



COMPUTER-ASIA
MANAGEMENT'S GUIDE TO COMPUTER TECHNOLOGY

JULY 1983 No. 57

REPUBLIC
OF CHINA
— Special Report —

COMPUTER-ASIA
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TAIWAN

**ASIA'S
MICRO
DRAGON**

Matthew Miao
Chairman/Taiwan's
Mitac Group

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Edson de Castro, president of Data General, says his company is going to be around for a long time yet. 75

WIN A MEDFLY — FREE

Your last chance! 35

Software is a creative art. So says Brian Cohen, who confesses to enjoying the business of programming. 15

One of Singapore's outstanding computer personalities talks about her life and work. 18

Educationalist Nat Goodman argues for more computers in the classrooms. 36

John Rankine of IBM dispels some of the health hazard fears surrounding visual display terminals. 28



Our cover report this month deals with the computer industry in the Republic of China. 60



The annual Hong Kong Computer Conference was most notable this year for the degree of criticism levelled at the government. 19

Our Man About Town devotes his space this month to the Hong Kong Computer Conference. 31

And Simple Simon, in his usual place at the back of the book, has become security conscious. 82

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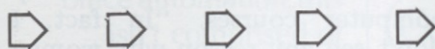
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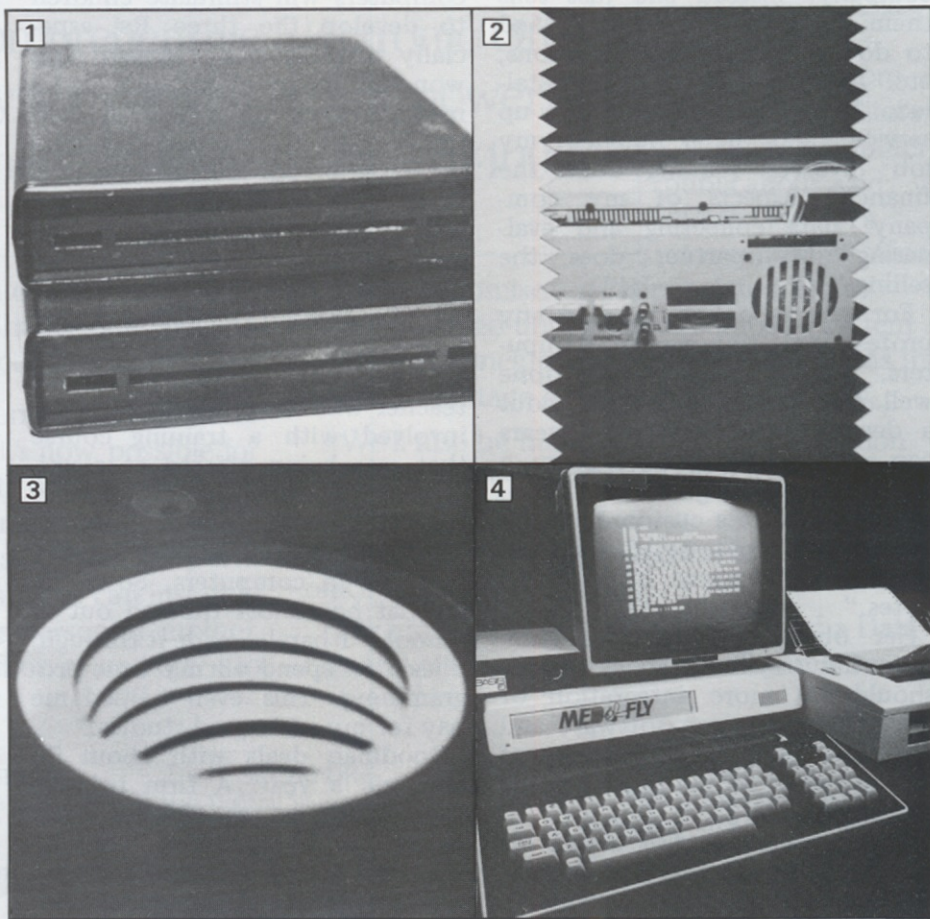
Here is your last chance to own a powerful double-drive microcomputer free of charge. Computer-Asia and Basis Microcomputer Ltd have joined together to give you this chance



HERE'S HOW IT WORKS:

These four black and white photographs are all microcomputer related. They have been appearing in the past three issues. We have been gradually exposing a little more of each, and here is the final exposure. What you have to do is identify the photographs. You can send in as many entries as you like. But remember the competition closes this month so this is your last chance. Try now! The powerful MED-FLY could be yours.

The winner will be the first correct entry opened. Entries will be opened only after the closing date, that is July 31. All entries received so far have been date stamped and lodged with Computer-Asia's solicitors for safe keeping. Entries will be opened in strict order of receipt. The first correct entry opened will be the WINNER. So, don't miss out on this last chance to win a super microcomputer.



HOW TO ENTER.

Write what you believe each photograph to be in the lines marked one to four. Send your entry (ies) to us as soon and as often as you like. The competition closes on July 31 1983 and entries received after that date will be invalid. Judging will commence on August 1, 1983 and the winner will be notified. Results will be published in the September 1983 edition of Computer-Asia.

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enter this competition.
2. The judges' decision will be final and no correspondence will be entered into.
3. Entries can be sent on facsimile copies of the official entry coupon.

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Put more computers in schools

A yen to solve problems, to be the first to provide solutions and to implement change are among the aspirations of Jai Menon.

The youthful researcher from IBM's San Jose laboratory is inspired in his mission by what he describes as "leeway" and tremendous opportunities to interact with professionals.

Menon has been working on the design and implementation of intelligent backend controllers. While doing his Ph.D in computer science at Ohio State University, Columbus, he worked on the design and analysis of a multi-processor based datamachine for performance enhancement and capacity growth. "I am more of a software person. I enjoy studying performance modelling of existing software, see how it can be improved, modified or made more manageable. Software is becoming so vast that there is a never ending need for research."

While a lot of his work is done on a team basis, IBM also encourages its staff to undertake their own studies. Says Menon: "I continue to research and publish my own work. IBM has plenty of incentives and awards for good work. An employee is judged not only on his contribution to the company but also on how well he does within the industry."

Asked how he came to be in computers, Menon adds laughingly: "I was tired of electronic engineering." Then on a serious note he confessed that his interest in computers began when he was an undergraduate at the Indian Institute of Technology in Madras, where there was an IBM. Menon received his bachelor of Technology in Electrical and Electronic Engineering from the IIT.

On the lookout to tap knowledge and share his skills, Menon soon will start teaching on a part-time basis. He advocates greater use of computers in the classroom. "It allows the student time to orientate with a tool that will



Menon. . . more of a software person.

play a vital part in the workplace. IBM has an interesting program with one of the universities where every undergrad doing a four-year course has a PC. The cost of the computer is included in the school fees. At the end of the course the student is allowed to keep the PC. But students, like those in the arts stream are not keen to work on PCs. So there is some opposition to the idea. But the issues have to be addressed and only time will tell. People always oppose change. But they are quick to appreciate and adopt a change when the potentials become clearer."

Menon is critical of the software industry. A sore point is the approach to programming. "Learning Basic for instance. . . the non-structured nature of Basic means a whole group of Basic programmers are thinking the non-structured way. As a result they write programs that are difficult to prove correct. I would like to encourage structured programming, which is the correct programming."

Menon hails from the state of Kerala in India. When asked if his future plans include sharing his skill with his countrymen he said: "Perhaps one day. . . but the day is not here yet. I have a lot to learn before I can do something worthwhile or be in a position to contribute to the well-being of India. As one gets older, one becomes less selfish and more giving. Now I am young enough to want to do things for myself."

Menon was a speaker at Conference '83 in Singapore.

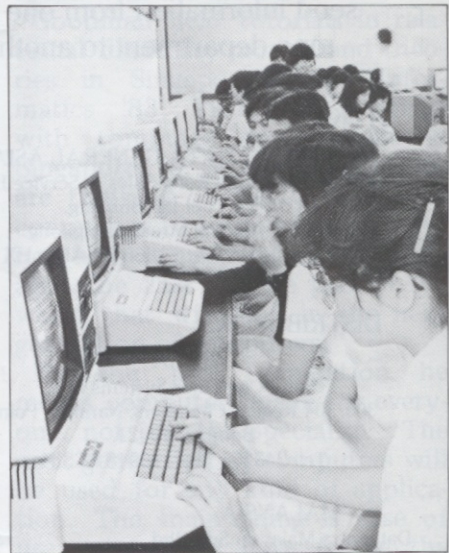
An aid to teaching

Teachers, trainers, and data processing managers can now create their own computer-assisted instruction courses with an interactive authoring system from McGraw-Hill International Training System.

At the launch of the system in Hong Kong Joseph Hatcher, marketing manager said that people with no knowledge of computer programming could use it. "This means that people with specialist knowledge in any subject, without teaching skills can impart their knowledge through a flexible and adaptable computer program."

He went on to say that the increasing emphasis being placed on the role of the computer in education in Hong Kong makes this the ideal time for the Interactive Authoring System to come on line. "Guided by step-by-step directions on the computer screen, the instructor can easily develop courses which incorporate text, colour graphics, and video tape segments. The resulting lessons test the student as he progresses, identify his areas of weakness and concentrate on improving him in those areas."

Apples for student



Nine Apple IIs have been installed at the Mun Seng College, Hong Kong. The Apples supplement the school's existing microcomputers, obtained through the Government computer pilot scheme.



The small dragon awakens to computers

The Republic of China, on the island of Taiwan, has been described as one of the four small dragons of the east Asian economic zone.

For the past three decades Taiwan has competed with the other small dragons — Singapore, Hong Kong and South Korea — in manufacturing and exporting textiles, garments, footwear, plastics and other low-end products. Now the race is on to get into high technology and, at this stage, Taiwan appears to be striding ahead of the competition.

There are almost 300 companies in Taiwan producing electronic products, up to 80 of them doing small computers, some of which are selling in vast numbers while others are still being test-marketed. Currently, Taiwan has a grip on just 1% of the world electronics market. The plan, over the next few years, is to double that to 2% — but 2% of a greatly expanded market.

Kuo Yun, president of the Institute for Information Industry (the equivalent of a national computer board in other countries), quotes figures to show that Taiwan in 1982 produced

\$2.96 billion worth of consumer electronics, communications and data processing equipment and components. That represented 1% of the worldwide \$292 billion industry. He has other figures which estimate the world market will grow over the next five years to \$510 million.

The visitor to Taiwan is left with a strong impression that this country of 19 million people will meet its target. The government has declared computers a strategic industry and no effort is being spared in providing research and production facilities. "We have a special way of doing things," said L.N. Wu,



Kuo Yun

vice-president of Pan-Asia Electronics. "Our companies are small, but we have a high level of cooperation with the universities. They have the skilled technical people and they are happy to put them to work on research projects that will assist industry. They develop the products and we commercialise them."

Taiwan is moving away from making electrical consumer products such as radios and television sets into computer-related equipment. This is reflected strongly in some recent trade figures. Exports of consumer products in the first quarter of this year fell by 15% (from \$235 million to \$199 million) compared with the corresponding period in 1982. Data processing products, on the other hand, enjoyed fantastic export growth — up by 539% from \$6.1 million in the first quarter last year to \$39 million this year. Telecommunications products were up 36% from \$33 million to \$45 million.

The showpiece of Taiwan is the Science-based Industrial Park at Hsinchu, about 100 kilometres from Taipei. So far, the government has allocated \$75 million to develop the Park. By the time its 10-year development ends in 1990 the Park is expected to be home to 150 companies manufacturing products at the high end of technology. And by then

Currencies quoted in this and other Computer-Asia reports are United States dollars, unless otherwise specified. The term billion is the American version, i.e. 1,000 million.

WORLDWIDE ELECTRONICS INDUSTRY SALES

	(US\$billions)		COMPOUND GROWTH RATE (%)
	1982	1987	
Consumer Electronics	41	65	9.6
Communications	61	98	9.9
Data Processing	130	245	13.5
Components	60	102	11.2
Total	292	510	11.8

TAIWAN'S ROLE IN WORLDWIDE ELECTRONICS INDUSTRY - 1982 (US\$billions)

	TAIWAN	WORLDWIDE	AS PERCENTAGE OF WORLDWIDE (%)
Consumer Electronics	1.03	41	2.4
Communications	0.16	61	0.3
Data Processing	0.06	130	0.05
Components	1.71	60	2.8
Total	2.96	292	1.0

production from within the Park could reach \$3 billion annually.

Adjoining the Hsinchu Park are two universities, the National Tsinghua and the National Chiao-tung, where the emphasis is on technology. And a little further up the road is the Industrial Technology Research Institute where valuable work is being done on the design and development of integrated circuitry.

Great efforts are being made to attract companies to the Hsinchu Park which is modelled to some extent on California's Silicon Valley. Foreign investors are welcome, with no requirements for local equity participation. Factory space is rented by the Park administration for around 20 cents

a square foot, far cheaper than anything available elsewhere in Taiwan.

There are fairly strict conditions governing the type of businesses allowed in. They are not, for example, interested in either labour-intensive or atmosphere polluting industries. So far, 46 companies have been approved to begin manufacturing in the Park but, mainly because of the recession, only 30 of them have actually started up.

Taiwan, like other places, is finding that people are in short supply in the electronics industry. One survey has revealed that there will be a demand over the

next two years for more than 3,000 engineers with Ph.Ds or masters' degrees. The supply from Taiwan's universities will be only 2,250.

Kuo Yun's staff at the Institute for Information Industry have prepared a manpower profile for the software industry which shows the demand for people will grow from today's figure of 13,000 to 54,000 over the next seven years. To fill the vacancies within its industry, Taiwan is recruiting heavily in the United States where many of its bright young people have gone to study. It's meeting some competition in that regard from Singapore.

TAIWAN'S EXPORTS OF ELECTRONIC PRODUCTS IN 1982 (US\$ millions)

	EXPORT	IMPORT
ELECTRONIC PRODUCTS	1,271	275
Consumer Products	1,034	77
Telecommunications Products	163	35
Data Processing Products	64	112
Measuring & Controlling Equip.	10	51
ELECTRONIC COMPONENTS	1,712	1,231
Consumer Electronic Parts & Accessories	927	439
Electronic Passive Components	163	146
Semiconductors & ICs	483	383
Valves & Tubes	139	263
Total	2,983	1,506

TAIWAN'S TRADE IN ELECTRONICS

	EXPORTS			IMPORTS		
	1st Q 1982	1st Q 1983	GROWTH RATE (%)	1st Q 1982	1st Q 1983	GROWTH RATE (%)
ELECTRONIC PRODUCTS	276.4	285.6	3.3	68.3	61.2	-10.4
Consumer Products	235	199	-15.4	29.4	13.3	-54.9
Telecommunications Products	32.7	45	36.2	3.7	5.8	57.2
Data Processing Products	6.1	39	539.0	22.8	30.5	33.7
Measuring & Controlling Equip.	2.6	2.6	0	12.4	11.6	-6.2
ELECTRONIC COMPONENTS	396	382	-3.6	279.3	303.3	8.6
Consumer Electronic Parts & Accessories	209	187	-10.7	99.8	102.6	2.8
Electronic Passive Components	35	36	4.7	34.3	35.8	4.4
Semiconductors & ICs	119	124	4.4	88.5	103.8	17.3
Valves & Tubes	33	35	4.8	56.7	61.1	7.8
Total	672.4	667.6	-0.7	347.6	364.5	4.9

Room for a boom in the Park

"In the boom years," observes Ning-jo Chu, "everyone is a good economist. Lately, there haven't been any good economists around, even in the United States."

Chu, deputy director general of the Science-based Industrial Park Administration in Hsinchu, was reflecting on the progress of Taiwan's "Silicon Valley" since it opened 2½ years ago. So far, 46 enterprises have been approved by the Park administration to set up factories there. Only 30 of them have actually moved in and some of them, because they are only a year or two old, are not exactly awash in profits.

Nevertheless, interest in the Park, among both local and foreign investors, continues to grow. The recession, explains Chu, has held back development somewhat. But there are signals which suggest better economic times are around the corner and planning proceeds at a merry pace within the Park administration.

The aim, from the outset, has been to attract 15 new enterprises in a year to Hsinchu. So far, they're on target with approvals and they're optimistic that actual start-ups will soon match their targets. In fact, the pace could quicken any time now. Chu is just back from a trip to Europe where there is strong interest in the Park.

Previously, the promotional drive had been in the United States where big names like Wang and Qume had been attracted. "There was good reason to concentrate on the U.S. first," says Chu. "American companies tend to be more internationally minded than Europeans. Besides, most of the Chinese expatriates, a key target group to attract to Hsinchu, live in the U.S."

The Japanese have expressed interest in Hsinchu but mostly for the wrong reasons as far as Taiwan is concerned. Japan's strategy always has been to



Ning-jo Chu of the Science-based Industrial Park at Hsinchu.

export the labour-intensive side of its industry. At Hsinchu they're not interested in labour-intensive undertakings. They want high technology, the kind that employs heads rather than hands.

Hsinchu was conceived as a vehicle to take Taiwan into the new age, a showplace for its information industry where low-cost, sophisticated items can be produced mainly for world markets. All sorts of incentives are provided to attract investors to Hsinchu. These include tax concessions, a removal of important duties on commodities to be used in export products, guarantees against nationalisation of foreign enterprises and freedom for foreigners to own up to 100% of businesses operating within the Park. Rents charged for factory space and dwelling units within the Park are more than competitive — currently about 20 cents a square foot per month.

Of the enterprises approved so far for the Park, 69% involve local capital, 25% foreign and 6% overseas Chinese. The 30 companies already established in the Park employ 2,400 staff. The Park's administration employs another 200 and there are 1,600 people working in the three banks, post

office and customs department already established there.

One quarter of the manufacturing staff are university graduates. "At least bachelors' degrees," says Chu. "Many have masters' degrees." Seventeen are Ph.Ds, including Chu himself who was a chemistry teacher at the National Tsinghua University before taking up his present post.

Education continues among Park employees. The Tsinghua and Chiaotung Universities, both of which have campuses adjacent to the Park, are offering extension courses and accepting workers for part-time degree studies. Business administration courses are the most popular because many of the young engineers who have embarked on entrepreneurial ventures want to learn more about the nuts and bolts side of running a business.

The movement of large numbers of people into the Science-based Park has placed tremendous strain on local resources. The Park administrators are grappling with problems associated with housing, transportation, health clinics, recreation facilities and schooling. A new school, due to open in September, will provide



bi-lingual education, (Chinese and English) to cater for children of expatriate Chinese who have returned to Taiwan to work in the Park.

By end-June 1983 the government had budgeted the equivalent of \$75 million to develop the Hsinchu Park while the 46 approved enterprises had allocated a similar amount. Of this total of \$150 million, about 90% would be spent on developing land and buildings, said Chu.

The idea for the Hsinchu Science-based Industrial Park was first mooted back in 1976 by Dr S. S. Hsu, then chairman of Taiwan's National Science Council. Hsu, a former mathematics professor at Tsinghua University, later moved to Purdue University in the United States and eventually was recruited back to Taiwan. He is now retired. He is credited with having pushed the Park idea so hard that the government accepted it. To this day, the Park administration reports to the National Science Council rather than to a government ministry.

In the Park's first full year of operations, 1981, the value of

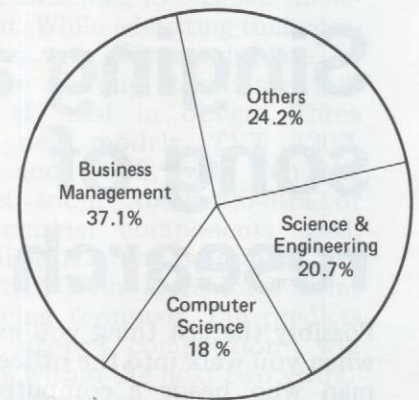
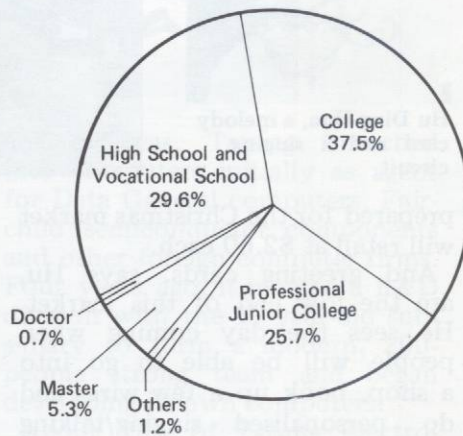


Housing for Park workers.

SOFTWARE INDUSTRY MANPOWER PROFILE - 1982 (EDUCATION)

DEGREE

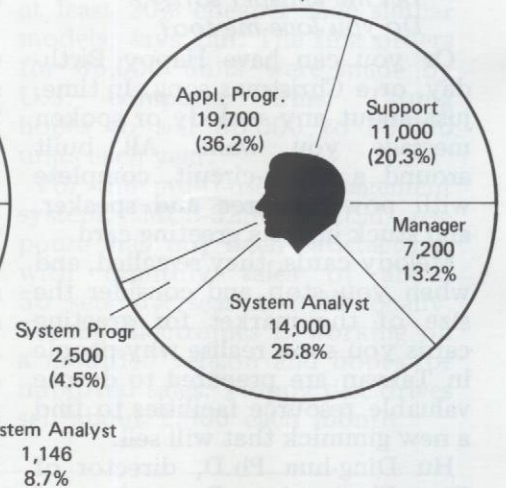
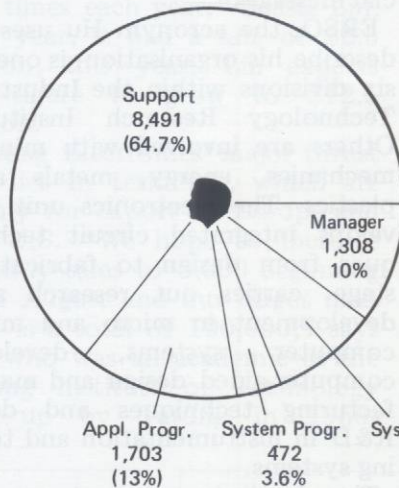
MAJOR



SOFTWARE INDUSTRY MANPOWER PROFILE (1982 vs 1989)

Total 13,120

Total 54,400



production was \$3.6 million. This increased dramatically to almost \$26 million in 1982 and in the first four months of this year reached \$18 million. The pro-

jected figure for the whole of this year is \$80-\$100 million. Almost 50% of production there currently goes to the domestic market, 25% to the United States and 14% to Hong Kong.

So far, the Park is running a balance of trade deficit. In 1981 its imports were worth nearly \$14 million. It redressed the unfavourable balance slightly in 1982 with \$23 million in imports (against \$26 million exports) and in the first four months of this year imported \$23 million worth of components and equipment.

The trade balance is likely to alter dramatically in coming years as more and more companies within the Park get on their feet and pass beyond setting up and product development stages.

Taiwan

Singing a song of research

Possibly the last thing you expect when you walk into the office of a man who heads a computer research centre is to be greeted with a thin, slightly metallic melody of an old song that goes:

*Let me call you sweetheart,
I'm in love with you.
Let me whisper softly,
Do you love me too?*

Or you can have Happy Birthday, or a Christmas song. In time, just about any melody or spoken message you want. All built around a micro-circuit, complete with power source and speaker, and stuck inside a greeting card.

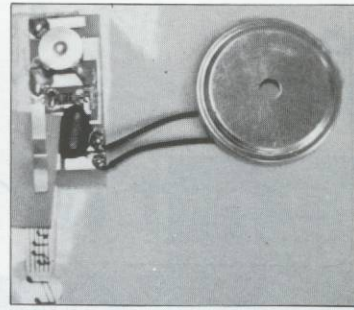
Melody cards, they're called, and when you stop and consider the size of the market for greeting cards you soon realise why people in Taiwan are prepared to devote valuable resource facilities to find a new gimmick that will sell.

Hu Ding-hua Ph.D, director of the Electronics Research and Service Organisation within Taiwan's Industrial Technology Research Institute, is proud of the melody cards. They represent what he believes is an important area in his organisation's work. They provide a product from the computer age that can be used at the low end of the manufacturing industry, in small factories employing people with the most basic of skills.

And the market for them is enormous. Hu estimates that the annual sale of greeting cards in the United States alone exceeds four billion. Worldwide, it's probably 10 billion. If they can capture only 5% of that market, that's still a lot of integrated circuits to be made in Taiwan's factories and then exported to the world with plenty of added value. The current batch of cards being



Hu Ding-Hua, a melody card and a singing circuit.



prepared for the Christmas market will retail at \$2.50 each.

And greeting cards, says Hu, are the low end of this market. He sees the day coming when people will be able to go into a shop, hook up a few wires and do personalised singing/talking cards for their loved ones. And even, perish the thought, when the advertising and marketing industries move in with commercial messages.

ERSO, the acronym Hu uses to describe his organisation, is one of six divisions within the Industrial Technology Research Institute. Others are involved with mining mechanics, energy, metals and plastics. The electronics unit develops integrated circuit techniques from design to fabrication stage, carries out research and development in micro and mini-computer systems, develops computer-aided design and manufacturing techniques and does R&D in instrumentation and testing systems.

The Institute was set up 10 years ago by presidential directive as an independent non-profit organisation. All its divisions co-operate closely with industry, undertaking research and development for manufacturers, sometimes for a straight fee, sometimes on an equity sharing basis when a product proves successful. "Our mission," said Hu, "is to conduct R&D and then to provide technical services to industry, to accelerate the development of industrial technology".

When ERSO first started it brought in RCA's technology in semiconductors, set up a demonstration plant, showed it could make integrated circuits and then transferred the technology, said Hu. "We have concentrated on the design methodology because we firmly believe that

the application of integrated circuits can penetrate the international market with innovative products.

"We concentrate on semi-conductors that are semi-custom made in nature. The circuits have their own specifications; we need to customise the top layer or the inter-connections. We are using the Intel 16-bit family to develop a series of hardware modules. We have a multi-bus board, a CPU board, a memory board, a disc drive board and so on. We're also looking for a board to be used in 16-bit personal computers and at local area networking. A combination of boards will configure as a personal computer. Other boards can be combined as the basis of a graphics terminal."

Module design is not cost effective in the area of business but it's useful, says Hu, to "demonstrate our technology". ERSO has signed a contract with a local company to develop a graphics terminal that will have only one board, instead of the more usual three. "Once we show local industry that we have technology then we are confident they will join with us to manufacture the products we can develop."

Hu says they already have made great advances in the size of integrated circuits. "At present the technology is in the size range of 3 to 3.5 microns. We want to get it down to 2.5 microns, or even 1.5. In the first four years we concentrated on developing our integrated circuit technology. The next four will be devoted to upgrading their performance, further reducing them in size, and to develop VLSI".

There are 1,200 people on the staff of ERSO, about 800 of whom are junior college graduates or above.

Tatung aims at the top spot



Tatung, which dominates the electrical appliances market in Taiwan, is moving swiftly into computers. Encouraged by the success of its terminals which currently enjoy a sale of 2,000 to 3,000 units monthly, Tatung is to launch its first small business computer and a modified multi-user computer system soon.

"We've always aimed to be No 1 in many products, and this will be the case with computers," says Lin Yeh-tseng, president of Tatung Electronics Corp., the subsidiary specialising in computer production.

Lagging slightly behind in computer manufacturing previously, Tatung Electronics aims to overtake its competitors with its latest products. "We hope to sell a complete system for under \$2,500, which will be extremely attractive to many customers," says Lin. Tatung Electronics designs and produces all peripherals including printers, floppy disc drives and video monitors.

Founded in 1918 in Taiwan, Tatung is the leading local electronics firm with a sales turnover of \$316 million in 1981. It employs 25,000 workers in some 40 subsidiaries, 10 of which

are overseas. Tatung branched into computers initially as agent for Data General computers, Fairchild semiconductor components and other foreign computer firms. Four years ago, it merged a R&D division with the 17-year-old subsidiary to form a modern, 200-people strong team and began developing its own computers.

About 25% of Tatung Electronics, resources are devoted to R&D, indicating its ambitious long-term commitment in this industry. "We expect to grow by five times each year," boasts Lin. Last year, it had a sale of \$2.5 million; this year, Lin expects the figure to grow to \$12.5 million.

Tatung Electronics' major thrust still lies in terminals, which are mainly for export to Europe and the U.S. "We hope to increase monthly sales to 5,000 beginning from August and our target next year is a total of 100,000," says Lin who was an academic at the Tatung Institute of Technology (set up by Tatung in 1956)

before switching to business management. While admitting that competition with Korea is intense, he believes Tatung terminals still lead, at least in design. Three other new models, TVT 4200, 4300 and 6600, will join the market soon. About 20-30% of the terminal components used, including ICs and keyshifts, are imported. With more local firms producing terminals, Lin predicts that strong competition will emerge within the next two years.

Tatung's new small business computer, the TPC 2000, is a desktop, single-user system built around a Z-80A. With an OEM price of \$1,000 and suggested retail price of \$2,500 the product is at least 20% cheaper than similar models, says Lin. The first orders for 35,000 units were made by U.S. computer firms. Tatung hopes to sell 30,000 to 50,000 units each year.

For the multi-user management system, MCS-3280, initial response has not been satisfactory, with monthly sales of about 50 sets overseas and 20 locally. Tatung Electronics is working on a modified version and hopes for improved sales. Floppy disc drives sell about 2,000 each month.

TAIWAN'S EXPORTS OF COMPUTERS & RELATED EQUIPMENT
(US\$ millions)

	1981	1982	AVERAGE GROWTH 81/82	JAN-MAR 1983
Computers & Peripherals	5.2	63.8	**	39.4
Microcomputers	0.4	2.0	400%	1.4
Magnetic Disc Devices	0	0.4	**	0.8
Printers	0.1	4.5	4400%	2.9
Terminals*	3.8	21.3	**	17.7
Monitors*	N.A.	33.6	**	15.6
Others	0.9	2.0	**	1.3
Parts For DP Systems	100.3	95.7	**	33.0
Parts for Microcomputers	9.8	12.4	27%	4.8
Parts for Minicomputers	8.5	14.8	74%	7.1
Parts for Computers*	82.0	68.5	**	21.1
Total	105.5	159.5	**	72.4

* Jan-Mar, 1982/1983 Adjustment

** Meaningless

TAIWAN'S IMPORTS OF COMPUTERS & RELATED EQUIPMENT
(US\$ millions)

	1981	1982	AVERAGE GROWTH 81/82 (%)	JAN-MAR 1983
Computers & Peripherals	65.4	112.0	71	31.0
Microcomputers	8.4	12.8	52	2.1
Minicomputers	11.6	13.1	13	2.3
Computers	17.6	37.4	113	7.6
Magnetic Disc Devices	0.7	2.7	286	2.4
Printers	7.7	11.0	43	4.7
Terminals	7.8	11.5	47	4.9
Others	10.6	23.5	122	7.0
Parts for DP Systems	32.3	35.9	11	9.9
Parts for Microcomputers	8.8	8.8	0	2.7
Parts for Minicomputers	4.2	4.3	2	1.2
Parts for Computers	19.3	22.8	18	6.0
Total	97.7	147.9	51	40.9

Taiwan

To market, to market, to buy a fat pig...

Everyday in Taiwan, farmers all over the country lead their pigs off to market. On busy days they sometimes had to lead them home again if darkness fell before the auctioneer had got through all the day's offerings. That meant a total waste of time for the farmer and it didn't help the pigs either because all that walking made them lose weight.

Not any more though; not since the computers were installed to control the daily pig auctions at three locations throughout the island. Matthew Miao, chairman of the Mitac Group tells how it was done:

"There's a 350-seat auditorium with a circular walkway in the middle. The pigs come out like beauty contestants. When the buyers arrive at the auction they pay a deposit and get the use of a computer terminal with an identifying number. They're experts, these guys. They can tell from the way the pig walks and from its general appearance if it's good quality. If they want to bid, the more the price rises. This system gives a throughput at the auctions of 3-3½ times what they can do with the old system."

The computer has eliminated all the arguments about who had bid for each pig. The bidder offering the top price is clearly identified by the number of his terminal. The computer also keeps the buyers informed of whether they have enough deposit left to continue bidding. At the end of the day their bills are generated automatically by the system.

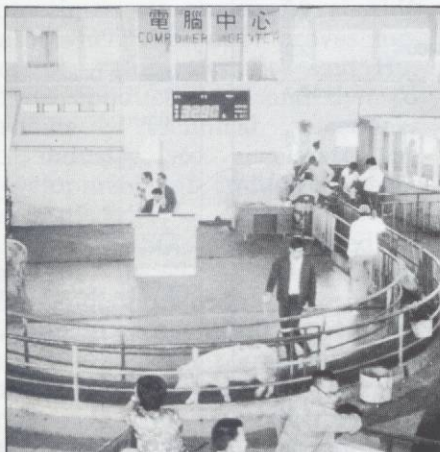
At the heart of the system is a Digital PDP-11/23 while the terminals are built around Intel microprocessors. It has to be hardy hardware, says Miao, because of the environment. "As

you can imagine, there's a lot of pig mess around the place."

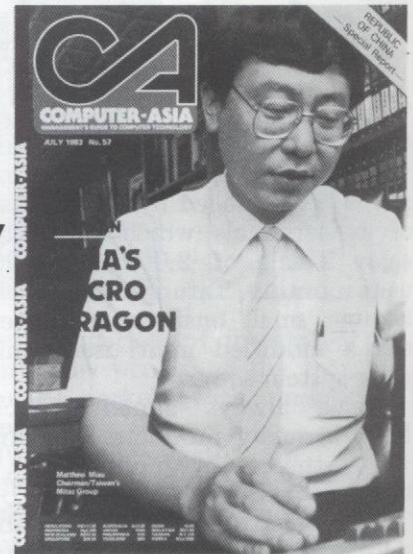
Matthew Miao has something of a pioneer's background in computing. For five years, starting in 1971, he worked with Intel in the United States. He was one of five people who developed the now-famous 8080 range of chips, and then did a spell as Intel's marketing manager. He talks of the "old days" when not many people knew anything about microprocessors, when Adam Osborne was writing about computers rather than manufacturing them under his own brand name.

Miao moved to Taiwan after his Intel stint and found that although computers had been used there for 25 years they were still regarded by the vast majority of people as "black boxes". He moved into a company called Taiwan Automation, a hardware dealer with 10 people on staff, and set about reorganising it.

"We figured the best thing to do would be to take micros and apply them to the local market," he said. "We started with big dreams about building a better computer than anyone else. After a year it was a big failure. We learnt a lesson. You shouldn't



Pigs go under the computerised hammer.



just re-invent the wheel. We found that our software was not as good as that in the United States. The hardware was not as reliable. The hardware even looked bad."

Miao and his colleagues decided then that they should go into something they could be good at, something not available in the West — a Chinese computer. "Because Taiwan Automation had been trading in technological products, it had built up a team of engineers. At that time we had the Bureau of Criminal Investigation as a customer and they wanted to do a huge project, to computerise all criminal records. We pretty much ruled out a mainframe for that. We took some minis and some micros and modified their operating systems to interface with the Chinese intelligent terminal we had developed. That proved to be a good starting point for our Chinese computer system. That was our first generation Chinese system, and it's still running 24 hours a day, six years later. We call it the Iron Horse."

Since then Taiwan Automation has developed second and third generation Chinese computers. "We're really on top of the market now. But development of these systems has been costly. For every dollar we've put into hardware we've put four into software."

Mitac specialises in manufacturing computers and peripherals. It's licensed by Shugart to make its disc drives. The only other

companies in the world so licensed are IBM and Matsushita of Japan.

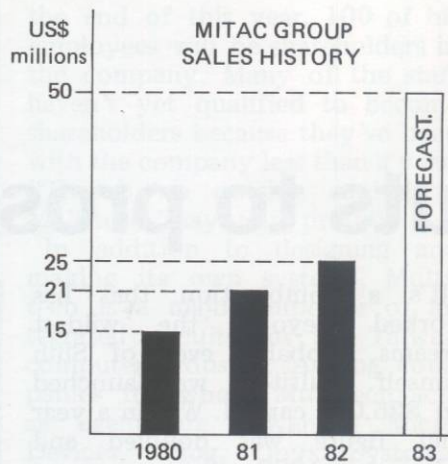
Another group member, China Management Systems, specialises in software. CMS is the largest software company in Taiwan and 25% of it is owned by the largest software company in Europe, Societe General. CMS uses an IBM, a Digital VAX system. Another company, China Software Development, specialises in banking. Another does components. There's also a publishing company within the group and yet another which is the Digital Equipment Corp distributor.

Within the group they have done a number of successful turnkey systems. One was to computerise Far East Silo Corp, the largest of its kind in Asia with 90,000 tons of grain storage capacity.

This system is built around three minis and 11 micros and is said to save tens of millions of dollars a year in grain handling costs. The silos are used to store wheat, barley and other grains, except rice, which are imported to Taiwan. The importers are hundreds of small buyers who don't have their own storage capacity.

From the time the ship arrives in port the handling of the grain is controlled by the computers, keeping track of which customer owns which portion of the shipment. Up to 30 truck drivers arrive at the silos each day and activate the system by inserting an identity card into a computer terminal. A German company won the contract for the computerisation of the silos and sub-contracted Mitac to do much of the work.

Currently the Mitac Group is contracted by Omron of Japan for a highways contract in Taiwan. This will string a series of computerised signboards along the country's highways to inform motorists of traffic conditions up ahead. Thus, if there is serious congestion caused by an accident or fog, motorists will be advised of the most appropriate detour. The system will keep all sorts of statistics on vehicle movements, but at this stage there is no plan to follow



Hong Kong's example and use it to impose road usage tolls on motorists.

Under sub-contract to L'Air Liquide, the French company which is the largest oxygen manufacturer in the world, the Mitac Group is doing yet another turnkey project. Twelve of its engineers have gone to France on this one. "We have become very international in turnkey systems design," said Miao.

He and his colleagues are trying to persuade the government in Taiwan to allow horse racing to start there — so that they can computerise the betting system, "like in Hong Kong and Singapore."

Miao points out that Chinese people like to gamble. "It's a shame that everybody closes their doors and gambles illegally. The government could tax them if it allowed horse racing."

Matthew Miao has definite views on the subject of standardisation for Chinese computers, a subject that is now being given serious consideration by Taiwan's Institute for Information Industry.

There are two areas, he says, where a standard is involved. One is the internal code. That has to be standardised, with all the addresses in the same place so that all software can be compatible.

The other is the input method. He does not believe it should be standardised. A telephone information system, for example, is used by an operator who reacts to a sound. That needs to be phonetic and requires a large keyboard containing perhaps up to a couple of thousand characters.

Miao personally prefers to use a small keyboard, similar to the standard QWERTY keyboard on which Chinese characters are built by using up to five key strokes.

"Professionals need a large keyboard, like a Chinese typewriter," he says. "It all depends on the application. Let the best system win for the individual application involved. But a good system should have both keyboards, large and small."

Mitac has an impressive range of products on the domestic and international market. At the bottom of its range is the Little Intelligent Computer. The LIC-2001 sells on the home market while the LIC-3001 is exported. These are dual-processor personal computers with 64K bytes of RAM and 24K of ROM.

Mitac makes two series of small business computers. The MIS-5000 runs under CP/M and has minifloppies for storage. The MIS-8000 uses eight-inch diskettes, and comes with two drives. Diskettes are dual density and can be single or double-sided, depending on choice of drive. The MIS-8010 drive gives 2 x 512K bytes of storage while the MIS-8020 gives 2 x 1 megabytes.

Mitac claims to be the only Taiwan company manufacturing disc drives. Others merely assemble them, says Miao. "We also sell parts to people who assemble drives," he added. Also in the Mitac range are Mate-I and Mate-II, Apple-compatible disc drives which are selling well in Asia.

One of the by-products of Mitac's Chinese computer system is a 128K byte dynamic RAM board. "We were the first in the world to produce a 128K board," says Miao. "Now everyone's got them. But we were first." That was three years ago.

Miao's secretary uses a CCRT-1640, a 16-bit Chinese system developed by Mitac. One of the applications in it is a business card filing system, to keep track of 10,000 cards Mitac has collected. The system allows input and output in a mixture of Chinese and English. Cards are filed by personal name, company name, type of business, geographic location and so on. The software for this was developed in-house.

From peanuts to prosperity

"In the hands of youth lie the hopes of mankind." So reads the inscription on a sculptured award made to Stan Shih, founder and president of Multitech International Corp, by K.T. Li, minister in charge of science and technological development in Taiwan.

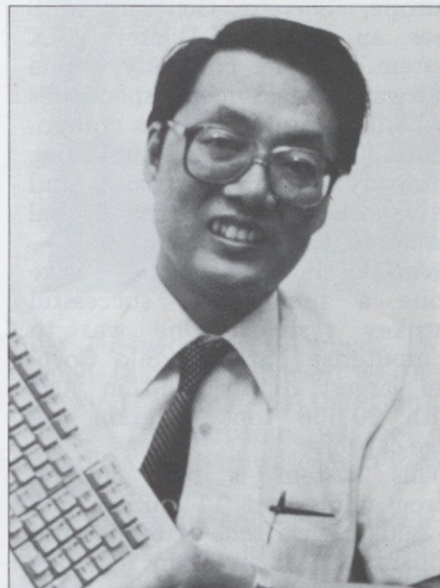
The award graces Shih's office in Taipei and a life-size replica stands outside his company's main factory in the Hsinchu Science-based Industrial Park. Multitech, founded by Shih and six colleagues in 1976, is the outstanding success story of Taiwan's electronics industry.

The secret of that success is a hard-headed combination of technical excellence and marketing strategy. "I cannot emphasise too strongly," says Shih, "that we are more than just a technical leader. We set out to commercialise the computer business, to promote our products strongly in the marketplace."

It's a combination that has worked beyond the wildest dreams, probably even of Shih himself. Multitech was launched on \$25,000 capital. Within a year that figure was doubled and sales in 1977 were a mere \$325,000. This year, with capital increased to \$3.3 million, sales are estimated to reach \$42 million.

Average annual growth in sales over the past six years has exceeded 120%. The only year when growth fell below 120% was in 1981 when they were ploughing all their energies and spare cash into new products. Even so, they increased their revenues that year by an impressive 78%.

Shih and his co-founders of Multitech gained their foothold in electronics while working for a calculator manufacturer. They scraped together their \$25,000 in capital ("Peanuts really," observed one of today's industry



Stan Shih of Multitech.

leaders) and went into business as traders and consultants. In their first four years they designed 40 micro-based products for other people. Among them was the Esprit terminal which they designed for Disco Electronics, a Taiwan manufacturer. Disco later sold the Esprit technology to Hazeltine and that American manufacturer has taken it to great heights.

Meanwhile, Multitech was working on two products that were to establish it as a manufacturer in its own right — the Dragon terminal to handle Chinese-language input-output and the widely accepted Micro-Professor, an entry-level computer packaged like a student's text book. The first of these, the MPF-I was unveiled in 1981 at the Westcon Show in the United States. Z80-based, it was designed for engineers, students and hobbyists wishing to learn about hardware and software. More than 100 universities in the United States now use it as a teaching aid.

So far, Multitech has produced 40,000 units of the MPF-I and they're still rolling off the com-



Assembling the Micro-Professor in the Multitech factory.



Y.S. Chiu who is in charge of manufacturing at Multitech.

the end of this year, 100 of his employees will be shareholders in the company. Many of the staff haven't yet qualified to become shareholders because they've been with the company less than a year. "There's no outside capital in Multitech," says Shih proudly.

In addition to designing and making its own systems, Multitech is a major importer of integrated circuits for the Taiwan computer industry. Among companies for whom Multitech acts as agent are Advanced Micro Devices, Zilog, Onyx Systems, Hazeltine, Gould Instruments, Monolithic Memories, Rockwell, RCA, Texas Instruments and National Semiconductor. For its own factories, Multitech will spend more than \$10 million this year on chips, at prices ranging from less than 20 cents to more than \$20.

The Dragon system, already accepted as an industry standard among Chinese computer systems, has absorbed most of the research and development funding of Multitech. But results are coming in now. And the price is falling all the time. "When we introduced the Dragon computer in 1980," said Shih, "we had to price it at \$6,000. Our new Dragon 7000 series is much more powerful and retails for only \$2,500".

Currently, they're producing only 50 a month, mainly because of a materials supply problem but they're fast getting on top of that. Apart from the domestic market they see good prospects for the Dragon in Singapore and Hong Kong.

Multitech achieved its breakthrough into a Chinese computer system by devising a method to

build Chinese characters on a standard ASCII keyboard. Working from the fact that every Chinese character is made up of strokes, (up to five) they managed to assign enough basic strokes to 24 of the standard QWERTY keys to be able to write up to 22,000 different characters. Three hours of instruction is enough to get someone literate in Chinese doing input. After one month, speeds of 30-50 characters a minute are possible and another month can get this to the 60-90 characters a minute range.

Shih is confident about the Chinese system. "At the start, our problems were in the area of input-output. We've conquered those. Now, the problems are software and promotion. The Apple computer has become fantastically successful only in the past few years — because of the availability of software. Two years from now, there'll be applications software available for the Dragon. Then it will really take off."

Acceptance of the Dragon is certain to be stimulated by another Chinese system which Multitech has developed for schools in Taiwan. This is so basic it doesn't even take a floppy disc, let alone a printer. Price: less than \$200.

As he contemplates his changing marketplace and the rising cost of R&D, Stan Shih is cautious about future growth of Multitech. "It probably will come down a bit," he ruminates, "maybe down to 100% a year."

MULTITECH GROUP SALES RECORD

	1976	1977	1978	1979	1980	1981	1982	1983 (Forecast)
Capital	25	50	50	250	250	1,000	1,625	3,375
Sales amount	—	325	800	1,775	4,025	7,175	17,000	42,500
Growth rate	—	—	146%	122%	127%	78%	137%	150%
Sales amount/capital	—	6.5	16	7.1	16.1	7.2	10.5	12.6
Employees	11	12	18	46	104	175	300	500
Sales amount/employee	0	27.1	53.3	55.5	53.7	51.3	71.4	106.3

Teaching Chinese to an Apple

Plus & Plus was one of the successful coin-operated video game manufacturers in Taiwan — until the government late last year banned such machines from the domestic market.

Plus & Plus had seen such a move coming and two years ago it swung its engineers over to designing computer products for business use rather than for games. In the past year it has unveiled two products, both of which were designed and developed in-house.

CAN-80 is a microprocessor training kit and development system, suitable for engineers and students. It came on the market in the United States in December and, according to Tony Liao, vice-president, distributors and agents are knocking on their doors wanting to get rights to it. At this stage they're selling 100 CAN-80s a month in Taiwan and 250 a month in the U.S. It's only a matter of time, says Liao, before they tie up a big-quantity order. The end-user price is about \$120.

The other product on which Plus & Plus is counting to make strong sales is C-Plus II, a Chin-



Jackson Ho of Plus & Plus.

ese character generator which comes in the form of an Apple-II compatible interface card. "It's a first for Taiwan, and the world," says Liao. By plugging in the card, a user can give both Chinese and English language capability to his Apple. Says Liao: "We developed this so that children in Taiwan can begin using computers at similar ages to children in other countries."

At this stage Plus & Plus is producing 600 of its Chinese character generators each month. They say it's simple to learn to use. A

Taiwan

couple of hours is usually enough, for anyone familiar with the Chinese language that is.

The next step is to make the Chinese character generator compatible with the IBM Personal Computer. That's not expected to take anything like the 12 man-years of R & D which went into the Apple-compatible model as most of the work is done now. Longer term, they want to develop it for minis and office automation systems. "The most difficult part," said Liao, "has been to find the way to generate the characters. We've done that now so it gets easier."

Also on the way is the MIART-1000, an Apple-compatible small business system. Plus & Plus has developed its own operating system for this one and it's now awaiting a report from the United States to back up its claim that it doesn't infringe any Apple patents.

Waiting for the third Sunrise

Sunrise Computer Service Co has been through two phases in its 18-month history and now it's planning for the third.

They would rather not talk about it today, but Sunrise started out as a copier of the Apple II, the pioneer in fact of that shady business.

It moved into Phase Two in October last year following a visit to Taiwan by the president of the German company which makes the Basis 108, a major seller in the micro markets of Europe and the United States. Sunrise at that time was developing its own micro, the Apollo 400.

A deal was done to swing its production line over to producing a machine called the Basis Medfly which combines some of the features of the Basis 108 with some of those of the Apollo 400.

"The original idea," said Paulus Yang of Sunrise, "was to build the entire product in Taiwan. But that idea had to be modified. What we're actually doing is to make everything except the main board which comes from Germany. We crate all our production off to Hong Kong where the systems are assembled." The market for the Basis Medfly so far is confined to Asia and Australia and Sunrise currently has a production target of 20,000 units a year.

But it's Phase Three of Sunrise's development that really excites Paulus Yang and his colleagues. This will be the Phase when Sunrise produces and markets its own home-grown system. Any day now they hope to start production of their Cat-100, a dual-processor machine using both

Zilog Z-80 and Rockwell 6502 chips. The people at Sunrise reckon this system will be even more popular than the Apple II. That's an optimistic outlook, considering there are an estimated 50,000 Apple-type machines in Taiwan alone.

Why Cat? we asked. An acronym perhaps for Computer-Aided Trainer/Transactor? Something like that? "Not really," said Yang. "We were looking for a short catchy name. Someone recalled that we'd started out in the micro business as a copycat. So, why not?"

After they get the Cat-100 established, which means full approval from the American Federal Communications Commission, to avoid any problems with Apple, Sunrise will throw its R&D energies into developing a 16-bit micro.

Computer ahoy!

It could be Data General versus Data General when the 12-metre yachts go down to the line in the America's Cup contest off Newport Rhode Island in September. Both the American defender and Australia II, one of three Australian entrants, are equipped with Data General computers.

Australia II has two computers. A microNova MP/100 on board its tender vessel receives data from Australia II's instruments, stores it on magnetic tape and then feeds it into an on-shore Nova 4X.

Data includes such statistics as boat speed, apparent wind angle (the actual wind angle plus the effect of the boat's motion), apparent wind speed, heel angle, heading (direction of the boat), rudder position, trim tab position, water angle, pitch and time.

As well as providing analytical data, the system also accepts navigational input on such crucial details as information on the tides, the yacht's initial position, and the position of marks, for crew purposes.

"The instant analysis of these crucial aspects of 12-metre racing are important technological advances which give the Australia II skipper and crew significant strategic advantages over past Australian challenges for the America's Cup," said syndicate chairman Alan Bond.

"When Australia II returns from training and trials at the end of the day, we can provide this computerised analysis, while events are still fresh in everyone's mind. Previously, we had to wait until the following day when some of the statistical facts could be calculated manually."

Bond said that because the computerised system can also store up to one million pieces of statistical information per day, the crew is able to look back over a whole history of pre-



vious trials and races to determine timing of different tackling procedures, boat performance with different navigational variants, overall equipment performance (current sails, masts etc. compared to previous ones) and a host of other data.

This is the first time an Australian challenger for the 132-year-old America's Cup, has had a fully computerised system, adapted specifically for 12-metre sailing purposes, at its disposal. The computerisation was kept a secret until recently, so as not to alert the Americans to the scheme.

Bill Johnston, communications manager of Data General Australia, told Computer-Asia that another major advantage held by the Australia II syndicate is the presence in the crew of Glen Read, a Data General field engineer on loan to the Australia II syndicate with responsibility for all hardware maintenance.

Read is the current world titleholder in Soling, a three-man yachting contest. He is being tipped to represent Australia in yachting events at next year's Olympic Games in Los Angeles.

Spinnaker flying, Australia II shows its style. Below: Alan Bond, Australia II syndicate chairman, with the Data General microNova on board the tender vessel.



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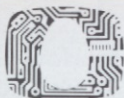


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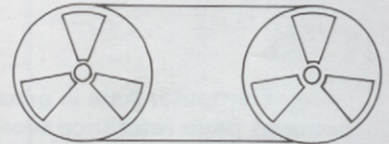
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