

1984

# Jipdec Report

**Japan Information Processing  
Development Center**

**The PC Phenomenon  
— End of an Epoch ? —**

**No. 57**



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1984

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**No. 57**

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

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# PERSONAL COMPUTER SHOPS AND TRENDS

## (1976 ~ 1983)

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NEC Corp. came out with its TK 80 one-board microcomputer kit in 1976, an event which signalled the start of the Japanese personal computer industry.

Of all the personal computers sold in Japan since the days of the first TK 80's, 42% have been sold by NEC, making it Japan's top personal computer company. In 1976, NEC never dreamed it would rise to become the leading seller of personal computers in Japan. In fact, the company never dreamed that the personal computer industry would ever grow to become the giant that it is today.

It is estimated that a total of 2.2 million personal computers had been sold in Japan as of the end of 1983. The number of units sold during 1983 alone was calculated at one (1) million, and sales by volume for the previous year, 1982, worked out to 760 thousand units. From these figures it is clear that the Japanese personal computer industry has really taken off just during the past two years.

This leap in personal computer sales was so sudden, and the competition between and among manufacturers so fierce, that it became popular in 1982 to refer to the situation as "microcomputer warfare."

### APPEARANCE OF PERSONAL COMPUTER SHOPS

About the time NEC first introduced its TK 80 one-board microcomputer kit back in 1976, it also established a small electric appliance retail store in Akihabara, Tokyo, called the "Bit-Inn." When it first opened, the Bit Inn was more a showroom for NEC products than it was a real retail outlet. However, young computer hobbyists were quick to spring on the TK 80s handled by the store, buying them up almost as fast as they were put on the shelves.

Akihabara is a famous discount shopping area in Tokyo known especially for its abundance of retail shops specializing in home electric appliances, audio equipment and ham radios, as well as the parts and components that go into making these. The same people who frequented the Akihabara stores in search of bargain VTRs, TV sets, shortwave radios and the like, were the ones to initiate the buying trend for personal computers.

The Bit Inn was the first personal computer shop in Japan. Since this store was planned and financed by NEC, one of Japan's largest computer manufac-

turers, it can't really be called an independent personal computer shop. But one thing is for sure, and that is the Bit Inn played an instrumental role in the birth of the Japanese personal computer industry.

Personal computer fever gradually spread between 1976 and 1978, adding to the numbers of computer hobbyists in Japan. This phenomenon in turn encouraged large communication equipment companies and electronic parts distributors with stores in the Akihabara area to open small personal computer shops or "corners" within their existing locations.

It might be a good idea to take time out here to explain just briefly about a controversy which welled up in Japan concerning the terms microcomputer and personal computer.

The term personal computer, or PASOCON as it is abbreviated here in Japan, is widely used today to refer to microcomputers for personal and business use. However, this was not always the case. When the TK 80 was the hottest thing going, these machines were referred to simply as microcomputers or MICON. The controversy over whether it was more correct to call them microcomputers or personal computers reached a peak in Japan around 1982, after which the name personal computer gained the ascendancy.

The term microcomputer is still used to describe those products aimed primarily at the dyed-in-the-wool computer buff, but those machines used in business or home applications are generally

referred to as personal computers. For simplicity sake, the terms "personal computer" and "personal computer shop" are used throughout this report to refer to these machines and the stores that sell them.

## COMPUTER HOBBYISTS LAY FOUNDATION FOR PC INDUSTRY

People interested in personal computers solely as hobbies ventured out to personal computer shops in ever larger numbers to see what these new machines were all about. Most of these individuals only wanted to use personal computers to play video games, which came in the form of cassette tapes available on the market. Other computer hobbyists, however, used these machines to write their own programs and create their own video game software.

It wasn't too long before truly original video game software was being turned out by certain of the more talented personal computer hobbyists. These individuals soon realized the value of their creations and began selling their home-made software to anyone with an interest. The more venturesome among them even got together to form companies to sell their products on the open market. Numerous Japanese software houses specializing in video games got their start this way.

A number of individuals and groups interested in building and marketing their own personal computers also emerged from among these computer hobbyists.

The first privately produced and marketed personal computers showed up in Tokyo, but soon were appearing in places all over Japan.

This state of affairs started about 1978. In order to better understand how personal computer shops spread throughout Japan, it will be necessary to follow the actions of the central figures in this movement, the computer hobbyists, a bit further.

### **COMPUTER HOBBYISTS: A MIXED LOT**

Most Japanese computer hobbyists became familiar with the operation and capabilities of personal computers while using them as forms of personal entertainment. Around 1979 the ranks of computer hobbyists in Japan began to consist of increasingly larger numbers of businessmen.

The businessman/hobbyist soon began to look at the personal computer as a tool to be used in his work, while students, who had also thought of personal computers only as hobbies up until this time, began to experiment with them as a means of consolidating and arranging the data necessary for their research reports and term papers.

However, those computer hobbyists who became the most addicted to personal computers were the ones who analyzed every aspect of their hardware and software, and then attempted to build their own improved versions of these machines.

The Japanese personal computer in-

dustry, which is now capable of producing machines that can be operated by even the most uninitiated, developed into the giant it is today from what was once a market confined almost solely to computer hobbyists.

### **PCs AND THE WORLD OF BUSINESS**

The early personal computer users weren't all hobbyists to begin with; there were also those who turned personal computer hobbyists after gaining experience in the operation of computers in their work.

Computers are ideally suited for the task of instrumentation control, and have been used in this fashion by people attached to the design and manufacturing departments and/or research sections of Japanese companies. The large-scale computers installed at Japanese companies are primarily for use by full-time operators to carry out technical calculations, but are also used by certain individuals to process their own personal work requirements. It was from among this latter group that numerous of the original personal computer hobbyists evolved. Their hands-on experience with the big machines enabled them to quickly grasp the workings of personal computers. And just as birds of a feather are said to flock together, so did the early personal computer hobbyists. They formed groups and clubs, and when they realized how numerous their numbers were, the more farsighted among them opened up personal computer

shops. This phenomenon wasn't limited to Tokyo alone, but occurred all over the country.

As one example of the groups that were formed by these personal computer hobbyists, let's take a look at the Japan Microcomputer Club, which held its first meeting in July, 1977.

As of the end of 1983, the Japan Microcomputer Club (JMC) had approximately 9,600 members on its rollbooks. If we break down this membership by age group, we learn that young members ages 19 ~ 29 make up the majority at 32.7% of the total. The next largest age group are those members between 30 ~ 39 years old, who account for 31.4% of the club's enrolled members. This group is followed by members ages 13 ~ 18 who make up 10.1% of the JMC membership, members 50 ~ 59 who account for 7.6%, the 60 years of age and older group which comprises 3.2% of the club's members, and finally the 13 years or younger group, accounting for the smallest percentage of the membership at just 0.5%.

As can be seen, the members of JMC are by and larger rather young. According to the club spokesman, JMC doesn't get as many new members who are totally unfamiliar with personal computers as they did when the club was first formed, a fact he attributes to widespread exposure to these machines through TV and magazines. "Instead," he said, "new members with a good basis in personal computers are on the increase. People who have had some experience with computers at their com-

panies, and who are now ready to study these machines in more detail, or prior hobbyists who are now interested in applying personal computers to their jobs are in the majority now."

Personal computer utilization in Japan is widespread today, and the number of personal computer specialty shops nationwide as of the end of 1983 was estimated at over 3000.

### **HERE A SHOP, THERE A SHOP, EVERYWHERE A PC SHOP**

The number of personal computer shops in Japan has risen sharply since 1979. At present, there are better than 3,000 personal computer shops specializing solely in personal computers and their accessories, plus an estimated 30 thousand personal computer corners set up inside existing home electric appliance stores, supermarkets and department stores.

The types of businesses which have entered the personal computer industry by opening a personal computer shop or corner are extremely diverse. These include examples of computer hobbyists who quit white collar jobs to open personal computer shops, ham radio stores, electric home appliance stores, business equipment dealers, small business computer dealers, doll stores, small and medium-sized manufacturers of precision machinery, computing centers, the SOGO SHOSHA (Japan's big trading houses), newspaper firms, television broadcasting companies and publishing houses. And the list could go on.



The motivating factors behind these various types of businesses wanting to break into the personal computer market are as diverse as the businesses themselves. The most representative examples, however, are as follows.

The growth of the electric home appliance industry has reached its peak, and members of that industry are counting on personal computers to stimulate sales and possibly become the next big selling home appliance if the trend towards "home" computers gets off the ground. Most electric home appliance dealers have simply rearranged their existing stores to make room for personal computer corners, but the larger dealers have even gone so far as to open personal computer specialty stores which handle nothing but personal computers and their accessories. A large part of this strategy entails capitalizing on the popularity of personal computers to attract more customers to the stores.

The motivating factors behind the entry of office equipment dealers into the personal computer market are similar. The market for copying machines, the bread-'n-butter product of office equipment dealers, has entered a stable growth period. It is now considered a mature market. For this reason, dealers specializing in office equipment began looking around for something new to stimulate sales. Numerous dealers latched on to small business computers as their hope for the future, but found that a large price gap existed between copying machines and small business computers. This realization prompted many dealers

to try to fill this gap by expanding their product lines to include Japanese-language word processors, facsimile machines and other types of more reasonably priced office automation (OA) equipment.

Although personal computers are similar in nature to the small business computers, they cost less, placing them in the same price category as copying machines, Japanese word processors and facsimiles. Also, application software packages are available for personal computers, making them much more attractive as products than small business computers. Personal computers have been steadily gaining popularity in activities other than hobbies. In fact, they have penetrated the field of business so extensively that they are now lumped together with copying machines and other office machinery when speaking of OA equipment.

Another reason why so many different businesses have been anxious to secure a share of the personal computer market is more emotional in nature. That is, many simply feared that if they didn't work their way into the personal computer industry during its early stages, the unbelievable growth rate of this industry would preclude their being able to enter the market at a later date.

In other words, the personal computer boom has shaken otherwise calm, cool-headed businessmen into making hasty leaps for the bandwagon before it passed them by.

## NATIONWIDE DISTRIBUTION PATTERN FOR PC SHOPS

But just how are all these newly opened personal computer shops distributed throughout the Japanese archipelago, and how big are they in terms of size and sales? The staff of Business Computer News asked itself these very questions, and in order to derive the answers, embarked on a survey which began in early 1982 and lasted through 1983. During the conduct of this survey, we contacted some 1,300 major personal computer shops nationwide, and from

these narrowed the field down to 150 leading shops, which we then analyzed in depth and reported on. The following is a summary of our findings.

According to our results, the distribution ratio for personal computer shops in Japan is as indicated in Figure 1. The highest concentration of these outlets is found in the Kanto region immediately surrounding, but not including, Tokyo, and accounts for 33.3% of the total. Tokyo is next with 28%, followed by the Hokuriku, Chubu and Tokai region with a combined 16.7%, the Kinki and other western regions with 12.7% and the

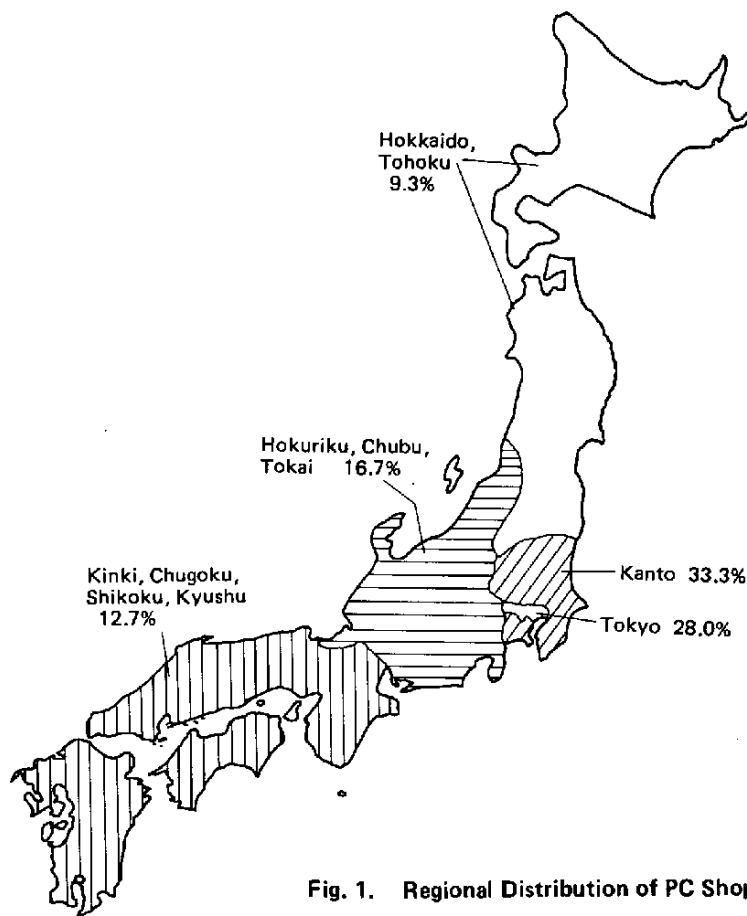


Fig. 1. Regional Distribution of PC Shops in Japan

Tohoku and Hokkaido regions with a combined total of 9.3%.

This distribution ratio matches up almost exactly with the demand distribution ratio here in Japan.

The highest concentration of personal computer shops in the Tokyo area is located in the electrical appliance discount shopping district of Akihabara. Just a little under 50% of all the personal computer outlets in Tokyo are found in Akihabara. In addition to Akihabara, the other shopping centers for personal computers in Tokyo, in order of number of store locations, are Shinjuku, Shibuya, Ikebukuro and the world famous Ginza (See Figure 2). The proximity of these areas to public rail and bus transportation points means that there are always lots of prospective customers around.

This factor makes these areas ripe for businesses of all sorts, and restaurants, bars and other eating and drinking establishments, department stores and specialty shops of every description, including the personal computer shops, are rife. In fact, it has gotten to the point

where personal computer outlets are almost as numerous as the eating and drinking establishments, which themselves border on being too abundant.

And this phenomenon isn't limited to the Tokyo region alone by any means. Even outlying districts such as Utsunomiya in Tochigi Prefecture, Omiya in Saitama Prefecture, Chiba in Chiba Prefecture, Maebashi in Gumma Prefecture and Yokohama in Kanagawa Prefecture all have more than their respective shares of personal computer shops.

By way of example, the trend in the restaurant business in recent years has been to open establishments near national railway lines and stations. And the same goes for personal computer outlets. Although similar cases can be seen in the United States, the practice of opening personal computer shops near heavily used transportation facilities is particularly popular in Japan.

Let's go back to 1979 and review the situation surrounding newly opened personal computer shops since that time. For example, if we make the num-

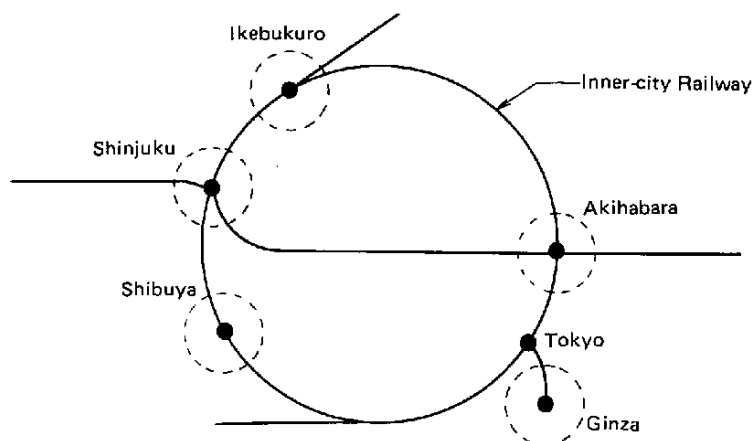


Fig. 2. Five Major PC Shopping Centers in Tokyo

ber of personal computer shops in existence in 1979 our basis, we see that compared to 1979 figures, the number of outlets opened in 1980 rose by some 118%. This trend continued through 1981 with 240% more new shops opening that year than had opened the year before. By 1982 the rate of new openings began to level off, rising only 90% over previous year figures. Nevertheless, in comparison to the number of outlets existing in 1979, 1982 figures worked out to a 253% increase.

On a region to region basis, the first place to experience large increases in the number of new personal computer shops was Tokyo. But this phenomenon soon spread to cities in the outlying regions of Japan as well. In 1982, new shops were still being opened nationwide, but by the start of 1983, "out of business" signs began to crop up in shops across the country.

By the middle of 1983, the number of personal computer shops forced out of business had grown conspicuously. This trend coincided with the leveling off of personal computer sales in Japan. Overall sales of personal computers in 1983 was up just 123% over figures for the year before, whereas 1982 sales had shown an increase of 216% over 1981.

Next let's take a look at monthly sales figures for personal computer shops. Those shops averaging 20 million yen or more of sales per month accounted for 28.6% of the personal computer shops surveyed. Shops that average between 15 and 19.99 million yen per month accounted for 10.7% of the total,

those with between 10 and 14.99 million yen worth of monthly sales for 18.7%, those with between 5 and 9.99 million yen per month accounted for 22.7% and those shops with monthly sales of less than 4.99 million yen for about 19.3% of the total.

Pre-capita personnel expenses for personal computer shops, including wages, works out to around 300 to 400 thousand yen per month. In order to earn enough money to cover personnel expenses alone, a personal computer shop must do at least between 1 and 1.5 million yen worth of business per employee. According to our figures, roughly 10.7% of all the personal computer shops surveyed were recording sales of 990 thousand yen or less per month per employee, which means that despite the personal computer boom going on in Japan, there are still quite a few shops, approximately one out of every ten to be exact, that are just barely making ends meet. And the number of shops experiencing such financial difficulties will more than likely increase during 1984.

The reason for this lies in the fact that personal computer shop sales during the last half of 1983 were down roughly 20% compared to six-month sale averages during the peak period from 1979 through the first half of 1983.

Something happened in 1983 to stall the rapid growth of the personal computer industry. Just what that "something" was we aren't yet sure. But one possible answer is that mid-1983 simply marked the end of the first growth period for personal computers in Japan. In order

to forecast just how the personal computer industry will grow in future, it will be very important to carry out de-

tailed analyses of the events and trends which prevailed during this initial growth period.

# TRENDS IN PERSONAL COMPUTER SOFTWARE

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## PERSONAL COMPUTERS: TWENTY-FOLD GROWTH IN FOUR YEARS TIME

The extremely rapid growth of the Japanese market for personal computers has yet to be matched anywhere else in the world. According to the results of a survey into computer shipments conducted by the Japan Electronics Industry Development Association (JEIDA), an organization comprised of eighteen of Japan's leading computer manufacturers, overall sales of personal computers during fiscal 1982 reached 762 thousand units (220 billion yen), a two-fold increase over the figures given for fiscal 1981, which indicated the sale of 288 thousand units (110 billion yen) [The report published by JEIDA contains the only authorized figures on this subject in Japan].

Total shipments of personal computers during fiscal 1982 alone came to over 1.7 million units, more than the accumulated total of 1.5 million units of these machines shipped prior to that year. Shipments for fiscal 1983 are expected to increase by an additional 1 million units over the previous year's figures, and if they do, the growth rate for personal computers will have exploded to twenty times what it was when these machines first really took off four years ago in 1979. Amidst the current nationwide lull in business, the personal computer industry stands out as a solitary example of strong, steady growth.

JEIDA has also put together a forecast of things to come in the personal computer market in and after fiscal 1984. The statistics it quotes are shown in Figure 1.

These statistics are based on a study

**Fig. 1. Market Forecast for Personal Computers (March, 1983)**

1984	1,491,800 units (Increase over previous year — 147%)	376,520 million yen (Increase over previous year — 132.6%)
1985	2,002,500 units (Increase over previous year — 134.2%)	470,890 million yen (Increase over previous year — 125%)
1990	5,407,400 units (Increase over 1985 figures — 270%)	986,060 million yen (Increase over 1985 figures — 209.4%)

(Source) JEIDA's "Personal Computer Report" (March, 1983)

which concentrated on the market for personal computer hardware and representative examples of peripheral equipment only. Had the scope of this study been broadened to take in the entire personal computer industry, including the large numbers of other peripheral devices, exclusive-use machines and software products, plus those fringe industries such as magazine publishers and the organizers of educational programs and seminars which are capitalizing on the personal computer boom, then the extremely large size of this market would have become more apparent.

There are numerous personal computer companies in Japan, but only about 40 of these, including 10 firms financed by foreign capital, are currently involved in the increasingly bitter competition taking place in the Japanese market. Of these, the three largest firms are NEC Corp., Fujitsu Ltd. and Sharp Corp., which together account for more than 80% of the market.

Personal computer companies operating in Japan can be divided into two broad categories: those which concentrate on the market for small business computers as a part of their larger operations in the field of office automation (OA) equipment; and those which aim at the general consumer or "home" market for personal computers.

The business-oriented firms include the traditionally big computer manufacturers such as NEC and Fujitsu, as well as IBM Japan Ltd., which introduced the new IBM 5550 in March, 1983, and

the foreign-financed firm of Apple Japan. The recent commercialization of 16-bit machines, which make further diversification of computer applications possible, thus making the business market more attractive, has prompted computer and office equipment manufacturers to join this group as well.

Expectations surrounding the 16-bit personal computer are running high, making these machines the central attraction at business shows lately. However, their share of the market is still relatively small, accounting for only around 10% at present.

## **MSX MACHINES CAUSING A STIR**

Those companies which have set their sights on the home market for personal computers include audio/video and electric home appliance manufacturers such as Matsushita Electric Industrial Co., Ltd. and Sony Corp. Foreign capital firms are represented by Microsoft Co., Ltd. and Commodore Japan, Ltd. One recent development calling attention to this movement in Japan is the "MSX" personal computer.

America's Microsoft Company announced a proposal calling for the standardization of home computers in June, 1983. This proposal was labelled MSX. MSX is now being supported by some 16 companies, led by the big home appliance manufacturers. Among these supporters are such firms as the Victor Co. of Japan, Ltd., Nippon Gakki Co., Ltd., Matsushita Electric Industrial, Japan's largest home

Fig. 2. MSX Personal Computers

Manufacturer	Product Name	Price	Principal Characteristics
Fujitsu, Ltd.	FM-X MB-25150	49,800 yen 16KB RAM	Stereophonic sound capabilities when hooked up to the FM-7 model. RAM expandable to 32KB when hooked up to FM-7.
Hitachi, Ltd.	HI	62,800 yen 32KB RAM	Cylindrical step-sculptured keyboard keys. Adjustable speed control. Equipped with carrying handle for easy portability.
Matsushita Electric Industrial Co., Ltd.	CF-2000	54,800 yen 32KB RAM	Features two ROM cartridge slots, and printer interface capabilities.
Sony Corp.	HB-55 HITBIT	54,800 yen 16KB RAM	Built-in ROM provides programs for data processing, the creation of address lists and schedules and message recording. Data generated via the built-in programs can be stored on data cartridges for up to one and a half years. Program selection using the cursor and menu function.
Nippon Gakki Co., Ltd.	CX-5	59,800 yen 32KB RAM	Features ample peripheral devices, an FM sound synthesizer, a music board (44-key mini keyboard) and a play card set for card reading and automatic musical accompaniment capabilities, plus a MIDI bus for communications and the MIDI-equipped synthesizer, and a KANJI word processor unit for Japanese-language word processing.
Toshiba Corp.	Pasopia IQ	65,800 yen 64KB RAM; 55,800 yen 16KB RAM	The addition of 10 slots and KANJI ROM cartridges makes Japanese-language word processing possible — very expandable. Very large capacity 64KB RAM.
Mitsubishi Electric Corp.	ML-8000	59,800 yen 32KB RAM	Capable of being hooked up to a TV printer for computer graphics print outs. Available with a hexadecimal keyboard input unit.
Sanyo Electric Co., Ltd.	MPC-11	74,800 yen 32KB RAM	Lightpen function. Frame grabber function (Capable of converting images appearing on the VDT into digital signals for reading into the computer). Superimpose function and RGB output.
Victor Co. of Japan, Ltd.	HC-5	59,800 yen 16KB RAM	Video editing possible by connecting the built-in analog RGB output, which features an optional superimpose function, to a VTR. VHD screen control possible. MIDI bus interface (scheduled)

appliance manufacturer, and Sanyo Electric Co., Ltd., companies which had no connection whatsoever with computers up until now. Figure 2 is a chart of the personal computers being manufactured and sold by these firms in compliance with the new MSX standards.

MSX personal computers share a basic

hardware construction in common at the LSI level and run on software (MSX BASIC) designed specifically for that type of hardware. This means that if you have a personal computer which complies with MSX standards, you can use any of the MSX software packages available on the market, regardless of



what particular machines they might have been developed for.

MSX software comes in ROM cartridges and is supposedly simple enough that even beginners can use it right away.

Standardized software such as this has the advantage of enabling the user to buy and use various brands of software regardless of what make of machine he might have, something that hasn't been possible to date. While this is a welcome development, it doesn't come without its share of problems.

Since the Japanese market for personal computers is dominated by the three leading firms cited previously, whose total combined share amounts to better than 80%, latecomers to this market have found that, since the majority of the software available for personal computers is designed for use on the machines produced by the top three makers, no matter how advanced their hardware might be, without software they can't make a dent in the market. MSX standards have created a way out of this predicament for the latecomers. If all personal computers adhered to MSX standards, then the problem of incompatible software would disappear. This prospect was too much for the audio/video and home appliance makers to resist, and sixteen such firms immediately jumped on the MSX bandwagon.

As can be discerned from the chart in Figure 2, the first to market MSX personal computers have been the home appliance manufacturers, who have taken it upon themselves to blaze a trail for others to follow. Leading PC manufac-

turers such as NEC, Sharp and Sord Computer Systems, Inc. have yet to commit themselves to the MSX movement, although NEC has been paying lip service to it. A wait-'n-see attitude seems to predominate. If MSX personal computers start to sell well, then the leading computer manufacturers will also more than likely begin to market their versions of these machines.

When Microsoft came out with its MSX standardization proposal in June of last year, it highlighted the instability of the software market for personal computers in Japan. However, even though users have been complaining of software that isn't compatible with their machines, many still harbor doubts concerning the MSX movement.

## **PACKAGED SOFTWARE DISTRIBUTION**

The home market for personal computers is just now really beginning to open up, and 1984 is expected to see the start of truly widespread utilization of these machines in Japan.

The uses to which personal computers are being put are also increasing, from video games to various types of utilities, business and educational uses. And it is no longer necessary to learn BASIC in order to operate a personal computer. Now there are software packages available that can be bought and used by even the most novice of users.

Personal computer applications have also begun to expand, extending from the realm of hobbies and games to the world

of business. At present there are some 5,000 different software packages put out by over 100 companies. Word processing and simplified user-level programs including electronic spreadsheets, what are called KANIGENGO here in Japan, are the two types of software packages most often used in business applications here.

The data presented in Figure 3 are the results of a questionnaire survey conducted by JEIDA on software packages currently available on the Japanese market.

**Fig. 3. Hardware Manufacturers' View of Distribution Situation**

Type of Software	Total Responses	Percentage
Systems Software	545	26.9 %
Business Software	639	31.6 %
Home/Educational Software	186	9.2 %
Video Game Software	422	20.8 %
Scientific/Technological Calculations Software	184	9.2 %
Measurement Software	4	0.2 %
Others	43	2.1 %
Total	2,023	100 %

## [1] Software Packages And Their Prices

### Software

Systems software consists of operating systems (OS) as well as basic, general-purpose and simplified programs, and utilities. The characteristics of systems software can be summarized as follows:

- Roughly 80% of all systems software

on the market can be purchased for 60 thousand yen or less;

- Systems software falling into this category can be divided into two price ranges, that which sells for 40 thousand yen or less, and that which runs between 40 and 60 thousand yen;
- Systems software in the 40 thousand yen or less range consists mostly of single function and hardware manufacturer-supported software;
- Packages in the 40 to 60 thousand yen range are mostly high performance software that can be sold in bulk;
- Systems software is supported by OS and hardware manufacturers and is generally included in the price of the system;
- The majority of the simplified programs on the Japanese market are produced by Japanese software houses in response to user needs for KANJI and KANA capabilities.

### Business Software

Software developed for use in specific businesses and/or job tasks is referred to simply as business software. The types of business software available include packages for use in finance, procurement, inventory control, payroll calculations and hotel and taxi operations. The special characteristics of this software are as follows:

- Approximately 75% of all business software can be purchased for 100 thousand yen or less;
- Business software can be broadly divided into custom-made and general-

purpose packages, with custom packages occupying the higher price brackets.

### **Home/Educational Software**

This is software used in managing the home and in private or institutionalized learning situations. Some of the capabilities provided by these types of software packages include managing the household budget, recording needed-to-know addresses, individual study programs to learn typing, BASIC, English or arithmetic, and others for use by professional teachers to process grades and create lesson programs. Home and educational software possess the following features:

- Home and educational software programs selling for between 2,000 and 4,000 yen account for roughly 60% of the market for these products;
- Most of the packaged software for home study use come in the form of cassette tapes;
- Software for use in learning about personal computers and/or in keeping the household budget are by and large sold in the form of floppy discs.

### **Software For Video Games**

Examples of typical kinds of video game software available in Japan include packages for playing space invader, cards and mah jong, plus the maze type games which challenge the player to move an electronic figure through a number of barriers and obstacles to a decided finishing point without being

blown up, disintegrated or otherwise destroyed. Video game software has the following features:

- Most video games can be bought for around 2,000 or 3,000 yen;
- Over 90% of all video game software comes on cassette tapes.

### **Science and Technology Software**

Software for use in the fields of science and technology enables the user to perform basic statistical calculations, multivariate analyses, numerical calculations, general functions and computations related to the areas of architecture and civil engineering. The special features of this type of software are:

- Software for scientific and technological computations can run anywhere from two thousand to one million yen;
- Packages that cost less than 10 thousand yen account for 22% of the overall market; those running between 10 and 50 thousand yen make up another 25% of the market; and packages that cost between 50 and 100 thousand yen account for about 17% of the entire market.

### **Measurement Software**

Software designed for use in measurements has the following characteristics:

- Two packages are available for 80 thousand yen;
- Two packages run 120 thousand yen.

### **Other Software Packages**

Other types of software packages currently available on the Japanese

market include those for use in demonstrations, development support programs, TSS terminals, various simulators used in communications, document retrieval and retrieval systems that employ marked cards as their input medium.

## [2] Distribution Of Software House Packages (From a Sampling of 200 Companies)

Figure 4 provides data on software sales in Japan for the three year period beginning 1980 and ending 1982.

**Fig. 4. Software Sales In Japan For Period 1980 ~ 1982**

Year	Number of Packages	Accumulated Total
1980	380	7,593
1981	22,300	513,889
1982	148,575	766,241
Total	171,255	1,287,723

Software sales for fiscal 1982 by type of package break down as follows: systems software — 24.4%; business software — 23.1%; video games — 44.7%; and home/educational software — 2.4%.

The life cycles for these different types of software vary from between 3 to 5 or more years for systems software, 5 or more years for business software and only about a year or so for software used in video games.

The distribution routes used to market these software packages included the combination of direct sales and retail outlets (microcomputer shops and the like) [61.9%]; direct sales + retail outlets

+ manufacturer wholesale operations [12.8%]; retail outlets + manufacturer wholesale operations [10.1%]; and the direct sales method alone [11.9%].

The purchasers of software packages during fiscal 1982 can be broken down as shown in Figure 5.

**Fig. 5. Types Of Software Purchasers**

Salaried Workers	26.3 %
Companies	24.8 %
Students	22.6 %
Independent Stores	19.5 %
Teachers	2.0 %
Housewives	0.3 %
Others	2.5 %

Business software and systems software accounted for 66.5% and 27.2%, respectively, of the packages sold on a direct software house/customer basis. Video game software dominated the open market.

## SOFTWARE UTILIZATION

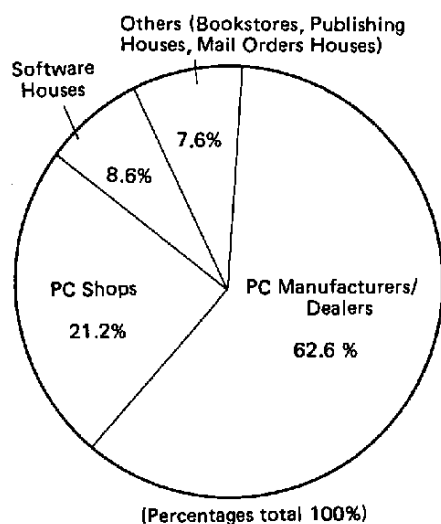
Utilization of the software packages available in Japan was investigated by the Software Product Center and those results compiled in its report titled, "Study On Software Product Distribution," published in March, 1983. In the course of its investigation, the Center targetted 958 users in 23 different industries and received 236 valid responses. Figures 6, 7 and 8 provide data on the types of applications, principal sources and costs of this software, respectively, on a percentage basis.

This report also provides data on how satisfied the users were with the software

they had purchased. According to the figures released, 19% of the users were completely satisfied with the software

**Fig. 6. Software Applications**

Ranking	Application	Percentage
1	Tabular Calculations/Simplified Programs	46.4
2	Word Processing	36.9
3	Hobbies/Video Games	29.8
4	Computer Languages	16.7
4	Utilities	16.7
6	Graphics/Music	15.5
7	Financial Accounting	10.7
8	Sales Management (Inventory, Procurement)	9.5
9	Customer Control	8.3
9	Operating Systems	8.3
9	Custom-made Business Software	8.3
12	Statistical Processing	7.1
13	Scientific/Technological Calculations	6.0
13	Financial Planning	6.0
15	Cost Accounting	4.8



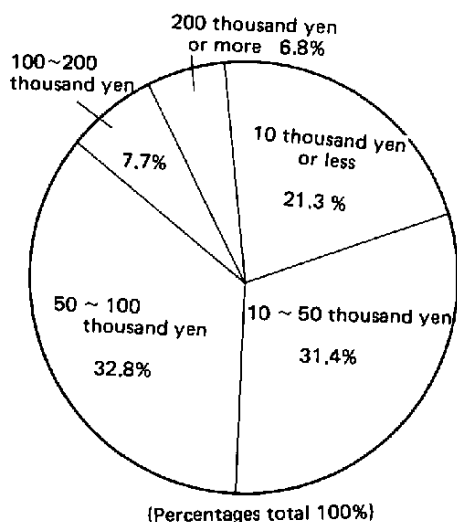
**Fig. 7. Software Sources**

package(s) they bought, and another 44.5% were relatively satisfied. Relatively dissatisfied users accounted for 28.4% of those responding to the survey, and only about 8.1% of the users surveyed expressed complete dissatisfaction. If we limit our categories to just satisfied and dissatisfied, then the percentage of users falling into the satisfied category works out to around 63.5%, and those dissatisfied with their software to 36.5%.

The study also attempted to determine what user feelings were concerning future utilization of software packages. The results reported are shown in Figure 9.

**Fig. 9. Future Outlook For Packaged Software Utilization**

Outlook	Percentage
1. Will utilize to the fullest	27 %
2. Will seriously consider utilization	16 %
3. Will have to consider utilization	29 %
4. Are not considering utilization	23 %
5. Do not intend to utilize	3 %
6. Others	2 %



**Fig. 8. Software Prices**

## **SPREAD OF 16-BIT MACHINES MAKES OS MORE VITAL**

As office automation (OA) continues to make inroads into the world of business, the 8-bit computer is gradually giving way to the more powerful 16-bit machine. Japanese users, who have been utilizing personal computers on a stand alone basis until now, are rapidly switching to network configurations which enable them to use their machines as terminals. It has gotten to the point where communications, file management, Japanese-language word processing, graphics and multi-task functions are a requisite for personal computers designed for business applications. And these functions must now be capable of being used simultaneously to process a number of different jobs at the same time.

Operating systems (OS) are the secret behind personal computers with these kinds of advanced functions. As personal computers are equipped with ever increasing functions and higher performance, their range of applications expands, their programs become more complicated and the number of peripheral devices capable of being supported by them grows, making it vital that they have operating systems like those found in large-scale computers to control these additional capabilities.

When 8-bit personal computers still dominated the market, OS generally weren't considered all that important. What suddenly brought them into the limelight was the fact that OS determine the degree of performance possible from

computer hardware. The arrival of the 16-bit personal computer encouraged Japan's general-purpose computer manufacturers not only to increase the performance of the personal computer itself, but also to equip it with their own OS to enable it to communicate with general-purpose machines. Then, in order to make their computers more appealing to more and varied users, manufacturers got into the habit of mounting the most superior OS on the market into their machines. In the beginning, Japanese personal computers were all equipped with American-made OS. Later, however, numerous Japanese manufacturers took to refining American-made OS and/or equipping their machines with OS developed in house in order to make their computers adhere more closely with Japanese user needs. Nevertheless, the practice of employing OS widely used in the U.S. isn't likely to change for some time. The widespread use of CP/M, MS-DOS and UNIX OS in Japanese personal computers can be traced to this trend.

The question now is, what kind of OS will be used in personal computers of the future? CP/M has all but become the standard OS for 8-bit personal computers. The problem lies in the area of OS for the new 16-bit machines. Figure 10 presents a table showing the leading OS and the personal computers they are employed in. The OS most often mounted in 16-bit Japanese personal computers is MS-DOS, and the next most often used is CP/M. The trend recently seems to be to replace MS-DOS with CP/M-86. And there are

Fig. 10. Operating Systems Employed In Major Japanese PCs

Make/Model \ OS		CP/M-80	CP/M-86	MS-DOS	FLEX	OS-9
8-bit Machines	Fujitsu FM-8	○			○	○
	FM-7	○				
	N E C PC-8001	○				
	PC-8801	○				
	Sharp MZ-80C	○				
	MZ-2000	○				
	MZ-80B	○				
	Toshiba PASOPIA	○				
	Hitachi LEVEL 3	○			○	
16-bit Machines	Fujitsu FM-11	○	○	○	○	○
	N E C PC-9801		○	○		
	N5200-05		○	○		
	Toshiba PASOPIA 16		○	○		
	Hitachi MB 16000			○		
	Canon AS 100			○		
	Mitsubishi MULTI 16			○		
	Matsushita My Brain 3000			○		

already quite a few machines which offer two OS in the same machine, one being MS-DOS and the other being CP/M-86.

In addition to the CP/M vs MS-DOS battle, there is also growing interest in UNIX as the OS of the future. The hardware for 16-bit personal computers (including peripheral equipment) is getting more advanced all the time, and the applications to which these machines can be put are expanding rapidly. There is thus a need for an equally advanced OS for 16-bit machines; UNIX is felt to be just such a software system. At present, the 16-bit machines put out by Ai Electronics are all mounted with either UNIX or UNIX-like OS. In order for personal computers to be able to link up with minicomputers to form networks, they will have to be equipped with OS capable

of handling the task. Advanced OS will be necessary in personal computer networks, too, the more intricate these systems become. Another plausible course which Japanese manufacturers seem to be considering is to equip individual personal computers with a number of different OS, any one of which can be selected by the user at the flick of a switch.

#### HIGH PERFORMANCE, EASY-TO-USE, SIMPLIFIED PROGRAMS

In addition to OS, another important aspect of personal computer utilization is packaged software, both sophisticated business programs such as payroll packages, and the more general purpose KANIGENGO. Personal computers differ

from general-purpose machines in that they are not designed for one specific user, but rather for a wide range of users. The utilization of personal computers in business takes one of two main forms. The first of these is as tools to carry out specific tasks at companies where computer specialists are not available, and the second is as individual user machines at companies where computer specialists are available but users prefer to perform their work without having to rely on these specialists.

If a user wants to get his hands on a certain type of software to perform a specific task without having to trouble the experts, one way of doing this is to purchase packaged software. Although the quality of packaged software varies, making it vitally important that the prospective buyer choose a trusted brand, the number of software packages on the market is increasing everyday. Even so, it still isn't easy for users to find sophisticated business programs perfectly suited to their needs. For this reason, users often revise packages to meet with their particular processing needs. In some cases, however, they are hard pressed to find a business package that comes close enough to their needs to be revised. Thus, sophisticated business programs aren't the answer in all situations. This is where the simplified, easy-to-use programs, the KANIGENGO, can be useful; they give the user a free hand in processing his job as he sees fit rather than in accordance with a predefined set of rules.

But just what are KANIGENGO and how can they be used? Simply stated,

KANIGENGO (translated as "simplified languages" or "non-programming languages" in Japan, they aren't languages at all, but ready-to-use programs) are very simple, easy-to-use, general-purpose programs such as the electronic spreadsheet packages so popular in the U.S. Businessmen and office workers often use paper and pencil or pen to draw up spreadsheets with the necessary number of columns and lines to match the task at hand. They then enter the items to be worked on in the left-most column and fill in the appropriate figures in the corresponding blocks. Spreadsheets such as this are then used as ledgers for inventory control, management of finances and debts or customer control. Electronic spreadsheets and their Japanese cousins, the KANIGENGO, enable the user to perform the same operations using a personal computer's memory banks in place of pen and paper.

The electronic spreadsheet programs produced in Japan were developed specifically for business and can be classified as follows in accordance with the applications involved.

First there are the matrix programs which provide electronic grids within which the user can input the necessary data. Once this data has been entered into the blocks formed by the grid displayed on the screen of the CRT, those figures appearing in any one block can be manipulated together with the figures appearing in any other block for ease of computation. No matter how difficult the computations involved might be, they can be easily performed by simply



inputting the appropriate figures into the grid-like matrix provided by the spreadsheet program. The special feature of matrix programs is their ability to carry out calculations using figures that appear anywhere within the grid, not only those in the same column or line, but figures which are located diagonally within the grid or in non-adjacent columns.

Matrix programs are best suited for use in financial analysis and tax-related computations which involve the preparation of tables containing all the necessary data on one sheet. But what about when the work involved requires that separate tables be prepared for different tasks and the figures contained therein totalled by column and/or line? In this case, totalling programs are probably the best.

Totalling programs, like their name implies, are used to find the aggregate or total of figures input into the same column or line in an electronic grid. Unlike matrix programs which feature only one kind of screen, totalling programs offer a variety of different screens for different types of calculations; the user must select the appropriate screen prior to getting started. For example, if the user wants to list up and rank sales by customer, or compare sales for the past X number of years, or compare and rank the company's market position with that of the competition, or determine per-capita sales and list them in descending or ascending order, he can select the appropriate screen from among those offered with the totalling

program and set to work calculating the necessary totals.

Being able to freely manipulate this kind of data to come up with the results one needs is an extremely useful capability in the world of business. But KANIGENGO are not all spreadsheet programs.

Another kind of KANIGENGO available on the market is the data-retrieval program. Data retrieval programs are designed specifically to enable the user to retrieve certain data from among large volumes of collected information. Various keywords are possible, including such concepts as AND, OR, WITHIN THE SCOPE OF ....., OUTSIDE THE SCOPE OF ..... and SIMILAR TO ....., This type of software is thus particularly well suited for the task of customer management. The control of customers' business cards is one such use. When a company's customer list is quite extensive, or when the person in charge of keeping track of the company's customers has to be able to produce the names and locations of particular customers in a hurry, registering the information contained on customer business cards into the computer using a data retrieval program enables fast, accurate retrieval whenever the need arises. Software with address label printing capabilities is especially helpful in keeping track of the location of customer stores.

This particular application of data retrieval programs has grown quite popular, and comes in especially handy in Japan at mid-year and year's end when companies are expected to exchange

traditional greetings with one another. What used to take considerable time and manpower to address large numbers of greetings cards, can now be done in an extremely short time using personal computers and data retrieval programs.

Data retrieval programs with KANJI capabilities are on the increase and are gaining widespread acceptance. However, since this software requires input data be codified in order to be retrieved, it can hardly be called easy-to-use. The range of utilization of this type of software could be greatly expanded by adding a word search function to it for use with word processor packages.

There are also integrated KANIGENGO designed to handle a number of different tasks at once in order to systematize the user's entire operations.

For example, integrated programs are used not only to total and record orders received, but also to automatically prepare statements of delivery and bills. This software is also capable of checking the inventory list of ordered goods, and preparing order forms for those items not in stock. Of course, since they possess multiple functions, they are not as easy to manipulate as the spreadsheet and data retrieval programs described above.

What can be expected from these KANIGENGO in future? The first thing we can expect to see is rapid development of more and varied Japanese-language software. The package put out by Panafacom Ltd. called EPOCALC-J is already known for its Japanese-language

capabilities. The EPOCALC series is designed specifically for use on 16-bit machines and is already ahead of other such software in terms of the functions it makes available to the user.

KANJI processing capabilities are not inherent in off-the-shelf 16-bit CPU microprocessors. Personal computers manufactured by Oki Electric Company were among the first to be equipped with KANJI processing functions, and the company also has simplified programs available to support these functions. One such piece of software is called DATA-BOX (KANJI version).

Future KANIGENGO should have the following capabilities in order to keep pace with user demands. The first of these is automatic operation. Most simplified programs on the market today require that the user feed in one instruction at a time in order to perform a given task. But this can be very time consuming. One possible solution would be to incorporate functions into KANIGENGO that would enable them to combine series of individual commands into special purpose macro commands, which could then be registered in the machine so that particular tasks could be performed automatically.

Another function which is coming into ever increasing demand is the exchange of data between personal computers and general-purpose machines. KANIGENGO will therefore have to feature communication functions as well as IBM format file conversion functions.

Fig. 11. Chart Of Principal KANIGENGO

Producer	Name	Principal Functions	Price
Co. I.B.C.	Data Processing Library 5S	Perfect for all types of data processing	¥ 38,000
"	Document Retrieval 5S	Capable of storing 1,000 files per section	¥ 38,000
S C C	Power Input System	Voice input capabilities	¥ 20,000
Orbic Business Consultants Co., Ltd.	PLANNER 8 (KANJI Version)	Japanese-language programming capabilities	¥155,000
"	PLANNER 18 (KANJI Version)	Designed for use in inventory and funds management	¥155,000
Otsuka Shokai Co., Ltd.	PC-PAL I	For use in creating graphs, retrieval operations and sorting	¥ 50,000
Kodensha	PARAM 3 (1W)	For use in preparing reports	¥ 39,000
Computerland, Hokkaido	VIP 1000	Perfect for high-speed computing and retrieval operations	¥ 9,000
Nishinihon Micro-computer Center	STREET-A	For use in data management	¥ 39,000
Nihon Micom Co., Ltd.	Japan Visic	Graphic displays for ABC analysis; composition ratios	¥ 9,800
Nippon Racet Co., Ltd.	Magic Sheet (1W)	For use in preparing spreadsheets with specified numbers of lines, columns and blocks.	¥ 34,000
Personal Media Corp.	PaPa Customer Control	For use in customer control and label (address) printouts	¥ 12,000
Basic Systems Co., Ltd.	AP-I	General business-oriented software	¥ 20,000
Yahagi Consultants Co., Ltd.	Instant Processing	For use in processing data contained in tallying tables	¥ 68,000
S C C	Super Search	Capable of high-speed searches covering up to 6,000 items of data	¥ 15,000
Kenritsu Denko	FLAP-5-ID	Interactive list method database control	¥ 40,000
C A C	OA-1/GRAPH	For use in displaying data graphs	¥ 28,000
Reed Rex Corp.	DATA BOX 5	For use in arranging and retrieving data	¥ 50,000
Softmart Inc.	DATAVIEW 5W	Perfect for managing files	¥100,000
Tokai Create Corp.	PASOCAL	For use in PCs for office automation	¥ 19,800
Kodensha	Word Made (English-language Word Processor)	For use in preparing English-language reports	¥ 39,000
Hudson Soft Co., Ltd.	HUCAL	General-purpose totaling system	¥ 8,800
Microcomputer Center Ueno	BUSINESS-T	Table preparation program	¥ 9,500
Carrylabo.	MZ-CAL	High-speed calculations in machine language	¥ 8,000

Producer	Name	Principal Functions	Price
Christ System Laboratory	PREMESIAS	Japanese-language word processing and graphics capabilities	¥ 3,000
NEC Corp.	LAN PLAN 2	Ideal for tabular calculations	¥ 40,000
Hitachi, Ltd.	OFIS/POL	Perfect for preparing tables and graphs, plus automatic computations	¥10,000~ ¥60,000
Canon, Inc.	Canon Brain IIV3	Mass data processing capabilities and file functions	¥ 50,000
Sord Computer Systems, Inc.	KANJI PIPS	General-purpose data processor capable of handling KANJI	¥ 50,000
Fujitsu Ltd.	EPOCALC	Ideal for spreadsheet calculations	¥ 50,000
Toshiba Corp.	File Manager	Database creation capabilities	¥ 60,000
Mitsubishi Electric Corp.	Multiplot	Automatically prepares graphs based on a variety of numeric data	¥ 80,000
Ok Electric Industry Co., Ltd.	SUPERCALC	Ideal for forecasting, budget and accounting simulations.	¥ 80,000

# A USER'S VIEW OF PERSONAL COMPUTERS

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## DIVERSIFICATION OF PERSONAL COMPUTER APPLICATIONS

Marketing specialists talk in terms of a product's life cycle. This life cycle begins when a new product is first introduced on the market. The initial phase of the cycle often includes a buying craze spurred on by faddists, those individuals who enjoy tinkering with new devices and who take a certain pride in being the first on their block to own a newly marketed product. Personal computers, which started off as one-board machines that ran BASIC, also conform to the life cycle theory. Computer hobbyists were crazy about these early microcomputers, buying them up as fast as they could be turned out. But this period in the life cycle of the personal computer has been over for some time now in Japan.

The initial phase of a product's life cycle is very important in determining its success or failure. Feedback from the faddists lends itself toward improving the product's design, performance and applications. This in turn helps stimulate interest in the product on the part of the consumer population in general. Once this has been achieved, the product is said to be in the "take-off" phase of its

life cycle. The take-off phase for personal computers in Japan occurred about four years ago with the appearance of NEC Corp.'s PC-8001.

The take-off phase of a product's life cycle bolsters that product's sales and increases demand. Then as production output rises in line with demand, the cost of the product drops significantly. This stage of the product's life cycle is referred to as the "growth" phase. During this growth phase, the product loses some of its uniqueness and begins to come into widespread use as more and more people feel they simply must have one since "everybody else" has one. Japanese personal computers are now regarded as having entered the growth phase of their life cycle.

The final phase of a product's life cycle is called the "maturity" phase. It is during this phase that a product becomes an integral part of the average consumer's daily life; demand levels off and stabilizes. Television sets and automobiles are prime examples of mature products. Personal computers should also be able to reach maturity, but it will be some time before this happens in Japan.

Let's take a look at a few factors

indicating that personal computers have indeed reached the growth phase of their product life cycle here in Japan. The first of these is that yearly output of personal computers now exceeds one million units. Sales of TVs and automobiles didn't really take off until their annual outputs topped the one million mark. Although the number one million has no particular significance in and of itself, its psychological effect on personal computer manufacturers is bound to be quite strong.

Secondly, leading personal computer manufacturers have recently begun to reorganize their operations to enable the production and sale of microcomputer-related machines and equipment. This indicates that they are beginning to think seriously about the long-range prospects of personal computers.

The third factor indicating that Japanese personal computers are entering their growth phase is the recent controversy surrounding MSX. MSX is the name of the movement to standardize personal computer hardware and software specifications; to make personal computers compatible with one another. Standardization, or making specifications uniform, was a major problem in the video tape recorder business, too, one which caused considerable commotion. Be that as it may, the current need for standardization in the personal computer market, especially the home market, is proof positive that personal computers have graduated from the take-off phase into the growth phase of their product life cycle.

Yet another indication that personal computers are moving into the growth phase of their life cycle is the diversified applications to which they are being put nowadays. There are better than 100 different models of personal computers on the Japanese market now, with some manufacturers producing as many as ten different models. This situation enhances the role of each machine's "individuality" when it comes to marketing strategies. It is interesting to note that the MSX movement was initially aimed only at top-of-the-line machines for entertainment use, but has rapidly broadened in scope to include high performance small business computers as well. But the main point I'm trying to make here is that personal computers now come in a wide variety of models for use in ever diversifying applications.

Personal computer applications in Japan differ from those in the United States, especially when it comes to business uses. In America, software offering spreadsheet capabilities has been a big seller. This type of software enables the user to enter data into the personal computer's memory the same as he or she might record that data on a real spreadsheet, the difference being that with the computer the user is capable of freely manipulating that data. This capability is particularly attractive to management level personnel in their planning and simulation work. Spreadsheet-type software such as this has greatly improved sales of personal computers in the U.S.; but it has yet to make

a sizable dent in the Japanese market.

Personal computer use here in Japan, especially in the area of business, is limited to certain types of work only, such as sales promotion, inventory control and/or customer management. Electronic spreadsheets, as well as the broader category of software products to which they belong, referred to here as "KANIGENGO", are also confined to use in specific tasks, primarily sorting files and creating lists. Japanese users are still a long way from being able to use personal computers in applications of their own choosing.

Portable computers such as those currently on the market in the U.S. aren't selling very well here in Japan. The idea behind the portable computer is to enable the user to take the microcomputer he or she uses at the office home or to some other location outside the company and continue his/her work there. The portable computers now being produced in the U.S. are almost all IBM compatible, a fact which enhances their attractiveness and usability. Although there are presently several models of portable computers on the market here in Japan, not one of these machines is capable of running standardized personal computer software. And besides, there are few if any Japanese firms where each individual worker is assigned his or her own personal computer. The most typical example of personal computer use at the Japanese company is to have a number of machines allotted to each section for use by certain individuals only (usually female workers) in the carrying out of specific tasks.

In due course of time, the Japanese businessman will come to realize the power of the personal computer and the various and varied tasks to which these machines can be applied when used as tools by individual workers. When this happens, the portable computer will most certainly be viewed as a handy machine to have around. If the personal computer is to continue to progress through the growth phase of its product life cycle, then considerably more Japanese businessmen are going to have to take an active interest in these machines and actually try them out on the job.

A large percentage of the personal computers being marketed in Japan fall into the 100 thousand yen or less price range. For the most part, these consist of 20 to 40 thousand yen entertainment machines and 80 to 100 thousand yen home computers. Those for entertainment use are primarily video game machines, and although the user should, technically speaking, be able to write his own BASIC programs for these machines, in actuality this is impossible. The home computers, on the other hand, are not limited merely to playing video games, but also offer the user the opportunity to practice programming in BASIC and even do a little in the way of personal business or work.

Personal computers which comply with the new MSX standards generally run somewhere between 50 and 60 thousand yen. This is a little too much to pay for a video game machine, but doesn't seem quite enough for a real

personal computer for home and/or business use.

The number of Japanese businessmen interested enough in personal computers to buy one and try it out for themselves is on the increase. And more often than not, these individuals will start off by buying one on the pretext that it is for their children. Now if the machine they buy is limited to playing video games, then it really does become the child's machine. And MSX computers still have quite a few bugs to be ironed out. Thus, the largest share of personal computers being sold in Japan today are those priced around 100 thousand yen.

The purely game-oriented personal computers sold as toys have contributed significantly to the overall number of personal computers marketed in Japan. A personal computer priced at around 20 or 30 thousand yen is well within the financial reach of most parents as presents for their younger children. The competition in this market is understandably severe, each manufacturer employing pricing and novel game software as its biggest weapons.

Japanese users are putting personal computers to increasingly diverse applications. In addition to the entertainment and home computers mentioned thus far, small business computer systems costing over one million yen are becoming more and more popular. Interest in multi-functional personal computers and workstations capable of serving as terminals and/or word processors is on the rise. And at the other end of the spectrum,

pocket-sized hand-held computers are coming into their own as high-tech additions to the conventional calculator market.

## **ONE MAN'S APPROACH TO PERSONAL COMPUTER UTILIZATION**

I teach business administration at the university level, and find there are times when simply discussing business concepts isn't sufficient. I thus rely quite a bit on the technique of having my students simulate actual business situations. These business games, as we call them, are to the field of business administration what war games are to the business of soldiering: they both give the uninitiated a feel for the real thing. My use of personal computers is aimed primarily at this aspect of my teaching.

It isn't like business games can't be conducted without the use of personal computers; I've seen several examples of the "hand-made" type. But computing power is necessary in order to make the situation as true to life as possible. That is, the computer makes it possible to create realistic "models" of business situations for use in the games, plus provides the students with required data as well as the results of their decisions made during the course of the games. Using computers increases the efficiency of the game and gives the students access to more easy-to-digest feedback than they would otherwise have.

In the past, I used large-scale general-purpose computers to make up and execute business games. However, using a big machine can be more trouble than



it's worth. For example, one major drawback is the limitations placed on when and where the computer can be used. It's true that the advent of TSS enabled the computer to be operated from a larger number of campus locations than was previously possible. And it became possible to access the computer just about any time you wished. However, the terminals used for this purpose are not a part of the facilities available in the ordinary classroom, and the room where these terminals are installed may be fine when it comes to actually operating the computer, but can hardly be called conducive to stimulating lively classroom discussions. There is also the problem that the times allotted for computer utilization at Japanese universities are fixed, meaning that it is impossible to work on programs and computer models for business games very late into the night.

Actually, it doesn't require all that much computing power to carry out one of these business games. The advanced personal computers on the market today are more than adequate for the task. It was for this reason that I began using personal computers in my teaching. That was about four or five years ago. Prior to that I either made use of general-purpose computers as discussed above or program-mable calculators. The first microcomputer I ever used was the Sord model M220, which came with the CPU, keyboard, CRT and disc drive device all integrated into one unit. It had a 64KB RAM as standard equipment and was the most advanced machine on the market at that time. I had initially considered

purchasing a SOL 20 produced by the Processor Technology Co. of America. However, since I wanted Japanese KANA capabilities, I finally settled on the M220. Following that, I tried my hand at using PET, APPLE and TRS machines, which were considered the best personal computers money could buy for a rather long time. Then NEC Corp. brought out its best selling PC8001. The PC8001 ran on a special microcomputer version of BASIC, which gave it a high price-performance ratio and made it one of the all-time favorite personal computers in Japan.

NEC's PC8001 set the trend for future Japanese personal computers to follow. In fact, other PC manufacturers didn't manage to catch up with the performance of this line of machines until very recently.

Following my switching to the PC8001, the business games I set up for my classes changed considerably. The biggest single change was in the number of personal computers I was able to make available to my students during these games. Prior to switching to the PC8001, I had used only one personal computer to carry out business games. But thereafter I decided to allot a personal computer to each participating team. In other words, instead of using personal computers to simply prepare and run the business game model, compute performance and print out results, each team was now equipped with its own machine, enabling the team members to analyze their decisions during the course of the game. Compared to the general-purpose computer I had used in

the past, the easy-to-learn, easy-to-use personal computer has proven to be a real boon for students taking part in my business games.

The students who participate in these games are not all veteran computer users by any means. Just the opposite in fact, most of them have never laid hands on one before. I often carry out business games with employees of large companies for students, and each time a do, I find that a high percentage of these individuals suffer from what is known here in Japan as "computer phobia:" they have a definite fear of computers. Using personal computers as tools in the conduct of the business game appears to alleviate most of these individuals' apprehensions. This is probably because, unlike the general-purpose computers they have come in contact with to date, personal computers are much "friendlier" and easier to get used to. However, if these machines are to achieve really widespread use, they will have to be made even more user friendly in future, I believe.

A new machine recently released on the market which looks good from the standpoint of playing business games is the NEC PC9801. In Japan, personal computers capable of handling KANJI and KANA, the characters which make up the Japanese writing system, are essential, and are thus on the increase. The PC9801 is one such personal computer. It is a 16-bit machine with plenty of storage capacity and the ability to support a variety of peripheral devices, making it just right for my needs.

Business games are not the only appli-

cation to which I put personal computers. There are a number of different tasks related to research work and other aspects of my job which are facilitated by the use of a variety of personal computers. One example is my use of hand-held computers in the teaching of seminar courses. The PC8201, which is on a par with the TRS Model 100, is what I use for business administration seminars. Each student has a PC8201, and I have them use these machines to program the various approaches to problems given during a class and then analyze those approaches to find the best solutions. Then I make them give oral reports in class, using their computers to execute the approaches they selected. Hand-held computers are very effective as tools for use in seminar courses of this type.

Personal computers also play a big role in my research on office automation (OA). Research aimed at finding out just how OA equipment such as personal computers can serve the office worker is best carried out on a practical basis; theoretical approaches just aren't sufficient. Personal computers available with advanced operating systems (OS) like UNIX can now be used in multi-user situations, i.e. networks. These same machines offer the OA researcher an opportunity to check out a number of OA-related devices under actual operating conditions. I am currently using the Chuo Electronics Co., Ltd. CEC8000 series of computers in this fashion. This system features a UNIX OS, an MC68000 CPU, 20MB of hard disk memory and links together six terminals. I use it in my OA-related research

activities to experiment with electronic mail capabilities, for instance.

The third way in which I use personal computers in my work is to carry out research on management decision support systems. The aim here is to determine how computers can be used by managers of large companies in their daily decision making processes. While this type of work requires surveys and studies to be conducted at the actual workplace, the construction and test operation of a pilot system is equally as important. I am currently testing a small-scale decision support system made up of personal computers.

Lastly, personal computers serve as a variety of different tools in my daily work routine. The most important of these is probably their role as word processors. Recent software developments enable personal computers to process texts as well as most word processors.

Personal computers also come in extremely handy when it comes to computing various statistics. I sometimes find it necessary to carry out regression analysis, at which times I make use of microcomputer software packages developed especially for use in statistical analysis.

Another area where I utilize personal computers is document control. In the past, I used to write the names of all the documents and other written materials I was responsible for on cards and then file them in a card file. However, as the number of these cards increased, the tasks of sorting and storing them became quite a problem. Fortunately, software designed specifically for this purpose has been

developed for use on microcomputers, and I now keep track of my documents using this kind of software on my personal computer.

The fact that I make full use of personal computers in my daily work probably sets me apart from the average Japanese user. However, the days when a prospective user bought a personal computer, and, after trying it out and failing to master it within a few days, set it in a corner to gather dust are over it seems. Large numbers of people who purchase personal computers today do so because of these machines' word processor capabilities. And of course, those users who have discovered the joys of video games can play these on their personal computers until their heart's content.

## **PROBLEMS INHERENT WITH JAPANESE PCs**

As stated previously, Japanese personal computers have entered the growth phase of their product life cycle, and this in turn has given rise to severe price and performance competition among manufacturers. The major producers of personal computers in Japan are all large companies, which means that they aren't likely to go bankrupt or drop out of the business as a result of minor disruptions of the market.

For the user, however, this rapidly changing market can be both good and bad. The good aspect of it is that he can buy higher quality, more advanced machines at cheaper prices. The price-performance ratio for Japanese-made personal computers has risen remarkably

during the past few years. Increased utilization of these machines has also bolstered sales for those businesses aiming their wares at the PC user market. Book stores are doing a thriving business in personal computer-related magazines and How-To books, and even the smallest of country towns now boasts at least one personal computer shop. The number of software packages for use on personal computers is also increasing at a rapid pace, and TV programs designed to educate viewers in the operation and use of their personal computers are being broadcast the year around.

The situation surrounding personal computers in Japan is thus in a constant state of flux. For the new or prospective user, this can mean considerable confusion and uncertainty.

For example, the biggest problem has to do with the unbridled drive to turn out new products as fast as they can be manufactured. The user can't help but feel that the personal computer he bought today, will somehow become outdated by tomorrow. And to hear the manufacturers talk, as soon as one new product is released on the market, they are already busy working up the plans, designs and prototypes for the next new machine. In some cases, no sooner is a new personal computer marketed, than the operator's manual for the next new machine is prepared. As the marketing cycle for new personal computers contracts from one year to half a year and even less, the sense of having acted too hastily and/or regret at money ill-spent experienced by those who purchase these machines becomes

extremely strong. And for individuals still contemplating the pros and cons of buying a personal computer, the decision as to just when the best time to purchase one will be becomes extremely difficult.

The second biggest problem surrounding personal computers on the market today is also related to this shortening market cycle, and has to do with the vast array of different makes and models of machines all competing at the same time. This has exacerbated the problem of compatibility. With the exception of those few machines which adhere to the recently developed MSX standards, software compatibility between and among the numerous different makes and models of personal computers currently on the market is close to zero. Even though 8-bit machines almost all use Z80 microprocessors as their CPUs, and the majority of 16-bit machines feature either Intel 8086 or 8088 microprocessor CPUs, the versions of BASIC used with each machine differ slightly, the storage media differ from machine to machine and it is impossible for one make of machine to use software produced for a machine made by a different manufacturer. Therefore, it has come to the point where similar software packages must be prepared and sold for each different make of machine on the market. This puts the software houses that produce these packages at an extreme handicap. The upshot is that the number of software packages available for a certain personal computer increases in direct proportion (twofold) to that machines' share of the market. In other words, no matter how

high performance a machine might be, if its share of the market is too small, then software houses can't afford to produce packaged software designed specifically for that machine, meaning that its market share is likely to drop even further as a result.

The lack of software compatibility is so bad that there are few if any Japanese computer manufacturers who can guarantee that the software that works on one of their machines will also be able to run on other models which they produce. Of course, we are speaking of high level compatibility here. But nevertheless, for the user who has just spent his hard-earned money on a new machine only to learn that because a newer model has been marketed he can no longer get new software that will run on his machine, this is a problem of major proportions. Manufacturers are not ignorant of this problem by any means, and the fact that they aren't doing anything to alleviate it would seem to indicate that they don't place much faith in the future of their products.

The problem of compatibility isn't limited to the field of software alone. Even though the individual user isn't likely to have a large number of different types of machines laying around, companies very often have tens and even hundreds of personal computers installed. Now if the company has purchased one certain model, then it probably won't have many problems. But if it has installed different makes and models of personal computers, then it is bound to experience compatibility problems with its peripheral equipment as well as compli-

cations when it comes to controlling these machines. This makes it apparent that standardization and compatibility among personal computers are highly desirable goals.

The third problem vexing the Japanese personal computer user has to do with a lack of information concerning software. There are now countless numbers of software packages on the market, and the leading software distribution houses are said to handle more than 20 thousand different packages at any one time. But even with all this software readily available to him, the individual user finds it almost impossible to locate the type of package he needs to carry out a particular task. This is because the selection process is just too overwhelming; there are hundreds of different software packages for hundreds of different makes and models of personal computers, and the prices vary almost as much. Also, the explanations found on the outside of the packages themselves are hardly sufficient to inform the prospective buyer as to the exact contents of the software enclosed therein. Asking the clerks who work at the personal computer shops where these packages are sold seldom helps any either; they most often know little if anything about the merchandise they are handling. Users thus need and want more complete sources of information concerning software packages and what each package is capable of doing. Ideally speaking, we would like to hear what some third party, a kind of software critic, has to say about the performance of these software packages; how one package rates against

another. At present, the only sources of such information readily available to the personal computer user are the piecemeal monitor reports on packaged software which appear in personal computer magazines.

It would be nice if packaged software aimed at the Japanese personal computer market had to undergo a trial period prior to being released, during which time they were tested and those results recorded for prospective users to base their purchasing decisions on. At present there is no such system in Japan. In this respect, the Japanese software industry, which relies heavily on computer manufacturers for guidance, differs radically from its American counterpart.

There are without a doubt many other problems that could be brought up here. But the point remains that, in a relatively short time, personal computers have become indispensable tools for large numbers of users. In the past, it was commonly held that personal computers were just a fad. However, despite all the problems inherent with these advanced new tools, they have become fixtures at numerous companies and in ever growing numbers of homes.

What do Japanese personal computer users expect from these machines in future? The answer to this question will differ slightly depending on who you ask, but the following few examples should serve as a good guideline.

First of all, in addition to dealing with the problems cited above, most users would like to see personal computers made even easier to use than they are

now. The Japanese phobia concerning keyboards is an often raised case in point. Something will have to be done about the way the keys are arranged, as well as the method of inputting data itself. New means of inputting data into computers, such as mice and touch-sensitive screens, should probably be combined with the conventional keyboard approach to make operating personal computers easier as well as more enjoyable. Voice input capabilities are also being looked forward to with great anticipation, but this technology is still a long way off it would seem.

The next area where users would like to see improvements made is the various manuals which come with personal computers. These are a considerable source of anxiety and frustration for the new user in particular. As personal computers become more widespread in use, increasing numbers of users are finding the explanations contained in operator's manuals difficult to read and even more difficult to understand. Instruction manuals should be written in simple, easy-to-understand language; should contain a large number of illustrations; and should incorporate examples which everybody can relate to. Perhaps personal computers could be equipped with an operator's manual or guidebook type function, something similar to the help function featured in many machines already. For example, a help text and prompts are available with UNIX and are displayed on the screen during operation.

The same problem exists with the ex-

planations accompanying packaged software. Although these explanations have improved considerably in recent years, they are still far from being able to be called readable. Anyone who believes a software expert is capable of writing an easy-to-understand manual for the beginning user is mistaken. What is needed is to train a bunch of technical writers specifically for the task of writing easily digestible software manuals for users.

Software is the key to the effective utilization of personal computers. This is an indisputable fact. Personal computer users would thus like to see measures taken to promote the reliability of packaged software. The types of measures I am referring to include those aimed at protecting software rights, which would lend support to the activities of software houses, and others involving software maintenance and the provision of various information, measures which

would benefit as well as protect the user. These kinds of measures aren't things that can be brought about by computer manufacturers and software houses alone. Rather, it will take governmental participation and leadership at the national level to implement truly effective measures of this sort. The spread of personal computer utilization has now reached the point where such measures must be seriously considered. It is good to be able to say that Japan has been moving in just this direction lately.

Naturally, the points raised here can not be considered the whole story by any means. But at least they should indicate the nature and extent of the problems surrounding personal computer utilization in Japan. Once these problems have been satisfactorily dealt with, the Japanese personal computer market should really start to grow.

## Special Report

# ROBOTS AND BRUSSEL SPROUTS: SUPERMARKETS GO MECHATRONIC

John McWilliams

President

The Word Shop, Ltd.

What has a fully-automated parking lot, an egg selling robot, unmanned transporters and an automatic ham slicer, and sells milk, bread, vegetables and robots all under the same roof? The answer is the Seiyu Nokendai Store, a "mechatronized" Japanese supermarket opened in October, 1983, to test the feasibility of automating the retail food store business, while at the same time serving as a demonstration site for a Computer-aided Sales and Service (CASS) system and other electronic and mechatronic systems and devices developed for and sold by The Seiyu, Ltd. Going to the local super for a quart of milk, a loaf of bread and a small-sized articulated handling robot somehow just doesn't seem kosher, but sales at the Seiyu Nokendai Store for both foodstuffs and robots are surpassing all expectations, which could well mean that mechatronized supermarkets are indeed the wave of the future.

The Seiyu Nokendai Store is just one of a chain of Seiyu supermarkets scattered throughout Japan. The town of Nokendai is a growing suburban residential area located just over an hour by train outside of Tokyo. Mr. Etsuji Kobayashi of The Seiyu, Ltd. Public Relations Office was kind enough to give us a tour

of the store and answer our questions.

Automation and advanced technology are evident even prior to entering the store. The store's parking lot features an Automatic Parking System comprised of two Seiyu Parking "Robots" and a Simplified Communications System that employs small-sized parabola antennas and ultra shortwave frequencies to relay parking information to a control terminal located inside the store.

Rising out of the well-kept garden/rest area adjacent to the store building is a tall, rectangular-shaped clock powered by the latest in semiconductor technology, an amorphous direct sunlight-to-electricity solar battery.

At the entrance to the store, customers are greeted by a robot egg seller being demonstrated in the display window. This ultra-compact, lightweight industrial robot is manufactured by Dainichi Kiko Robotics for work requiring high-speed, precision handling capabilities. The window demonstration features two such robots working in tandem to sort eggs, using sensors to separate real eggs from dummy ones at speeds much faster than could ever be achieved by human hands. The Seiyu Nokendai Store serves as a sales outlet for robots like these.



Once inside the store, the visitor's first impression is of an ordinary supermarket with display shelves neatly lined up left to right and extending towards the rear of the store, and the familiar cluster of cash registers manned by female check-out clerks near the exits. But that's where the familiarity ends.

The check-out counters are equipped with the latest in laser beam sensor technology to read the bar codes attached to each purchased item. Since this bar code reader is an integral part of the in-store point-of-sale (POS) system, the heart of the CASS, all information contained in the bar codes, such as brand name, price and other characteristics, is automatically stored in the POS computer, enabling inventories to be made quickly via terminal at any time.

Suspended from the ceiling is a mono-rail system, the "Ten-Rail," installed to automatically carry invoices from the



**Ten Rail "truck" carrying invoices to the accounting section.**

registers to the accounting section of the control room in the rear of the store to keep register services constant.

New customers, and unwary visitors, are likely to be surprised when they have to dodge a compact Mini Unmanned Transporter named "Chibi Robota" (Chibi means pee-wee in Japanese) as it runs up and down the aisles over a strip of aluminum alloy that serves as a track, introducing special sales items and new products.



**Chibi Robota as it moves among the aisles advertising new products.**

Towards the back of the store, customers are lined up waiting their chance to operate the buttons of the SR-1 Automatic Ham Slicer; other customers are relaxing over drinks and snacks in the coffee shop section of the Information Salon while they view computer graphics displays or selected menus from an 850 recipe database stored on video discs and presented via an interactive video disc system featuring a 9-screen multi-vision video center; and still others are typing

commands into microcomputers in the Personal Computer Corner as they play video games or try their hand at word processing.

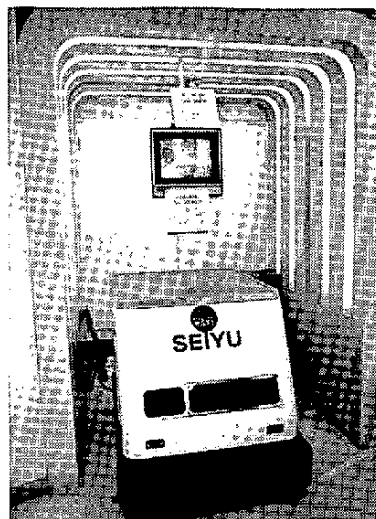
Our interview with Mr. Kobayashi took place just beyond the PC Corner of the Information Salon in a small room furnished with a white oval table and chairs surrounded by pamphlets, brochures and other printed matter, and equipped with a video cassette system, all aimed at educating interested customers or visitors about the store's CASS and mechatronic systems, especially the Automatic Warehouse and Unmanned Transportation Systems.

During our interview, and later via a film and guided tour, we learned that automation at the Seiyu Nokendai Store concentrates primarily on the delivery, storage and in-store transportation and distribution of merchandise. Incoming shipments arrive by truck, not an ordinary truck, but an auto-loading truck specially designed for automatic loading and unloading. The packaged goods are loaded into special cage-like carts at their place of origin, and are automatically unloaded from the trucks by means of a device called an auto-traverse charger, which transfers each cart to the entrance of the S-Stacker, the store's automated multi-tiered warehouse. The S-Stacker takes over from there, automatically storing the carts in their appropriate locations within the warehouse in accordance with instructions input via a terminal or contained in bar codes assigned to each cart beforehand.



**Cage-like cart loaded with merchandise being automatically stored in the S-stacker. The white box on the pole at the left center of the photo is the bar code reader.**

The carts and their goods remain in the warehouse until closing time, after which they are automatically delivered to waiting unmanned transporters for dis-



**"Riki Robota," the unmanned transporter, resting up for the night's work ahead.**

tribution to some thirty different stations within the store. The displaying of the goods on the store's shelves is still done by hand, and takes place the first thing in the morning when the employees arrive to work.

Other high tech features of the store include an amorphous charger that recycles artificial light to keep the batteries of an emergency lighting system charged; electronic display shelves equipped with infrared sensors that detect the customer's hand reaching for an item and automatically turn on a pre-recorded message describing the product; POS-linked liquid crystal price display panels which can be readily altered from an input terminal, doing away with the task of replacing old price cards with new ones by hand; and sterile kitchen/refrigerator sanitation systems employing a revolutionary spray-mist sterilizer system that artificially purifies the air inside the kitchen area and refrigerators to ensure "clean room" levels of cleanliness.

The store is also equipped with state-of-the-art safety, security and energy conservation systems, all controlled by computer and, in certain cases, featuring optic fiber technology.

But why bother to automate the retail food business? Surely personnel expenses can't begin to equal the investment required to install and maintain all the high tech equipment featured in the Seiyu Nokendai Store.

"We aren't interested in saving labor. Our primary goals in this experiment are to prove that the retailing industry can offer more and better information and

services to its customers, become more information oriented, more human oriented," Kobayashi replied.

He explained that automation, or "mechatronization" to use his term, is not the final goal, but rather the "high tech" approach needed to realize the "high touch" goals of improved customer service. Seiyu hasn't cut back on its store personnel; it has freed them from monotonous physical tasks so that they can familiarize themselves with the store's entire operations, and thus be of more service to the store's customers.

"Other aims include the demonstration and sale of the hardware and software being used at this store, as well as the promotion of our systems engineering and consulting services," he pointed out. In addition to foodstuffs, the Seiyu Nokendai Store also sells the industrial robots and microcomputers it has on display, and is building up a reputation as a systems engineering consultant to small- and medium-sized companies interested in automating parts or all of their operations. Seiyu specialists work with the customer to devise the most optimum system for his needs, then serve as the middlemen between the customer and the hardware and software manufacturers to ensure that the system they engineered is built to specifications.

So far the experiment seems to be working out all right. According to Kobayashi's calculations, the Seiyu Nokendai Store is recording sales that should add up to roughly twenty percent more than the projected first year figures of 680 million yen for store operations and 180

million yen for systems engineering and consulting. At that pace, he expects the company to be able to recover its initial investment of 1 billion yen (400 million for land, building and construction; 500

million for research, development and installation of electronic and mechatronic systems; and 100 million for equipment for the Information Salon) within four or five years.

## CURRENT NEWS

### COMMERCIAL BANKS TO UNIFY CASH DISPENSOR SERVICES

Japanese commercial banks are taking steps to unify their respective online cash dispenser (CD) services. The types of banks involved in this move include city banks, mutual loan and savings banks, trust banks and regional banks.

Until just recently, Japanese city banks had operated two separate CD systems, but integrated these into a single service called "BANCS," which went into operation on January 4 of this year.

A group of some 72 mutual loan and savings banks are planning to bring their CD system online with the BANCS system operated by the 13-member city bank group beginning in April. The city bank group currently has better than 10 thousand CDs and automatic teller machines (ATMs) in operation. Add to this the nearly 5,000 machines that make up the mutual loan and savings bank online CD system and you have an integrated service consisting of roughly 15 thousand machines. In order to effectively handle the increased processing capabilities that will be required of a unified system such as this, the mutual loan and savings bank group will have to replace the computer they currently

use, which can process roughly 12 thousand withdrawal operations per hour, with one that is similar to the city bank group computer capable of processing 25 thousand operations an hour. It will also be necessary for the mutual loan and savings bank group to replace many of its CDs and ATMs with models similar to those used in the city bank system so that passbook balance checks and other related services can also be integrated. This unified CD service system is scheduled for completion by April, 1985.

In early January, seven trust banks reportedly made a similar proposal to the city bank group, and since the corporate customers of city banks overlap with those of numerous regional banks, the regional banks are also said to be considering teaming up with the city bank group in the formation of a nationwide CD network.

The Japanese Finance Ministry is apparently in favor of a unified online CD system for commercial banks so that these banks can effectively compete with the nationwide online CD system scheduled to be put into operation by the Ministry of Posts and Telecommunications beginning in March, 1985. With the support of the Finance Ministry, the unification of commercial bank CD

services is expected to progress quite rapidly now that the city bank group and mutual loan and savings bank group have reached an agreement in this regard.

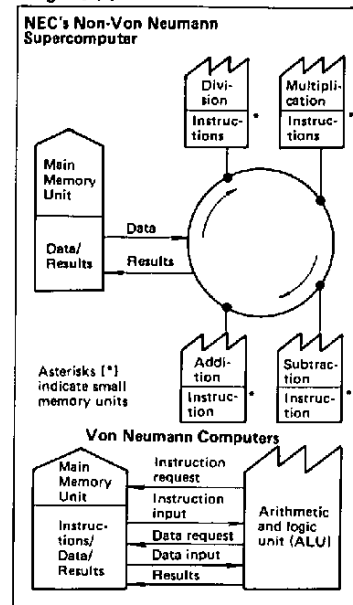
## NEC COMMERCIALIZES FIRST NON-VON NEUMANN MACHINE

NEC Corp. has announced its success in being the first computer manufacturer in the world to commercialize a supercomputer based on a non-von Neumann architecture. According to the company, the advantages of this new supercomputer are: [1] It is capable of much faster processing speeds (53MFLOPS) than ordinary von-Neumann-type large-scale computers currently on the market; [2] It runs on easy-to-produce software; and [3] It is about the same size as a mini-computer and is as reasonably priced. Since the configuration of this new supercomputer is relatively simple, it was quite easy to achieve large scale integration (LSI).

The configuration employed consists of a data-driven system, which enables the computer to automatically process data in accordance with that data's movement within the system, and a variable-length pipeline system with its processing elements arranged in a ring.

Since this new supercomputer doesn't rely on the von-Neumann approach to processing data, i.e. the give and take required between the computer's main memory unit and arithmetic and logic unit (ALU) [See Figure A], it is capable of processing data much faster than machines based on von-Neumann archi-

**Figure A**



ture. Its configuration also enables the use of very simple software. Mass production of this supercomputer is expected to keep its price tag down in the hundreds of million yen bracket.

It has long been the opinion of computer experts that traditional von-Neumann machines would not be able to keep pace with user demands; the von-Neumann architecture limits the performance capable with these types of computers. For this reason, the practicalization and commercialization of this non-von-Neumann supercomputer can be expected to cause a considerable ripple in the computer industry.

The ongoing Japanese project aimed at developing the fifth generation of computers by the 1990's is also pushing the creation of a non-von-Neumann machine. In the case of the fifth genera-

tion computer, however, it will be an intelligent machine capable of functioning at the human level. Its principal capabilities will include automatic translation and decision-making based on inference processing. The nature of the newly developed NEC supercomputer with its emphasis on image processing and ultra-highspeed calculations is thus very different from that of the fifth generation computer now under research. Nevertheless, the NEC machine is bound to have a considerable influence on fifth generation computer R&D the world over.

## **JAPAN LAUNCHES ITS FIRST DBS**

On January 23, 1984, Japan's National Space Development Agency (NASDA) launched this country's first direct broadcasting satellite (DBS), the BS-2a, from its Tanegashima Space Center located just off Kyushu. The BS-2a is scheduled to enter geostationary orbit around the end of February.

Since the BS-2a is capable of broadcasting to locations throughout the Japanese archipelago, NHK (Japan Broadcasting Corp.) plans to use this DBS beginning in May of this year to beam its general and educational television programs to some 420 thousand viewers situated in areas where reception is normally very poor. In addition, the BS-2a is also scheduled to handle local information broadcasts as well as emergency warning broadcasts. In the case of the latter, the satellite features capa-

bilities that will enable it to automatically turn on the television sets of those viewers equipped to receive its broadcasts to warn them of pending danger.

The second phase of BS-2a's operations are scheduled to begin this fall and will include high-resolution TV broadcasts that are supposedly five times sharper and clearer than present transmissions; pulse-code-modulated (pcm) broadcasts that are of higher quality than frequency-modulated (FM) broadcasts; and facsimile and other new forms of electronic media broadcasts. These broadcasts will be carried out on a test basis late at night after the regular broadcasting day has ended.

The only problem with NHK's plans for the BS-2a is that even after it begins broadcasting over this DBS, not everybody will be able to enjoy the benefits of the programming made available. It's a matter of costs. In order to be able to receive TV broadcasts bounced off the BS-2a parked roughly 36 thousand kilometers out in space, subscribers will have to purchase special antenna systems consisting of a 70 centimeter diameter parabola antenna, a tuner and converter. The price of these antenna systems, including installation fees, are expected to run as much as 300 thousand yen due to limited production schedules.

The Ministry of Posts and Telecommunications has come up with a scheme for revising the tax system during fiscal 1984 so as to exempt tuners from commodity taxes through 1987 as a means of promoting their sale. Manufacturers of

the parabola antennas, who are busy getting ready to market these devices prior to the start of broadcasting, are hoping this measure proves effective at boosting sales.

### **MITI ANNOUNCES PROPOSALS FOR A SOFTWARE PROTECTION BILL**

The widespread utilization of computers in Japan has resulted in an increase in unauthorized software utilization and rentals to third parties, which in turn has led to considerable squabbling among the parties concerned. The Ministry of International Trade and Industry (MITI) has decided to propose a new software protection bill in an attempt to stem the tide of these incidents.

The bill to be put forth by MITI is aimed at protecting the rights of both software producers and users, while at the same time promoting the development, distribution and utilization of software products in Japan. The protection bill covers only the software programs themselves, excluding such things as manuals and flow charts.

This bill will set forth provisions for the protection of both software producers and users that cover the areas of utilization, reproduction revision and lending. Utilization rights are to be granted on an exclusive basis by the producer of the software; the right to reproduce computer programs will require the expressed permission of the producer; revision of all or part of a computer program by a third party will be

possible with the permission of the producers; and users will have the right to lend or rent software programs to third parties.

In addition, users' rights are protected by provisions that establish the duties of producers, such as providing clear descriptions of the contents of software packages, and that call for the establishment of a system of mediation and/or arbitration to settle disputes. Other provisions stipulate the penalties and estimated amounts of fines that can be levied in cases involving infringements of the rights to be set forth in the bill.

### **JNR AND CONSTRUCTION MINISTRY TO OFFER COMMUNICATIONS SERVICES**

In preparation for the liberalization of the telecommunications business, the Ministry of Construction and Japanese National Railroad are moving to provide communications services as parts of their respective overall operations.

The Ministry of Construction is taking steps to lay fiber optic cables along all the expressways under its jurisdiction, making the new communications network that will result open to commercial enterprises. There is presently about 3,200 kilometers worth of expressways in Japan, but the Ministry of Construction would like to increase this to 7,600 kilometers by the 21st Century.

The Ministry of Construction plans to lay two fiber optic cables per expressway, one to serve as the main com-



munications line and the other as a back-up channel that can be used in case of emergencies or traffic accidents. Terminals will be installed at one site in each prefecture through which these fiber optic cable-equipped expressways pass, and users will have the option of accessing them via either the public telephone system or dedicated leased lines.

In order to actually install such a system along an expressway between Tokyo and Osaka (550 kilometers), the Ministry of Construction estimates initial costs to run in the vicinity of 30 billion yen, and calculates that it will take at least 80 personnel to manage and maintain the facilities thereafter.

As for the Japanese National Railroad (JNR), it will establish a wholly-owned subsidiary in April, 1985, at a cost of 3 billion yen to serve as the heart of its planned communications operations. At present, JNR's communications capabilities are limited to leased lines and telephone relay services, but starting in April, 1987, it plans to

offer telecommunication services aimed primarily at the Tokaido Megalopolis area which extends between Tokyo and Osaka. In order to achieve its goal, JNR will spend roughly 14 billion yen to lay two fiber optic cables alongside the tracks of the Tokaido Shinkansen (the Bullet Train).

In future, JNR plans to extend its communications services along all existing Shinkansen lines to form a nationwide fiber optics communications network. This network will be upgraded to offer image transmission and data communications capabilities, helping JNR achieve the status of a major vendor of telecommunications services in Japan, second, it hopes, only to the Nippon Telegraph and Telephone Public Corporation (NTT).

JNR is counting on its entry into the telecommunications field to enable it to carry out its long overdue reconstruction plans. Communications services are seen as a last ditch measure to save Japan's deficit-ridden national railway system.

# COMPUTER INSTALLATIONS IN JAPAN

— As of the End of March, 1983 —

## General Purpose Computers in Operation

(Value: million yen)

Size of Computers		End of March, 1983	End of December, 1982
Large	System (%)	3,847 ( 3.0)	3,805 ( 3.1)
	Value (%)	2,928,915 (55.4)	2,918,799 (56.0)
Medium	System (%)	12,608 ( 9.8)	12,381 (10.1)
	Value (%)	1,236,662 (23.4)	1,215,500 (23.3)
Small	System (%)	38,949 (30.3)	37,308 (30.6)
	Value (%)	703,697 (13.3)	677,161 (13.0)
Very Small	System (%)	73,006 (56.9)	68,510 (56.2)
	Value (%)	421,641 ( 8.0)	401,737 ( 7.7)
Total	System (%)	128,410 (100.0)	122,004 (100.0)
	Value (%)	5,290,916 (100.0)	5,213,197 (100.0)

Notes 1. The characteristics of computers covered by the current survey include:

- (1) Digital type computers
- (2) Stored program computers
- (3) Main memory of 2,000 bits or more
- (4) Computing based on logical computations

2. Standards for computer classification by scale in terms of purchase price

Classification	Purchase price
Large	More than ¥250 million
Medium	¥40—¥250 million
Small	¥10—¥40 million
Very small	Less than ¥10 million

**Computer Usage by Industry**  
**(End of March, 1983)**

(Value: million yen)

Industrial Category	No. of Systems	Value	Value per System
Agriculture	120	2,844	23.7
Forestry and hunting	60	594	9.9
Fisheries, fishing and pisciculture	207	3,887	18.8
Mining	167	4,816	28.8
Construction	3,001	72,692	24.2
Foodstuffs	3,999	92,499	23.1
Textiles and textile products	2,499	56,650	22.7
Pulp, paper and paper products	970	19,694	20.3
Publishing and printing	1,173	47,597	40.6
Chemicals and petroleum refining	4,287	195,273	45.6
Ceramics	1,008	32,375	32.1
Iron and steel	1,206	147,244	122.1
Non-ferrous metal	2,092	67,867	32.4
Machinery	2,576	94,498	36.7
Electric machinery	5,294	604,928	114.3
Transport equipment	2,033	213,649	105.1
Precision machinery	1,035	52,808	51.0
Other manufacturing	4,349	88,536	20.4
Wholesale and retail, trade firms	57,119	820,372	14.4
Finance	6,795	751,933	110.7
Security	318	77,860	244.8
Insurance	769	158,541	206.2
Real estate	359	5,943	16.6
Transportation, and telecommunications	4,014	139,624	34.8
Electricity, gas and water	558	78,001	139.8
Service	10,594	450,478	42.5
(General Service)	5,577	131,051	23.5
(DP Service)	5,017	319,426	63.7
Hospitals	1,065	30,743	28.9
Universities	1,248	152,000	121.8
Senior high schools	554	11,275	20.4
Other schools	391	12,460	31.9
Municipal bodies	1,749	117,401	67.1
Government department agencies	831	153,823	185.1
Governmental organizations	1,232	382,382	310.4
Cooperative association and organizations	4,567	143,000	31.3
Religious organizations	58	1,413	24.4
Not elsewhere classified	113	5,216	46.1
<b>Total</b>	<b>128,410</b>	<b>5,290,916</b>	<b>41.2</b>

## UPCOMING EVENTS IN JAPAN 1984

DATE	EVENT	CITY/PLACE	ORGANIZER/CONTACT
April 3-5	International Teleconference Symposium	KDD Otemachi Bldg., Tokyo	Data Communication Dept. Kokusai Denshin Denwa Co., Ltd. 2-3-2 Nishishinjuku, Shinjuku-ku, Tokyo 160 (03) 347-7727
3-6	Communication Tokyo '84	Tokyo Ryutsu Center, Tokyo	Communication Industries Association of Japan Sankei Bldg. Annex, 1-7-2, Otemachi, Chiyoda-ku Tokyo 100 (03) 231-3156
17-19	OA Show Kansai	Osaka Merchandise Mart Bldg., Osaka	OA Show Kansai Nihon Keizai Shimbun 1-1, Kyobashi Maenochō Higashi-ku, Osaka 540 (06) 943-7111
24-27	Computer Graphics Tokyo '84	Tokyo Ryutsu Center, Tokyo	Japan Management Association Kyoritsu Bldg., 3-1-22, Shibakoen, Minato-ku, Tokyo 105 (03) 434-6211
May 21-23	The 3rd International Microelectronics Conference	Keio Plaza Hotel, Tokyo	Mr. Hisao Hirabayashi ISHM JAPAN 5-635 Hanakoganei, Kodaira, Tokyo 187 (0424) 67-7602
23-26	Micro Computer Show '84	Tokyo Ryutsu Center, Tokyo	Japan Electronics Industry Development Association 3-5-8, Shibakoen, Minato-ku, Tokyo 105 (03) 434-8211 Ext 352
23-26	Business Show	Kokusai Mihon-ichi Kaijo, Tokyo	Nippon Administrative Management Association 4-1-13, Sendagaya Shibuya-ku, Tokyo 151 (03) 403-8910
June 11-13	World Computing Services Industry Congress IV	Keio Plaza Hotel, Tokyo	JSIA/JIPCA Kikai-Shinko-Kaikan Bldg., Room 406-2, 5-8, Shibakoen 3-chome, Minato-ku, Tokyo 105 (03) 436-3938
27-30	Micro Computer Show '84 Osaka	Osaka Kokusai Mihon-ichi Minato Kaijo, Osaka	Japan Electronic Industry Development Association 3-5-8, Shibakoen, Minato-ku, Tokyo 105 (03) 434-8211 Ext 352
July 2-5	'84 Office Automation Show	Tokyo Ryutsu Center, Tokyo	Enterprise Project Bureau Nihon Keizai Shimbun 1-9-5 Otemachi, Chiyoda-ku, Tokyo 100 (03) 270-0251
September 26-29	Data Show '84	Harumi Tenjijo, Tokyo	Japan Electronics Industry Development Association 3-5-8, Shibakoen, Minato-ku, Tokyo 105 (03) 434-8211 Ext 352
October 2-4	Software Show	Shinjuku NS Bldg., Tokyo	Software Product Center 1-14-1 Toranomon, Minato-ku, Tokyo 105 (03) 591-2440
4-9	Electronics Show	Kokusai Mihon-ichi Kaijo, Tokyo	Japan Electronics Show Association 3-2-2 Marunouchi, Chiyoda-ku, Tokyo 100 (03) 284-1051

DATE	EVENT	CITY/PLACE	ORGANIZER/CONTACT
October 30 – November 2	Optoelectronics Show '84	Tokyo Ryutsu Center, Tokyo	Optoelectronic Industry and Technology Development Association 20th Mori Bldg., 2-7-4, Nishishimbashi, Minato-ku, Tokyo 105 (03) 508-2091
November 6-9	International Conference on Fifth Generation Computer Systems	Keio Plaza Hotel, Tokyo	FGCS '84 Secretariat Institute for New Generation Computer Technology Mita Kokusai Bldg. 21F 1-4-2R Mita, Minato-ku, Tokyo 108 (03) 456-3195 Telex: 32964 ICOT
December 3-5	SEMICON Japan '84	Kokusai Mihon-ichi Kaijo, Tokyo	SEMICON Japan '84 Secretariat Marcom International Inc. Akasaka Omotemachi Bldg. 4-8-19, Akasaka, Minato-ku, Tokyo 107 (03) 430-8515

#### CORRECTIONS

We would like to correct the following errors which appeared in issue 56 of JIPDEC Report.

- (1) In Table 8. Sales by Type of Business (p.5) the figure "36.0" which appears in the top right-hand column (1985 estimated %) should be "52.8".
- (2) The reference to Booz-Allen & Hamilton's abbreviation for the Information Industry (pp.36-41) as being "I<sup>2</sup>" should be revised to read "I<sup>2</sup>" (I-squared).





JIPDEC

Japan Information Processing Development Center