

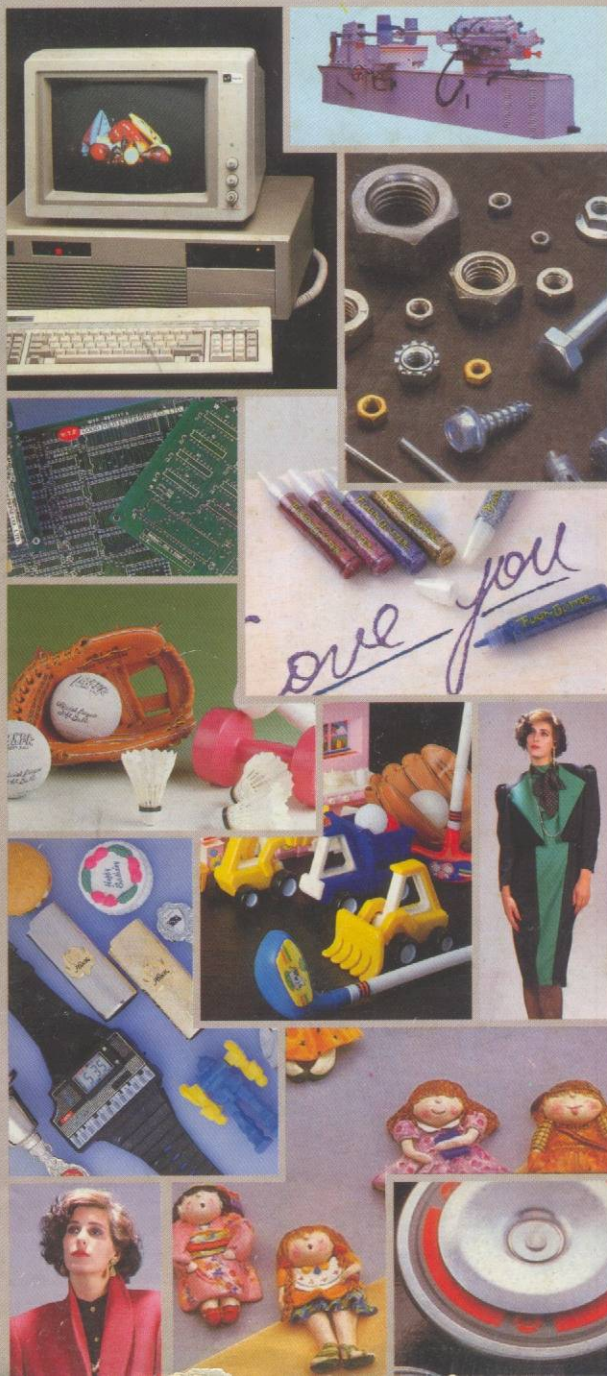


# TAIWAN INTERNATIONAL TRADE

PUBLISHED BY IMPORTERS & EXPORTERS ASSOCIATION OF TAIPEI

## Comprehensive Survey Of Exports 1987

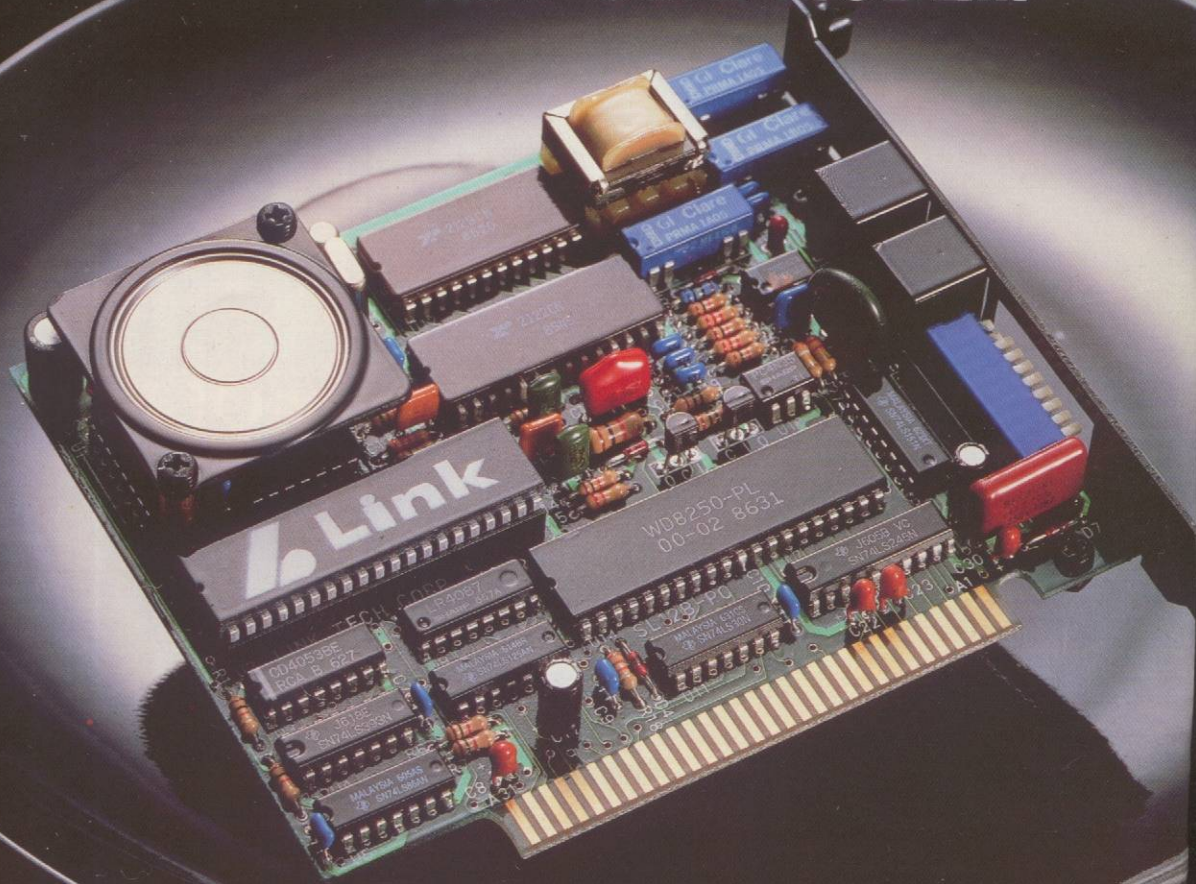
### Supplementary Issue



INTERNATIONAL



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### HEAD OFFICE

5th Fl., 350, Sungchiang Rd., Taipei, Taiwan, R.O.C.  
Mailing Address: P.O. Box 598, Taipei, Taiwan, R.O.C.  
Cable: "IMEXTAI" Taipei  
Telex: 23339 IMEXTAI

### EDITORIAL AND BUSINESS OFFICES

**United Pacific International Inc.**  
4th Fl., 311, Nanking E. Rd., Sec. 3, Taipei, Taiwan, R.O.C.  
Mailing Address: P.O. Box 81-417, Taipei, Taiwan, R.O.C.  
Tel: (02) 715-0751 (5 lines) Telex: 28784 UNIPAINC  
Fax: 886-2-7169493 Service Line: (02) 715-0660  
Taichung Agent: (04) 254-9417  
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Tel: (02) 771-0175



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C  
Consumer  
Electronics &  
Information  
Products



## An Overview

# Consumer Electronics & Information Products

By Neil Bond

According to the Ministry of Economic Affairs, the estimated value of the R.O.C.'s electronics industrial output by the year 2000 will be \$10.87 billion. The industry will be the largest among all manufacturing industries.

The electronics industry in Taiwan has become a booming business, and electronic products have emerged as the key

export items of the 1980s. In 1983, exports of Taiwan-made electronic products were valued at \$2.94 billion, and in 1984, outbound shipments of electronic goods were listed at \$5.5 billion.

During the first half of 1986 more than \$3 billion worth of electronic products were sold abroad, an increase of 11 percent compared with that for the corresponding period the year before.

## Information Products

The information industry saw tremendous growth in 1986. Mini and personal computers were the leaders of this growth. In the first six months of 1986, exports of mini and personal computers grew by 131.6% over the same period the previous year. Technology in this area has improved and these products should have a bright future.

Other information products also had a good year. With a strong base in the TV industry, Taiwan's manufacturers are able to make quality color and B/W monitors. Monitor exports increased by 37.4%. Electronic

computing machines were also up in the January to June, 1986 period. Growth was 28.1% over the same period in 1985.

On the bleaker side, printers, which have to compete on the market with the stronger Japanese products showed a negative growth rate in the first half of the year, with exports dropping 2%.

## Consumer Electronics

Taiwan's consumer electronics manufacturers also had a pretty good year. Consumer electronic product exports averaged a growth of 4.2%. The record of individual products, however, varied a great deal, with some products seeing remarkable growth in exports and others facing major declines.

Among the products that experienced growth in the January to June period were color TVs (38.3%), car radios (500%), radios (3.6%), VCRs (82.7%), electronic clocks (38.9%) and miscellaneous products (46.9%).

Products that fared worse in the first six months of the year than they did in the same period the year before include B/W TVs (-11.2%), tape and record play-



## CHOOSE THE BEST COMPANY FOR YOUR COMPUTER

ers (-11.1%), calculators (-31.5%) and electronic watches (-6.9%).

In general, though, the line saw prosperity last year and manufacturers in the line are optimistic about the future.

### Government Role in the Electronics Industry

Crucial to understanding the R.O.C. electronics industry is an appreciation of the role of the government, which has dubbed electronics a "strategic" industry in the country's economic growth. The government is making an all-out effort to expand and upgrade the industry in seven product areas.

The Ten Year Development Plan for the Electronics Industry, published in 1980, specified these target areas as components, data processing, software, communications equipment, industrial electronics equipment, test equipment and consumer electronics.

One of the government's major initiatives is the Hsinchu Science-based Park, modeled after California's Silicon Valley, which was begun in 1980. By 1989 the Park, located 60 kilometers south of Taipei, will have 150 to 200 manufacturers in production. Already the keystone in Taiwan's computer research and development, the park facilitates working together by the

science-dominated universities, research organizations and private industry, all of which are located nearby.

The R.O.C. government now wants to make the park a "science technology city." The idea of transforming Hsinchu into a "sci-tech city" recently gained momentum when Premier K.H. Yu gave the go-ahead to preliminary architectural plans prepared by the Hung-yuan Christian University.

According to Li Cho-hsien, the Park Administration's director general, the planned "sci-tech city" will comprise four areas: a residential district in Hsianshan, a business area including the Science-based Industrial Park and the Industrial Technology Research Institute (ITRI), a historical preservation site (the old town of Hsinchu), and a college town consisting of the National Chiao Tung University and the National Tsing Hua University.

Li indicated that within ten years, Hsinchu Park and ITRI together will have a workforce of 70,000. It is also projected that Hsinchu's present population of 300,000 will double.

The Electronics Research & Service Organization (ERSO) of ITRI meanwhile has also been busy developing technology appropriate for Taiwan industry and providing tested manufacturing skills to produce high

technology items. This has reduced the time necessary to transfer needed technology to private industry and reduced the risk in developing innovative products.

ERSO has played a major role in designing ICs, turning out over 150 designs in the last 10 years. In 1983, ERSO began a five-year plan to develop VLSI technology. ERSO operates the most advanced research facility, the second largest wafer fabrication facility and employs close to 1,600 people, many of whom are engineers.

Attractive government incentives such as low-cost loans, tax holidays, land, and even start-up capital are also helping to attract foreign IC manufacturers.

Philips of the Netherlands signed a joint venture agreement in June 1986 with ITRI to set up a new company, Taiwan Semiconductor Manufacturing Company, Ltd. (TSMC), to produce very large scale integrated circuits (VLSI) in Taiwan.

Philips will acquire 27.5% of the shares in the TSMC, 48.3% will be held by the government of the R.O.C., with the balance available to domestic industries. The total capital investment will be \$210.5 million.

Initially, TSMC will lease the VLSI demonstration factory to be completed by ITRI. This \$63 million 1.5-2.0 micron fac-



tory will start production this year. By the end of the year, the factory will have a monthly production capacity of 800 6-inch wafers (which will be cut in to VLSIs). That production capacity will then be boosted to 10,000 pieces a month by the end of 1987, according to Chang.

TSMC plans to invest \$150 million to set up a more advanced VLSI factory in 1989.

Not to be outdone, United Microelectronics Corp. (UMC) has decided to invest \$150 million over the next five years to expand its wafer fabrication plant.

At a time when the Ministry of Economic Affairs (MOEA) is frustrated in its attempt to solicit capital from private enterprise for a proposed VLSI project, UMC's plant expansion appears promising.

The \$150 million capital required for the project will be sourced from the issuance of new shares, profits earned from other investments, and bank loans. Of the \$150 million, \$125 million will be used to expand UMC's wafer processing plant, the remainder for R&D.

Taiwan's growth, its increasing sophistication and the government's economic incentives have combined into an attractive investment package. A survey of U.S. electronics firms rated Taiwan the eighth best place in the world for overseas invest-

ment.

Tabulations compiled by the Ministry of Economic Affairs confirmed that, as of July 1986, among 445 foreign-invested electronic firms in Taiwan, 172 companies came from the United States and Europe, accounting for 39 percent of the total. The investments for those U.S. and European firms amounted to \$1.38 billion, occupying 66 percent of the total foreign investments in terms of electronics industry.

The Industrial Development Bureau recently hired the U.S. consulting firm Arthur D. Little to advise how to improve sales and service channels in the U.S. A report was made in June 1986.

The consulting firm noted the high growth rate of the industry, but pointed out that most local manufacturers are still too small and that neither the software industry nor the component industry has yet become firmly established. In addition, the ADL study revealed that most local information oriented firms derive their primary revenues from sales of terminals, printers, or personal computers.

The consulting firm suggested the R.O.C. government develop the capability of the Institute for Information Industry (III) to be consultant for the industry and map out a plan to help upgrade local firms' marketing ability so that growth in the industry can be sustained.

## Outlook

If the future trends in the industry are fairly obvious--semiconductors, especially ICs and VLSIs, high technology, more emphasis on R&D and innovation--then problems, including marketing, are also fairly clear.

As Taiwan moves away from low-end, OEM production, brand name awareness in foreign markets will be critical. This is why ERSO has placed such emphasis on ICs and VLSI technology. The agency believes that this is the only way to develop custom circuits so that finished products will be distinct enough to win brand name awareness in foreign markets, and also to assure supplies of chips during times of shortage.

Taiwan certainly has the capital to underwrite major research, design and development. Its foreign exchange reserves are at least \$40 billion. On the whole, exports keep surging despite periodic downturns and its people save a remarkable 30 percent of gross national product.

Today, electronics is a proven money-maker. In 1983, it replaced textiles as the island's chief foreign exchange earner, and companies like Formosa Plastics, Taiwan's biggest private business conglomerate, are investing in its future.

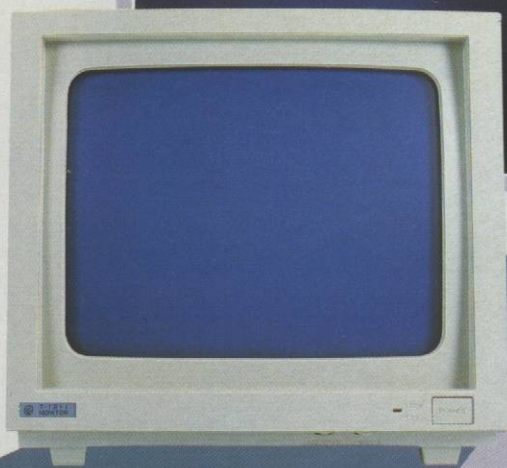


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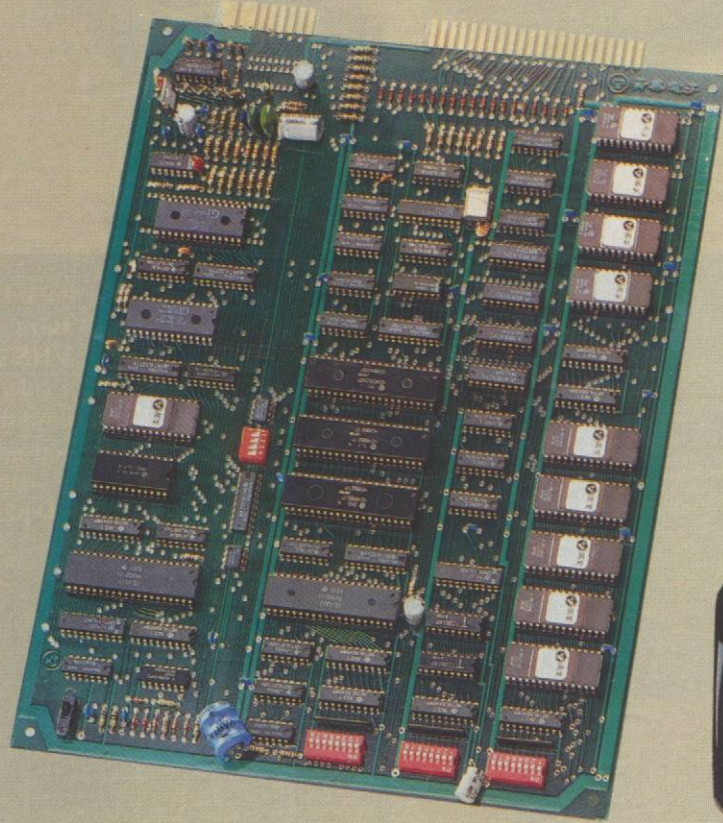
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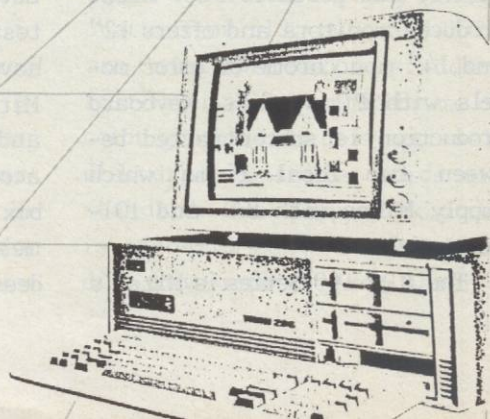
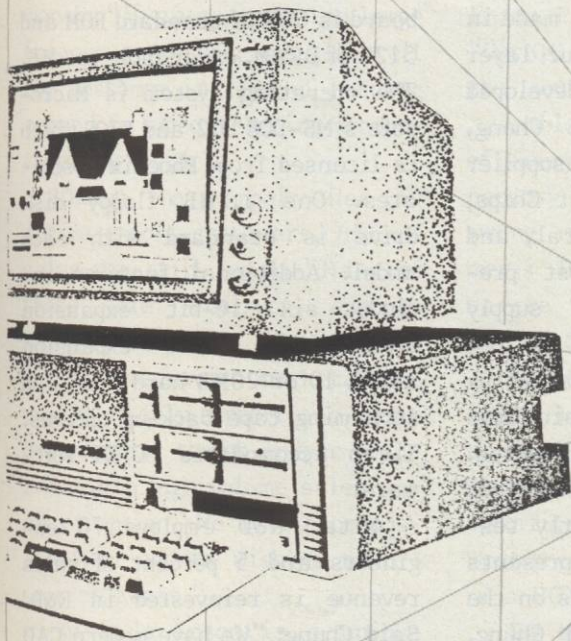
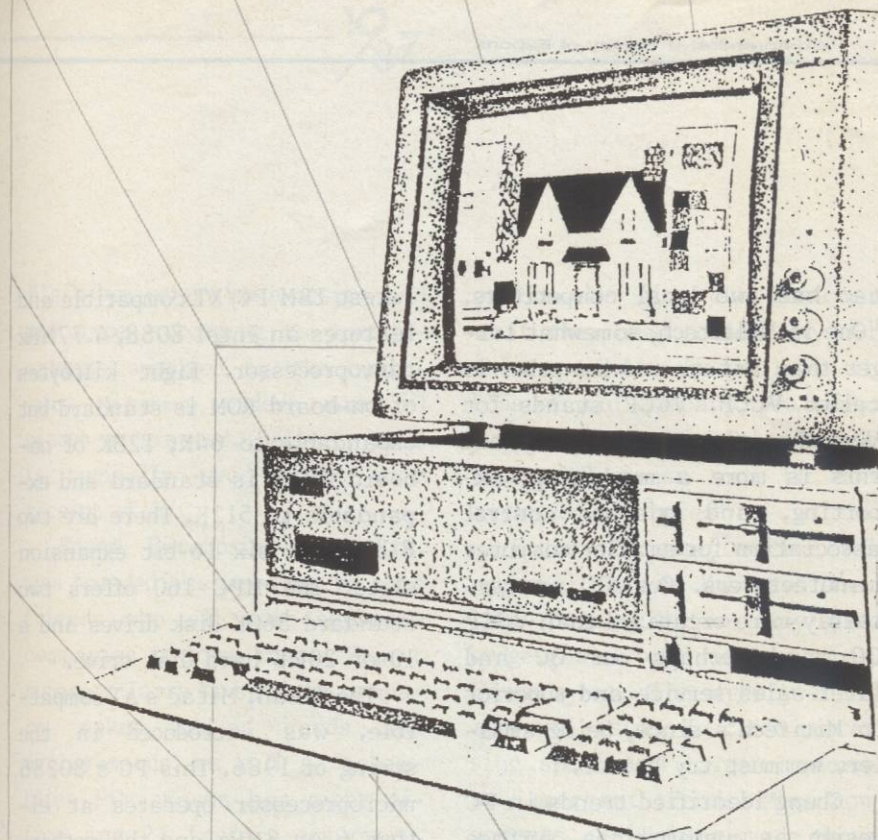
\* The joker is the highest card with the highest stakes. Adjustment is automatic.



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# Personal Computers:

## AT Compatibility The Trend

By Sean F. Delaney

Taiwan's computer industry is growing at a rate of from 35% to 40% per year. Assembled PC's are this country's most valuable export item. PC sources in Taiwan range from small trading companies which subcontract assembly to companies with close to 1,000 employees and overseas branches.

Of the four sources contacted for this report, not one produced or assembled Apple compatible machines. IBM PC/AT compatibility is the dominant production and sales trend among the companies contacted. Relevant trends also include larger memory capacities, 6 to 8MHz processing speeds, and gate-array ICs. No company contacted produces its own keyboard: all subcontract. The largest company contacted does produce monitors and the other three have OEM suppliers. ICs and disk drives are generally imported from Japan.

Companies contacted offer from one to 12 years of manufacturing experience. One company is actually a trading company which subcontracts assembly of components it sources. These companies employ from five to



800 people. Quoted production capacities indicate no correlation to company size and range from 1,500 to 3,000 per month. Exports account for from 65% to 97% of production. Minimum orders range from one to 50 pieces. Delivery times range from 10 to 60 days.

For this report, TEI contacted Mitac Corp., Enson Enterprise Co., Ltd., Trun Sole Enterprise Co., Ltd., and Lynk Technology Inc.

Mitac Inc. was founded in 1974 and is the oldest computer company in Taiwan. Mitac's single, 1,900 square meter factory is located in Hsinchu. Office and production employees number 800, 130 of whom are engineers. The company manufactures a wide variety of CPU's, portable PCs, peripherals, and Chinese information-processing equipment. Mitac's first product was a Chinese word-processing system. The company is currently close to its 1,000 CPU per month capacity. A new factory to be built on existing land is due for November 1986 completion and should boost monthly capacity by 2,000 CPUs.

Mitac has distributors in 20 countries across the Americas, Europe, Asia, and Oceania. Eighty percent of production is exported; 50 percent of production is sold bearing the Mitac name. The United States is Mitac's largest market and American Mitac Corp., in Santa Clara, CA, handles North American business.

According to Catherine Chung, Mitac marketing specialist, Mi-

tac has two local competitors. "One is Multitech, somewhat larger than Mitac, and the other is called VCCP. VCCP stands for Very Cheap Computer Company, and this is more a marketing, exporting, and quality control association for smaller computer manufacturers. Our QC is certainly more organized than VCCP. QC, and perhaps our QC and after-sales service and superior to Mititech's since, being smaller, we must try harder."

Chung identified trends in PC design as custom chips, surface mounting, and falling prices. Sixty percent of components and materials are imported. Chips and hard disk drives are made in Japan. Mitac offers four layer motherboards and has developed six-layer models. Said Chung, "We are a big component supplier in Taiwan. We represent Chips, Intel, TI, Western Digital, and Matsushita. This almost precludes any material supply problems."

According to the marketing specialist, Mitac maintains standard QC and QA procedures. But prior to mass-production, prototypes are stringently tested. "A Mitac product represents much more than what sits on the end-user's desk!" added Chung. Standard models include PC/XT, PC/AT, and portable PCs. Mitac produces monitors and offers 12" and 14" monochrome or color models with PC systems. Keyboard production is subcontracted between two local firms which supply Mitac with 84- and 101-key models.

The MPC 160 Series is Mitac's

latest IBM PC/XT compatible and features an Intel 8088, 4.77MHz microprocessor. Eight kilobytes of on-board ROM is standard but expandable to 64K; 128K of on-board DRAM is standard and expandable to 512K. There are two 8-bit and six 16-bit expansion slots. The MPC 160 offers two standard 360K disk drives and a 10 or 20MB hard disk drive.

The Titan, Mitac's AT compatible, was introduced in the spring of 1986. This PC's 80286 microprocessor operates at either 6 or 8MHz and the motherboard contains five custom gate-array chips by Chips. The Titan has a four layer motherboard. On board is 64K of standard ROM and 512K of DRAM, expandable to 4MB. The operating system is Microsoft's MS-DOS 3.2 and BIOS which is licensed from Phoenix Associates. One 1.2MB floppy disk drive is standard with each model. Additional features include six 16-bit expansion slots, two 8-bit expansion slots, 10 or 20MB hard disk, and streaming tape back-up options. Titan accomodates PC/XT software.

Mitac R&D employs 70 engineers and 5 percent of sales revenue is reinvested in R&D. Said Chung: "We have modern CAD facilities including an Intel Development System as well as HP testing equipment. Our engineers have created original designs for Mitac's Viso portable computer and Mega graphics adapter. We accept both white box and black box design requests." White box means a prototype according to a design provided by the customer.



Black box refers to a design and prototype according to specifications supplied by the customer. Minimum orders are 50 pieces or greater. Delivery time is typically two months from receipt of L/C.

Enson Enterprise Co., Ltd. was founded one year ago by some friends who all quit separate companies to form Enson. Export manager Jarry Ku said the company makes add-on cards and motherboards, as well as assemblies PCs. Enson has eight office and 24 factory employees. Ku would not say what current production is but said the company's capacity is 1,500 PCs per month. "If an order is too large for our resources, we will tell the customer instead of turning around to subcontracting production," he said.

Though the company has 30 active export customers, 65% of sales are still local. "Many of these are indirect exports though," said Ku. "Germany is our largest foreign market. Generally we only support one agent per country, though larger countries with high volume sales are an exception. We invite proposals from agents wishing to represent Enson."

Ku feels Enson is a unique company which places achievement in product quality above financial profit. "Many companies in Taiwan stay in business for a few years and make money by selling a few thousand cheap PCs. This is bad and ruins markets for the rest of us." He continued: "We are right for some companies, not right for

others. We give our customers what they need to identify with their product. If you are the boss of your company, you can do your business with the boss of Enson. Business can be done among equals here."

Enson is applying for FCC approval, which Ku says is a large part of the company's R&D budget, and hard on a company Enson's size. The urgency of FCC approval aside, Ku cited processing speed and larger memories as important trends. Most components are Taiwan-made though disk drives and some ICs are imported from Japan. Though some material costs are going up, Enson PC prices are going down. "Our QC scrutinizes materials at the source, then burn-in tests assembled PCs. We keep one piece of every production lot at the factory so if anything ever goes wrong with an overseas customer's PC, we can evaluate a sample from the same lot right away," claimed Ku.

Enson produces an IBM PC/XT turbo switchable between 4.77 and 8MHz. The company can supply keyboards and monitors of any specification with its CPUs. The most popular CPU model currently is a PC/AT compatible.

The standard AT has a micro-processor which can switch between 6 and 8MHz. Memory configurations of 512, 640, and 1024 are available on a standard four-layer PCB. A monochrome or color graphics card is optional, disk drive controller cards are standard. One floppy disk drive is standard as is a 20MB hard disk drive imported from Japan's

NEC. Power comes from a 192 watt switching power supply.

Enson employs five engineers and welcomes custom orders. "We are willing to satisfy OEM customers," said Ku. "We are getting into industrial control systems and even toll booth money-collection systems. The challenge of custom orders inspires us." There is no minimum order. Orders of 100 pieces can be shipped within 10 days of receipt of L/C.

Trun Sole Enterprise Co., Ltd. has manufactured motherboards, and enhancement cards, and assembled PCs for three years. The company's 330 square meter factory is located just south of Taipei in Chungho. Trun Sole employs 16 people, three of whom are engineers. "We can produce as many as 4,000 PCs per month. At the moment we produce 1,300 per month, almost twice what we produced last year," said Saphia Dong, Trun Sole export manager.

Ninety-seven percent of production is exported. Almost every one of the company's six export customers is a distributor or importer. The United States and New Zealand are the company's largest markets. Dong feels customers do well by buying Trun Sole PCs because the company is still small and interested in accommodating all potential customers. Said the export manager: "We, unlike many other firms, use only new ICs, all of which are imported from Japan. Our disk-drives are also imported from Japan."

Material costs are expected



to remain stable or rise slightly. All production and assembly is done in-house. "Quality Control is performed on assembled PCs and this includes 24-hour burn-in testing. Four technicians oversee this process," said Dong. Standard model PCs include IBM PC/XT and PC/AT compatibles. Monochrome monitors, as well as 84- or 101-key keyboards are supplied with each CPU.

The XT compatible comes with up to 640K of memory on board and a 4.77MHz microprocessor. A two-layer PCB is used for the XT compatible. Eight expansion slots, two of which are 8-bit, accommodate enhancements which are also available from Trun Sole. This model is powered by a 150 watt switching power supply. Two standard floppy disk drives are imported from Japan.

Trun Sole's AT compatible features an 8MHz microprocessor and clock IC on a four-layer motherboard. One megabyte of memory is standard and 10 or 20MB hard disk drives are optional. The AT compatible has eight expansion slots, two of which are 8-bit. A 200 watt switching power supply powers the PC. This is currently the company's most popular model.

Dong said prices will go up over the next year, reflecting increased labor and quality certification costs. Trun Sole engineers are capable of custom design services and Dong invites all inquiries. With the exception of a single, sample PC, a minimum order is usually five pieces. Orders of 50 to 100

pieces can be shipped within 45 days of receipt of L/C.

Lynk Technology Inc. is one year old. The company is a trading company which sub-contracts the assembly of CPU's and locates keyboards and monitors. Previously, company President Frank Lin founded and managed a computer technology importing company in greater New York City. There are five employees, including one engineer who oversees the more technical aspects of Lynk's business. Complete PCs may be enhanced with interface cards, hard disk drives, and tape back-up systems, all of which Lynk supplies.

According to Lin, there is no limit to the number of PCs Lynk can supply. The company currently exports 500 per month. "Late May, June, and the beginning of July were slow. But business has since picked up," said Lin. The company has ten PC customers, three of whom are in the United States, the remainder are West European importers. Local orders account for 10% of Lynk's business. Lin feels the advantage of doing business with Lynk is that Lynk is always sourcing the most economical, first quality PCs.

The company sells individual components in addition to selling complete PCs. Coginto hard disk drives and Chips gate-array ICs are purchased from Japan. Price trends across PC components are mixed and prices for assembled PCs should remain stable. "QC begins when we source components. The most important

part of our QC is performed on assembled PCs. We leave the PCs on for at least 24 hours and run a variety of software through them."

The company's most popular model is an IBM PC/AT compatible with an 80286 microprocessor switchable between 6 and 8 MHz. It features a standard 1MB motherboard with clock IC, but can be enhanced with a 2.5MB multifunction card. The board accommodates three 8-bit and five 16-bit add-on cards. This PC comes with two floppy disk drives and a 20MB hard disk drive, all which are imported from Japan. Disk drive controller cards and a monochrome graphics card are standard, as is a 200 watt switching power supply.

Lynk can supply keyboards and monitors. Although an IBM-style keyboard is available, the standard model has 84 keys, ten of which are programmable function keys. There is a large "Return" key, as well as LEDs monitoring the status of "Capital Lock", "Scroll Lock", and "Numeric Lock." Lynk's standard monitor offers a twelve-inch, amber or green phosphor screen. Resolution is 720 columns by 350 lines. Controls are front-mounted.

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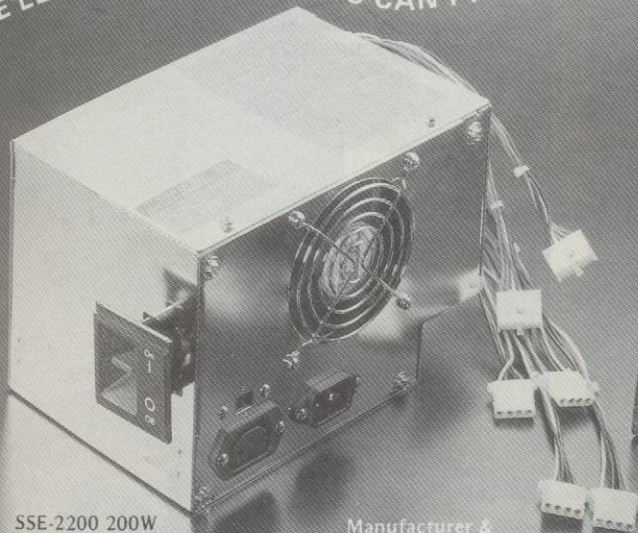
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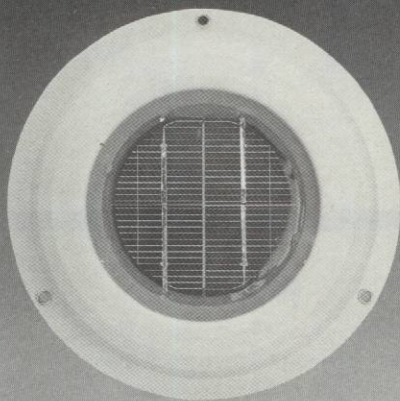
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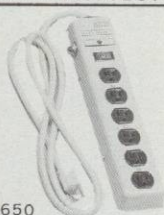


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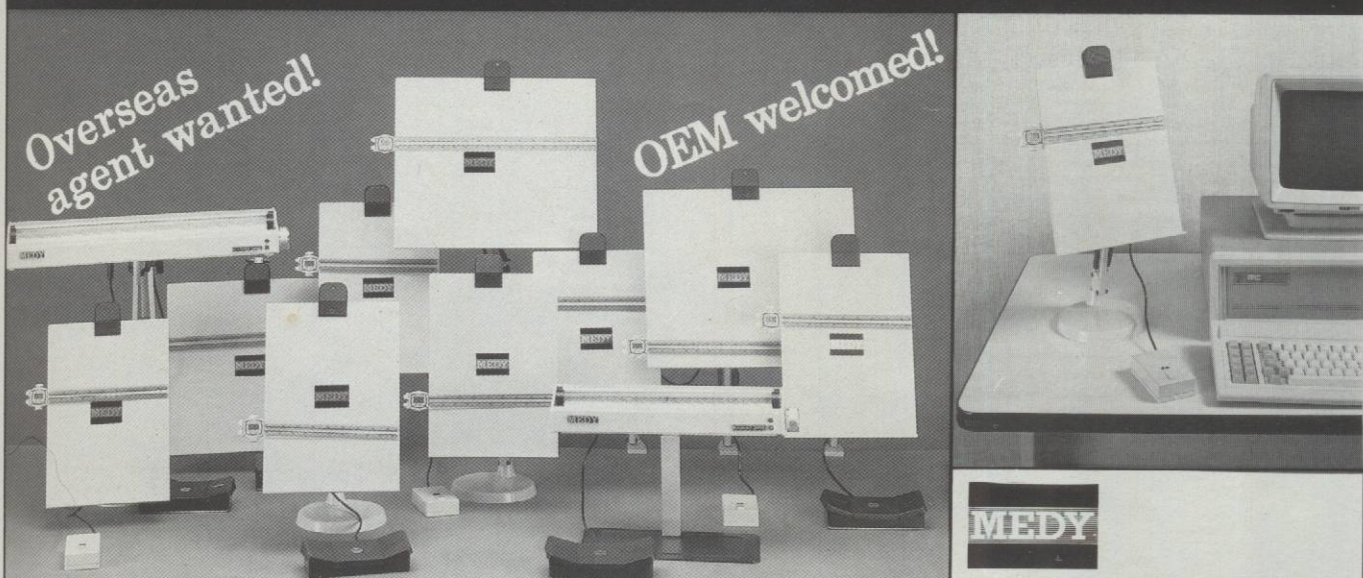


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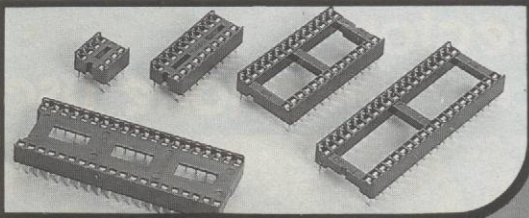
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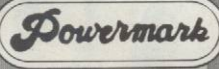


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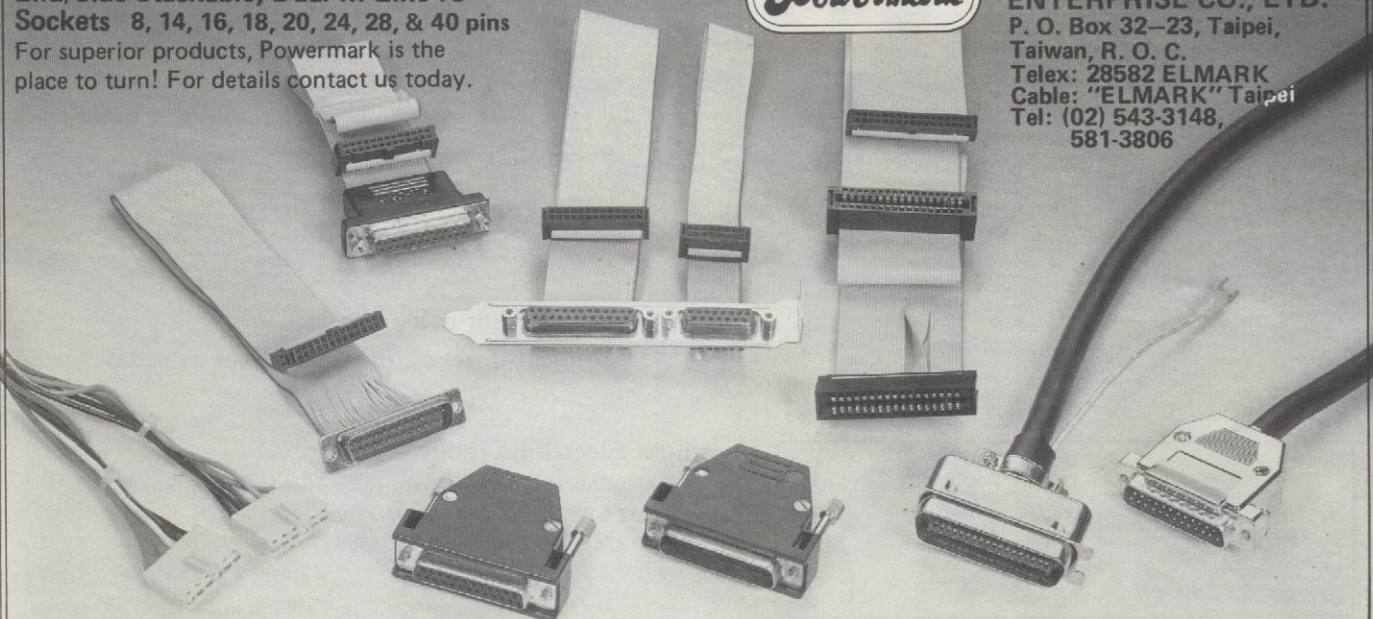
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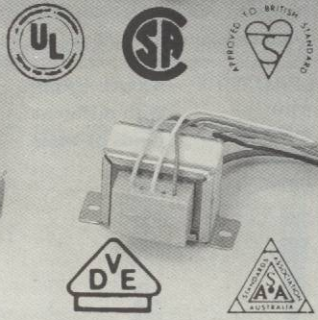
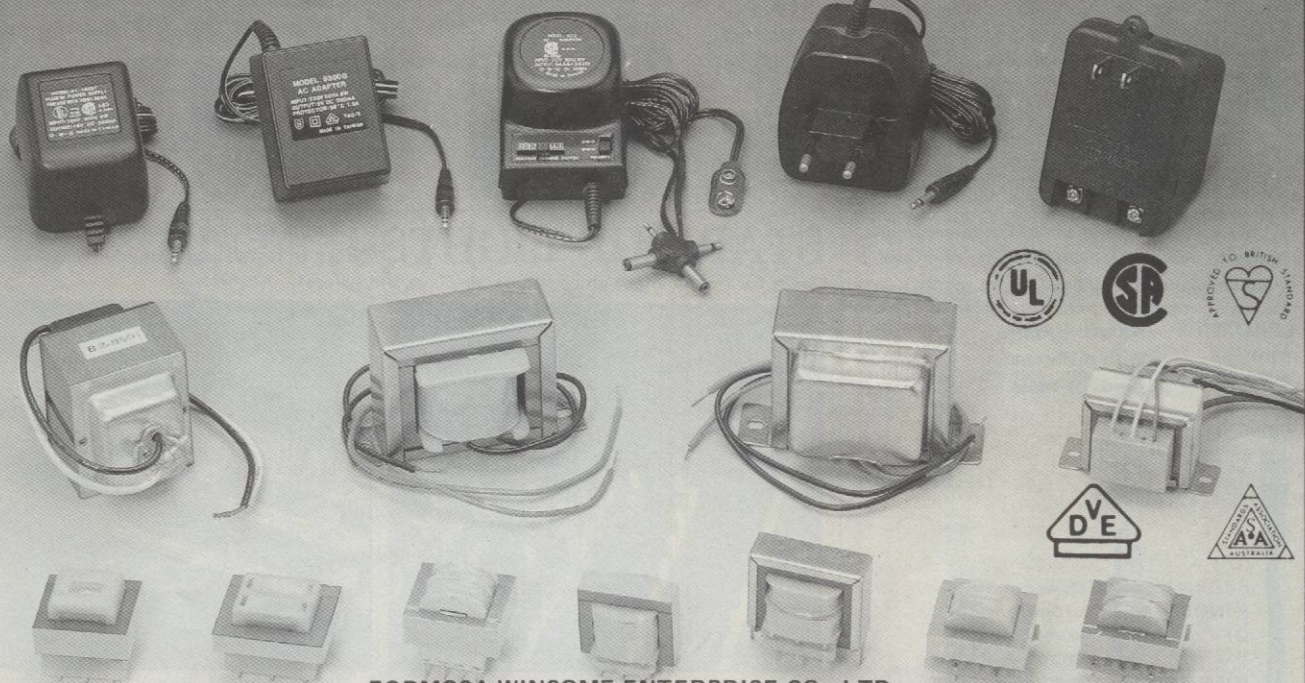


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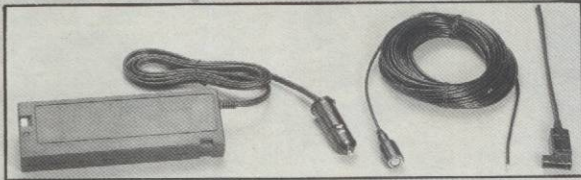
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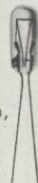





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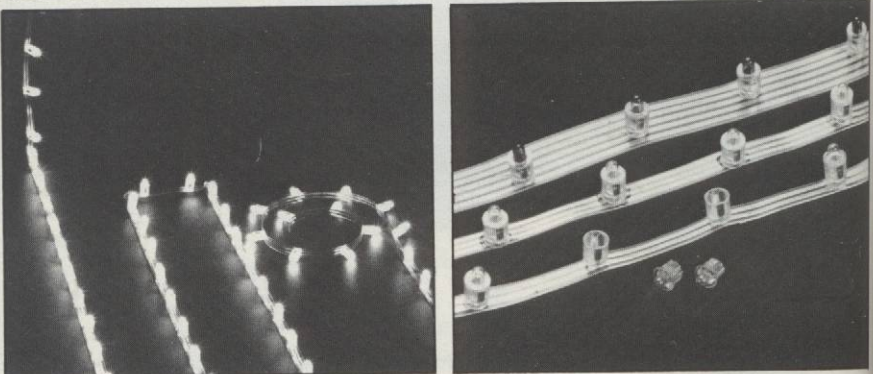
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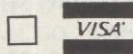
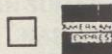
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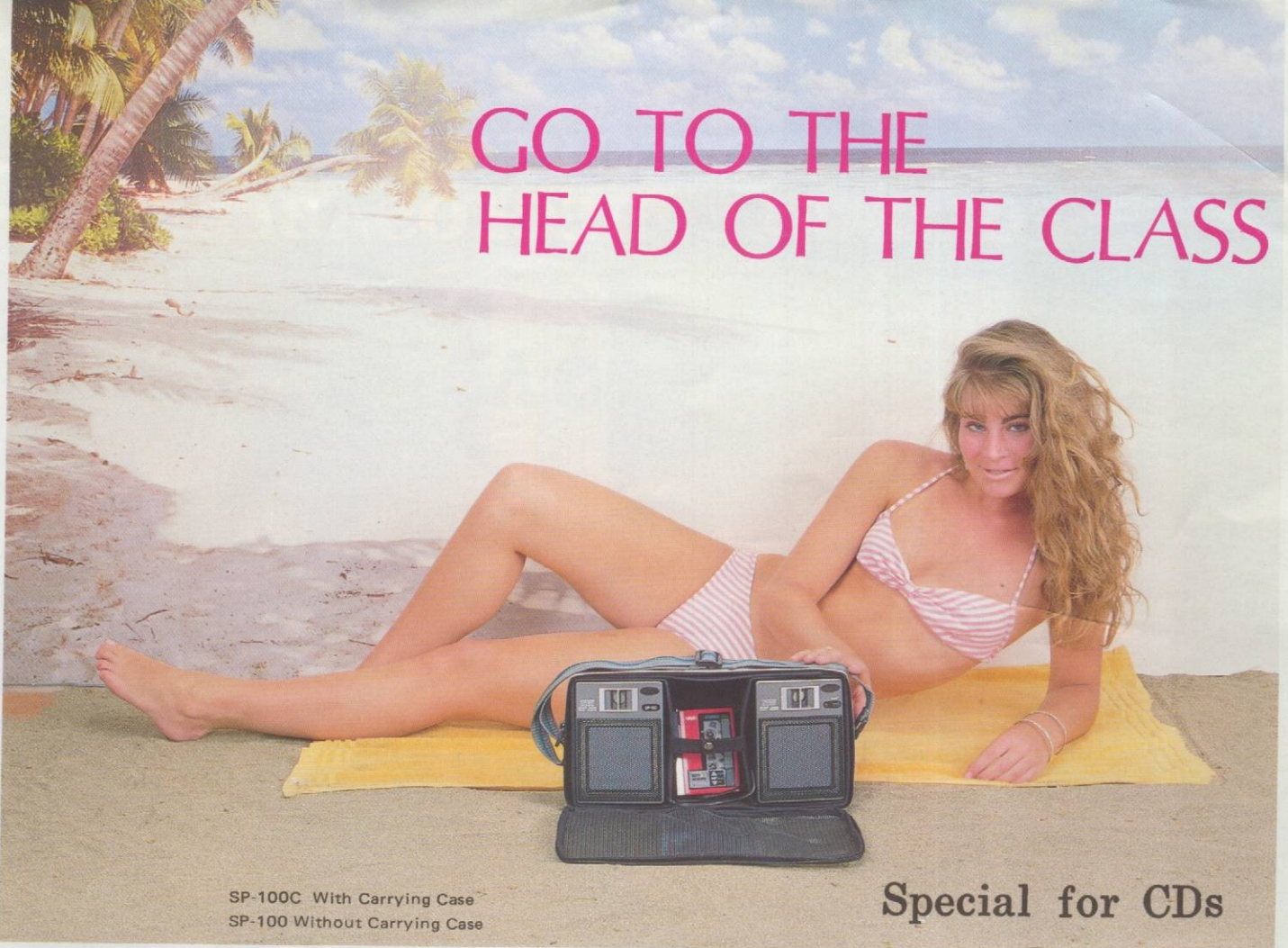
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