on a CD. We can see them on the screen of a personal computer by connecting a CD-ROM player to it. Such a CD is called a photo CD. Photographs displayed on the PC screen can be copied and pasted on a document. We can make an album using album software. I myself have used a photo CD several times.

Images (photographs) are changed to electronic signals when they are stored in a photo CD. Similarly, photographs and printed documents can be changed to electronic signals using equipment called a scanner so that they can be processed by a personal computer. We have a scanner at my house. We produce an illustration for New Year's cards by scanning an animal photograph. If a scanner and character recognition software are combined, written text can be "copied" to produce electronic signals which are stored in a database. By combining a scanner with translation software, English text that is read by a scanner can be translated into Japanese. At my house, we have attempted to produce a personal computer tutorial by the "double-play" of scanning the children's English textbooks and translating them with translation software.

3. Future Progress of Informatization of Home Life

So far, I have discussed the informatization of the home by introducing the information equipment found at my house. From the stand point of the average household, it may seem that the current state of my home is only an imagined state of informatization at future homes. However, I think the current informatization state at my home will soon be commonplace, because information equipment is rapidly becoming less expensive and easier to use. The question is what conditions must be met to make such a state a reality.

Low prices and easy operation are extremely important for information equipment to enter the home. However, these are only some of the essential conditions. The need for informatization and computer literacy are important issues for studying the informatization of home life. I will present these issues below.

Nowadays, housewives are interested in participating in various activities outside the home. More efficient means of communications are necessary for joining activities in a far wider area than the neighborhood. Telephones, word processor, and personal

computers will be used as tools to support such communications. Housewives need support for housework in order to gain enough time and energy for outside activities. Microcomputers built into household electric appliances (the main focus of the current informatization of the home) have decreased housework labor in various ways. If home banking, home trading, and shopping from multi-media terminals are realized, these are expected to provide a great help.

Children also play some role in the informatization of the home. They learn to use game machines and personal computers as tools without being taught by anyone. Personal computer education has become an official subject of compulsory education. Husbands (or housewives in some cases) who are the center of a family often bring their work home. If they have information equipment at home that is similar to the equipment at the office, they can continue their work at home smoothly. Opportunities to use information equipment increase as our interest in hobbies and volunteer activities increases. Thus, the needs for informatization at home are expected to keep increasing.

On the other hand, there is growing interest in so-called information lit-

eracy. Information literacy education is given in various forms as part of school education and corporate education. At present, offices where no work can be done without word processor machines or personal computers are common. These social changes will inevitably influence home life and promote the use of information equipment at home. At least, the psychological allergy to information equipment will disappear.

The development of multi-media in the near future will realize linked operations of audio-visual (AV)

equipment, such as TV and video equipment, and personal computers or game machines. In view of the importance of TV and video in home life, their linkage with AV equipment will trigger rapid informatization of the home. It can be said that Japanese home life is at a considerable higher level of informatization now than it was ten years ago. Informatization can have negative aspects in terms of emotion and so on, but it is certain that it will play an important role in our future home life. We all must consider the informatization of the home from our own standpoints.

Introduction of Latest Information Equipment

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Various information equipment is now found in Japanese homes, as discussed under "General Survey on Informatization of Home Life." I would like next to discuss portable personal information equipment, such as electronic notebooks, and explain how they are used specifically. Equipment of this type is also called a personal terminal or PDA (Personal Digital Assistance). I will refer to such equipment as personal information equipment below.

1. Electronic Notebooks

Electronic notebooks are a typical example of the personal information equipment that has been used for some time. Photo 1 shows one of the latest electronic notebooks (Sharp's ZAURUS). As the photograph shows, it is pocket-size and weighs only 250

g. New series and models of electronic notebooks have been released in rapid succession. ZAURUS is the latest and the most popular product at present. ZAURUS is packed with numerous functions, including report generation, a phone book, an address book, a calendar/schedule, business card management, a handwritten note pad, an action list and action planner, Japanese, English-Japanese, and Japanese-English dictionaries, and a global clock. It can even exchange data with an optical communication function and print data using a printer for a personal computer.

(1) Pen Input

No matter how many advanced functions are included in personal information equipment, it will not be used if it is difficult to operate. Ease of

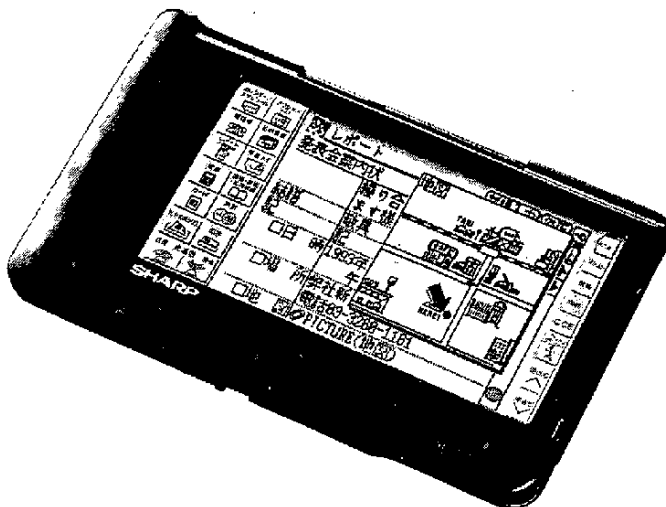


Photo 1: Sharp's Electronic Notebook, ZAURUS

operation is especially important for personal information equipment that can be carried around in a pocket and used anytime. Many recent electronic notebooks and other personal information equipment feature pen operation. This feature is included in ZAURUS as well. For example, processing can be executed immediately by using a pen to select an icon (picture symbol) that represents a function from the menu displayed on the screen.

A pen is used as a data input device as well. Japanese users need to input data that is unique to Japanese, such as kanji and kana. Recent pen input equipment supports various input methods, such as handwritten character recognition and typewriter keys.

A user can select any of them. ZAURUS offers the following four basic input modes: handwritten character recognition, a Japanese alphabet board (arranged in the Japanese alphabetic sequence), an alphabet typewriter board, and an alphabet-kana conversion board. It also has the input functions of OCR (automatic input by a character reader), common word input, and input from a user dictionary.

(2) Report generator and handwritten notepad

The report generation function produces reports in specified formats. This function is convenient for making memos or shorthand notes at meetings or business trip reports. The

report is ready when the meeting ends or when you return from the trip. Of course, detailed reports must be produced separately with a word processor.

One often wants to make a brief note of one's ideas. It is convenient to be able to make notes freely during a meeting or on a train during a business trip. ZAURUS offers the handwriting memo function by which we can make memos in images or characters by combining characters, hand-drawn lines, straight lines, an eraser, and various patterns. A memo can be pasted on a report.

(3) Phone book and business card management

Businessmen need a phone book and business cards. Using the phone book function, we can record names, addresses, telephone numbers, etc. and retrieve them freely. Using the business card function, we can input and use names, company names, departments, positions, and addresses. The postal code function is convenient for inputting an address; when a postal code is entered, a list of the corresponding addresses is displayed, and we can input an address by selecting the correct one with the pen. ZAURUS has various such data input support functions. The common words

function is one of them. For example, we can input department names, positions, etc. in a simple operation by registering them as commonly used words.

(4) Calendar/schedule

Using the calendar/schedule function, we can input a schedule for any day of a monthly calendar table. Schedules of a whole week can be listed or graphically displayed. We can jump to a specified date or set an alarm.

(5) Action planner

This function ranks various jobs, such as manuscript writing and submission of estimates, in order of importance and manages them in various ways. For example, it can list the jobs of specified importance or extract incomplete jobs only or completed jobs only. The action planner function can list the actions related to a particular job, schedule them, extract the related people, or generate a report.

(6) Other functions

We can use any of the three dictionaries, Japanese, English-Japanese and Japanese-English, by selecting it from any screen with the pen. Information can be retrieved by specifying a headword, kanji, pronuncia-

tion, or field. Since ZAURUS has the world clock function, we can select a city from the city list displayed on the screen and get the time of that city. Data can be exchanged between ZAURUS units by the optical communication function. The secrecy function protects data from others and the calculator function performs computing.

ZAURUS has far more sophisticated functions than the previous electronic notebooks and can truly be called personal information equipment. Toshiba's EXTEND series is similar to ZAURUS. Although the EXTEND is large and heavy, it has a floppy disc and outstanding functions for operating in linkage with a personal computer or a word processor machine. A pen is fully utilized for its operation.

Apple Co.'s Message Pad ranks above personal information equipment. Apple's technology called Newton is utilized for this model. At present, the Message Pad is available only in the English version, but if a Japanese version is released in the near future, it could bring about a major change in the field of personal information equipment.

2. Electronic Books

In Japan, electronic books that store

information in an 8 cm optical disc have been available from Sony, Matsushita, and Sanyo Electric for several years. Some electronic books support characters only and some support both characters and images, while others support characters, images, and voice. Photo 2 shows Sony's electronic book which supports characters, images and voice. One disc can store the equivalent of about 10 dictionaries of characters or more than 5 hours of voice. Several hundred titles have already been released, ranging from teaching, dictionaries, technical terms, languages, and business to hobbies/leisure. Foreign-made electronic books are also available.

Electronic books vary in size and functions. A small electronic book resembles an electronic notebook with a small liquid crystal display. An electronic book of a higher model has a large screen, high-speed retrieval and graphic display functions. Some can be connected to a personal computer so that information in an electronic book can be retrieved from a personal computer. Some have a language teaching keyboard such as an English conversation keyboard, so that a user can learn conversation while listening to voice. A user can change the disc to enjoy a great variety of titles with any model.

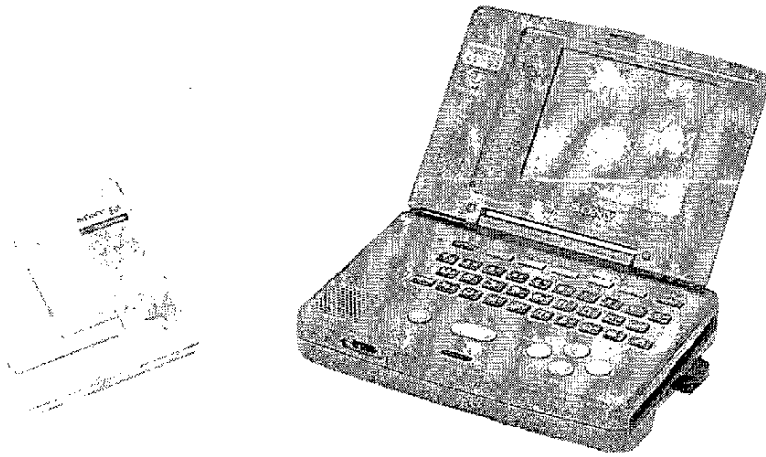


Photo 2: Sony's Electronic Book

In the home, an electronic book can be used as an electronic dictionary or encyclopedia or as a language teaching tool. When we input only part of a word, a list of candidate words is displayed. We have only to select the right one from the list. When it is used as a language teaching tool, a list of various situations, such as an airport or an airplane, is displayed. When we select one situation, we can see or hear an actual conversation in this situation in English.

An electronic book must be placed on a desk or something stable because its weight is substantial, and it must be operated with a keyboard. In contrast, with digital books recently released by NEC, a user can read an electronic book anytime and anywhere. Photo 3 shows NEC's digital book. Floppy discs that are ordinarily

used for personal computers and word processors are used for digital books. Therefore, one disc can store several books. The floppy disc unit and the main unit are separate. Before the user starts reading, he transfers the contents of a floppy disc to the main unit. Since this takes only five or six minutes, more than enough for a day's reading can be transferred before the user leaves home for work. The contents of books range from novels to go (Japanese checkers), shogi and games.

The functions of digital books include page changing, bookmarking, magnification, and reference. Using the reference function, we can see detailed information about a person in a novel, the map of a location, or an illustration of a historical event, for example. We can enjoy reading in a way

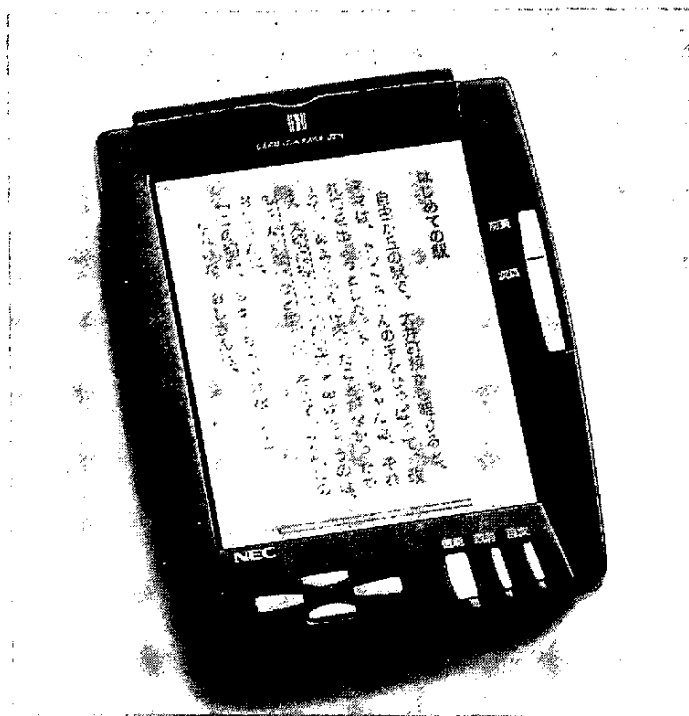


Photo 3: NEC's Digital Book

that is different from ordinary reading. Since a digital book can be held in the hand, we can read it even while standing in a crowded train. Although the first digital books have only recently been released, a wide range of titles, including novels, essays, business, languages, dictionaries, sports, fishing, go, shogi, quiz, and comics, is becoming available. Floppy discs for digital books can be used on personal computers as well. We can enjoy reading on the screen of a personal computer at home and on a digital book when away from home.

Electronic books for personal computers are available as well. They are multi-media, a form that has re-

cently been spreading widely in Japan as well. The several thousand CD-ROM titles that are available can be enjoyed by connecting a CD-ROM to a personal computer with Windows or a Macintosh. They have the potential of changing the way we enjoy personal computers at home. Encyclopedias, electronic picture books and music software including various explanations are typical examples of these titles. Some personal computer series are advertised as having multi-media support from the beginning. Some models are available for about 300,000 yen for a whole set. Photo 4 shows Fujitsu's multi-media personal computer. Multi-media personal computers can greatly expand the

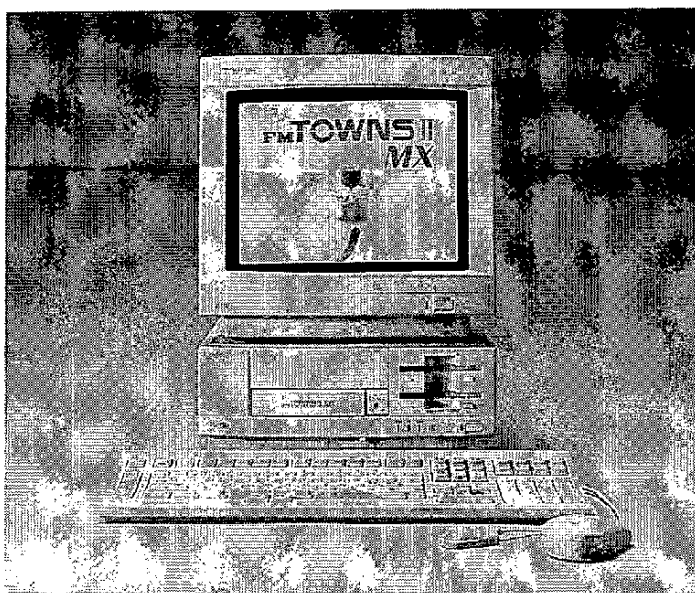


Photo 4: Fujitsu's Multi-media Personal Computer

range of PC utilization because ordinary word processing software and spreadsheet software, of course, can also run on them.

3. TV Game Machines

TV game machines can be called the most widely disseminated information equipment in Japan. The typical series are Nintendo's "Super Famicon" (an abbreviation for "Family Computer"), Sega's Mega Drive, and NEC's PC Engine. The market is flooded with software for them. Famicon is especially popular. When popular software is released to the market, people who want to buy it

even wait in line all night. A Famicon is operated with a controller with several buttons. It is amazing to see how easily this controller is operated even by a primary school child. Many people have pointed out that a psychological allergy to the keyboard is a barrier to the dissemination of personal computers in Japan, but I think that the age will soon come in Japan in which anybody will be able to freely operate a keyboard.

I have introduced some examples of information equipment that is expected to play an important role in the informatization of home life.

History of Informatization of Home Life in Japan

Minoru Kikuchi

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Media Development Research Institute

1. Age of Personal Media

In Japan, it is thought that informatization means computerization. This is due to the industrial policy, begun in the 1970s, of equating informatization with the introduction of computers.

From the viewpoint of home life, informatization took place in two phases in Japan just as it did in Europe and America. Printed media spread during the first phase and telecommunication media such as broadcasting and the telephone during the second phase. (Figure 1)

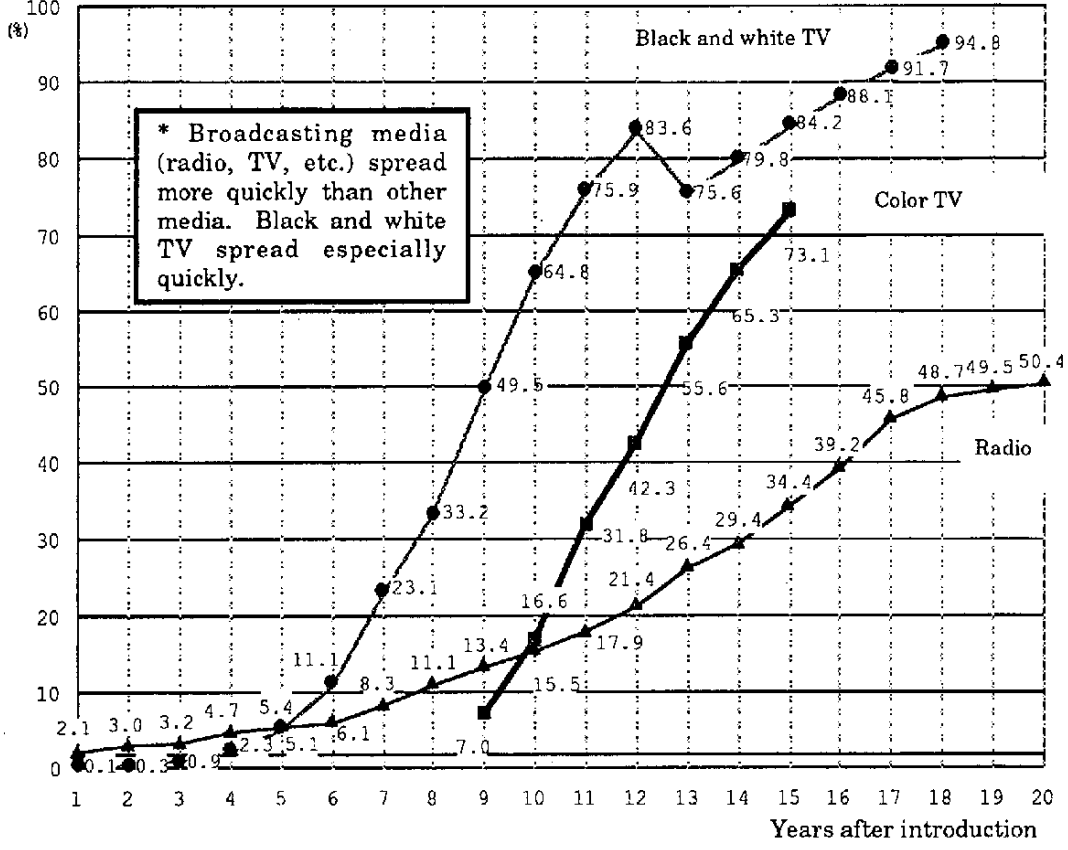
Printed media (newspapers, periodicals, etc.) spread along with modernization; radio broadcasting started in 1924, and TV broadcasting started in 1953. These are still the main information media utilized in Japan at present (Note 1). TV service has spread far more rapidly than the other

information media and has had the largest impact on the information life of the Japanese people. The technology and production of TV laid the foundation for Japan to become a country based on the electronic industry, and became the driving force of rapid economic growth during the 1960s.

Telephone service, which constitutes the nucleus of networks, was commercialized in 1890, after telegram service. However, telephone service was available mainly to governmental, public, and military organizations before World War II. Telephones spread slowly in the home and were overtaken by radio and TV, which began later. The rate of telephones in homes did not go above 50% until the 1970s.

The 1980s saw the informatization of the third phase for Japanese homes with the appearance of "information

Propagation rate



Years after introduction	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Radio	'25	'26	'27	'28	'29	'30	'31	'32	'33	'34	'35	'36	'37	'38	'39	'40	'41	'42	'43	'44
Black and White TV	'53	'54	'55	'56	'57	'58	'59	'60	'61	'62	'63	'64	'65	'66	'67	'68	'69	'70		
Color TV	-	-	-	-	-	-	-	-	'68	'69	'70	'71	'72	'73						

(19_)

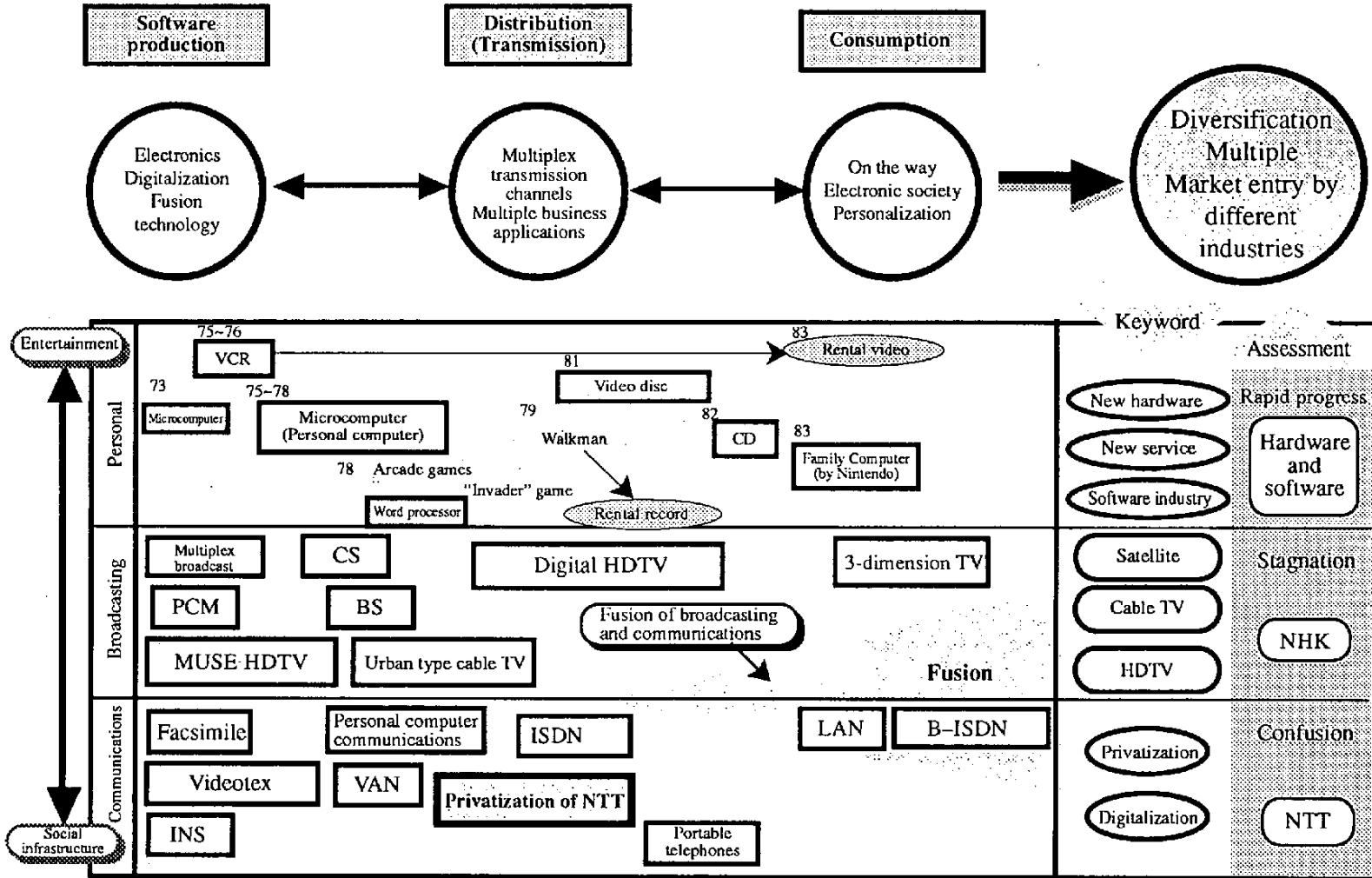
(Prepared by Media Development Research Institute)

Figure 1 Spread of Radio and TV

electric appliances,” which are oriented more to personal and information use than the previous “household electric appliances,” as represented by TV sets.

New information equipment appeared and spread in rapid succession between the mid-1970s and the 1980s.

Microcomputers (equivalent to current personal computers) appeared between 1973 and 1975; 1/2 inch cassette type VTRs (VCR) of Betamax or VHS in 1975 , CDs in 1982, and Nintendo’s “Family Computer” in 1985. (Figure 2)



(Prepared by Media Development Research Institute)

Figure 2 History of Information Media

These have different characteristics, but share one feature: the personal, free handling of information media.

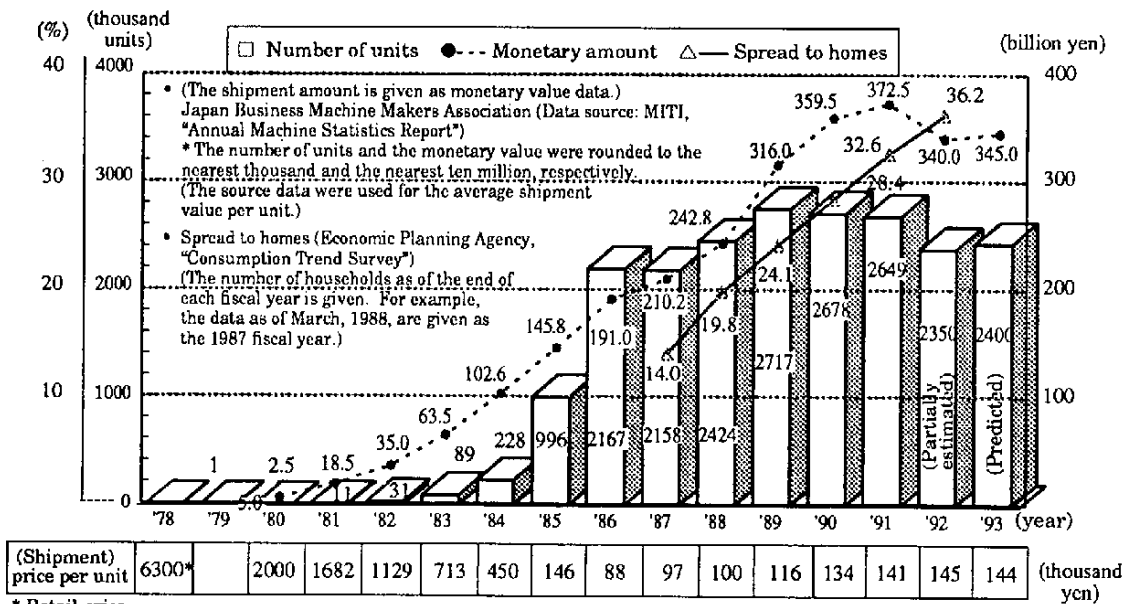
2. Word Processors and the Open Market Policy in Telecommunications

The 1980s saw two events that should not be overlooked regarding informatization in Japan.

One was the appearance of Japanese word processors, developed by Toshiba in 1978.

In Europe and America, typewriters have been used since the end of the 19th century. In contrast, Japanese

typewriters that could print several thousand different characters of three categories (kanji, katakana, and hiragana) were used only for printing and business purposes. At the beginning of the 1970s, the processing of Japanese by computers was the frontier technology of information engineering. "Kana-Kanji conversion," developed as a result of research since the 1960s, allowed practical use of word processors. Initially, word processors were regarded as equipment for printing and business use because of their high prices. However, they gradually spread to the home owing to their rapidly improving performance and declining prices. (Figure 3)



(Dentsu Research Institute, "1994 White Paper on Information Media")

Figure 3 Trends in Word Processor Market

Like telephone service, word processors spread to companies first and homes second. Many currently available word processors are used as electric typewriters, simply for typing documents. However, word processors that process characters in various ways are highly significant as a means of personal information processing for Japanese people who did not experience the evolution process from typewriters to personal computers.

The other event that had a major impact on the informatization of the home was the privatization of NTT. This decision was made under a deregulation policy, along with the U.S. and the U.K.

Telephone service began to disseminate to the home after World War II. However, those who applied for subscription had to wait two or three years because the construction of the communication infrastructure progressed only gradually. Its spread progressed rapidly during the 1970s (the rate of household telephone ownership reached 50% in 1974) because dialing service was introduced nationwide in 1968. The backlog was eliminated in 1977.

In the 1980s, NTT promoted the experimental development of INS, videotex, etc. to diversify telecommu-

nication services. When NTT was privatized in 1986, new common carriers such as Daini-Denden entered the telecommunications market. The new non-NTT telecommunications service market grew to 2.3 trillion yen in only five years.

The change from black dial-type telephone sets to colorful push-button phones is symbolic of the process of the privatization of NTT. (Of course, push-button phones had already appeared between 1969 and 1970, before privatization, and offered functions for computing services interlocked with a host computer and for airline ticket reservation.)

Black dial-type telephone sets are based on the idea of business telephoning: that is, a telephone call is made to talk about business briefly. In contrast, multi-function push-button phones are intelligent communication terminals. Various portable telephone terminals have brought about long private calls and new applications.

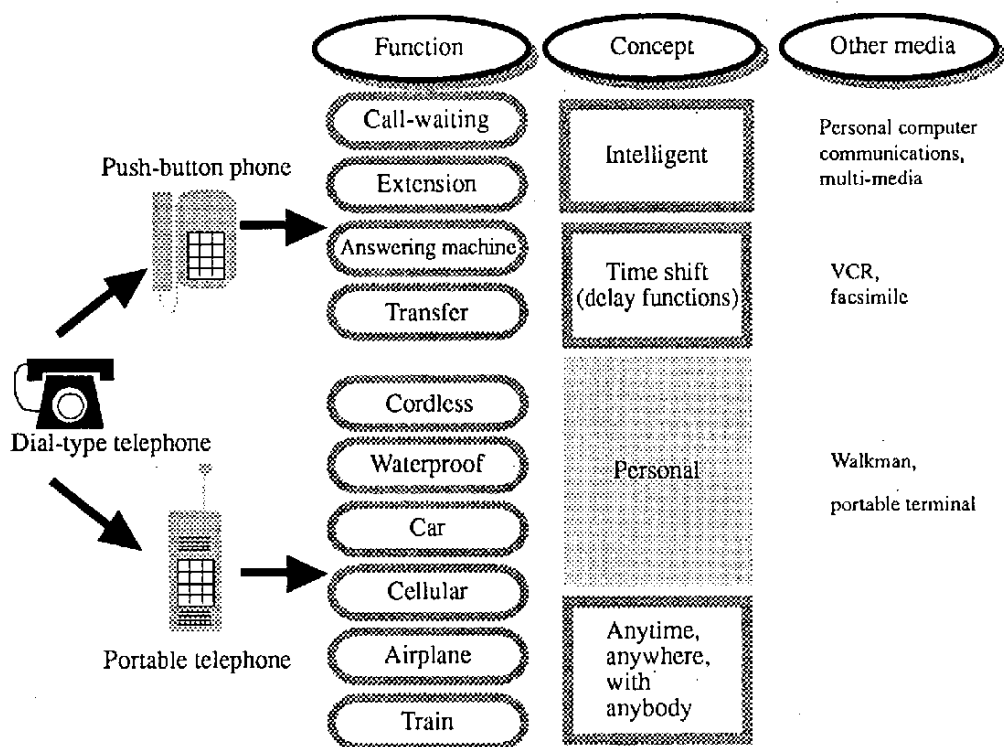
The change from ① black dial-type telephone sets → ② colorful push-button phones (answering machines, call-waiting) → ③ portable telephones (cordless, cellular, extension) is closely related to the informatization of the home and "personaliza-

tion". Just a few years after the privatization of NTT, waterproof telephone sets appeared and pagers became popular among high school girls and primary school children. A new telecommunication network society is being formed.

Telecommunications, as represented by the telephone, are often regarded as infrastructure. Telephone sets tend to be regarded as one of the "three

most important business tools," along with copiers and personal computers. For home life, the telephone service is the most basic network media. Network media, as represented by the telephone, are essential for disseminating personal computer communications and multi-media.

Telephone sets have changed toward ① multiple functions and ② portability. (Figure 4)



(Prepared by Media Development Research Institute)

Figure 4 Evolution of the Telephone

Telephone sets have various intelligent functions. The answering machine recording function should not be overlooked. The rather primitive answering machines using a cassette tape are worthy of attention because they have brought about a change in the real time nature of telephone communications.

Facsimile (printing information on paper) and personal computer communications, which drew attention as new forms of communications in the 1980s, have both real time nature and delay functions. The convenience of being able to contact a person even during his absence and being able to retrieve information (messages) anytime is very significant.

On the other hand, the main concept of the portability of telephone terminals is "anytime, anywhere, and with anybody". We are now able to make a telephone call from a car, a train, a ship, an airplane, or outdoors.

The time and space restrictions of telephone service were eliminated in the 1980s.

Telephones are used in various ways. A child who has just come home calls up a next-door child to whom he has just said goodbye. A young couple talks on the phone for hours. Some

people find pleasure in Dial Q2 or telephone clubs, which are a type of voice database. Some high school girls use pagers for communications among themselves. These new usages of the telephone will provide useful information for the spread of multi-media and PDA.

3. Information Media as Entertainment

All information media except broadcasting, including TV and radio, have spread for business use first and home use second. A new information medium begins to penetrate into the home after people get used to it at the office. Personal computers and word processors spread by this pattern. The same pattern is expected to hold for fax machines, copy machines, and multi-media equipment.

Many Japanese people make a clear distinction between work and their private lives. This is reflected clearly in their information behavior.

Employees who freely use electronic media, such as personal computers, word processors, fax machines, and international telephone services, and read technical periodicals and economics newspapers such as The Nikkei Shimbun at the office make a sudden change in their information

behavior at the moment they leave the office. Let's look at what they hold while they hurry home in crowded trains in Tokyo at 6 o'clock in the evening.

What they are holding is not electronic media, such as a digital book or an electronic notebook. They are reading sports papers with baseball, soccer, and entertainment articles, tabloid evening papers with appealing titles, and weekly cartoon magazines.

In Japan, newspapers are not differentiated into high level papers for the intelligentsia and lowbrow papers, as in Europe and the U.S. Sports papers that carry articles on sports, entertainment, social topics (crimes), and scandals enjoy high popularity among the general public.

The most unique phenomenon in the Japanese society is the popularity of cartoon magazines. For example, Shonen Jump has a circulation of six million copies. (* Many readers of this magazine are in their 20s and 30s, although the title contains the word "shonen" (boy).) Cartoon magazines are popular up to the mid-40s age group. Many foreigners are surprised to see Japanese employees absorbed in cartoon magazines on a train. Comics and cartoons are among the information media that have be-

come deeply established among the Japanese people.

(1) Game centers

Game centers and karaoke boxes (establishments with a number of small rooms for karaoke) have become popular amusement places.

In Japan, movies were the king of entertainment until the 1950s. However, they declined quickly beginning in the 1960s because of the spread of TV sets and the diversification of leisure life. (Note 2)

In contrast, game centers appeared during the 1960s and received social recognition after "Invader" game, a desktop type TV game, gained high popularity at the end of 1978. Since then, game centers have formed a great amusement market.

Previously, game centers were popular mainly among teenage secondary school and high school students. But their popularity has spread even to male and female employees in their 20s since the mid-1980s.

This is due to the high popularity of simulation games produced by computer graphics (CG) such as 3D Polygon, driving games, virtual reality games, and crane games that attract

people with character goods.

The CG technology and simulation video technology integrated with movement applied to these games are of the highest standards found in Japan except for those used for business applications, such as CAD/CAM. In Japan, advanced video technology such as 3-dimensional CG, pseudo stereo, and virtual reality is flourishing not at military or business facilities, but at game centers in cities. (Note 3)

In Japan, game centers are growing into mini theme parks (urban type theme parks, in which an entire building is a game center), as represented by Namco Wonder Egg. Simulation games that are played interactively by a number of people and simulation games produced by virtual reality technology are being developed in rapid succession.

On the other hand, theme parks as represented by Tokyo Disney Land became very popular in the 1980s in Japan. More than one hundred plans were promoted. This led to the renewal of the amusement industry (amusement parks). One of the greatest attractions is high definition IMAX (70 mm, 15 perforations). This produces simulation video by interlocking high resolution video and a

theater.

(2) Karaoke

Unlike game centers, which attract mostly urban young people, karaoke is popular among men and women, the young and the old.

Japanese people have always enjoyed liquor and music together. Guitar music and live piano performances were enjoyed.

The word "karaoke" derives from the Japanese word "kara" (empty) and the English word "orchestra." Its origin is said to be accompaniment tapes for professional singers used in 1972 at a snack bar in Kobe. In 1976, Clarion developed karaoke equipment for business use. After that, karaoke became a form of entertainment for employees of middle to advanced age.

It was after 1980 that karaoke created a national boom. Video disc karaoke, producing music and video in combination, appeared in 1982. This triggered the spread of karaoke not only to the night market (bars), but also to the home market. Video disc karaoke sets that can reproduce music and video when buttons are simply pressed were recognized as the first "interactive media".

The appearance of karaoke boxes, facilities designed especially for karaoke, promoted the rapid expansion of the karaoke market during the later half of the 1980s. At present, 150,000 karaoke systems are installed for the day market (inns, hotels, etc.) and 350,000 systems for the night market (pubs, snack bars, etc.). There are 10,063 karaoke boxes and 107,488 karaoke rooms in the country (as of the end of December 1992).

Karaoke users have expanded from the previous group of employees of middle age and over to people of all age groups (primary school children, secondary school students, housewives, aged people), all generations, and all occupations. Among various types of leisure, karaoke has the largest and widest population. (Note 4)

Karaoke systems are evolving as well. They are changing from video discs to more compact digital multi-media equipment such as CD-I and CD-V. Communication karaoke that utilizes N-ISDN (Narrowband Integrated Services Digital Network) has spread rapidly over the last years or so. A user at a terminal can access tens of thousands of musical pieces stored in a host computer at the center. (The on-line type and the off-line type are available. In the former, a user makes

direct access to music stored in the host computer at the center. In the latter, about ten thousand musical pieces are stored on a hard disc and a user accesses them in off-line mode.) This is the newest application of digital communications.

4. Informatization of Social Systems

Entertainment such as game centers, theme parks, and karaoke are the most easily understandable forms of information media. In our daily life, informatization utilizing networks is most obvious at convenience stores and banks.

In Japan, the informatization of social systems by means of computerization was started by large transportation companies, such as Japanese National Railways (1963 - 1964), Japan Air Lines, and banks.

We first saw computers and learned about on-line networks when we watched service counter staff operate the computer terminals of the seat reservation system. (In those days, a reservation could not be made automatically from a terminal.)

(1) Financial settlements by transaction operations

Recently, credit cards are becoming popular among Japanese people. However, the Japanese society is basically different from the cashless American society where checks are widely used.

Cash cards spread rapidly while Japanese city banks constructed on-line computer systems (1st, 2nd, and 3rd phases). These cash cards are magnetic type cards and were used mainly for withdrawing cash during the initial period. However, they have become multi-purpose cards that can be used not only for withdrawals but also for deposits and transfers. This change took place along with the progress of banks' on-line systems. In order to save labor, major city banks adopted machines for individuals' financial settlements. Up to about ten CDs (cash dispensers) are installed at every branch office of a bank. A customer inserts a cash card, inputs his password (number), and touches buttons to follow the instructions on the touch sensor monitor. The customer can perform all kinds of financial settlements in this way.

This is the most common type of transaction among the Japanese people. Some people of middle and advanced age group do not fully utilize these machines. Some feel resistant to machine operations that are forced

one-sidedly by banks. However, forcing seems to be the most effective way to spread machine transactions. (Note 5)

Telephone type bank terminals (used for both telephone and bank services) are being developed for business users. They are expensive and have not spread widely. Automatic financial settlement will penetrate homes in the future when the necessary infrastructure is laid, terminals are improved, and some legal revision is made.

(2) Informatization of convenience stores

Electronic registers and POS systems at convenience stores and supermarkets draw our attention as another form of social informatization. At convenience stores, consumers do not actually operate terminals, as they do at banks. However, bar codes on goods are read by terminals, and theater reservations, public TV fee payments, and electricity bill payments are processed instantly. These operations strongly show us beyond a doubt that informatization is progressing rapidly.

5. Informatization of Automobiles

Information media are actively intro-

Table 1 Spread of Information Media to Cars

	AM/FM radio	Cassette player	CD player	Car phone	Car TV	Navigation system
Spread	94.0%	88.0%	21.5%	1.3%	1.7%	0.6%
Percentage of car owners desiring to purchase	—	—	23.3%	12.5%	26.2%	26.9%

* A large percentage of car owners desire to purchase navigation systems, CD players, and car TVs.

(Dentsu Research Institute, "1994 White Paper on Information Media")

**Table 2 Spread of Information Media to Homes
(As of end of March, 1993)**

Color TV	Satellite broadcasting	CATV (Urban type CATV)	VTR	CD	Word processor
90.0%	21.3%	19.7% * (2.5%)	75.1%	54.7%	36.2%

Personal computer	Push-button phone	Video camera	Video disc	Facsimile	Karaoke	Video game
11.9%	53.2%	25.6%	16.8%	6.7%	18.1%	72.0% **

(Economic Planning Agency, "Consumption Trend Survey")

* Ministry of Posts and Telecommunications

** Industry estimate

duced in automobiles as well along with the informatization of our living.

The standard information media for automobiles were AM/FM radio and a stereo cassette player. The 1980s saw rapid spread of car CDs. In Japan, many audio fans spend more money for audio equipment in their cars than at home because of poor

housing conditions. In fact, men in the 20s and 30s spend more time enjoying audio equipment in cars than anywhere else.

Car TVs, cellular telephones, and a navigation systems are newly drawing attention. Cellular telephones were once a status symbol for rich people, but have become a common medium. A car navigation system using a CD-

ROM has become standard equipment in large passenger cars. It has recently become highly popular among young people and is ranked as "the product I want to buy more than anything else." It seems that karaoke and navigation systems are triggering the spread of multi-media. (Table 1)

6. Informatization of Home Life

Broadcasting media (TV and radio) and the telephone are the main information media in the home. Since the telephone is used mostly for talking, transaction type services did not spread widely. The usage of personal computer communications, electronic mail, and database services is still low, although these markets are growing rapidly in the U.S. (Note 6)

AV equipment such as VTRs and CDs, word processors, personal computers, and game machines (video games) have begun to disseminate quickly, but most are used as stand-alone equipment. They are rarely connected to networks (Table 2). Although mail-order sales are growing rapidly in Japan, catalog shopping has the largest share. (Note 7)

Tickets can be reserved from a multi-purpose telephone terminal. But most people prefer to make reservations by

phone. Japanese people prefer to talk with staff face to face or over the phone to make a reservation unless they are forced to use a machine like a cash dispenser at a bank.

Facsimile machines are used more frequently than personal computer communications in offices as well.

This seems to be a result of the Japanese characteristic of valuing man-to-man communications (or face-to-face sales in business) or visual information, such as characters.

The failure of stock trading by Nintendo's Family Computer terminals seems to have been caused by people's unfamiliarity with machine transactions.

Japanese people have utilized information media mainly in the form of mass media (printed information, broadcasting, AV, etc.) or in the field of hobbies and entertainment (game centers, karaoke, etc.). Multi-function telephone sets, word processors (used as electronic typewriters at first in Japan), and personal computers were spread in the 1980s.

It will take a considerable amount of time until people begin to use word processors and personal computers in more advanced forms and carry out

various transactions by terminal operations.

For such services to be started, the ISDN network must be expanded as the infrastructure, TV and AV equipment must be made easier to use, and intelligent telephone terminals must be developed. At the same time, our communication and purchasing habits must change.

However, it is predicted that today's young people, who can freely use game machines and personal computers, will quickly move towards transaction type services. This has not only physical advantages, such as resource conservation and time saving, but is also the direction of a network society in which "communications" play a central role.

(Note 1)

A Japanese person's average daily free time is 6 hours and 6 minutes. Of this free time, he spends 4 hours and 37 minutes on information media behavior. TV watching accounts for 3 hours of this time. (NHK, "Survey on People's Living Time: 1990 Fiscal Year")

(Note 2)

The 1950s were the golden age of movies in Japan as well. There were 1.127 billion moviegoers in 1958, and the number of movie theaters was 7,457 in 1960. These numbers decreased to 0.13 billion persons and 1,734 movie theaters by the 1993 fiscal year.

(Note 3)

In the 1992 fiscal year, the arcade game market was 487.0 billion yen,

three times that of movies. There are 19,286 stores specializing in games. (The total number of facilities that have game machines is 34,000.) There are 4.4 billion game machines. (Leisure Development Center, "White Paper on Leisure", document of the National Police Agency)

(Note 4)

In 1992, 53.60 million persons participated in karaoke. This is second only to the number of people that ate at restaurants, traveled within Japan, and drove. It is larger than the liquor-drinking population. (Leisure Development Center, "White Paper on Leisure '93")

(Note 5)

Cash dispenser installation is expanding from city banks to local banks, post offices, and other finan-

cial institutions. Most people are able to withdraw cash from machines. But it is reported that more than half of aged people over 50 cannot perform other transactions, such as money transfer.

(Note 6)

There are 210 personal computer communication networks. The total number of members is 1,957,000. (Since the same person may be

counted more than once, the total number is closer to 1,200,000.) (June 1993, New Media Development Association)

(Note 7)

In Japan, the mail-order sales market is 1.840 trillion yen (in 1992, according to The Japan Direct Marketing Association) and its growth rate is 4.5%.

Current News

*** Fujitsu announces marketing of IBM compatible PCs**

Fujitsu has announced the marketing of an IBM PC compatible series. Named the "FM-V" Series, it includes three desktop types and three notebook types, with 17 models in total. They will be Fujitsu's third major PC product after "FM-R", originally designed PCs for business users, and "FM Towns", PCs for personal users.

Fujitsu explains why it entered the IBM compatible market: "They can easily be manufactured cheaply, and they can run Microsoft Windows at high speed." IBM compatible machines have been released in rapid succession not only by Japanese manufacturers such as Hitachi, Toshiba, and Mitsubishi, but also by foreign affiliated manufacturers such as IBM Japan and Compaq. The IBM compatible group will be further expanded by the entry of Fujitsu, which had maintained a non-compatible

policy. They will have intensifying market share competition with the NEC compatible group, including NEC, with a share of more than 50% in the Japanese PC market, and NEC compatible manufacturers.

*** Major electric equipment manufacturers decrease R&D expenses but increase fixed capital investment**

Major electric equipment manufacturers have begun to suppress R&D expenses. Fujitsu decreased R&D expenses for the 1993 fiscal year by 14%, or about 44.0 billion yen, from the amount spent in the previous fiscal year. The number of actual R&D projects was decreased by 15% from the previous fiscal year. Hitachi has lowered R&D expenditures by 25.0 billion yen from the 1992 fiscal year. They are especially concerned with streamlining in the field of information and electronics, including software development, which has

accounted for a large part of R&D expenses. NEC and Matsushita Electric have cut R&D expenses by 10.0 billion yen and several billion yen, respectively.

In contrast, some have increased fixed capital investment in view of the favorable business conditions for semiconductors and liquid crystal displays. NEC has revised its planned fixed capital investment for the 1993 fiscal year to 160.0 billion yen, up 20.0 billion yen from the initial plan. Hitachi has also increased its fixed capital investment to 160.0 billion yen because of a decision to invest in new liquid crystal display and semiconductor plants.

NEC has increased its consolidated semiconductor equipment investment, including investment in overseas plants, from 70.0 to 80.0 billion yen, and Hitachi from 80.0 to 90.0 billion yen because of additional investment in an American plant. As a result, the total semiconductor equipment investment of the five major manufacturers, including Fujitsu, Toshiba, and Mitsubishi Electric, has increased from the initial prediction of 375.0 billion yen to 390.0 billion yen for a 21% increase over the previous year.

*** Computer installations down 14% in fiscal 1993**

JEIDA (Japan Electronic Industry Development Association) has announced a prediction that computer installations, including exports, in fiscal 1993 will amount to 3.245 trillion yen, down 14% from fiscal 1992, for the second two-digit decrease in two years. This is the first time since the survey was begun in 1957 that a decrease has been recorded for two years in succession. The prediction is based on MITI's "Statistical Survey on Computer Installations". Computer systems installed to users as the set of a CPU and peripheral equipment are totalled and some predictions are made.

Lower informatization investment by businesses and the decline of personal consumption due to the recession are the main factors in the decreased computer installations in fiscal 1993. Other factors are the promotion of overseas production due to the high value of the yen and the shift of demand from high-priced general-purpose machines to low-priced PCs and WSs. Sales received the double blow of both the recession and structural reform in the computer industry. No major recovery is predicted for fiscal 1994, either. 1994 installations are

predicted to be about 3.250 trillion yen, nearly the same as the 1993 amount.

*** NTT develops document retrieval system with automatic learning**

NTT has announced the development of a new retrieval system that can efficiently retrieve documents by automatically learning users' interests and goals for retrieval. This is a newspaper article database system in which about 800 articles are registered. When the user inputs a sample article of a field that interests the user, its keywords are analyzed by neural network technology. Since the system looks for whether the keywords are used and produces a keyword relationship diagram, accurate retrieval can be accomplished even with ambiguous keywords. The percentage of successful retrieval of necessary documents from a database is raised remarkably, from 74% to 92%, with the use of this system. The percentage of documents considered necessary from among the retrieved documents increased from 32% to 57%. In other words, the retrieval of unnecessary documents has been decreased. NTT plans to further improve retrieval accuracy through test application in an in-house product information system and the like.

*** Mitsubishi Electric develops high precision image processing system for face recognition**

Jointly with ETL (Electrotechnical Laboratory), Mitsubishi Electric has developed a high precision image processing system that can recognize a person's face in real-time. The system has been tested on 116 persons. The percentage of mistaken recognition of the image of an unregistered person as a registered person was only 5%, and registered persons were recognized with the accuracy of 98%. Faces can be recognized regardless of expression and angle. Application is expected for security systems at various types of facilities.

The system consists of a CCD (charge coupled device) camera to read in the image and a WS. The image of the face photographed by the camera is converted to five images of different resolutions by magnification and reduction. Indicators characterizing each person's face are extracted through information processing on each of the images. A judgement is made by comparing these indicators with the database of registered persons. The system can accomplish more flexible identification when the recognition process is divided into two steps: "Is the image of the photo-

graphed face registered?" and "If it is registered, who is it?"

Logical reproduction of the human process of facial recognition is said to be one of the most difficult issues in information processing technology.

Mitsubishi Electric is engaged in commissioned research on visual information processing as part of the Real-World Computing Project, begun by MITI in fiscal 1992. This image processing system is one of the achievements of that research project.

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