OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

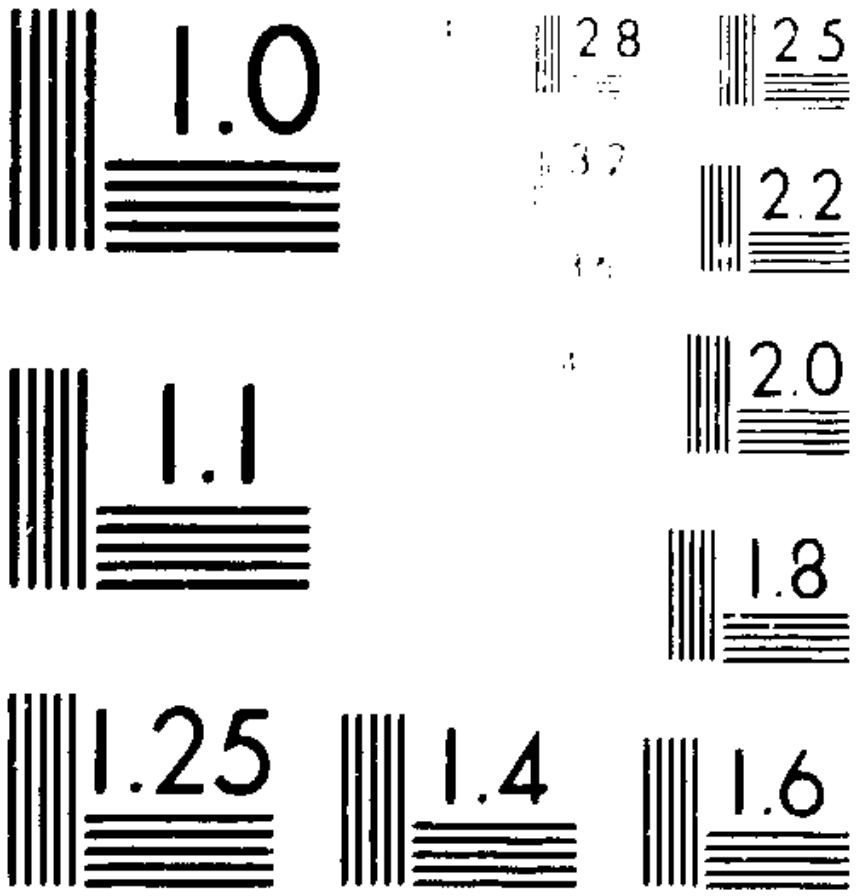
FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

MICROELECTRONICS MONITOR

12753

Issue Number 6 April-June 1983

Dear Reader,

The main event sponsored by UNIDO in the first half of 1983 was the organization of the International Forum on Technological Advances and Development, which was held at Tbilisi, USSR, from 12 to 16 April 1983. Some 70 experts from developing and developed countries met in the lovely capital of the Georgian SSR and had fruitful discussions and exchanged ideas on the impacts of selected technological advances which no country, developed or developing, can afford to ignore. There is more on specific recommendations and conclusions of the meeting relating to microelectronics inside this issue in the section on News and Events.

The Forum was the first of five high-level expert group meetings preparatory to the Fourth General Conference of UNIDO (UNIDO IV) which is scheduled to be held in 1984. Other high-level meetings deal with strategies and policies for industrial development in developing countries; human resources development for industrialization; industrial co-operation among developing countries; and energy and industrialization.

UNIDO's Technology Programme is continuing its efforts to promote regional co-operation in microelectronics; following a suggestion of the Forum it will look into the possibility of setting up an international centre on microelectronics applications. There has also been a request to UNIDO from an electronics meeting held in New Delhi recently to assist in the setting up of an Asian centre for electronics.

In view of the forthcoming summer vacations it may not be possible to adhere to the scheduled date for the next issue; nevertheless we will try our best to bring out an issue in September/October covering the most important developments.

8 39

G.S. Gouri
Director
Division for Industrial Studies

Inside this issue:

Mention of any firms or licensed products does not imply endorsement by UNIDO.

Compiled by the Technology Programme of UNIDO P.O. Box 300, A-1400 Vienna, Austria

NEWS AND EVENTS

International Forum on Technological Advances and Development, Tbilisi, USSR, from 12 to 16 April 1983

The Forum, which has been mentioned already in previous issues of the Microelectronics Monitor, was attended by experts representing 23 countries, both developed and developing as well as high level consultants in the areas of specific technological advances such as genetic engineering and biotechnology; microelectonics; materials and related technologies; petrochemicals; and energy from biomass and solar photovoltaic cells.

In the field of microelectronics, discussions centered on applications which should be developed and designed locally and have relevance to the improvement of the quality of life in developing countries in fields such as agriculture, health and education. Software development, it was said, was an integral part of the introduction of microelectronics and of particular relevance to developing countries where, with a minimum of effort, considerable capabilities could be built up. As regarded manufacture of components, chip design facilities could be developed locally so that custom designed chips for special applications could be developed.

The Forum recommended that UNIDO should undertake steps to explore the possibilty of an international centre on microprocessor applications to study the compatibility of the structure of production in the developing countries and the microprocessor applications with particular emphasis on applications in agriculture, transport, power generation and distribution and health; the centre should also facilitate development of the necessary software.

UNIDO was requested to expand its current work and systemize and expand dissemination of information. The Microelectronics Monitor was appreciated and it was recommended that it increasingly incorporate activities of the developing countries and policy measures suited for developing country situations.

The report of the meeting is available under symbol number ID/WG.389/6.

Fourth Brazilian Workshop on Microelectronics

The Workshop, as already described in Issue No. 5 of January 1983, took place at the University of Campinas, Brazil, from 21 February to 4 March 1983. UNIDO co-sponsored the event by financing the participation of two consultants who lectured on two specific subjects; i.e. biomedical application of ICs and application of ICs for power devices. Altogether a total of 23 lecturers and 350 students, teaching staff and engineers from Brazilian universities participated. The working group on biomedical applications among others discussed integrated sensors; solid state sensors and actuators, microelectronics applications to neurophysiology and new developments in pacemakers and artificial heart. An exhibition was held during the Workshop presenting the achievements of the electronics laboratory of the University of Campinas as well as products of the Brazilian microelectronics industry.

It was recommended that UNIDO provide continued backing enabling the Workshop, which should remain an annual event, to become a nucleus for regional co-operation and a catalyst for technical co-operation between Brazil and developing countries from different parts of the world. Participation of scientists from developing countries should be increased in future workshops. The organizers and UNIDO should mobilize specialized bodies such as the Institute of Electrical and Electronics Engineers Inc. (IEEE) to promote through the Workshop the dissemination of microelectronics knowledge in Brazil and the Latin American region as such. It was also suggested that the Workshop might become an important element in promoting ECLA/UNIDO co-operation in Latin America.

Symposium on Microelectronics for Productivity in the Asian region

An International Symposium on Electronics for Productivity was held in New Delhi from 21 to 23 April 1983. UNIDO sponsored the participation of five participants from countries of the region and was also represented by a staff member. Among other things the Symposium requested UNIDO to work out the modalities and mechanisms for the establishment of an Asian centre for electronics.

UNIDO mission to Peru Venezuela, Mexico, Barbados and Spain

During February/March 1983 a UNIDO staff member visited the above countries essentially with the purpose to assess the status of national efforts in computerizing technology transfer registries information systems, to determine the flow of information in each registry and evaluate the information exchange feasibility through TIES* on magnetic tapes. He also discussed with the authorities concerned problems connected with microelectronics, computer applications and information systems.

Seminar on the Assessment of the Impact of Science and Technology on Long-term Economic Prospects

The above Seminar is organized by the European Economic Commission in Rome, 16 to 20 May 1983. One of the subjects covered is the economic impact of the introduction of industrial robots and flexible manufacturing systems for which the EEC secretariat prepared a paper EC.AD./SEM.8/R.2.

Microcomputer Show '83 in Tokyo

Sponsored by the Ministry of International Trade and Industry, the Microcomputer Show has been held every spring since May 1977 and presents the newest technology, products and systems for every application. This year it is held at the Tokyo Ryutsu Centre from 25 to 28 May 1983. 114 exhibitors will show microprocessors, microcomputer and terminal equipment, personal computers, software and development tools, and microprocessor and microcomputer applications.

Meeting on computers in education and training

A National Conference on Computers in Education and Training was held on 2b to 17 March at New Delhi. Prof. C.S. Jha, Educational Advisor (T), Government of India, while delivering the conference keynote address, said that Computer Aided Instructions (CAI) will be increasingly used in India to solve some of the problems faced by educationists. The Conference, jointly sponsored by IIT (Delhi) and NIIT, was attended by over one hundred delegates from various organizations such as government departments, computer industries, training establishments, defence, business houses and academic institutions. The conference had deliberations on the issues like computers in education, issues and implications of CAI, computers in training, systems for CAI, graphics and simulations for CAI, and the place of CAI in the educational spectrum.

Dr. N. Seshagiri, Director, Department of Electronics, Government of India, while speaking on issues and implications in India, said that CAI could be effectively used as a 'crash' measure for training computer professionals. He wanted standardization in hardware and software used for CAI and stressed the need for introduction of well designed motivation and training programmes for teachers. Prof. S. Sampath (Director, IIT, Kanpur) who chaired the panel discussion on 'The place of CAI in the educational spectrum' recalled the capabilities of a computer and requested the educationists and teachers to exploit them for purposeful instruction and training. At the end the Conference appointed a working committee headed by Prof. R.P. Aiyar, Director, IIM, Calcutta to draw up CAI development plans and recommend implementation strategies. The committee will include computer experts like Prof. S. Sampath, Dr. N. Seshagiri, Gen. A. Balasubramanian and Prof. K.D. Sharma. Dr. E. Balagurusamy of the National Institute of Information Technology, New Delhi will be the member-secretary of the committee. Conference proceedings will be available from Dr. E. Balagurusamy, Head, CAI Division, NIIT, B4/159 Safdarjung Enclave, New Delhi - 110 029.

The barefoot microchip**

In Ecuador, a one-minute advertising spot on the prevention of goitre, broadcast on a rural radio service, and repeated several times a day over one year, increased the proportion of households using iodized salt from 5 per cent to 98 per cent. This is just one example of the power and potential of modern communications reported at a symposium on the barefoot microchip held in Paris in February to mark the 10th anniversary of Development Forum, the monthly United Nations newspaper. With satellite technology which can transmit messages into the remotest areas, solar-powered radio telephones, portable video recorders, audio cassettes and low-cost local broadcasting, all made ever-cheaper and more versatile by the magical microchip, the reality of the "global village" is technically round the corner. According

* UNIDO's Technological Information Exchange System.

** See also page 4 of issue no. 5.

to Professor Tjoikko Schuringa, Co-ordinator of Rural Telecommunications for Philips International, "with today's possibilities of data storage, processing, retrieval and transfer, the accumulated experience of all mankind is available to each individual anywhere on earth" - provided they have use of a telephone and know how to ask the right question.

At the moment 90 per cent of the world's telephones connect 20 per cent of the world's population living in North America, Europe, Japan and Australia. But Professor Schuringa believes a system of basic needs telephony is quite feasible in terms of both technology and cost. The idea is to use the latest solar, radio-telephony, and microchip equipment to provide one telephone within an hour's walk of each villager, or one community phone for everyone in an area of 200 square kilometres. The whole rural population of the world could be served by an investment of $2.5 billion - and the system would even make a profit if each user spent $25 a year on it. Meanwhile costs continue to fall. The indirect rewards of such a system would be much greater than the direct ones, as Richard Butler, Secretary General of the International Telecommunications Union, pointed out. Rural telephones cut the costs of other expensive means of communication to outlying areas, save working hours, avoid losses in emergency situations, use capital more efficiently and have many social benefits. ... (People, volume 10, number 2, 1983.)

1983 World Conference on Systems

This conference will be held in Caracas, Venezuela from 11-15 July 1983 and is being organized by Fundación para la Investigación e Integración de Sistemas, Av.Fco. de Miranda, Torre la Primera, Piso 15, Chacaito. The focus of the Conference will be transdisciplinary; a number of working groups will be set up to cover the different areas which will also include artificial intelligence systems; computer graphics systems; control systems; computer organization systems; application of microcomputers. High level experts will head the respective working groups.

Third party vendors get own conference

Buying in hardware and software products then selling to the end user was the subject of a conference organized by Computer Weekly from 26 to 27 April. The conference is for so-called third party vendors - the systems houses, OEMs, software houses, distributors, dealers and retailers which buy in from a manufacturer or supplier and market to the end user. It will cover the ways to sell, the level of post-sales support to offer, the right product to choose for the right market, and the use of advertising and direct mail.

Called the Computer Trade Conference, the event runs alongside Computer Weekly's recently announced computer trade show at the Wembly exhibition and conference centre. Both conference and exhibition are the result of collaboration by Computer Weekly and sister journals Systems International, Practical Computing and Software. (Source: Computer Weekly, 24 February 1983.)

Hanover Fair spotlight on micros

A new exhibition concept for electronic component manufacturers was among the many features of the 1983 Hanover Fair (13 to 20 April). Called Microtronic, it is designed to stimulate and extend the application of microelectronics throughout industry at large. Microtronic covered every aspect of applying microelectronics from basic components, to the integration of microelectronic applications, which was complemented by a number of product presentations and discussion sessions aimed at helping visitors become better informed on the intricacies of harnessing microelectronics to improve products and productivity. In addition to components and sub-assemblies, this massive concentration of technology covered telecommunications, measurement/test, control/automation, electro-acoustics, video and security devices. Electronic systems also strongly featured in halls covering electrical energy supply, and processes in electrical engineering.

Complementing the world market for electronics and electrical engineering was the CEBIT "world centre for office and data technology" exhibition in which more than 1,100 exhibitors from 26 countries took part, including a contingent of 29 companies from Japan which do not have subsidiaries in Europe. In parallel with CEBIT were numerous conferences, including a week's seminar organized by the Computer Section of the IEEE. CEBIT Forum 83 dealt with the contentious topic "jobs - securing the future through new office technologies". Aimed specifically at young people, it showed them modern office technology as applied in a typical

office environment and gave information on careers, training and further education possibilities. The Fair also had a Research and Technology Exhibition at which over 200 exhibitors from research establishments in 12 countries featured the results of their work and offered opportunities for technology transfer. (Source: Electronics Weekly, 9 February 1983.)

1983 Leipzig Fairs: showcase of microelectronics

As the Leipziger Messeamt has announced, both Spring and Autumn Fairs in 1983 will be devoted to the theme of the application of microelectronics.

As the press announcement from the Messeamt has already stated: "In line with the central theme 'programmed efficiency through microelectronics' both Fairs will concentrate on the current level of development in all techical departments without in the process failing to give attention to other branches not affected. The direct practical technical options will represent the major attraction for buyers and technical experts alike." The 1983 Leipzig Spring Fair will pay particular attention to microelectronically controlled machines and plant, with special reference to mechanical engineering, the energy industry, and production processes in agriculture and the food processing industry etc. The 1983 Leipzig Autumn Fair will feature the application of microelectronics in the textile engineering industry, in printing machinery, in plant and apparatus for the chemical processing industry as well as in medical technology.

In view of the response which this theme has aroused, including among exhibitors from abroad, the Leipziger Messeamt expects a broad international representation. (Source: Trade Technical Review, November 1983.)

The following news items have been excerpted from the sources indicated.

COUNTRY REPORTS

Austria

The Federal Ministry for Science and Research, in October 1978, set up a task force on microelectronics to work out a concept and to consider specific research projects and to single out problems caused by technological, micro- and macro-economic aspects of microelectronics. The Austrian Institute for Economic Research and the Austrian Academy of Sciences were asked to carry out a study on the applications, diffusion and implications of microelectronics in which representatives of trade and industry as well as the Trade Union were involved thereby ensuring that the legitimate interests of these groups were taken into account. The study is now available as a book (from Springer Verlag Wien Berlin New York) and presents the first empirically based nationwide study of the application of microelectronics in the Austrian economy and its impact on the labour market, quality of labour and leisure time activities.

The Federal Ministry for Science and Research has also published the original research concept including a directory of Austrian R+D capacities as a document entitled "Microelectronics and Information Processing - a Research Concept for the Eighties", Vienna 1983.

"Austria 2005: Implications of the microelectronics revolution"

This study was prepared by the Stanford University, USA in co-operation with the Austrian Society for Policies for the Future (Oesterreichische Gesellschaft für Zukunftspolitik) looking at the cultural aspects of the microelectronics revolution. The conclusions reached by the study are based on the assumption that social peace and the so-called "social partnership" will continue to prevail, which will endorse the defensive attitude of the Austrian public at large vis-à-vis the microelectronics revolution and will assist the country in drawing social benefits from this revolution. In line with the cultural conservatism prevailing in Austria and the cautious attitude which society adopts versus "cultural imports", it is expected that implications in other countries will be analysed before adopting a final position.

The study further points out that in contradiction to economic implications where freedom is restricted by the world's political and economic situation, education was an area where it was up to the Austrians themselves to decide on the role of microelectronics in school etc. It comes to the conclusion that an elite made up of the country's most qualified and ambitious intellectuals and technologists would determine not what but about what the population at large should be thinking. However, even this elite, controlling the micro-

electronics revolution, in the year 2005 will not be able to stop it or give it a push in another direction. Both elite and the rest of society will recognize that the technology with its mutual social dependency while offering more freedom within the system, leaves very little freedom to move outside the system. (From reviews in Austrian magazines.)

Brazil wafers

Heliodinamica, a Brazilian firm formed in 1980, plans to meet all of Brazil's demand for photovoltaic silicon wafers by 1984. The only grower of silicon ingots in Latin America, it expects to export in volume as well. Electronics (24 February 1983) reports that the company may soon produce wafers for the lower end of the integrated circuit production market. The Brazilian government is considering the development of an industrial park near the University of Campinas, in Sao Paulo state, which might include a Heliodinamica silicon plant. (Global Electronics Information Newsletter, April 1983.)

Bulgaria

The Bulgarian Computer Works has had considerable success in reducing production costs in order to hold its market - 90 per cent of the output is exported. Unit costs for production of central processors were cut by 80 per cent, and for matrix processors by 271 per cent in 1982. The enterprise, which two years ago was dubious about its market prospects, has now totally renewed its range, meets all local market needs, and has drawn up a development programme running up to 1987. (Electronics Weekly, 9 February 1983.)

Canada establishes micro-informatics committee

An advisory committee on international collaboration in micro-informatics will be established to advise the government on Canada's involvement in the World Centre - Informatics and Human Resources - in Paris. The committee will include representatives from business, labour, universities and research institutes. Canada's plans for participation in the World Centre were announced by the Prime Minister in Paris in November. In a letter to Mr. Servan-Schreiber, president of the World Centre, Mr. Trudeau commented on the importance of micro-infomatics to society. The Advisory Committee will be examining the feasibility of sending Canadian scientists to Paris for a year to work at the centre. They will consider the possibilities of undertaking a project in Canada, in collaboration with the centre, or donating Canadian-built equipment to the centre. The Prime Minister also suggested, for consideration, the naming of Canadian representatives to the administrative council of the World Centre. Established in 1981 by President Mitterrand of France, the World Centre in Paris will study the applications and implications of microcomputers for information technologies. The centre will monitor the impact of the new technologies on society and will develop technologies accessible to a wide range of personal and national incomes. (Canada Weekly, 28 January 1983.)

Canadian centre supports future of chip industry

There is an aggressive movement to build a knowledge base in both semiconductor materials and applications at the university level in Canada. No fewer than 44 universities have some sort of interest in the field; about 30 were sufficiently keen to send representatives to the first Canadian Semiconductor Technology Conference held at Ottawa last month. Initiated by scientists at the National Research Council, the conference did much more than round up almost 200 Canadians interested in this narrow slice of technology. It established a tentative dialogue among the experts in the three solitudes of industry, universities and government. It was also clear testimony of the substance to Canada's attempt to be part of the worldwide semiconductor scene. The day before the conference, at a gathering convened for the purpose, the academic community unanimously agreed to push for establishment of a national semiconductor centre of excellence. This would be an independent facility, offering hands-on experience for students and researchers, the next step beyond the recently announced VLSI implementation programme.

A meeting last fall gave dimension to the idea of using an existing industrial integrated circuit foundry to process student designs. Since then, the Natural Sciences and Engineering Research Council (NSERC) and the Ottawa-based Semiconductor Components Group (SCG) of Northern Telecom Ltd. have combined their resources: NSERC will fund a campus-based centre to co-ordinate the flow of student VLSI designs, and Northern Telecom will donate limited access to its fabrication facilities. NSERC will provide an initial $75,000 grant to establish the centre at Queen's University. The centre will convert student VLSI software design information to NTL fabrication formats using modified Mead-Conway design rules. NSERC

will likely contribute a similar amount of funding to continue the programme in 1983. Northern Telecom expects its cost will be about $80,000 this year to fabricate student ICs and has reserved $140,000 for 1983. NTL's investment includes IC mask fabrication, IC production and administrative/engineering assistance. SCG will return 20 packaged devices for each design received. Four universities have already submitted design projects - Queen's, Toronto, Western Ontario and McGill - representing an involvement of nearly 100 students. Carleton University, the University of Manitoba, University of Waterloo and the University of Alberta could be added this fall. The programme can accommodate designs from a total of 12 universities and other universities are welcome to join the programme in future years.

The proposal for a national semiconductor centre of excellence is of a much greater magnitude. The usual vested interests were put to one side, undoubtedly in recognition of the magnitude of the project. At an estimated $65 million over the first five years, bickering over administrative and site details within the academic community would detract from the case for the fundamental need for such a centre. The proposed centre would house a silicon foundry pilot line and a VLSI development line of no fixed technology. Each participating faculty would have local design and test capability, tied to a central fabrication centre. The centre is seen as a vital component in training qualified graduates for the emerging Canadian integrated circuit industry. It would also function as a consulting centre of expertise. The centre would generate a domestic source of design and processing software for the commercial sector so it could better maintain pace with the fast-moving worldwide IC industry. Governments, Ottawa in particular, are seeking ways to participate in the industry. The Science Council called for support of the domestic IC industry, a task force is finalizing its report to the National Research Council proposing a mandate for its laboratories in this field and, of course, NSERC has just funded the university-industry co-ordination office. ... Funding will be a long haul if the proposal is handled through the conventional federal government channels. NSERC funds already are committed totally for the current year and there is no allocation even within its five-year plan for the $27.5 million operating funding for such a venture. NRC would have a similar problem if it tried to fund the initial $25 million capital cost and ongoing equipment depreciation. Extraordinary allocations would have to be submitted for Cabinet approval. (Canadian Research, September 1982.)

CAD/CAM centre opened in Ontario, Canada

The Ontario Government recently opened three new centres for industrial high technology. The three centres are: the Ontario Centre for Farm Machinery and Food Processing Technology, in Chatham; the Ontario Centre for Advanced Manufacturing: CAD/CAM (computer-aided design and computer-aided manufacturing), in Cambridge; and the Ontario Centre for Advanced Manufacturing: Robotics, in Peterborough. Already open and working are three other such centres: the Ontario Centre for Microelectronics, in Ottawa; the Ontario Centre for Auto Parts Technology, in St. Catharines; and the Ontario Centre for Resource Machinery Technology, in Sudbury. (Canada Weekly, 23 February 1983.)

Applied Microelectronics Institute in Nova Scotia, Canada

A new single side band radio has been designed that can store frequencies, operate on any one of those frequencies over great distances, and match the antenna with the chosen frequency. It can even transmit teletype messages. Design for portions of this radio is only one of the many ventures of the Applied Microelectronics Institute in Halifax, Nova Scotia. The Institute, under the directorship of Dr. Douglas Pincock, is a self-funding, non-profit corporation bringing together the research and development expertise of its three founding institutions, the Technical University of Nova Scotia (TUNS), Dalhousie University and the Nova Scotia Research Foundation Corporation. Much of the work under way at AMI is marine-oriented. For example, an underwater information acquisition and control system eliminates the need for heavy, expensive cables. The system provides for accurate surface monitoring of data from underwater sensors by means of a single wire. AMI has also developed techniques for the construction of small transmitters to attach to free swimming fish to monitor physiological and environmental data.

AMI's research and development capabilities also include medical electronics. The large medical research establishment in Halifax has encouraged AMI to develop commercially exploitable medical instruments, such as a system for measuring blood flow using a miniature fibre optic catheter. The Applied Microelectronics Institute opened in September of 1981. It has no plans to market its designs. According to Dr. Pincock, the institute's chief aim is to become a "centre of excellence" in the microelectronics field, leaving the marketing of its products to the business sector. (Canada Weekly, 9 March, 1983.)

China signs joint venture with UK firm

Racal-Dana has signed a joint-venture agreement with the Chinese Government which covers the manufacture of Racal's frequency counters in a joint-venture factory in Shanghai. The agreement follows several years of forays into China by Racal-Dana and individual sales of the company's equipment. This is Racal's first move into Chinese production and the Chinese Ministry of General Electronics will be responsible for manufacture under licence from Racal. Primary manufacture will be in Shanghai although sales director of Racal-Dana, Derek Stanners, told EW that there will be outlets for the equipment in several parts of China. Initially pilot assembly will be from kits supplied from the company's Windsor facility. However, it is expected that the Chinese will soon move to assembly from component level. Although certain components such as the custom-designed chip from Ferranti will continue to be supplied from the UK, other equipment such as the metal work and transformers will eventually be sourced from inside China. Stanners reckons that within 12 months the factory will be partially self-sufficient in sourcing components from China. Once full production is reached it is expected that it will not be less than 1,000 units per year. Racal will also be helping with marketing of the products to other parts of China and for export. Stanners believes that China is well placed to sell to Third World or non-aligned countries since it is seen as a friend of the developing world. The factory where the frequency counters are manufactured employs some 500 people who are also involved in the manufacture of other general electronic and communications products. During the last year Racal-Dana introduced several instrumentation ranges into the Chinese market. One of its most recent orders, worth some $250,000 and won against international competition, was for 30 of the company's logic state analysers launched just three months ago. (Electronics Weekly, 16 February 1983.)

China to host show

Canton: China will host an international telecommunications conference and exhibition in Canton this August to help upgrade its telecommunications system and boost modernization programmes, Chinese officials have announced. In a statement issued by conference organisers of Telexpo China 1983, it was announced that more than 100 manufacturers and suppliers of telecommunications equipment around the world are expected to take part in the event, scheduled for 26 August to 3 September at the Canton Foreign Trade Centre.

ZD-2000 Chinese character microcomputer developed

Last September, the Computer Industry Administration of the Ministry of Electronic Industry organized a session to evaluate the ZD-2000 Chinese character microcomputer developed by the Yanshan Computing Centre; the model was formally approved for batch production by North China Terminal Equipment Company. The ZD-2000 Chinese language microcomputer is modular structured, using a microprocessor as the CPU. In accordance with the specific needs of users, various kinds of software modules and hardware modules can be selected and pieced together into different types of Chinese language microcomputers for various kinds of uses. The successful development of the Chinese language microcomputer has created conditions for further developing Chinese language information processing systems, Chinese language communication systems, and Chinese language computer networks; it has opened a new realm for the extensive use of computers in this country. It can be used in a wide range of applications such as processing of official documents, file management, cadre/personnel management, enterprise and economic management, census register management, and statistics for state institutions, factories and mines, commercial and cultural organizations. (Translated from: "Chinese Computerworld", 5 October 1982.)

HCP Chinese character information processing technology

The Hunan Province Computing Technology Research Institute and Hunan Province Computing Center have successfully developed a Chinese character information processing system on Cromemco Z80-C microcomputers. They have also developed Chinese character printing technology for Dynabyte Z80-A, B microcomputers. These achievements are extensively used in some 20 provinces and cities throughout the whole country. In order to bring into play the social

benefits of the system as soon as possible, and allow all users to exchange information and experiences, help each other tackle problems, and share resources, the "HCP Chinese Character Information Processing Technology Users Association" was recently established in Changsha City, Hunan Province.

All Cromemco Z80 or Dynabyte Z80-A, B microcomputer users who are interested in using the HCP Chinese character information processing technology can apply for membership. The members are expected to provide information on their application experiences and application situation; they can share all of the Association's achievements and resources at little or no charge at all. (Translated from: "China Computerworld", 5 October 1982.)

China set for drive in computers

China has announced an ambitious seven-year plan to modernise and expand its computer industry to produce 1,000 mainframe computers a year by 1985 and 1,800 a year by 1990. The production of microcomputers, under the plan, is targetted to rise from the current estimated 500 a year to 10,000 a year by 1985 and 40,000 a year by 1990. Currently China produces about 500 small-to-large general-purpose computers a year at its 10 major and several minor facilities. But most of these facilities still suffer from several setbacks, such as lack of automated equipment for assembly and testing and inadequate supply of components, particularly high-quality, reliable integrated circuits and semiconductor devices.

At present, China has some 3,500 large, medium and small computers in use, most of them domestically produced, plus another 10,000 micros compared to over 40,000 small-to-large computers and over 50,000 micros in Japan. China's planners see computers as a key component of its economic modernisation. China has already made co-operative arrangements with several reputed computer makers such as Honeywell and IBM. Several foreign manufacturers have also opened services and training centres in Peking. They include Japan's Nippon Electric Company, Hitachi, US micro manufacturer Cromemco and a Hongkong firm servicing the TRS 80. Among the foreign electronics makers now having various dealings in China are Varian and Perkin-Elmer of the US, Radofin Electronics of Hong Kong, Sharp Corporation of Japan, Datamax of Australia, and Fujitsu. While Radofin electronics of Hongkong is engaged in a production deal to produce computer and video games in the Shenzhen Special Economic zone, Sharp Corporation is selling kits to China for making personal computers. Datamax of Australia, on the other hand, is to make and market its 3,000 series computer in China, while Fujitsu is assisting a Qinghua University team in developing new software.

China has also reached an agreement with seven US electronic firms to supply IC manufacturing equipment to a facility in Jiangsu. But this has not yet received the approval of the US Government. (Electronics Weekly, 23 March 1983.)

New microcomputer-controlled signal system for Chinese hydropower plant

The Gezhou Dam Hydropower Plant has many generating units will all kinds of primary and auxiliary equipment requiring a multitude of monitoring signals. The units, moreover, are dispersed over a fairly wide area, not to mention the important role Gezhou Dam Hydropower Plant plays in the Central China Power Grid, which calls for even stringent requirements in safety and monitoring measures. In late 1977, the Nanjing Automation Research Institute of the Ministry of Water Conservancy and Electric Power, the Planning Office for Changjiang (Yangtse) River Basin, and inland pilot power stations began to develop the SXJ-1 accidents sequence display/recording device which was put to trial use for one and half years by inland pilot hydropower stations. The device was recently evaluated and approved by the Ministry of Water Conservancy and Electric Power. The evaluation board agreed that the device was "properly designed, reliable, and stable." The device also has such features as "expandability and resistance to interferences." It is now in full operational mode in Gezhou Dam Hydropower Station.

The device can monitor more than 750 kinds of signals covering the entire plant's accidents, malfunctions, and operations on a single 19 inch color screen. Chinese characters in different colors are used on the display unit for distinguishing the nature of the events, and the system can monitor the entire sequence of accidents and malfunctions in the plant with microsecond-level precision. It can display the main power nodal lines of the plant, call back the historical sequence of all kinds of signals, and accomplish other kinds of man-machine interactive functions. It has played a fairly useful role in the drive to improve the level of safety operations. (Translated from: "China Computerworld", 5 October 1982.)

Co-operation between CMEA countries in microelectronics application

The CMEA member-countries pay considerable attention to microelectronics utilization. Microelectronics is one of seven high-priority areas of specialization and co-operation within the frameworks of CMEA. Accordingly, the 35th session of CMEA in summer 1981 took a decision to develop a draft programme of CMEA member-countries co-operation for 1982-1990 in development and wide application of microprocessors in different branches of economy. In 1969 the CMEA member-countries set up the Intergovernmental Commission on co-operation in the field of computer technology which took the responsibility for arranging interaction in the field of development, manufacture and use of advanced computers. This laid down a foundation of one of the largest joint projects of socialist countries which is a bright illustration of realizing the Comprehensive Programme of Socialist Economic Integration of CMEA member-states.

Initially the problem faced by these countries was confined to pursuing a unified technological policy in development of computer technology. They started with co-ordination of their R and D activities. New form of multilateral co-operation emerged. Already the first several years of joint efforts produced considerable results: a unified system of computers (ES EVM) was designed, 11 models of these machines were introduced and mastered in production. About 160 different devices of ES EVM were designed and put into operation. Design, development and production were carried out by about 40,000 researchers and designers, 300,000 workers, 400,000 mathematicians, engineers and technicians maintained the computers operating within the frameworks of the joint programme of co-operation. In 1974 the range of co-operation was extended. It was found desirable to develop, along with ES EVM, a family of microcomputers (SM EVM).

During the joint activities, an efficient mechanism of co-operation between fraternal countries has been established. The Intergovernmental Commission has its working or executive body - Co-ordination Center, in which specialists from all co-operating countries work. The Center, along with the Economic Council, Councils of Chief Engineers of ES EVM and SM EVM, Council on complex computer maintenance, presents co-operation plants to the Intergovernmental Commission. The research activities are carried out on the basis of a common five-year plan. The R and D included in the plan cover all significant problems of development, manufacture and utilization of computer technology. For the majority of themes, the plan contains design specifications, schedules, authoritative executants. Heavy emphasis in the plans is placed on rational utilization of computer technology in different branches of national economies.

An extensive co-operation of socialist countries in development of advanced computers convincingly proves the effectiveness of joint implementation of large-scale programmes on multilateral basis. Mass production of computers allowed the member-states to drastically reduce imports of such devices from abroad.

In summer 1982, at the 36th session of CMEA, the Heads of Governments of Bulgaria, Hungary, Romania, GDR, Cuba, Mongolia, Poland, USSR, Czechoslovakia and Vietnam approved the draft programme and signed a general agreement on co-operation in the field of microprocessor utilization. The final objective of the programme is the mass introduction in the national economies of systems, machines, instruments, equipment etc. employing microelectronics. Therefore, the development of such systems for a rather large number of areas effectively utilizing this technology became an integral part of the programme. (Excerpted from a paper prepared by Mr. E.E. Dudnikov, International Institute for Control Sciences, Moscow.)

Microelectronics in the GDR

In recent years, the development and application of microelectronics in the GDR has become a major issue in the growing efficiency and export strength. The VEB Kombinat Mikroelektronik is the centre of industrial research, development and production.

By 1985, 40,000 industrial robots are expected to operate in the GDR. In addition, the combine assumes important export obligations. The VEB Kombinat Mikroelektronik exports electronic components, consumables, time-measuring instruments and equipment for meteorology. The export offer includes furthermore special equipment for electrical engineering and electronics, products and equipment of vacuum technology and basic material for electronic components. (Trade Technical Review, November 1982.)

ESPRIT contracts

The Commission of the European Community has awarded several study contracts to British companies as part of the European Strategic Programme for Research and Development in Information Technologies (ESPRIT). Scicon and Eosys will begin a joint project this month, to be completed in spring, in the area of office automation. Imperial Software Technology's contract is to look into the requirements for software engineering databases, and will be performed jointly with CSELT, the Italian telecommunications research centre, Imperial College and Logica SA in Belgium. The main ESPRIT programme will begin later this year. (Electronics Weekly, 19 January 1983.)

EEC approves ESPRIT projects

Euro-MPs have approved the selection made by the EEC Commission of types of project to benefit from grant aid under the ESPRIT information technologies research and development programme. But in giving their approval at the December session of the European Parliament in Strasbourg, the members added a number of riders. They urged in their resolution that emphasis should be placed on "pre-competitive" developments, rather than trying to catch up with the Americans and Japanese in sectors which are already highly competitive. They also warned that ESPRIT projects - like their predecessors - would be "doomed to failure unless they are accompanied by measures designed to improve the organisation of the European market with a view to its simplication and expansion". (Electronis Weekly, 12 January 1983.)

EEC telecoms ruling

The European Commission has applied the Treaty of Rome rules on competition to a telecommunications case for the first time. The decision could have far reaching consequences for international telecommunications - and it could spark a major row between the governments of member states because in almost all of them, except the UK, telecommunications are run by government departments (as they were in the UK until 1969).

Under the decision British Telecom is obliged to allow telex bureaux to accept messages from overseas countries for onward transmission to other overseas countries. Some bureaux have been doing this already, although since 1978 BT has forbidden it under its conditions of providing the service after complaints from other telecommunications authorities (PTTs) that the practice was depriving them of revenue. (Computer Weekly, 13 January 1983.)

Finland automation group streamlined

Finland's state-owned Valmet is streamlining its Automation Group into more comprehensive international co-operation. The most likely partner is the Swedish company L.M. Ericsson. The two firms are already partners in a joint venture, DAVA OY, in which Valmet has a 63 per cent stake. DAVA, a software company with a 1982 turnover of Fim 250 m, specialises in marketing and maintenance of administrative and industrial processing systems, microcomputers and banking and teller terminals. Edacom cash terminals based on Finnish Kajaani-Electronics hardware are the company's bestseller being exported mainly to Scandinavian and continental markets. Regarding the Soviet Union, DAVA is hoping to become a kind of intermediary through which exchange of knowhow and business transactions could be effected between East and West. Valmet Automation Group has set a very ambitious sales goal of Fim 1 bn to be reached by the end of 80s. The company needs both foreign markets and partners for that purpose. "But we are not bound to the same components suppliers for as long periods as our major competitors. We have a greater freedom to select suppliers and therefore better chances of coming up with optimum results", says Anders Kranck, DAVA President. (Electronics Weekly, 23 March 1983.)

French electronics companies merge

Thomson-CSF has extended its role in France's electronic components industry by taking over the whole of Eurotechnique, the Franco-American semiconductor company. Eurotechnique was previously controlled 51 per cent by the French conglomerate Saint Gobain and 49 per cent by National Semiconductor. The takeover has been on the cards for several months but was given the official government seal at the first meeting of France's National Electronics Development Committee at the end of last week.

Eurotechnique was formed at the end of the 1970s, near Aix-en-Provence. It now employs about 450 people, and has been known to be operating at a loss for quite some time. National Semiconductor will receive the token sum of one French franc for its share in the company, but Thomson will also have to pay royalties and buy licences from National Semiconductor in order to pursue production of American-designed components. The Saint Gobain 51 per cent

share will be automatically transferred to Thomson. The deal cuts the number of major French electronics components manufacturers down to two - Thomson and Matra-Harris, the state-owned defense and electronics group. This has already caused some objections from private industry figures in France who claim the cutback will restrict the choice of components available. (Electronics Weekly, 26 January 1983.)

French flock to computer centre

There is a place in the leafy Avenue Matignon, just off the Champs-Elysées, where children and grown-ups can learn to use computers at their ease. The walk-in centre is the result of two years' struggle by an international group of scientists to realise an ideal. The founders' concern was to reverse the popular view of computers as a threat rather than a benefit to the peoples of the world. Their idealism has been battered and a little compromised along the way but it was rewarded when the Centre Mondial Informatique et Ressources Humaines opened in Paris. A good deal of credit for the organisation must go to Jean-Jacques Servan-Schreiber, the French politician and publicist, who established the centre with extraordinary speed. Its conception was in early 1981; operational status was reached in March 1982. A number of countries, including Kuwait, Senegal, India, Saudi Arabia and the Philippines, have expressed interest in collaborating with the centre's work. The man who inspired many of the staff to come in the first place was Seymour Papert. This South African, who held chairs of mathematics and education at the Massachusetts Institute of Technology (MIT), was the centre's first scientific director. He is a folk hero in microcomputing circles for his development of LOGO (a high-level computer language popular with teachers) and his book Mindstorm. The book, inspired by the Swiss educational theorist Jean Piaget, describes how contact with computers can help children develop a sense "of the deepest ideas from science, from mathematics, and from the art of intellectual model building". Papert has been described by Marvin Minsky, director of the artificial intelligence laboratory at MIT, as the "greatest of all living educationalists". There are a number of projects in their infancy. One group is developing hardware for a personal computer, sufficiently robust and inexpensive to be useful in the Third World. The same group is also looking at interfaces to video discs, they hope to provide, perhaps, a medical dictionary on a screen. The second major activity is the testing of experimental devices and programmes in the Third World. In addition, there is a project to explore applications of personal computers in France, with emphasis on the needs of children, unemployed people and the elderly.

The interdependence of these activities at the centre is clear. Computers which operate reliably in classrooms and offices in Boston, London or Paris, may quickly fail in a dusty village in Senegal. It is conventional wisdom that software development lags several years behind the hardware. At the Centre Mondial, it looks to the outside observer as if the problem is reversed. The staff hoped that a French micro, the Thompson 07, could be modified for use in their first major pilot project near Marseilles. But production of the modified machine could not start in time. The centre's directors recognise that the price of a microcomputer still has to fall a long way before the machines can play an important role in Third World education. But developments in Britain and the United States over the past two years suggest that micros need ultimately to cost little more than a tape recorder or a good transistor radio. Dr. Harry Goldberger, another MIT veteran who directs the centre's medical group, is interested in the British microcomputer "Husky" which is used by meter readers and the army. Its rugged construction and large memory may make it suitable for experiment; but at £3400 it is far to expensive for widespread use in the Third World.... (Excerpted from an article by C. Roper in New Scientist, 10 February 1983.)

India plans big computer network

A large computer network called Indonet - which links Bombay, Calcutta, New Delhi, Madras and Hyderabad - to provide interactive facilities and sophisticated software, including computer-aided design, is being set up. Being implemented by the Computer Maintenance Corporation, this prestigious project will offer data processing, large data base and local computing facilities to small and medium scale sections, according to the annual report of the Department of Electronics for 1982-83. Besides, the Indonet (integrated national data processing and communication facility) will provide highly specialized software in the areas of engineering design, structural analysis and management services, which can be shared by professional organizations. Also, various users in other locations would be able to use the system, through terminals provided for direct access. (The Hindustani Times, 26 April 1983.)

Indian computers

The Government of India's Department of Electronics has proposed the cancellation of licenses and letters of intent for the manufacture of small computers of those firms which have not yet taken steps toward production. Dr. N. Seshagiri, Director, Information Planning and Analysis Group of the Electronics Commission, said 60 of 120 letters of intent issued earlier would be withdrawn. Only 15 companies, in both the public and private sectors, have initiated production. Fifteen more have begun planning for manufacture. The rest plan systems engineering. Dr. Seshagiri favoured speedier growth of the computer industry, particularly the production of personal computers. He said an investment of up to $170 million over five years in both the public and private sectors was needed to establish the infrastructure required to make the industry self-reliant. He supported the development of centers for testing and applications engineering. Noting that there is no bar on the import of electronics technology, Seshagiri said the government should have been liberal in permitting foreign tie-ups in the past. In his personal view, de-licensing the computer industry five years from now will stimulate the industry. To reduce the cost of computer equipment, he said peripherals should be manufactured in volume by just a few firms. Those firms should not be allowed to build computers, however. The production of central processing units, he argued, should also be concentrated. On the other hand, he suggested that a large number of enterprises be encouraged to develop software systems and conduct systems engineering. Specific software, however, should not be imported more than once. (Global Electronics Information Newsletter, April 1983.)

Logic for Ireland

Logic Systems International of Japan is to set up a £3.5 million operation in Dublin to produce small business computers. Management recruitment will be completed shortly and production is due to commence in the middle of the year. Logic is to be based at the Sandyford Industrial Estate, with IDA grants which haven't been disclosed and a projected 60 employment figure. The IDA says the Irish investment is to support the growth of the company's customer base throughout Europe and adds: "It is expected that as the project develops, the Irish company will assume responsibility for hardware design, software development and materials sourcing." (Electronics Weekly, 9 February 1983.)

Electronics 'co-op' proposed for Eire

A newly formed electronics company in Ireland has come up with rather an innovative idea which, if implemented, will drastically reduce purchasing costs for small companies. Probably one of the most irksome problems facing small electronics companies is the dilemma of having to buy raw materials (or components) in quantities that discourage good discount.

But Gerry Grifthin, managing director of Midland Fasteners Ltd, has devised a way of overcoming this problem. He suggests that a number of the smaller electronics companies get together, and form a purchasing co-op. So far, according to Grifthin, the big suppliers such as Philips and Siemens have reacted favourably to his idea. If the idea gets off the ground, Midland Fasteners will hold the bulk stock and supply components at only slightly more than bulk prices.

Midland Fasteners not only supplies components, but as its name suggests it is also involved in fasteners. The Irish Development Association funded a two-month feasibility study, to look into the possibility of manufacturing fasteners in Ireland. Grifthin explained that the results look promising. He said: "Our intention is to first start importing fasteners and then gradually to start manufacturing ourselves - or to sub-contract the manufacturing to others". (Electronics Weekly, 9 February 1983.)

Jamaica

The Caribbean island nation of Jamaica, now under the conservative leadership of Prime Minister Edward Seaga, has joined the chorus of Third World countries asking for high technology investment. In January, when Seaga addressed a conference at Stanford University, he met with several Silicon Valley executives. Jamaica offers an English-speaking workforce, a location near the continental U.S. in one of the same time zones, and workers who can be hired for $US 1.20 per hour, including benefits. (San Jose Mercury, 15 January 1983, reprinted in Global Electronic's Information Newsletter, January 1983.)

NT (Canada) launches Malaysia plant

Northern Telecom has set up a new offshore company in the Bayan Lepas Free Trade Zone in Penang, West Malaysia, for the assembly of dynamic receivers for telephone sets. The new company also has been established for the production of tooling and dies along with the manufacturing of test sets. Northern Telecom Malaysia Sdn, Bhd, began operations earlier this year in January. The company occupies 4,000 square feet of the 35,000 square foot factory area held by Northern Telecom Industries Sdn, Bhd, the parent company's first Asian off-shore assembly plant which was established in 1972, with Northern Telecom of Toronto holding a 50 per cent share stake. Northern Telecom Malaysia has been set up with 10 workers and the number of employees will be increased to 40 by the third quarter of this year and eventually to about 100 employees in 1984. Equipment to produce dynamic receivers is currently on order and is expected to arrive and be installed in June.

A company source told Electronics Weekly that production of dynamic receivers will start in September and is requiring an investment of about M$4 million (£1.1 million) by the parent company. Stamping parts, motor parts and plastic parts will be produced in-house while magnetic parts will be imported from Japan. All dynamic receivers produced will be used for Northern Telecom telephone units. "The dynamic receiver we will make is a new design," the source said. "The acoustic response is better than the conventional set. This new design has constant response from 20Hz to 15kHz. We compared the cost of manufacturing our parts with Keiko and Primo of Japan. We used to buy from them but our parts are at least 30 per cent cheaper although our design is more simple. All R&D work will eventually be done in Penang, but the original design has been developed by Northern Telecom in Canada." According to the source, the new company expects to produce three to four million dynamic receivers each year, using 80 workers. All the receivers will be tested on-site with automatic testing equipment. The finished receivers will be exported to Canada and the United States initially for assembly in Northern Telecom telephone sets. (Electronics Weekly, 20 April 1983.)

Poland plans MPU branch

The CEMI Semiconductor Production Centre hopes to have an all-Polish microprocessor, based on the Intel 8080A, in production by the end of the year. Production of components for the system, started at benchscale level last year, will build up to one million a year by 1984. The type is considered most suitable for Polish conditions and orders have already been placed by the Mera (control equipment), Predom (white goods) and Telkom (telecommunications) concerns. The CEMI insists that electronics are now essential to Poland's industrial export sales. In the telephone exchange field, where Poland has substantial PBX sales, customers in South America and Comecon are already demanding a higher proportion of electronic equipment. The component industry, because of small production runs, continues to be heavily subsidised and prices fall by only eight per cent a year. (Electronics Weekly, 23 March 1983.)

Singapore

ASTEC International, a Hong Kong-based electronics company is planning to spend $32 million to set up a major technology base in Singapore. ASTEC International is a component supplier to computer makers worldwide and is currently employing some 200 people in research and development at its Hong Kong plant. Its new plant in Singapore is expected to be on par with its Hongkong operations. According to the firm's new plans, it will invest $12 million in a semiconductor assembly and testing plant, its first and only facility to produce semiconductors. Another $5 million will be invested on its plant at Bedok which is due to begin the production of high-frequency switching power supplies by the first quarter of next year. (Electronics Weekly, 19 January 1983.)

Five-year R&D plan for Spain

The committee charged with producing the national electronics plan (PEN) in Spain is expected to recommend that the national telecommunications company (CTNE) and the companies which supply it with equipment should prepare a joint five-year research and development plan. This would also be put forward for government approval. In recognition of one of the telecoms manufacturers' strongest complaints, it will be proposed that CTNE should plan its investments on a four-year cycle, with purchasing programmes worked out on a two-year basis. The third major area in which the committee will make recommendations will be to provide options from which the government can issue broad directions to CTNE on its future direction. Such issues as future tariff policy will be outlined under this head. (Electronics Weekly, 2 February 1983.)

Industrial applications outstanding feature of Swedish computer scene

The ambitious application of modern techniques in the process and engineering industries and in the fields of computer-aided design and numerically-controlled machine tools are the most noteworthy aspects of the Swedish computer scene, according to an article in the magazine Sweden Now.

Computer techniques are widely used in Swedish industry for tasks such as order, delivery, invoicing and stock control routines, production planning and speeding up manufacturing processes. In particular, the traditional "heavyweights" of Swedish industry, such as the iron and steel sector, utilize computer aids on a large scale. A typical example is a microcomputer-based programmable process controller for the measurement and control of flow, pressure, temperature and level, made by ASEA, which can be applied to the treatment and processing of raw materials. Even crispbread, the most Swedish of products, has been computerized, the Wasabröd firm now boasting a highly automated crispbread bakery.

In the automotive industry, computerized robots are handling a wide range of monotonous or unhealthy jobs, for example at the truck division of Saab-Scania, where robots are at work in the gearbox, engine and chassis workshops. In addition, the company has a computer-controlled bolt-tightening machine in the engine assembly workshop and a heating and ventilation system operated by a minicomputer.

Generally speaking, the trend in Swedish computer developments is towards a high degree of decentralization, with a large number of small computers and intelligent terminals, a more modest system of medium-sized machines, and a large and growing number of big computers, all linked via a computer network. (Science and Technology, November 1982, Newsletter on Industry and Research in Sweden.)

Thailand

As a follow-up to a UNIDO mission on selective microelectronics applications in developing countries carried out in May/June 1982 (see issue No. 3 of Microelectronics Monitor) Thailand is considering a concept of commercial application of advanced modular technology for low-cost field-level irrigation systems in Thailand's Northeast. In this area conventional grade-level irrigation systems are difficult to install because of slightly rolling terrain. When field-level distribution canals must be elevated by a meter or so, a considerable area of land is lost to cultivation because of the fill requirements. In some cases farmers are reluctant to have the canals cross their land for this reason.

In considering possible ways to overcome this inconvenience, engineers at the Mekong Commission surveyed a variety of prefabricated modular channel technologies. They identified one which appears to promise good technical and economic performance. It has potential for relatively small-scale local production and low installed cost, while greatly reducing the land area diverted from agricultural use. The channel design is based on prefabricated concrete modules which are assembled in the field using standard reinforcing bars.

Where elevation is required, simple modular columns and suitable footings are used. The modular elements of the channels and of the pillars can be made on machines adapted from those used for manufacturing concrete blocks.

The channels are rather precisely designed in order to minimize weight and material content. Thus water level in the channels must be carefully controlled to assure rated flow capacity. This specification led to a suggestion to apply basic microprocessor technology for that purpose. It has also been suggested that control of the machine on which the modular elements of the system are produced is an appropriate application for a microprocessor-based programmable controller. (Reported by UNIDO's Senior Industrial Field Adviser, stationed in Bangkok.)

UK: Clinic offers free advice on micros

Industry's apathy to the government's £85 million Microprocessor Applications project could be cracked with a microprocessor clinic which gives individual rather than group consultation. That is the view of David Noaks, chairman of the University of Birmingham Microprocessor Group, who is trying to set up such a clinic. Noaks has approached the Department of Industry to help with the funding, and it has agreed to cover 50% of the clinic's costs for two years (the other 50% to be found from local sources) if it can be demonstrated that sufficient demand for the facility exists by local business. "The programme of course teaching, encouraged by the DoI and undertaken by all higher education

establishments, may well succeed in the long term, but in the short term there is a gap to be bridged between an employee attending a course and the employee immediately being able to adapt the course material to his own company's requirements", said Noaks. The microprocessor clinic aims to offer free advice about the use of microprocessors, comment on proposed designs, and help individuals design and test systems. Noaks also plans regular "updating" meetings. (Computer Weekly, 21 April 1983.)

UK: One in twenty households has a micro

UK micro owning households are about to hit the million mark, and look set to reach double that number by the end of 1985. According to a survey report from Liverpool-based Gowling Marketing Services, 940,000 homes - nearly one in 20 - have a microcomputer, and a seventh of these have two or more machines. Within the home the predominent users of the microcomputers are male, and most likely the sons of the family. The survey estimates that 45% of the main micro users are 18 or younger, and only 12% 40 or over. Females appear to have little interest in computers, the report comments. Two types of neighbourhood seem to stand out as typically micro owning: modern "middle price" owner-occupied housing, with young families living there, and high status suburbia. The main software used is games packages, though educational uses rate highest in a quarter of the homes. The survey report was based on a survey of 2,000 households carried out by the British Market Research Bureau. Copies are available from Gowling Marketing Services in Liverpool. (Computer Weekly.)

UK lacks a microplan

There is a lack of microcomputer strategies among British companies and end users are buying their own machines with little consultation with the computing department as a result. This is confirmed by a survey of National Computing Centre (NCC) members, which shows that 82% of firms with traditional data processing departments now have end users buying their own microcomputers. And it is data processing managers who should be producing the strategies, according to Ted Cluff, secretary-general of the Institute of Data Processing Management (IDPM). The NCC survey shows only a third of users call in the data processing department for consultancy, development and support when they get their first microcomputer. Around 15% never call on the computing professionals and half consult the experts only sometimes. Yet in 62% of the cases the data processing department has to ratify the user's decision to buy a microcomputer. The report concludes that computing staff "do not yet have a well determined role to play in the installation of micros" and that their involvement with end users "appears to be on an ad hoc basis".

Local connections to end user departments are expected to grow by a third this year and by 75% between 1983 and 1987. Remote links will grow by 27% this year and 83% by 1987. The financial sector easily leads the automation league, with 17 terminals for every 100 non-computing staff. In second place is education and research, with 11.2. These two are way ahead of engineering and retail and distribution trade, with 4.5 each. Government installations trail with 1.1 terminals per 100 staff. (Computer Weekly, 7 April 1983.)

£1 million for UK CAD Centre

The government's Computer Aided Design Centre is to stay largely in UK hands and will become a commercial company. A consortium led by ICL, with the UK engineering consultancy W.S. Atkins and the French services group SIA are paying £1 million for the centre. Over the next 10 years they will pay the government royalties reflecting the amount of public money being spent to turn the centre from a research body to a commercial firm. That sum could reach £4.5 million. There will be no job losses. (Electronics Weekly, 7 April 1983.)

USSR

The West Siberian weather centre has installed new computer equipment for analysing the 40,000 weather reports a day which come in from the northern hemisphere. One computer systematizes the data and feeds it to a bigger, 1 million ops/sec system which analyses the data and produces automatic charts. (Electronics Weekly, 23 February 1983.)

Caribbean satellite link

The University of West Indies (UWI) is installing a new satellite-based audio teleconferencing system to expand its ability to provide education, agricultural extension and other development-related services to its campuses and extension centres throughout the island nations of the Caribbean. Supported by the Agency for International Development, the pilot project is one of several being planned to explore the use of satellite technologies to provide domestic communications to meet the social and economic needs of the developing world. (Electronics Weekly, 23 February 1983.)

NEW DEVELOPMENTS

Moats etched into RAM substrate increase capacitance and stability

One of the major impediments to cramming 1 megabit and more of memory onto a single integrated circuit will be obtaining sufficient capacitance to ensure stable circuit operation. In a paper to be delivered at International Electron Devices Meeting in San Francisco, researchers from Hitachi Ltd. are describing what they call a simple and effective solution. It boils down to expanding capacitor space vertically in each dynamic-memory cell by etching moats in the substrate. This technique yields an increase in storage capacitance almost independent of cell size, because the moat can be deepened at will, says Hideo Sunami, senior researcher at Hitachi's Central Research Laboratory in Tokyo. It is also a more reliable approach than the alternative - ultrathin oxide layers in horizontal capacitors - proposed by other companies, Sunami argues.

As dynamic random-access memories increase in density, storage cells must shrink. This shrinkage reduces capacitor area and, correspondingly, the storage value and the stored signal charge. For stable circuit operation, the capacitance must be large enough to ensure an adequate signal-to-noise ratio, and a stored charge of at least 300 femtocoulombs is needed because an alpha particle can generate hazardous electrons of more than 200 fC at a typical maximum particle energy of 5 megaelectronvolts.

The stored charge of 256-K RAMs is already near 300 fc, but the stored capacitance of 1-Mb chips will be only a third that, assuming a cell size of 3 by 7 micrometers. To get a 300-fC storage charge in this area would require a silicon dioxide layer thinner than 5 nanometers. According to Sunami, applying 5 volts across such a thin layer creates an electric field of 10 megavolts per centimeter, leading to immediate and catastrophic breakdown. Hitachi's alternative is an adaptation of a deep-groove technique for silicon solar cells developed by Texas Instruments Inc. Sunami's team dryetches a 4-μm-deep groove into the substrate. The 1.2-by-2.5-μm moat is defined with an oxide mask and reactive sputtering. Then layers of SiO_2, Si_3N_4, and SiO_2 are applied, the silicon oxide by thermal oxidation and the silicon nitride by low-pressure chemical-vapor deposition. (Electronics, 15 December 1982.)

Has the future-proof computer arrived?

The trouble with most computers is that they run a very narrow range of software and last only a few years before they are outdated. Next month will see the launch of a microcomputer, called the Microframe, which apparently solves both of these problems at a stroke. The Microframe is not only designed to last for at least 10 years, but is capable of accepting software written for any number of central processing units (the chips that do the "computing" in a computer). Designed by a new company called the Tycom Corporation the Microframe's secret of long life is in the way that it treats processors. Instead of being at the centre of operations inside the computer, the processors are on an equal footing with other components in the machine. In most microcomputers the central processor, under the direction of an operating system, orchestrates the communications between elements of a computer over a bundle of wires called a bus. In the Microframe, this activity is delegated to a separate processor known as a versatile base bus connector, or VBC for short. The VBC is programmed to switch messages between any one of 22 components (in the jargon it can handle 22 ports). The programme is held on a number of read only memory (ROM) chips. The upshot of this arrangement is that unlike most computers which are built around a single processor, the Microframe can be fitted with a number of different processor chips. At present, the Microframe can hold up to four different processors. The VBC can however be programmed to take other chips. It is this feature that Tycom says has enabled it to increase the life-span of its computer. As new chips come along they can be incorporated into the Microframe. Tycom calls this "future proofing". Because the Microframe can hold up to four processors at once, it can run many more applications programmes than an ordinary machine. Such programmes have to be written for a particular operating system, which in turn is married to a particular processor. The Microframe can switch between different processors, different operating systems and hence different applications software. The structure of the Microframe also makes the computer suitable for scientific and engineering work. According to Tycom's managing director Allen Timpany, the computer could be fitted with several 32-bit processors such as the Motorola 6800 to do array processing (in which several computer operations are carried out simultaneously). (New Scientist, 23/30 December 1982.)

3-D chips

High-rise chips - with their circuitry stacked up on several layers instead of spread over only one - are on their way. Under a $2m pilot scheme, a string of Japanese companies including NEC, Toshiba, Matsushita and Oki reckon they can build "super-chips" with 50 times more circuits crammed on to them. Theoretically, even using components no smaller than today's, you could create a 10-megabit random-access memory chip with a 10-layer stack. Eventually, a 50-megabit ram might be on the cards. Such 3-D chips would have a number of advantages. For a start, you could get more functions on the same chip without necessarily having to shrink the individual devices of circuits. Each layer could be given over to different functions. Stacking should boost speed and efficiency, too, because it would keep individual devices closer together. But the first complex 3-D chips probably will not appear before the end of the 1980s. Several snags need to be ironed out. Creating a 10-layer chip means getting 10 layers no more than one micron (one thousandth of a millimetre) thick of active silicon, insulating each one from its neighbours and then producing connections among them. The need to interleave silicon and insulation makes it difficult to get silicon of sufficiently good quality to lie on each active layer. One way round this problem may be to drive or "implant" charged atoms (ions) of oxygen deep into the silicon to form an insulating layer of silicon dioxide. Creating an insulating layer in this way would have the advantage of leaving a thin surface of silicon to act as the right foundation for depositing another full layer of silicon. And this two-step process of ion-implantation and silicon-deposition could be repeated as often as necessary.

In the United States, there is excitement about the possibility of refining ion-implantation machines to the point where they could be used to "write" very fine circuit lines directly on to the wafers used to make chips, shrinking the size of individual circuit features to one tenth of a micron. But such technology, known as focused-ion-beam or Fib technology, requires sophisticated optical tricks to focus the ion beams adequately. There are other problems, too. The equipment is complex and expensive, sensitive to vibration and requires 150,000 volts to operate. Although a number of companies are working on Fib - and both Jeol in Japan and Ion Beam Technology in the United States are delivering research models - commercial Fib machines are probably four or five years away. Still, today's ion-implanters are quite adequate to drive layers of ions into silicon. Using ion-implantation and silicon-deposition, researchers at NTT (Japan's version of British Telecom) have produced a triple-layered stack of silicon and insulation. But they have yet to produce a working device. Among other things, nobody is sure how the active silicon layers in such a stack can be connected up. In trying to make 3-D chips, there are alternatives to using high-grade silicon. At California's Stanford University, researchers are working with polysilicon. Polysilicon is almost an insulator in itself but can be selectively refined to give good device-quality silicon. The Stanford group reckons it can double the number of devices on a chip by the simple expedient of folding over a polysilicon layer to form a single stack. Mind, the two halves have to be carefully aligned. In Japan, researchers at the Tokyo Institute of Technology have gone one stage further. They have been experimenting with amorphous silicon - which, in sharp contrast to the well-ordered single-crystal silicon normally used in chips, has no tidy crystalline structure at all. Amorphous silicon is cheap and easy stuff to stack into layers. The snag is that, in most applications, it would make poor devices. Undismayed by this trade-off, the researchers have shown that a simple circuit can be made on two layers of amorphous silicon - and promise nine-layered chips shortly. (The Economist, 12 February 1983.)

Optical computers

The prospect of digital computing devices using light signals instead of electronic ones is brightening. Researchers at Hughes Aircraft in California say they will have an all-optical switch later this year; workers at Kyoto University in Japan are also well on their way; and a British team from Heriot-Watt University claims it has already made an optical switch. Admittedly, this is only a beginning - a switch is a long way from a proper computer chip, let alone a computer - and there are a lot of fundamental problems to be overcome. Still, it is a promising beginning. The pressures to develop optical devices are partly practical ones stemming from the increasing use of optical fibres in telecommunications. At present, optical fibres are generally capable of carrying more signals than the systems that supply them and their transmission performance is degraded by inefficient switching via electronic devices at either end of a system. Then there is the attraction of the intrinsic speed of light signals as against electronic ones: nothing, after all, can exceed the speed of light. Further in the future, there is the intriguing possibility that an all-optical computer could manage tricks that electronic computers can do only with difficulty - or not at all. Just as substituting transistors and integrated electronic circuits for valves transformed the design of computers, so, too, could the substitution of photons of light for electrons.

In the race to develop superfast computers, devices based on light could have yet another formidable advantage: in theory, an optical computer might operate at close to room temperatures. By contrast, the two top contenders for the guts of speedy electronic computers - siliconbased Josephson junctions and gallium arsenide-based high-electron-mobility transistors - can operate only at very low temperatures. The gallium chips need chilling to liquid nitrogen temperatures; Josephson junctions to those of liquid helium. To be sure, optical devices, like electronic ones, will themselves generate heat when working hard. But this problem should be manageable. American researchers at Bell Laboratories reckon the transparency of the materials used to make optical devices may be the key here. How best to build a computer capable of using light signals? Broadly, there are two schools of thought. One favours an incremental or hybrid approach. This school argues that light should be used to transmit signals across a chip or between chips but that the signals should then be converted into electronic ones for processing by conventional transistors. Such hybrid chips would look much like conventional silicon ones in structure but would probably be made of gallium arsenide, since gallium arsenide (unlike silicon) can respond to both photons and electrons. An advantage of the hybrid approach is that it could draw on work on similar devices in the telecoms field (Britain's Plessey is among the leaders here). But there are disadvantages as well. Being a mixture of electronic and optical switching, a hybrid device suffers a speed penalty versus an all-optical device. Also, the conversion of light into electronic signals is inefficient and produces more heat.

So the purist school argues for going straight for all-optical computer devices. In theory, to make an optical transistor you simply need a sandwich of two thin light-reflecting surfaces on either side of a transparent material. And this configuration can be achieved by using a rectangular crystal with two polished sides. Beam a laser to strike one of the polished surfaces of the crystal at an angle, and a weaker beam will emerge from the other. How much weaker than the incoming beam the outgoing one will be will depend on the refractive index of your crystal: that is, how much light it allows through compared with how much it reflects back.

With most materials, the strength of the outgoing beam in proportion to the incoming one varies in a constant way. However, with some materials, this is not so. A small change in the power of the incoming beam can trigger a much bigger jump in the power of the outgoing beam. This non-linear "jump" effect gives you the basis of an optical switch - an "on-off" effect similar to that in electronic switches. The researchers at Edinburgh's Heriot-Watt used a material known as indium antimonide to make their optical switch. They claim it switched "on" or "off" in a mere picosecond (a millionth of a millionth of a second), roughly 1,000 times faster than a conventional silicon switch and several times faster even than esoteric gallium-arsenide ones. So far, so good. However, as the Edinburgh men point out, indium antimonide may not be the best bet for commercial optical chips. Finding other materials that could be suitable will be an important challenge. And difficult; nobody really knows what governs the non-linear refractive properties needed. Some esoteric materials are being tried out for optical devices. One is lithium niobate but, while this might function well as a basic connection material in optical computers, it is thought that it would have to be married up with active components made, e.g. of gallium arsenide, in a full optical system. Organic materials look promising, too. An optical switch based on polydiacetylene, a polymer being used by Bell Labs, might be able to switch in less than a tenth of a picosecond. Researchers at Xerox in New York are looking at the possibility one day of devices based on strange materials made from indolinobenzopyran compounds. They are known as "quasi-crystals" because their atomic structure is neither so tidily arranged as in a crystal nor so jumbled up as in an amorphous material. The interesting thing about quasi-crystals is that their structure changes in the presence of an electric field, a property that Xerox researchers think might be used to control the way they would react to powerful laser beams. Comparatively speaking, an optical computer is light years away. But optical switches called multiplexers are being developed to handle the simultaneous input (and subsequent unscrambling) of several signals into fibre-optic telecoms systems. And Japan's NEC has demonstrated a clever, if rather slow, optical "valve" for a handwriting-recognition system. (The Economist, 26 February 1983.)

Japanese super chip

Toshiba Corporation has developed what it claims to be the world's fastest logic Large Scale Integratd (LSI) chip. The chip is made of Gallium Arsenide (GaAs) instead of the conventional silicon wafer. It is claimed that the new chip can carry out calculations at a speed of 80 picoseconds (1 picosecond equals one thousand billionth of a second) through its 500 data gates or about 5 times faster than a silicon logic LSI. The electricity consumption of the GaAs LSI is 0.2 mW per gate, about a tenth of the silicon LSI. Commercial production will commence in 3 years. (Asia-Pacific Technology Digest, September - October 1982.)

Superchips create personal mainframe

A breakthrough in "superchip" technology has led to the design of a 32-bit computer small enough to fit on a desk. Made by Hewlett Packard, the HP 9000 is claimed to herald the advent of the personal mainframe. Five, quarter-inch-square superchips handle all the main functions of the new computer. The largest of these contains electronic circuits equal to 600,000 transistors. Together, the five superchips pack the equivalent of more than two million transistors. The chips are able to hold all of these electronics, says HP, because of an advance in large-scale integrated circuit technology which squeezes the circuits on the chips down to only one micron, or 40 millionth of an inch apart. With the circuits so close together, information can be transferred from one circuit to another 18 million times every second.

According to HP Executive Vice-President, Paul Ely, the superchips give "individual engineers and scientists the opportunity to have a personal 32-bit computer right on their desks - an industry first". With the capability of exchanging information with other computers, he says that the concept of one mainframe per user can increase laboratory productivity. A 32-bit machine can handle four trillion items at once and, according to Mr. Ely, the market for 32-bit computers is the fastest growing segment of the minicomputer industry, with a projected annual growth rate of 57% between now and 1985.

According to the company, the HP 9000 was developed in anticipation of a major change in the nature of technical computing. For the batch processing of technical data in the 1960s and the convenience of time-sharing in the 1970s are now both giving way to the 1980s style of computing whereby programmes requiring intensive computation will be offloaded from mainframes to computer workstations which provide high-performance, mainframe capabilities. (Technology Ireland, January 1983.)

Bubbles store video programmes

The research laboratories of NHK, the Japanese national broadcasting company, have built a video camera which records still pictures in a magnetic bubble memory. These memories store digital information in tracks of magnetic charges.

The camera has a solid-state image sensor which produces an analogue output signal representing the scene to be photographed. The signal is digitised, and a buffer memory temporarily stores all the information to make up a single picture. The buffer then sends the picture signals, one scanning line at a time, into a magnetic bubble memory. The picture can then be recalled at any time.

So far, NHK's prototype is primitive. A 1-megabit memory stores only a low-definition black and white picture. And it takes 20 seconds to load signals into the bubble memory and recall them for display. But NHK promises a colour camera with full definition and faster access in the future.

NHK's technicians have also developed a videodisc that records and erases moving pictures. It uses a combination of magnetic and optical technology, with a laser beam activating a magnetic coating. So far NHK has succeeded in recording only short sequences, but hopes soon to make a disc that can carry programmes as long as a conventional disc can. (The Economist)

New silicon chemistry for electronics

New chemistry that could lead to better ways of fabricating silicon products for the electronics industry has been uncovered by chemists at Northwestern University (Evanston, Ill.). The scientists have prepared the first sample of tricoordinate, positive silicon ion $(R_3Si)^+$ in solution. This material, long sought because of its unusual bonding state, is the silicon analogue of the carbonium ion $(R_3C)^+$, a common organic intermediate that was discovered at Northwestern 50 years ago. The silylenium ion could have commercial application in the synthesis of compounds that would require a silicon-carbon bond. Joseph B. Lambert, professor of chemistry, and graduate student William J. Schulz, Jr., who proved the structure of the silylenium ion, are now exploring other possible substituents that might stabilize tricoordinate silicon. (Chemical Week, 9 March 1983.)

Fifth-generation computing

Fifth-generation computing will involve not only clever software but new architectures, using non-von Newmann structures and VLSI for speed. GEC's (UK) Hirst labs is developing VLSI chips to implement advanced pipeline and hierarchical architecture. The pipeline chip, called a systolic array, is designed for signal processing. All the processing modules perform the same simple function simultaneously, working on different items of data.

The hierarchical chip, Grid for GEC rectangular image and data processor, is designed to process each picture element (pixel) of an image simultaneously, using a controller device that sends instructions to each processor element, equipped with its own memory. Computers of this type have been produced by University College London (Clip 4) and ICL (DAP), but the Grid shrinks all the electronics onto a few chips.

Columbia University Prof. D. Shaw is developing a computer that makes sure that 2 or more processors do not quarrel over which gets a bit of information; called the Non-Von, it is also hierarchical and endows each of 0.1 - 1 million simple processing elements with memory, so that it can manipulate a massive number of records virtually simultaneously. (The Economist, 12 November 1982.)

Artificial intelligence to go on sale

The world's first commercially available artificial intelligence system, recently demonstrated by Nixdorf Computers, will be offered to the marketplace early next year. The system, which hasn't acquired a name yet, uses an inference engine designed by UK expatriate Stuart Savory, to apply the knowledge in a knowledge base to problems in specific areas of expertise. The two applications on show at the Hanover Fair used the Expert System to help diagnose the cause of faults in a Volkswagen Golf, and to optimise a CPU and peripheral configuration for a Nixdorf 886X computer system. According to Savory, Nixdorf's head of artificial development, the only way to overcome the shortage of expertise in the world is to have multiple copies of experts. His method of achieving the non-biolgical multiplication of experts is to incorporate their knowledge, not their store of data, into a specially constructed knowledge base. Using a Z80-based Nixdorf microcomputer and a rule based inference mechanism implemented in Pascal software, Savory has achieved something of a breakthrough in terms of an economic and functioning system. His only problem is to so develop the system that it can't be used to develop better versions of itself, thereby injuring its prospects. (Computer Weekly, 21 April 1983.)

IBM electron beams write control patterns on ROM chips

Electron-beam techniques of writing control patterns directly on high-speed bipolar read-only memory chips cut IC turnaround time by two thirds for International Business Machines Corp. during the development of the 308X mainframe family. Instead of making glass masks for patterning a photoresist, IBM exposed the resist directly. A wafer's complement of assorted ROM chips was personalized in 20 days, as against 60 for the mask process. The control store contains 48 of the 2-K-by-9-bit chips, each measuring 4.572 mm^2, packed up to eight times more densely than the bipolar random-access memories on which IBM has previously used electron beams. To reduce the defect probabilities for any one chip, IBM arranged four to seven different designs on each wafer. This was not possible with the cheaper step-and-repeat mask techniques, which are used for mass production of the chips. The new technique was described at Nepcon/Northwest in San Jose, California. (Electronics, 17 November 1982.)

What next in chips?

New developments in resists will solve only one of the problems that face the designers of smaller chips. According to Professor Otto Folberth, of IBM West Germany, the others will be the thermal and electrical barriers.

Most of today's chips are cooled by air. But as designers pack more and more circuits into a given space, other methods become necessary (see next item). Another promising development is called forced liquid cooling, in which water at very high pressure is forced through tiny fins etched on the chip.

The electrical problem arises from the finite time it takes a signal to travel across a chip. The speed of the whole chip is restricted by the time it takes a signal to travel the longest distance. Tomorrow's large and complex chips will consist of three-dimensional modular arrays, rather than today's "spaghetti" wiring. (New Scientist, 3 February 1983.)

New chip is a cool customer

A new American semiconductor could overcome one of the biggest hurdles posed by the ever-diminishing size of integrated circuits. It could open up a whole new range of products, especially portable equipment. The big problem with today's chips, which squeeze more than 120,000 transistors into less than a square centimetre of silicon, is heat. If heat cannot be dissipated, circuits misbehave. Water cooling eliminates the problem in mainframe computers, but smaller machinery must find an alternative. The Intel Corporation claims to have overcome the problem by combining the attributes of two of its earlier semiconductors. One has low power requirements, thereby dissipating little heat, the other has high-density circuitry. By combining the two, the new chip dissipates one tenth as much current and heat as the high-density chip alone.

Intel claims that CHMOS (complementary, high-performance, metal-oxide semiconductors) will allow integrated circuits to shrink toward the goal of very large-scale integration (VLSI). Very large-scale integration will be necessary to achieve goals such as complete computers on one chip. They should be far more reliable than today's circuits. The new chip goes on sale this year in two microcontrollers which will be capable of going into "idle mode" when not in use. This further reduces both the power required and the heat generated, but without any threat to vital data. Intel claims that CHMOS will spawn a new generation of compact, portable and battery-driven electronic devices such as hand held medical instruments, portable computer terminals, lightweight video recorders, and new "senses" for industrial robots. Military uses include controlling small missiles and portable radios. (New Scientist, 3 February 1983.)

COMPANY NEWS AND MARKET TRENDS

Philips and Siemens join hands in R&D

Philips (the Netherlands) and Siemens (West Germany) have signed a joint information technology R&D agreement and have made an initial outlay of $3.7 million towards the EEC call for a $400 million strategic plan, Esprit (European Community's Strategic Programme on Research & Information Technology). Philips and Siemens' deal is aimed at products related to the computer industry, and includes semiconductors, microelectronics, computer-aided design and speech recognition. (Technology Update, 29 January 1983.)

Philips closure in Manila

Signetics, the Silicon Valley-based subsidiary of Philips, has reduced the workforce at its Manila, Philippines assembly plant from 900 to 200 and has announced plans to cease operations there later this year. The company continues to run its older assembly plants in Seoul, South Korea and Bongkok, Thailand, which employ a total of 4,000. The company also assembles military-specification chips in Sacramento, California. Signetics employs over 10,000 people worldwide, primarily in the U.S. and Asia. Though the Philippines facility is Signetics' newest offshore plant, it is reportedly less efficient than the other two plants. A Signetics spokesman said automation, not the economy, was responsible for the shutdown, "We've made this decision because of recent advances in mechanization." This report counters a common prediction that automation would drive offshore assembly back to the U.S. Rather, it appears to be reducing offshore employment without returning any work to the U.S., at least in this case. (Electronics News, 31 January 1983; Peninsula Times Tribune, 29 January 1983, reprinted in Global Electronics Information Newsletter, January 1983.)

"Philips workers news"

Philips, the Netherlands-based electronics giant that is the world's third largest private employer, has been re-organizing its global division of labor over the past decade. Not only does its Silicon Valley chip-making subsidiary Signetics have plants in the Third World, but in the past several years Philips' European workforce has been reduced by 100,000. Much of the work has been shifted to the Third World.

To monitor and influence the impact of company strategy on its workforce, the Research Unit Industrial Branch Electrotechnics (SOBE) organized an international conference of Philips employees at Eindhoven, Holland, in June 1982. Workers at that conference initiated the Philips Workers News, edited by SOBE. Available in English, sample copies of Philips Workers News can be ordered from SOBE, Kruisstraat 82, 5612 CK Eindhoven, Netherlands.

SOBE has also published an English-language book, "Philips: International Re-Organizations and Workers' Resistance", analyzing the worldwide electronics industry and Philips' position in it. (Global Electronics Information Newsletter, March 1983.)

IBM's purchase of 12% of Intel portends a trend

Now that International Business Machines Corp. has bought a minority interest in Intel Corp., semiconductor and computer industry watchers look for more of the same. U.S. semiconductor companies need tremendous amounts of cash for investment in research and development if they want to remain competitive, let alone leaders, in world markets. Except for a few specialized niches, the semiconductor industry is rapidly becoming a rich man's game. Typical of the reaction is the estimate of semiconductor industry analyst Stanley Salter of Herzfeld & Stern in New York. He says that the agreement for IBM to purchase 6,250,000 new shares of Intel, amounting to about 12% of the company (with a maximum ownership of 30%), for $250 million in cash, "is not bad for Intel. But it signals an admission of the need for additional cash flow to sustain their technical position". (Electronics, 29 December 1982.)

Westinghouse buying biggest robot maker

Continuing a trend that has seen major corporations like GE and IBM move heavily into the factory-automation business, Westinghouse Electric Corp. is making a major move to leap to the head of the class in industrial robotics. The Pittsburgh company plans to purchase Unimation Inc., the world's leading robot supplier with an estimated 40% of the U.S. market and recorded sales of $71.2 million in fiscal 1982, for about $107 million in cash. The Danbury, Conn., robot maker has been underfunded for some time and should benefit from Westinghous's financial strength. Westinghouse's Industry Automation division, formed in June 1981, has licensing or purchase-resale agreements with three foreign robot makers and also markets a robot of its own. The division expects to record robot sales of about $14.5 million this year, with all but $1 million of that internal. (Electronics, 15 December 1982.)

Merger of European consumer electronics companies taking shape

Grundig's planned takeover of the consumer electronics side of the ailing AEG-Telefunken group has been delayed by Thomson-Brandt of France bidding to take a majority stake in Grundig. These convoluted manoeuvres could eventually produce what amounts to a concerted European push to combat the challenge from the Far East in consumer electronics. However, it all revolves around the German Government's attitude towards the restructuring of the giant loss-making company, AEG-Telefunken. The idea of Grundig taking control of the consumer electronics side of Telefunken appeared to be an equitable one since it would keep the business in German hands. However, now that the French State-owned, Thomson-Brandt, is attempting to take a 75 per cent share in Grundig this puts a different complexion on the Grundig bid for Telefunken. The West German Cartel Office is looking into the Thomson-Brandt bid and there does appear to be strong opposition against it in Germany. Philips the other major European consumer electronics company is also indirectly involved in the action, since it has a 25 per cent stake in Grundig. If these four major European consumer electronics companies were pushed further together by these deals the results could be the sort of European, concerted presence, in consumer electronics that many people consider essential to face the magnitude of the threat from the Far East. (Electronics Weekly, 9 February 1983.)

The future shape of Europe's electrical goods industry became a little clearer this week. It will not please those calling for a pan-European competitor to confront those Japanese firms that have so successfully invaded the European market. On 9 March,

- West Germany's federal cartel office formally vetoed the proposed acquisition by France's state-owned Thomson-Brandt of the 75.5% of the West German electronics company Grundig held by its founder, the 74-year-old Mr. Max Grundig;

- Thomson-Brandt, thus thwarted, announced it had agreed with AEG-Telefunken, another flagging West German electronics group, to buy a 75% stake in the AEG television and video-recorder subsidiary, Telefunken Fernseh und Rundfunk. AEG tried last year to flog this subsidiary to Grundig;

- AEG's creditors formally told the West German court handling the company's receivership that they agreed to write off 60% of their DM5.5 billion of claims, so banishing the threat of bankruptcy.

- Philips, the Dutch electronics giant, which holds the remaining 24.5% of Grundig, announced a 21% increase in profits for last year to F1433m ($163m) and hinted it was intending to bid for control of Grundig.

All along, the president of Philips, Mr. Wisse Dekker, has had the future of Grundig in his gift through that 24.5% stake. The West German cartel office was bound to veto the Thomson-Brandt bid on antitrust grounds as long as Philips had a stake in Grundig. Philips remained determined to hold on to that interest, even though it, too, had had aspirations to a controlling stake in Grundig scuppered by the cartel office in 1979.

Now that Thomson-Brandt has paired off with AEG-Telefunken, Philips can hope to be allowed by the cartel office to make a second bid for Grundig. With two transnational electronics companies operating in West Germany, the anti-competition argument no longer holds up. Philips says only that it is in no hurry to make a move. It probably wants time to ponder the cost of its various options. (The Economist, 12 March 1983.)

US giant Burroughs links with French State firm

Burroughs may soon sell French telecommunications products in a co-operative venture between the US giant - No. 3 on the French computer market - and France's State-controlled CIT-Alcatel company, says Marcel Louvet, chairman of Burroughs-France. Stressing Buroughs' eagerness to become a fully-fledged partner in France's socialist economy, Louvet said his firm hoped to sell peripherals to Cii-Honeywell Bull. CIT-Alcatel is a subsidiary of Compagnie Generale D'Electricité which was nationalized last year. The chairman of Burroughs, which has been operating in France for 75 years, said the company was keen to be a "good citizen" and was trying to balance its exports with imports. Last year Burroughs-France increased exports by 64% and these now represent about one-third of turnover which in 1982 reached FFr 1,6564 million (£150 million), a 24% jump since 1981. Burroughs has a 5% share of the French market compared with 50% for IBM and 30% for Cii-Honeywell Bull. The French subsidiary has set itself a target of becoming the multinational's best performing unit outside the US by 1990 - ahead of those operating in Britain and Japan....

The French Ministry of Industry is studying Burroughs' proposals to market French telecommunications products and possibly software, believed to be a unique arrangement. (Computer Weekly, 7 April 1983.)

RCA and Motorola combine on C-MOS

Seldom has a pact between major semiconductor houses been as complementary as the one involving C-MOS microcomputer and peripheral chips signed between Motorola Inc. and RCA Corp.

For RCA, which holds many of the original C-MOS patents and in fact pioneered the technology, the deal offers the chance to increase its visibility in a market it helped create.

For Motorola, the deal - an alternate-source agreement covering its MC146805 microcomputer family - means a more prolific family to sell and the market edge of a credible second source. The C-MOS members of Motorola's 8-bit family now number seven, including the industry's first C-MOS microcomputer with erasable-programmable read-only memory, available in sample quantities for $250 each. (Electronics, 22 September 1982.)

Siemens stays in memory market

Encouraged by a 64K DRAM supply deal with IBM, Siemens has made a top-level commitment to stay in the dense memory market.

That means Siemens will not only hang on in with its 64K, it will also work towards introducing a 256K. Its £30m 2 micron line at Villach in Austria is capable of refinement, says Siemens, down to 1.4 micron, so allowing it to run a 256K. Siemens' 64K production is all coming off the 2 micron Villach line. It is believed that production volumes are around 100,000 a month and that a very substantial proportion of this is being shipped to IBM France under the two companies' supply deal. France is where IBM has its European test and qualification organization.... The decision by the Munich-based Siemens to ramp up the Austrian plant for the company's most advanced process was taken, says Siemens, because the Austrians are more prepared to do shift work than the Bavarians. That fact resulted in a £17m investment over the last three years to get the 64K line up and running.

The decision to go for a 256K is all the more suprising in view of a recent report by the US Semiconductor Industry Association. "Based on product development lead times," warned the report, "US firms should now be conducting R&D on the next generation memory device, the 256K RAM. "The fact that a number of major US RAM producers are refraining from doing so - and so apparently dropping out of the race - bodes ill for the future of the US industry. (Electronics Weekly, 2 March 1983.)

A look at Western Europe's semiconductor market

The West European power semiconductor market, valued at $879m in 1981, is forecast to grow an average 11 percent annually through 1987, reaching $1.6bn, according to Frost & Sullivan. The market will be buoyed by transistors, which produced $383m in sales in 1981, and will climb to $972m by 1987, for an average yearly increase of 17 per cent, says the market research firm in its study, The Power Semiconductor Market in West Europe. Transistors larger than 300W accounted for $30m in 1981, and are expected to grow at an average rate of 37 per cent a year. This segment will be propelled by new, high power bi-polar devices, which are expected to encroach on the thyristor market. Those transistors rated between 1W and 300W are forecast to advance from $353m in 1981 to $772m by 1987.

Power MOSFET transistors, which are projected to grow from $30m to $180m during the period are now more widely available in Europe, with several manufacturers offering, or about to introduce them, says Frost & Sullivan. However, developments in switching transistors - which compete with the power MOSFET - lead the marketing research company to conclude that MOSFETs will not replace the bi-polar power transistor, but will saturate at about 25 per cent of the market. AF transistor sales will mount from $78m in 1981 to $134m in 1987, while the market for Darlingtons is expected to remain constant at $80m, the study says. RF products should rise from $95m to $170m. The power rectifier market, $262m in 1981, is projected to grow to $392m in 1987. Thyristors, with sales of $190m in 1981, are concentrated in the high power market, as devices over 50A accounted for $130m. (Electroncis Weekly, 20 April 1983.)

Equipment makers

In 1982 twelve companies had more than $50 million in worldwide semiconductor equipment sales. If one considers French-owned but U.S.-based Fairchild to be American, nine of those twelve firms are American. Three - NEC, Canon, and Fujitsu - are Japanese. Of the top twelve, only two, Applied Materials and Kulicke & Soffa, have more than 75% of their sales in semiconductor equipment. (Electronics News, 7 March 1983.)

Company and Subsidiaries	(Sales $US million)
Schlumberger (Fairchild)	155
Perkin-Elmer	150
General Signal (Elec. Beam Micro., Tempress, Ultratech)	100
Varian Associates	100
NEC (Anelva, Kaijo, Ando)	95
Applied Materials (Cobilt, Gasonics)	90
GCS	70
Canon	65
Eaton (D&W, Kasper, Nova, Optimetrix)	65
Teradyne	65
Fujitsu (Takeda Riken)	55
Kulicke & Soffa	55

(Cited in No. 31, Global Electronics Information Newsletter, April 1983.)

Computers in small business

Entrepreneurs in Britain and America are profiting from sales of computers to small businesses whose needs the large computer companies and retailers have overlooked. Customers for such systems include car-parts dealers, insurance brokers, local newspapers, hairdressers, dentists, farmers, doctors, lawyers, funeral parlours and even bingo halls.

Microprocessors have allowed computer companies to build systems which small businesses with very specific needs can afford. A computer based on a microprocessor and costing $5,000 now has the power of a machine costing $50,000 in the early 1970s. (The Economist, 4 September 1982.)

SOCIO-ECONOMIC IMPLICATIONS

Unemployment not due to automation?

The British Secretary of State for Industry, Mr. Patrick Jenkin, in an article for New Scientist put forward his belief that Britain's industry must make use of microelectronic technology and that in order to secure employment the new technology must be embraced and not ignored.

Fears that automation will inevitably lead to higher unemployment are not new. In 1811 the Luddites rioted and destroyed the textile machinery which they saw as a direct threat to their jobs. Yet employment in the textile industry proceeded to grow during most of the 19th century. Nor was this an isolated example. In the same century, the fastest growing industries, in terms of employment, were those based on new technology. Railway employment rose from 29,000 in 1851 to 320,000 in 1901; in chemicals, employment over the same period trebled; and in metal manufacture employment nearly trebled. The last century demonstrates clearly, that, despite the fears to which new technology gave rise, technology promoted employment. More recent history repeats the lesson. Considerable concern was expressed in the 1950s and early 1960s about the impact of automation on jobs. Nonetheless, employment in the UK reached record levels towards the latter part of the 1960s. Despite the evident lack of competitiveness of much of the British economy, and the impact of the first oil crisis, total employment showed no overall fall during the 1970s, a decade which witnessed the widespread diffusion of computers. Even today, Britain has the highest proportion in Europe of people of working age actually in jobs.

It is easy to understand why the fears of technology-generated unemployment should enjoy a renaissance during a world recession. Undoubtedly concern about the impact of robots and other microelectronic-based production equipment has been exacerbated by the depressed world economy and the high levels of unemployment in nearly all the major industrialized countries. But the facts do not support any causal relationship between automation, higher productivity and unemployment. It cannot be emphazised too strongly that our unemployment problems do not stem from the installation of such equipment. In the first place the penetration of robots, numerically-controlled machine tools, and other microelectronic-based equipment in British industry is as yet very limited. By the end of 1982, for example, there were a total of 1152 robots installed in the UK. Estimates suggest that little more than 5 per cent of the stock of machine tools were numerically controlled. Quite simply, there is too little equipment installed to account for the levels of unemployment. Secondly, even when such equipment has been installed it would be wrong to conclude that the overall impact on jobs has been negative. The countries with the highest level of robots per employee, Japan and Sweden, both have very low rates of unemployment. Far from high usage of robots being associated with high levels of unemployment, the opposite is true. This may first appear paradoxical because robots are often - perhaps most often - thought of as mechanical workpeople, displacing humans. It is hard to associate that picture with an analysis which shows the use of robots promoting employment. To understand the true picture, it is necessary to consider how any new technology incorporating high productivity affects jobs. The installation of a robot, for example, has both a "direct" and a "compensating" effect on employment. The direct effect is the net change in the number of jobs before account is taken of output changes. It is sometimes, although by no means always, negative. However, the installation and operation of robots and related equipment improves output, albeit not immediately, and this helps to increase jobs.

How then does output increase? The primary reason for introducing new technology such as robots is to reduce costs and improve product quality. Lower costs mean lower prices. With the improvement in product quality, this results in increased demand for such goods and services, which in turn generates higher output and employment. Profits also increase, inducing higher investment and R&D expenditure thus creating jobs. Finally, investment in robots and other microelectronic-based equipment provides opportunities for domestic producers of such capital goods to increase output and employment.

Some specific examples show how the argument works out in practice; how automation, far from destroying jobs, can create or safeguard employment. Tallent Engineering at Aycliffe, County Durham, last October began to operate a computer-operated press system linked to a robot welding line. The system helped the company to win a £5 million a year contract to supply rear suspension arms for the new Ford Sierra. It not only secured jobs which might otherwise have been lost but also created 80 more. Without investment in new technology it is thought that the work would have gone abroad. Without the robots the company could not have coped with the Ford contract. The pressure on the welders would have involved a very high rejection rate - a problem overcome by robot welding.

Flexible manufacturing systems (FMS) provide the economics of mass production to small batch manufacture. Savings come not so much from savings in manpower as from the reductions in working capital, higher production quality, better control, and much faster switching from one product to the next thus avoiding the need to carry excess stock. Normalair-Garrett (NGL) at Crewkerne was among the first companies to introduce flexible manufacturing in the UK. NGL found that with FMS stock work in progress is now being turned over 24 times a year as opposed to the previous 3.3 times. It has also cut manufacturing lead times from 17 weeks to two and trebled output per operator.

A more traditional industry gives a similar account: J & J Cash of Coventry has been weaving name tapes on narrow measures of cloth since 1902. The industry's traditional labour-intensive Jacquard process had by the 1960s begun to threaten Cash's position because of rising prices and inability to respond to peak demands. A measure of automation based on a computer and a punched-tape system was introduced and this helped cut costs and speed production. But, more recently, it became necessary to introduce an improved system based more fully on microelectronics. The investment has made Cash strongly competitive, by keeping prices down and improving turn-round. Although a few jobs have been lost, the workforce today is nearly 200, whose jobs are now more secure because of automation.

Most recently, consider the direct effect at Telford in Shropshire through the expansion of the robot manufacturing activities of Unimation (Europe). Nearly 250 new jobs have been created in the company, and as many more in its suppliers. The important point is that increased use of advanced production technology represents a growth area for supply of the equipment involved. In robotics, for instance, a number of British companies have begun to develop and make robots, so creating jobs directly. Measuring the wider, compensating effects of automation is, of course, difficult. However, it is clear from a variety of European studies that improved competiveness helps jobs. The Institute of Employment Research at Warwick University recently carried out a number of macroeconomic simulations to discover what would happen if Britain installed sufficient microelectronic technology to improve its rate of productivity growth by 1 per cent relative to its competitors. The answer was that such a technological acceleration would create more jobs than it displaced. Similarly both the Rathenau Advisory Group in the Netherlands and the Industrial Institute of Economic and Social Research in Stockholm, carried out simulations which indicated that slow introduction of microelectronic technology would have a worse effect on employment than keeping up with other countries. It is not automation but the failure to automate that risks jobs.

Although microelectronic production technology can increase the total number of jobs, the occupational structure of employment is likely to change significantly. In particular, the demand for engineers, technicians, computer programmers and software experts can be expected to increase sharply. (The NEDC says that already 16,000 more programmers are needed.) Fewer machine-tool operators, welders and production fitters are likely to be required. In particular, the new demand is likely to be for those concerned with software. Already there is evidence that some firms which have introduced microelectronic production technology have experienced difficulties as a result of a shortage of engineers, technicians and programmers. What is needed is the right training and retraining and the government therefore makes available a wide range of training schemes and courses. The overall message is clear. We must make use of microelectronic technology. We must be prepared to adapt as some industries and occupations expand and others contract. Secure employment will come from embracing new technology, not from pretending that it does not exist. This is the way to build a high wage, high productivity country. We can then become more competitive, sell more goods and employ more people. We can also afford the better social services which are the hallmark of a civilised state. (New Scientist, 24 February 1983.)

The following article, on the other hand, holds a less optimistic view and expresses the mineworkers concern about job losses as a result of the introduction of an automated mining system in the UK.

Miners fear automation could cost 165,000 jobs

A secret report commissioned by the National Union of Mineworkers claims that 165,000 jobs could be lost within five years as a result of new technology. Researchers from the University of Bradford presented the report to the NUM last December, and the union is to set up a committee to discuss its implications. So far, the NUM has refused the Coal Board access to the report, which states that between 55% and 75% of the 220,000 workforce could be shed in the next 10 years. One of the researchers, John Winterton, stated last week that the reductions could take place within five years. The report says that the majority of job

losses would come from the introduction of the automated mining system MINOS, which is capable of controlling everything from cutting coal at the face to environmental control. In its initial stages, MINOS would only be used for coal clearance, but its potential would mean that the highly-skilled (and highly-paid) face workers would eventually find their jobs eliminated. An NUM spokesman cited the new Selby pit as an example of what the new technology could do: "Selby would require around 16,000 miners using conventional technology, but only 4,000 would be employed if MINOS were implemented there." But a spokesman for the Coal Board stated that the smaller number of jobs quoted by the NUM could not be blamed on MINOS: "The smaller number of staff needed at Selby would result from proper planning of the new development." (Computer Weekly, 10 March 1983.)

High tech jobs

In a brief, cogent report on the "Educational implications of high technology," Stanford University education researchers Henry Levin and Russell Rumberger have challenged the oft-heard assertion that the growth of high technology industry is creating a huge demand for technically trained workers and professionals. Using figures from the Bureau of Labor Statistics, they argue, "Although employment in high technology occupations will increase quickly in percentage terms over this decade, the contribution of these jobs to total employment growth will be quite small."

Levin and Rumberger endorse the notion that high technology is likely to increase the division of labor in the workplace. They conclude, "Past applications of technology in the workplace as well as present evidence suggest that future technologies will further simplify and routinize work tasks and reduce opportunities for worker individuality and judgement. Moreover, the displacement in jobs and the downgrading of skill requirements for most of the new positions will undermine employment generally, and especially the employment of skilled workers."

Rumberger and Levin assess the educational implications of high technology: "A solid basic education rather than narrow vocational preparation will become more imporant in the future." They summarize, "The educational system should strengthen the analytical and communicative skills of students, not because of the needs of high technology, but because such skills will help them deal with the changing political, economic, social, and cultural institutions they will face in their adult lives." (Institute for Research on Educational Finance and Governance, School of Education, Stanford University, Project Report 83-A4, February, 1983.) (Reprinted in Global Electronics Information Newsletter, March 1983.)

Third World role is in the balance

Microelectronics - will it be a job creator or will this country see unemployment on a larger scale as factory and office automation adds to the country's already lengthy dole queues?

UK's Information Technology Minister Kenneth Baker is still bullish about job prospects. Only last week Mr. Baker, addressing a meeting in Scotland, was predicting major new businesses would be created and that microelectronics would be the main source of the world's economic growth over the next 25 years - which is not quite the same as saying the British workforce stands to benefit. The unions are still keeping a fairly low profile. Numerous committees have been set up to look at their attitude. At present they do not want to appear Luddite in their approach, but still continue to represent their members' interests. In the argument over new technology at the Daily Telegraph recently the members seemed well able to take care of themselves without the support of their union's general secretary, but let that pass. Fleet Street is a law unto itself. More threatening from the union standpoint is a view first advanced by Clive Sinclair last year, and now taken up by Kenneth Baker. Their forecast is for manufacturing industry to survive but in smaller units, thus "leading to a happier society", as Kenneth Baker coyly put it, or "eliminating the need for unions", as Clive Sinclair bluntly put it. This is a problem the unions have yet to address, prefer to ignore or cannot see arising. They may see some hopeful signs in a recent report by the Institute of Developing Studies which explored some of the possible impacts microelectronics might have on the problems of under-development. One of its conclusions is that microelectronics and its benefits will cause producers to manufacture their goods in the UK and Europe rather than in the Third World. At the same time that these microelectronics-related innovations are reducing Third World comparative advantage, the growing depression in the developed countries (which also reflects the use of microelectronics in advanced economies) makes it increasingly difficult for Third World countries to export their manufactures. Thus the future advance of the South East Asian electronics industries - hitherto a catalogue of

substantial and sustained growth - is by no means assured. Indeed, a number of these producers have been forced to set up production lines in the United States and Europe. What can the Third World do in the face of these radical changes in technology and world markets? First, there is the problem of skill and back-up services. The various empirical studies reported in the report suggest that skills are not a constraint - if anything the new technologies are easier to operate than their pre-microelectronic counterparts.

However, an important facility for users (particularly in industries where software is imported) is a close interaction with suppliers and other users, and here Third World firms are at a great disadvantage. Indeed, this is reflected in the sales of microelectronics-related equipment - for example in interactive, computer-aided design equipment, only 32 out of more than 8,000 systems are known to have gone to the Third World, and of these one set was sold to Zaire without software, making it useless to the purchaser. So although the absolute levels of skills are not generally a problem insofar as using the equipment is concerned, thought must be given to providing the requisite back-up services, and this will inevitably have implications for training and educational programmes, as well as the development of a new type of industrial "infrastructure". Second, there is the question of software. The "old" view that under-development is caused by an absence of skills has now been exploded in the context of high levels of unemployed graduates in many developing countries. The irony is that many of these countries (particularly India) are exceptionally rich in the very software skills which constrain the introduction of microelectronics in developed countries. It is an open question, therefore, whether this software capability could be a source of developing countries' comparative advantage in the future, or whether the absence of an "organic" link between this skilled cadre and indigenous industry undermines the feasibility of this policy option. A role has been suggested for developed countries in further encouraging the production of software skills in developing countries. And, thirdly, there is the question of appropriate technology. Hitherto, the introduction of microelectronics has been associated with the military sector and in meeting the needs of developed country producers and consumers. Little attention has yet been given to meeting the requirements of groups within developing countries, to take advantage of the significant benefits which the technology offers. This does not mean the development of the solar-powered video recorders suggested by one agency to meet the basic needs of Indian villages, but rather technologies such as irrigation-control systems, in drop-feeds, meteorological forecasting for islands characterised by microclimates and rural health care systems. In conclusion, as the various contributions to the IDS report point out, in spite of the "under-development" of our awareness of the specific impact of microelectronics-related innovations, one cannot fail to recognise their significance. For a whole series of reasons, the coming decades are clearly going to differ from the previous ones, and it is important to bear in mind the technological dimensions of the changing world if appropriate policy responses are to be fashioned. At the same time, it would clearly be foolish to ignore the political-economic context in which these technological developments are occurring. Technology cannot be seen as an abstract good since it takes particular forms which reflect the interests of the innovating parties. And in addition since transnational firms account for such a large share of world trade manufactures, any set of policy responses should be acutely tuned to their likely reaction to these changing technological, political, economic and social climates. (Editorial in Electronics Weekly, 12 January 1983.)

UK bank staff call halt to computers

Bank staff voted for a tougher stand over new technology last week - against the advice of their national executive. Delegates at the annual conference of the Banking, Insurance and Finance Union (BIFU) voted by three to one to resist the introduction of new technology until employers sign agreements on its introduction. And the computer section of the 152,000-strong union passed a motion demanding that in future, software should be included as an integral part of any new technology agreement. The militant attitude taken at the Blackpool conference means that any attempt by management to introduce new technology without first agreeing the terms on which it is to be installed would result in industrial action and the refusal of staff to operate the equipment. At present, only one such agreement exists, that being between the Cooperative Bank and its employees.

Chris Cater of BIFU's national executive warned delegates not to set the rank and file union members an objective which they would be unwilling to support. But the overwhelming rejection of his advice indicates the growing fears in the finance sector over the introduction of new technology, and of the union's inability to control it. Deputy general secretary Terry Molloy said that the debate was the most important of the conference. "New

technology is the greatest challenge we face, not just for BIFU, but for the whole of the trade union movement. Our policy is to support new technology, but only if implemented via new agreements. "We are facing an unemployment figure of four million and new technology means that jobs are in danger in banking, building societies, insurance and finance." The conference heard how future enhancements to the clearing houses automated payments system, (Chaps), would have a disastrous effect on walks messengers. The staff, responsible for regular interbank deliveries, would no longer be needed when Chaps2 goes live. The national executive was called on to draw up a report urgently on Chaps developments.

The Royal Bank of Scotland delegation moved a motion asking that DP staff not be overlooked for promotion to general management. It claimed that their specialist skills tended to exclude them from management training schemes, resulting in few opportunities to progress away from the DP area. Barclays Bank and Williams and Glyn's delegates were concerned that as more and more installations moved towards a prime shift only operation, shift workers faced a reduction in living standards commensurate with the loss of shift allowance. The conference carried the motion seeking to implement shift wind-down payments for all shift workers. Bifu is to prepare a report on the subject for presentation at next year's conference. (Computer Weekly)

Computer literacy

The social effects of the push for computer literacy may not be entirely desirable, according to WJ Peutz, a former advertising manager of a group of weekly newspapers. For example, computer literacy could be the basis of an elite corps of information handlers who will be conversant in the language that will run the electronic society and computerized establishment. When a computer sits on every desk, it is unlikely that anyone without a computer background will be able to successfully compete for the high-level careers, thus encouraging an increasingly vast division between social and economic classes. (Technology Update)

SOFTWARE AND COMPUTER EDUCATION

A software checklist

Thoroughness, above all, is essential. When buying software, first prepare a list of your requirements. Programs can then be checked against this specification.

The following points should be looked out for:

- Does the program meet requirements? Check item by item, get written guarantees that file capacity is sufficient for the intended task. Ensure that report lay-outs are satisfactory.

- Check documentation. A professionally prepared manual, intelligible to the layman is essential.

- Will any of the application packages require modification? And can the supplier subsequently modify the package, if required?

- Is the program well tried? If so, the chances are that errors or 'bugs' have been ironed out.

- Is the program easy to use? A well written program will continually guide the user by producing unambiguous prompting messages on the VDU.

- Does the programme have adequate error trapping? It should be written such that all keyboard entries are subject to validity tests. Understandable messages should be produced if an error occurs. The programme should refuse to accept, say, XZY as an input for an hourly rate.

- Can the supplier provide genuine programme maintenance (contact other users), help with documentation and other enquiries, give adequate training (if so, at what cost?) and programme up-dates (again, specify charge)?

- Has the programme built-in security and back-up procedures? Does the programme allow for future integration of separate functions?

- If printing is temporarily halted, is it necessary to start the print-out from the beginning? (Technology Ireland, March 1983.)

Japan faces up to the software crisis

The computer industry in Japan is trying to solve its problems over producing software by fixing up deals overseas. Companies in Japan have arranged contracts in which people from China, Taiwan and South Korea write programmes for Japanese computers. The industry is also interested in signing up people in Brazil to write programmes (Brazil boasts a large number of Japanese emigres). Under a plan by the Japanese Software Industry Association, Chinese students will work on computer programmes for Japanese manufacturers. In return, the Chinese will receive training. Both Fujitsu and NEC plan to open software training centres in several Chinese cities. Fujitsu has started negotiations on a joint venture with the Chinese Science Commission of Tianjin for the development of a computer system for the Chinese language. In another move, Fujitsu has started to train South Koreans to produce software. This is done under the auspices of the Japanese firm's subsidiary, Facom Korea. Contract overseas are one way that Japanese firms can fight back against a chronic shortage of trained programmers. According to one estimate, the country could be short of as many as 180,000 computer specialists by 1985.

The computer business in Japan is unusual in that most software writing is done by people who use computers, as opposed to the manufacturers of the machines. Computer owners in Japan do not favour the trend in the West of designing general-purpose software packages. They prefer software tailored for a particular use. The programs will be produced either by the user company or by a software firm under its ownership. In the short run this approach costs more. A company that operates computers in Japan must employ its own software organisation with high fixed labour costs. But the long-run benefits are compelling. Custom-made software is often more reliable and has fewer "bugs" or faults. Also if the people who will later run the computer are also responsible for the software, then they are more likely to fit the programming to their own needs, which can save time and money later. In Japan, computer users create some 87 per cent of their applications programmes. Another 7 per cent is contracted with independent software houses, and computer makers provide the remaining 6 per cent. The software subsidiaries of large computer users are among the 40 largest data-processing firms in Japan. They include Mitsui Knowledge Industry, Sumisho Computer Service and MSK Systems-subsidiaries of the Mitsui, Sumitomo and Mitsubishi general trading companies. Nomura Computer Systems, which is owned by the largest Japanese securities house, ranks third among the largest information service companies. This practice is not confined to the largest companies. Medium-size enterprises such as machine-tool makers, now riding the wave of factory automation, are compelled to establish special software subsidiaries. One such toolmaker, Toyota Machinery Works, employs about 50 software engineers and needs 100 more.

The preference for custom software has shaped the industry in another important way. The hardware manufacturers themselves offer not only systems software, which comprises the most basic sets of instructions that make computers operate and with which users are normally powerless to interfere. The manufacturers also assist in developing applications software for specific jobs. In 1981, turnover of software houses from software development activities was more than five times that of 1975, with annual growth rates as high as 60 per cent. However, employment in the industry scarcely doubled to 105 981, which means that productivity rose appreciately due, at least in part, to better quality control measures. Both the Ministry of International Trade and Industry (MITI) and the Japan Software Industry Association have programmes to improve the training and professional competence of software systems engineers. People trained at the Institute of Information Technology, established by MITI in 1971, return to their original companies-users, mainframers or software houses - where they help to train junior engineers and programmers. (New Scientist, 14 April 1983.)

Software selling techniques

The recent past has seen an unprecedented rise in the demand for software. This has led to fundamental changes in the way that software is developed and, ultimately, the way in which it is sold. As long ago as 1968, the term "software crisis" was coined to describe the gap between the capabilities of the hardware and the software that could be used on it.

The seeds of the industry as it is today were in fact sown at about the same time when the hardware manufacturers, led by IBM, "unbundled" their software. Originally designed as a means for hardware manufacturers to increase their revenues, the unbundling gambit backfired by opening up the supply of software to independent companies. Most packaged software houses that are now well established owe their beginning to this decision by the hardware manufacturers. As soon as software as such became a "product" as opposed to a service it was inevitable that all of the devices used to sell hardware would also apply to the selling of software.

So, in the same way that an OEM market has grown up around hardware suppliers through the 1970s, the demand for software has created a similar structure in the software business. Traditionally the term OEM - derived from the phrase Original Equipment Manufacturer - has come to mean a company that takes a raw product (usually a Digital Equipment minicomputer) and by adding value to it turned into something new. Often this involves a certain amount of what has come to be known as "badge engineering" - in other words the only bit of value added to the original product is a new name. When it comes to software, the term has to be stretched a bit to include licensing deals between software suppliers and their customers where the customer is using the software to perhaps sell another product like a microcomputer.

"We have tremendous difficulty with the term OEM," commented the marketing manager of Micro Focus, a company specialising in Cobol compilers and programmer productivity aids. "It has always meant systems houses but I can see how it is becoming relevant to our business," he went on. "The great advantage to us in selling to other software houses and microcomputer manufacturers is in distribution. There is no way we could serve a world market with only 75 people. But by extending our products into other companies we can make use of their sales and support organisations". (Computer Weekly, 14 April 1983.)

Memory storage

The development of sophisticated personal computers is giving designers a headache. Sporting 16-bit microprocessors and using the latest user-friendly software, these machines require large amounts of memory. The problem is how to provide it at a price that will not swamp the cost of the computers themselves or sacrifice performance. Take the example of Apple's Lisa. It has roughly a megabyte (1m "words") of memory stored in the form of dynamic random-access memory chips (rams). These contain the programmes and data being used while the computer is in operation - and promply "forget" them once the machine is switched off. The rams can get the data they need at any one time from a semi-permanent memory stored on floppy discs, thin plastic discs covered with a magnetic film. The tricky part is coping with all of Lisa's software - both the operating system, which carries out the machine's housekeeping chores and gives it user-friendliness, and the application programmes. Lisa's software is designed to be integrated, so that a user can swith from one programme to another in a flash. To achieve this integration, Lisa's designers have used something called virtual memory, which effectively tricks Lisa's microprocessor into treating part of the software (stored on discs) as if it were stored on the rams. But, in order not to sacrifice speed, the designers could not rely on floppy discs alone: it can take several seconds to load software stored on a floppy disc into the virtual memory. The traditional solution to this problem is to use a so-called Winchester disc in addition to floppy ones. Winchester discs, which store information in a thin magnetic film on hard discs, can handle several million megabytes of data (versus several hundred for floppy discs) and operate very fast, so eliminating the processing delays otherwise involved in using virtual memory. An extra advantage is that the Winchester disc can store data as well as software. The big disadvantage is that they are very expensive, costing roughly $2,000 each. Partly as a result Lisa costs nearly $10,000. ...

A new, cheap alternative is the so-called laser card made by Silicon Valley's Drexler Corporation. The company says its card will store roughly two megabytes of information and cost only about $6. A laser card looks like an ordinary credit card except that it has a strip of a special film on which data can be recorded by a laser in the form of tiny pits. By using an array of optical detectors, it can then be read very quickly. In effect, light is shone on the strip and the pits reflect back less of it than the rest of the surface does. The snag with the laser card is that, unlike floppy and hard discs, it is a read-only device like a book. It is not possible to store new information on it. None the less, for programmes that are a permanent feature of a personal computer, such as operating systems, it could prove an ideal store. Although floppy discs would still be needed to store the results of calculations and the like, the card would eliminate any need for a costly hard disc. America's Hewlett Packard is already marketing a small personal computer which stores information on plastic cards, though these use a more conventional magretic film. Now Japan's Toshiba has licensed laser-card technology from Drexler for personal-computer applications. Others will follow suit soon. (The Economist, 12 March 1983.)

The way forward for database

The obvious way forward for database can be seen in the clear trend towards making it easier to use by the unsophisticated end-user. At the same time, the increasing power of the microcomputer means that many new users are not even considering mainframe or minicomputer database. Ease of use can be obtained by three features: relational databases, high level query languages, and data dictionaries. Internally, the database is becoming ever more

sophisticated; externally, the view seen by the user, is becoming ever more simple. In a relational system the data is viewed as a collection of simple tables. A table can represent a form or ledger in a manual system. This makes relational systems very easy to understand, so end users may use them directly. Their powerful query facilities allow data to be selected and extracted from tables. A number of tables may be combined or 'joined' just as you may crossreference two forms. Dictionary systems are valuable tools for documenting the organisation and the DP environment. In the future, more software products will be integrated with the dictionary. The dictionary will become the 'hub' of the wheel because it contains the basic data and the process definitions needed by other software. Information should only need to be collected, verified and stored once. The idea of database is now widely accepted. The data is held once (or repetition is controlled) and all application systems share this data. The same principle can be applied to processes. Instead of repeating validation rules and formulae in numerous applications, these rules can be held once and shared. This approach greatly reduces the effort needed to complete an application. (Computer Weekly, 21 April 1983.)

£36,000 to develop software for doctors

Manchester University has teamed up with a local group of doctors to develop CP/M-compatible software for general practitioners. The project is backed by a £36,000 grant for equipment from the UK Department of Health and Social Security, despite the fact that the doctors have picked a micro which is not one of the two systems made available to 150 selected practices under the £2.5 million Micros For GPs Scheme announced in June. The official systems are from CAP and British Medical Data Systems, but Manchester University's project at Barlow Medical Centre is based on a nine-terminal Multicomputer M200 which will be used by four doctors and their ancillary staff. University medical computing and computer science department staff will write programs for the system, which will then be available to other practices. The Centre's senior partner, Dr. Clifford Kay, was chairman of the Royal College of General Practitioners' computer working party which two years ago recommended using a local computer network to develop a multi-user system for GPs. The M200 is made by Molecular Computer in the US. It enables up to 255 users to share hard disc storage and printers while each having their own 64 Kbyte Z80 processor housed in the central system. It runs a CP/M-compatible operating system. An important factor in the selection of the M200 for Barlow Medical Centre was that Multicomputer had modified it to provide the resilience of a duplicated file processor so that the Centre can have a back-up copy of all its records on a second 20Mbyte Winchester disc. (Computer Weekly, 25 November 1982.)

UK tool factory computerises for survival

A Tyneside machine tool factory with £200,000 to invest in modernisation has opted for a computerised management system. The main problem for Stewart-Warner, makers of Thor pneumatic pavement breakers and Alemite pumps, was one of too many parts. Manufacturing director John Holmes admitted that a firm with a £5 million annual turnover struggling to make a profit should not have some 13,000 parts to keep track of. But there was not enough money available to carry out the radical redesign of the whole operation which would have been the ideal solution. Most of their machines are ten to 15 years old, some even prewar. To replace the lot was out of the question. Once Britain's largest undertaking of its kind, under the name of Armstrong Whitworth, which employed about 70,000 workers, it was bought by an American concern and has in recent years been hard hit by the recession. The payroll is now a mere 200, and the factory is running at well below capacity. Instead of the drastic move to complete automation, they turned to a new software answer provided by Burroughs, brashly called The Manufacturing System - TMS.

The idea is in its infancy: the B1900 mini is still far from taking over all Stewart-Warner's paper-passing tasks. But after the first year of running the system Holmes claims 30% improvement in productivity - a £500,000 saving, with a 20% reduction in inventory.

The software amounts to about half a million lines of Cobol code, covering accounts, payroll, maintenance and asset register, material requirements planning and a range of production aids. (Computer Weekly, 24 February 1983.)

Computers come to the aid of planners: new software package available

Ministries of physical planning and other government institutions involved in urban and regional development should be heartened to learn of a new planning tool available to them through the United Nations Center for Human Settlements (UNCHS): a microcomputer software program. Stating that this is appropriate technology at its most accessible, the program's

project manager, Jerry Coiner, has taken special pains to see that the costs of using the program are kept to a minimum, that workshop training is available to those who will use the program and whose needs it will meet, and that back-up consultancy is provided as needed for up to six months after the program is introduced.

Package designed for many needs. The Urban Data Management Software (UDMS) package has been designed by UNCHS to meet the needs for data storage, analysis, display, and mapping for physical, social, health, environmental and land-use planners, housing officials, resource managers, and regional scientists. The package is written in CBASIC for any C/PM disc operating system which allows it to be used on almost any microcomputer on the market. Because costs for microcomputers are steadily falling while their capabilities are increasing (due to technological advances), Dr. Coiner recommends a minimum investment in hardware. His suggested requirements for a 48 kilobyte microcomputer, at least 500 kilobytes of disc storage, two disc drives, a video terminal and a standard line printer, can be met in the U.S. for US$8,000. The copyrighted software package and necessary manuals are available free of charge to governmental organizations. Should a government require technical assistance to put the program in place, install the software and train personnel, the total cost, including hardware, will vary between US$40,000 and $80,000, depending on local conditions.

Dr. Coiner has received requests to date from over 30 countries interested in using this tool for physical planning. The National University of Colombia's Habitat Center and Sri Lanka's Urban Development Authority are two institutions that have successfully introduced this program.* Jamaica's Urban Development Authority is about to institute the system.

International requests. It is essential that an institution's need determine the kind of hardware and software it acquires, with the appropriateness of the software being absolutely crucial. By using this high technology at the small-scale operational level to process its own data in a useful way, the institution will avoid the common pitfall of having too much data with too few uses, while at the same time becoming comfortable with the technology.

A number of publications are available to accompany the program. One manual in particular, however, can stand alone as an excellent guide to the concepts of data management. Designed for human settlements planning and management agencies, these concepts are nonetheless relevant to others interested in a clear understanding of data processing technology. Each chapter of Data Management for Urban and Regional Development deals with a specific set of actions that must be taken to determine the utility of data management concepts and to select the appropriate technology for specific tasks. These chapters are grouped into "Basic considerations," "Assembling an information system" and "Technical and personnel aspects of information systems." A glossary, a bibliography, and a list of acronyms are included. The cost of this publication (number CHS/PP/81-1/S) is US$ 0.00. (Judy Brace) Resource Center Manager and Acting Director of the Clearinghouse on Development Communication.) For further information on this Urban Data Mangagement Program, or to order the above publication, contact Dr. Jerry Coiner, UNCHS (Habitat), P.O. Box 30030, Nairobi, Kenya.

The invasion of the mice

Graphics-based software that is easy to use requires a human interface that is equally agreeable. In office systems, the most common way to move the cursor or to invoke special commands with a keyboard is either through special function keys or a series of keystrokes. In computer-aided-design systems, light pens, track balls, joysticks, and graphics tablets have been employed. But with the new generation of computers, including Apple Computer Inc.'s upcoming Lisa and Macintosh and integrated, graphics-based software packages like Vision, a mouse can move the cursor and manipulate elements on a cathode-ray-tube display. A mouse (so named because the first was built in a hemisphere placed flat side down with switches on top and a cable "tail" connecting it to the computer) is a device about the size of a deck of cards that translates motion into a signal read by a computer. One or more buttons, software-programmable, may be on the mouse's back. These may be used for "attaching" the cursor to an object and moving it on the screen by moving the mouse. Or they can mark off a block of text to be moved or deleted.

From the simple analog design, the mouse has gone through many changes. Potentiometers were replaced with commutators and finger contacts, and the wheels were replaced with a ball. Later refinements include replacing he commutators with slotted disks and pairs of light-emitting diodes or Hall-effect devices that put out a string of bits indicating the direction and extent of the mouse's movement. The latest advance is the completely optical mouse: two sets of photodetectors pick up movement on a specially printed grid. (Electronics, 29 December 1982.)

---

* see also article on page 45

Computer-integrated manufacturing

CAD/CAM may help boost productivity and be the first step toward computer-integrated manufacturing. One main reason that productivity began to lag in the 1970s is due to the evolution of multiple data bases that are exclusive to each business function. Companies reporting successful results of increasing productivity include GW Plastics (Bethel, VT), General Electric's aircraft-engine-parts plant (Wilmington, NC), Cummins Engine (Columbus, IN) and Ford Aerospace & Communications' DIVAD Div (Newport Beach, CA). A history of CAD/CAM's development is included.

In 1981, installed CAD/CAM systems in the US were fewer than 4,600, according to Predicasts, a market-research firm. By 1995, there will be 190,000 units installed, and US-based shipments of CAD/CAM gear will grow 38%/yr until 1985, when the market will hit $2.8 bil, vs $765 mil in 1981. As the turnkey-systems market nears $12 bil/yr in 1995, the growth rate will slow to 22%/yr. Other aspects of CAD/CAM include competitors, growth area, software and possible integration of CAD with CAM.

US CAD/CAM application in 1985

	%
Mechanical	50
Electrical & electronic	20
Civil eng & architecture	16
Mapping	9
Other	5
Total	100

Source: Predicasts

US CAD/CAM installed base (units)

	1981	1985	1995
Mechanical design	1744	9000	82000
Electrical & electronic	1620	3700	51000
Civil engin & architecture	630	2900	37000
Mapping/other	568	2400	20000
Total installations			

Source: Predicasts

(Technology Update, 12 March 1983.)

CAM comes late to Ireland

According to a study by members of UCG's Industrial Engineering Department*, the use of computer-aided manufacturing (CAM) in Ireland is "minimal". The study admits that there are some valid reasons for this. It points out that much CAM technology has been developed from the point of view of large scale operations. "This provides a challenge to Irish manufacturing engineers to adopt CAM techniques to the needs of relatively small plants which exist in most sectors of the Irish economy," it says. It adds that many applications - for example robotics and also direct numerical control (DNC) which replaces dedicated computers controlling machines with a larger computer controlling a number of machines on a time shared basis - are not economical here. These applications, says the study, require a level of operation and market size unusual here. And "the predominance of assembly type operations... mitigates against the use of direct applications of CAM, in that much of the work on robots for example has been undertaken with a view to ... areas such as foundries, large scale car assembly plants and heavy engineering generally."

* Computer Aided Manufacture (Engineering Technology Series, No 3), by J. Browne, M.P. Fitzgerald, J. Harhen, and M.E.J. O'Kelly of the Department of Industrial Engineering, UCG. Published by the National Board for Science and Technology, Shelbourne House, Shelbourne Road, Dublin 4.

Up to now, robotics has not been widely applied in light engineering assembly, says the report, but adds that there is a particular need to keep this matter under review. "The development of special purpose light assembly manipulators of robots should have serious consequences for labour requirements in a number of Irish industries," it says. And the reasons for the "minimal" use of CAM are not all positive or justifiable. The study, published by the NBST, blames:

- Lack of awareness.
- Lack of suitably trained personnel.
- Low level of CAM technology transfer from multinational to native Irish companies.
- Low level of R&D in Ireland.

Also blamed is "some lack of cohesion among state services, in regard to responsibility for the assessment and raising of productivity in manufacturing industry". How should this situation be rectified? The study recommends that a series of seminars outlining the scope of the new technology should, in the first instance, be held. It also advises that "consideration be given to the provision of special grants to undertake studies by experts to assess the feasibility of using CAM techniques at the individual firm level."

Further recommendations involve demonstration projects by such bodies as IIRS, IPC, the Microelectronics Application Centre, Universities and other third level colleges. The study also indicates what scope there is for CAM techniques in Irish industry. It carried out a survey of nine companies and describes instances in various sectors. In electronics, applications are: PCB assembly; cable harnessing and the higher level assembly of modules into systems. The team visited four firms and says: "Techniques of computer aided manufacture have been and are being widely used in the early stages of assembly, particularly PCB assembly." For companies with high levels of volume and little variety, automatic axial lead assembly and dual in line packages (DIP) insertion machines under computer control are available, it says. All four electronics companies had computer-based incircuit testers for PCBs. In mechanical engineering, the main areas, not surprisingly, were NC and CNC machines. In healthcare, the study notes a recent development in computer monitoring of the parameters of the injection moulding process to control product quality. But this was not used in either of the two healthcare firms that the team visited.

As for indirect applications, the study points to the following:

- Financial/planning models.
- Materials requirement planning for inventory and so on.
- Data collection, monitoring and other forms of shopfloor control.

One aspect of CAM that can be expected to generate controversy is its effects on workers and employment. At the very least, as the report notes, training will be required. A trade union response can also be expected, it says: "The use of CAM technology has a significant effect on the quality of the working environment and it is likely that the younger and more educated Irish labour force will be more conscious of the need to consider such matters in the future." (Technology Ireland, November 1982.)

The new CAD/CAFE

New entrants into the computer aided engineering field are concentrating on the fast-growing electronics field. Driven by the inevitable fall in processor and memory prices, computer aided engineering and design system manufacturers are coming out with a new generation of equipment that promises to provide CAE and CAD to all but the smallest of manufacturing customers.

The microprocessor's plummeting price curve, combined with the know-how gained from higher-priced systems, is spawning a number of new companies that plan to automate as much of the engineering design cycle as possible. One of the most lucrative markets for such automation, in fact, appears to be non other than the electronics and computer industry. Interestingly, the microprocessor itself is helping engineers make better use of micros in new circuits and even design future microprocessors themselves. (Datamation, February 1983.)

Canadian computer graphics firm eyes world-wide markets

Ottawa's Omnitech Graphics Systems Inc. is making life easier for designers, draftsmen and map-makers throughout the world with its newly developed computer-aided CADD/CAM system for use in designing, drafting and manufacturing. The system, trade-marked "ERGOS 240", enables designers, draftsmen and cartographers to design products and systems on a video

display terminal. The system's minicomputer records the designs, allows easy alterations and prepares required materials costings and a bill of materials. Once the drawings have been produced, another Omnitech software package lets the system be used to co-ordinate and direct the manufacture of parts and assembly.

After a period of consolidation and building its base in Canada following its founding in December 1979, Omnitech is now setting up a world-wide network of distributors. The company has already signed agreements with distributors in England, the eastern United States, West Germany as well as Indonesia. Distribution agreements are being negotiated in the US, South America, Australia and other Asian countries. At prices ranging from $125,000 to $150,000, the company's systems are competitive in price with similar US systems selling in the $250,000 to $600,000 range. (Canada Weekly, 9 February 1983.)

Computer-assisted instruction

The PLATO system, which is used at the University of Illinois, is well-known as a CAI. In Japan, Kanazawa Technical University and Tsukuba University are using CAIs. The primary objective of CAI is to allow each student to learn at his own pace. In order to serve that purpose, the terminals that the students use should be easy to operate. Furthermore, the computers should be able to adjust to the ability and knowledge of each student, since treating all students identically is poor pedagogy. Therefore, instructional computer systems should be designed to alter the teaching method from person to person. And, if a student gives a wrong answer, the computer should be able to explain to him why his answer is wrong and eventually to give him the right answer by inferring how he made his mistake. A good trick! It will obviously be a tough job to develop such advanced CAIs. When we have them, they will certainly be helpful not only in schools but also in continuing education for adults and in professional training. When it comes to training professionals by CAIs, the task becomes even more challenging. Scientific technology at present covers an ever-broadening area, but knowledge which individuals have is becoming narrower. However, those who have broader and deeper knowledge are, in fact, in greater demand. It is also true that we cannot produce such persons quickly and easily. What is the solution? The computer! We must keep it at hand at all times, and, whenever necessary, turn to the computer for professional consultation. This is called an expert system. The MYCIN system, which was developed in the United States and is actually in operation in medicine, is an example. (Excerpted from an article by Mr. T. Kobayashi on US-Japanese Co-operation in Scientific Technology in Computers and People, March-April 1983.)

Software consultation office

The Software Industry Promotion Society of Japan announced on 10 November 1982 that it will establish a Software Consultation Office in Tokyo. This office will grant free consultation to software developers and users who are distressed by legal or contract problems in software transactions. "Pirated software" is already rampant in game machines and personal computers, so this establishment of the first consultation office in Japan since such troubles materialized will likely attract great interest.

The purpose for establishing the Software Consultation Office is to set up a healthy transaction system by protecting the software-related rights of software developers and users. The consultation office is set up such that the client will first send a summary, in writing, (no more than 800 characters) of the consultation matter to the office. The consultation office will then forward the matter to retained lawyers (five lawyers), and request an opinion. If it is necessary to talk with the client, the consultation office will consult the retained lawyers, and, after deciding the date, time, and place, will notify the client. The opinion of the retained lawyers will be conveyed through the consultation office.

Of course, the confidentiality of the consultation matter will be strictly observed. The Software Industry Promotion Society will bear all expenses necessary for consultation. However, the consultation office will not be at all involved in the specific handling of the consultation matter (i.e., litigation). The consultation office will be located in the Society's executive offices in the Machine Promotion Building at 3-5-8 Shiba Koen, Minato Ku, Tokyo (tel. (03) 436-3938).

According to the Promotion Society, there are a lot of cases in Japan where, even when trouble occurs because the receipt of written contracts in software transactions is inconsistent, settlement of the problem is dropped. One aim of establishing the consultation office is to acquire contract "know-how" now, since software clients are spreading to Europe and the U.S. as well. The Society will soon establish a special consultation committee as the top

organ of the consultation office, and this will deal with legal research on consultation matters. There is also a special committee for software legal protection investigation and research in the society, and this draws on eight lawyers. (Translated from Tokyo Nikkan Kogyo Shimbun, 11 November 1982.)

Microcomputer Software Association

The Japan Microcomputer Software Association, composed of users, manufacturers, and men of learning and experience, was started on 24 November 1982, with the goal of checking, from the users position, the quality of software for personal computers. Recently the distribution of personal computer software has gotten into stride, and various and sundry software has appeared on the market in large quantities. However, there has been considerable trouble because the quality assurance and responsibility system is inadequate. For this reason, the association was established to check the quality of the software from the consumer's point of view, attach the association's quality assurance seal to software that passes the test, and serve to distribute good-quality software.

Nishiyama Eizaburo (Director of the Japan Productivity Center) will assume the office of president, and Ishida Takeo (former president of the Aoyama Institute and University) will assume the position of vice-president. The executive office will be located at 8-12-1 Nishi Shinjuku, Shinjuku Ku, Tokyo (tel. (03) 361-5488). The purpose of establishing the association is to set up a quality assurance system from the user's point of view for good-quality software goods, in order to foster a healthy software distribution market. For this reason, the association is made up of a wide range of people such as users, manufacturers and industry-related people, men of learning and experience and legal experts (lawyers).

Due to the sudden spread of personal computers, large quantities of software, from game-type software to software for educational, home and business uses are being distributed. However, there are cases where the support is inadequate when there is some kind of trouble, so there are situations where it is "closed out." Therefore, the goal of the association is to check the quality of software from the consumer's standpoint, attach the association's inspection sticker to software that passes the test, and make it a standard for the consumer's selection of good-quality software.

Although various issues remain, such as specifically how quality will be checked, and how responsibility and complaints will be handled when approved software causes problems, the activities of the association are noteworthy simply in its hoping to establish an organization for checking quality from a third-person point of view. (Translated from Tokyo Nikkan Kogyo Shimbun, 25 November 1982.)

Christmas software for English toddlers

Toddlers can expect to find educational software in their Christmas stockings this year. The National Magazine Company has just embarked on a project to produce a series of cassettes for children between three and six with micros, and expects to release the first batch of about six in time for Christmas.

Dr. Linda Deer, recently appointed as managing editor of the project, explained it: "Plans are still in the formative stage," she said. "But the cassettes will each be part of an overall learning programme. Teachers and programmers will be involved in writing the cassettes, and the programs have to be accessible not only to the pre-school children but to their parents too."

The aim is for the series to be complementary to what the children will eventually learn at primary school.

It has not yet been decided which microcomputers will use the software. It seems a safe guess, however, that at least three will be those supported by the Department of Education's Micros in Primary Schools scheme: the Sinclair Spectrum, the BBC Acorn Model B and Research Machine's Link 480Z.

Dr. Deer is examining how best to produce material, particularly for the three year olds who may not be able to read, but is confident that with her team she will come up with the right answers. She aims to keep the documentation clear and simple as "parents are busy people and won't want to wade through thick manuals. (Computer Weekly.)

Pupils catch the micro bus

There are no conductors with the latest microcomputer bus kitted out at Salford University, U.K. The bus, the first of two, was handed over recently by Salford City Corporation, and will be used to provide microcomputer education to schools in the North-West. Known as Mobile Education Centres, both buses will carry up to 15 microcomputers, a handful of academic staff and a range of software, to provide on-the-spot training, demonstrations and advice to schoolchildren and others. Salford University takes an active role in promoting computer education within the region, and most of its activities are co-ordinated by its Centre for Computers in Education. Salford has a contract to run the electrical and control technology centre for the North-West, as part of the Department of Education funded Microelectronics Education Programme for Schools (MEP). (Electronics Weekly, 18 March 1983.)

Microcomputers in Britain's primary schools

Britain has stolen a march on the US in one of the most important aspects of information technology - getting computers into schools. The Department of Industry's £4 million scheme to put a microcomputer into every secondary school in Britain has closed with 6,400 computers distributed. Only 600 schools did not take up the offer of half-price computers.

The government has now turned its attention to primary schools. So far a quarter of Britain's 27,000 schools for the under-11s have taken up the offer of cut-price computers and training material. The Department of Education and Science provides the software and training for teachers. So far the department has sent 7,000 teachers on computer courses and reckons to train 50,000 teachers by the end of this year.

The DES has nevertheless been criticised for not giving enough training to teachers and for not providing adequate computer programs for the classroom. At present the department has a library of some 400 pieces of educational software. But the Department of Industry recently threw £1/2 million into the ring in an effort to get firms to adapt their software for use in schools. (New Scientist, 3 March 1983.)

UK "Micros in schools" programme

The announcement last week that the government is pumping a further £9 million into its Microelectronics Programme for Schools (MEP) to extend it until 1986 was widely welcomed. The Junior Education Minister, William Shelton, delivered the news to a packed audience at a Birmingham exhibition of the MEP's nationwide activities. Among the invited visitors were teachers, academics, local government officials and examiners. However, in the wave of euphoria and relief accompanying the announcement, it is important to put the MEP into perspective. Although significant, the MEP is second of three stages with the overall objective to get all schools routinely teaching the principles of computing. The objective may still founder at the next stage through lack of funds. The first stage was the subsidised provision, on a pound for pound basis, of hardware by the Department of Industry. The programme is now well underway with an estimated 98% of secondary schools and 30% of primary schools already possessing micros (but not peripherals) at an estimated total cost to central government of £14 million. The MEP, funded by the Department of Education is the second, complementary stage, set up to develop educational software and aids, to provide in-service training for teachers, and to co-ordinate and publicise these activities. The programme had a bumpy start. Originally intended to be a £12 million four-year programme, it was caught up in the 1979 General Election, was delayed a year and ended up with £9 million to be augmented to cover inflation. The spending has been: 1980/1 - £1 million; 1981/2 - £2.8 million; 1982/3 - £3.6 million; 1983/4 - £4.3 million. The additional £9 million for two more years marks a plateau.

However, the third stage, getting the software and aids into the schools, is crucial for the overall success. There is no central assistance to the local authorities or to schools for this purpose, which will have to find the funds from ever-decreasing educational budgets. There are three broad prongs to the MEP's work. About 50% of its grant goes to developing software packages, teaching aids and curricula. The MEP gives grants to projects which will produce materials which can be used nationwide. These are based in schools, polytechnics and universities. Additional aid, worth some £150-200,000 per annum, has been drummed up by the Director of MEP from industry, including IBM, BP and STC. There are four national MEP centres for software development, which aim to produce cheap but effective packages. These are Chelsea College; St. Mark and St. John College, Plymouth; Netherhall School, Cambridge; and King Edward's Five Ways School, Birmingham. The latter has developed into a separate commercial operation and has sold its software to Australia and to the US. Some 400 programs have been developed already, which retail on average from £7 to £15, and many more are in the development stage. Commercial publishers Longmans and Heinemann are involved in selling the products abroad, and MEP is also pushing for an additional consortium approach for exports.

The MEP also backs development of educational aids. Examples include a microprocessor based measuring device developed by Leeds University which retails at £175, and "BBC Buggy", a programmable robotic device developed by MEP for the BBC Computer Literacy Project, which will cost schools about £100. The exhibition of electronics and control technology developed in and for schools in Birmingham displayed a wide range of inventiveness, and adaptability. For example the pupils at Alsager primary school in Cheshire had made their own buggy for £7. The MEP is closely concerned with developing the curriculum, and has regular meetings with examining boards and the universities. There are signs that curricula may increasingly cover social implications of computers in addition to the electronic aspects. The National Union of Teachers has been pushing for this. Some 15,000 secondary teachers have taken two-day courses in computer awareness, and many are taking part in more extended in-service training courses organized by the MEP. (Computer Weekly, 10 March 1983.)

France puts 6,000 more micros into schools

France's Education Minister, Alain Savary, has announced that 6,000 more microcomputers are to be installed in schools this year, more than doubling the 5,000 already operating in the classrooms. The new computers will be delivered to primary schools. The new batch of micros, which will be of simpler design than their predecessors, will be concentrated in areas affected by unemployment. The government hopes that access to data processing at an early age in these regions will give youngsters better job opportunities. About 20,000 teachers are being trained in the use of computers by the Ministry of Education this year. (Computer Weekly, 24 February 1983.)

Legal challenge to computer requirement in public schools

Required use of computers in public schools may face a constitutional court challenge, according to International Resources Development Inc. The growing presence of classroom computers - aimed at fostering computer literacy and encouraging students to take up engineering and science - may provoke less-privileged families to sue local school districts on the basis of unequal educational opportunities. 'Financially advantaged families can afford to buy home computers for their kids to do homework on, while poorer families cannot,' said IRD's C. Frankel. The use of computers in education will significantly widen the chasm between the privileged and the underprivilged. Libraries, which have traditionally bridged the gap between rich and poor in education by making books available, do not perform the same service with computers. Despite possible legal challenges, Frankel predicts the educational marketplace for computers will boom in the next 10 years. (Technology Update, 19 March 1983.)

Micros given to colleges in USA

Control Data last week announced a $6 million giveaway of Model 110 eight-bit microcomputers and some Plato software. The company will give one of the micros and some of its Plato maths and science course materials to each of 110 colleges which will be required to submit to CDC a plan for integrating the Plato technology into their curricula. The colleges will also be required to develop plans to transfer the technology to secondary schools and community groups by October 1983. Upon approval of the plan, CDC will give each school free additional micros and some additional software. (Computer Weekly, 21 April 1983.)

Academic software heads for market

University software could be sold by software houses if a National Computing Centre proposal is accepted by the Department of Industry. The NCC has asked for £37,000 to back a survey of software produced in universities and a study of gaps in the software market. The money would also be used to help universities prepare proper documentation for the commercial market. The move has been welcomed cautiously by the industry, which fears academics might have an unrealistic view of what software marketing is all about. The man behind the initiative is Eric Johnson, who is responsible for keeping in touch with the NCC's 280 members in the computer and systems supply industry. He is working with a group of senior university people involved in promoting liaison with industry. He pointed out that the government's Alvey Committee proposals on fifth generation computing for the UK stressed the need for university work to be brought to the market. "Universities have a lot of expertise in automation, business administration and computing and mathematics," Johnson said. "We believe there is a lot of software around but many universities lack marketing expertise. For example much of their software is probably not documented to commercial standards. "We want the grant to see if this is so and then to put up proposals on the marketing, distribution and documentation of the software to software companies and computer manufacturers. We do not expect universities to sell to end users." (Computer Weekly, 14 April 1983.)

Canadian universities chip in

Northern Telecom Limited recently launched a program that should improve the quality of Canadian University education in microelectronics technology. Under the program, students from 12 universities will submit designs of very large-scale integration (VLSI) chips which the Company's Semiconductor Components Group will then fabricate for them. The logistics involved in converting the software of the student designs into Northern Telecom format is to be managed by Dr. J.R. Penstone of Queen's University's Department of Electrical Engineering. To set up an office to coordinate the design submissions, Professor Penstone has been awarded a $75,000 special project grant by the Natural Sciences and Engineering Research Council. (Science Dimension, January 1983.)

Computers to decode brain waves?

Once the problem of free form voice input to computers has been solved, direct input of brain waves could be the next step. This was one of the many provocative ideas thrown out by Professor A. Bork of the University of California at Irvine in his keynote address to "CAL '83", the computer assisted learning conference held at the University of Bristol last week Bork advanced the brain wave input idea in all seriousness. "From the computer's point of view, the problem of decoding brain waves is very similar to that of the coding the human voice," he said. "We tend to assume that it would be harder but the computer doesn't share our prejudices". Work in progress in the US has already achieved some success in getting subjects to control motor devices just by "thinking" the control codes. This could have real advantages over joysticks in producing smooth movements. Work at UCSB has also identified an electro-encephalographic (EEG) pattern which corresponds with a subject meeting an unfamiliar word. This pattern could be identified by the computer and used to feed the student with explanations. Bork predicted that the role of schools would alter fundamentally in the next 25 years. He anticipated a complete separation between the knowledge and social elements of education. Home computers might deliver the entire knowledge-based curriculum while schools would concentrate on the social elements. Bork was highly critical of the Basic language which was a mistake to learn, teach or use. "Basic is close to destroying the computer health of a whole generation of students." His theme was that such short term expedients produced long-term problems. By the year 2000 the computer would be education's major delivery system for whole courses. Courseware development might be along Open University lines, programmed in languages like Pascal or Ada. The attack on Basic was joined by other professors, notably Professor Kowalski of Imperial College, who advocated Prolog as a tool for logical thinking as well as a language for programming. (Electronics Weekly, March 1983.)

Process-oriented language

Concurrent-processing software no longer need lag behind the variety of sophisticated hardware components available for distributed-computing systems. Occam, a new programming language, offers a software design methodology and language for implementing concurrent processing systems. It is as applicable to the next generation of supercomputers, which are likely to use very large arrays of processors to create high-performance parallel-processing systems, as it is to distributed computing using microprocessors to offload work from a host mainframe computer. Occam gets its name from the medieval postulate known as Occam's razor, which holds that entities should not be multipled unnecessarily. Put another way, the argument is to reject complex propositions in favor of simpler ones whenever possible. The new language's name reflects the decision that its design would be bound by Occam's razor, that concurrency can be expressed by a few relatively simple software constructs. Although system designers and many application programmers must routinely incorporate features of concurrent processing in their work, they have been forced to design and implement software systems with sequential programming languages. Occam resolves this paradox by introducing a few simple constructions built around a pair of structures that logically mirror the important functions of concurrent systems: parallel processing of independent activities and communication between these parallel activities. A process - the fundamental working element in Occam - is a single statement, group of statements, or even a group of other processes and is responsible for handling one prescribed activity. Functionally, then, it is a group of statements (or processes) that share the same context. For an Occam compiler, a group of contiguous lines of code, whether statements or processes, indented at the same level share the same context.

On the other hand, a channel is the fundamental communication element that allows concurrent processes to communicate with each other. Connecting exactly two of these processes, a channel is an unbuffered structure and allows information to pass in one direction only. It can be considered a synchronization device, allowing two processes to transfer information. Thus, a channel behaves as a read-only element to a receiving process and a write-only element to a transmitting process. The transmitter can write only when the channel is empty, while the receiver can read only when the channel is full. Writing fills the channel, and reading empties it. In Occam, concurrency goes right down to the lowest level of the language. Individual statements are processes that can run in parallel with each other. Language statements are grouped together by constructors that allow individual statements of groups of statements to be executed in parallel or in sequence, or for one out of a set to be selected for execution depending on some logical condition. Along with a looping mechanism, these constructors complete the major control structure recognized by the Occam compiler. By retaining simplicity with this fundamental set of constructs, the language ensures that its own structure is not a barrier between a designer's view of a problem and the problem's representation in Occam. ... (For more details see a technical article by R. Taylor and P. Wilson, INMOS Ltd., Bristol, UK, reprinted in Electronics, 30 November 1982.)

Will Cobol resist the charms of modern Ada?

Jean Ichbiah, recognised by many as the language's inventor, declared recently that it is set to sweep Cobol aside as the leading language of commercial data processing. This certainly seems to be the belief of the European Economic Commission, which this year has poured £4 million into Ada projects other than those concerned merely with defence applications. The EEC in November 1979 announced that a European systems language could be built around Ada, if certain modifications were made. These modifications were incorporated in the definition of the so-called Ada Apse, or Ada Program Support Environment. The Apse was deemed necessary to support Ada programs throughout their life cycle, and provide the file handling capabilities needed to support database applications.

The US Department of Defence set up the Ada Joint Project Office (AJPO) in December 1982 to coordinate Apse developments, and develop the language definition and standards. Part of this work was completed this February with the announcement that Ada had joined Fortran and Cobol in the elite recognised by ANSI, the American National Standards Institute. The ANSI standard will soon be proposed as a draft to ISO, the International Standards Organization, according to Bob Mathis, technical director of AJPO. Almost 6,000 public comments were received, and Mathis believes that all shades of international opinion have already been catered for, so ISO should have nothing to complain about. But the ANSI standard is the one that matters, since it opens up for Ada the enormous US government market, and public sector markets in other countries such as the UK which recognise ANSI as the definitive standards body.

But meanwhile many people stuck in the mainstream of data processing beg Ada to keep to its place in scientific and defence applications. "If Cobol is ousted, it will not be by Ada, but by query languages and menu-based highly intelligent systems," says John Piggott, managing director of software specialists S&PC and a member of the British Computer Society specialist Cobol group. There is a fundamental misunderstanding about Ada's ability to handle commercial processing tasks, Piggott asserts. "It doesn't compete well with Cobol and doesn't have the ability to handle records."

Piggott's notion is seconded by Ken Myer at British Gas, who follows closely developments of program generators. "I would say Ada has its place," he condescends. "But it doesn't solve the basic problems of data processing. Things have to be done over whole files and fields and Ada does not cope with these." The Ada Apse would in theory supply these file handling facilities. But Myer does not believe that it is the right way to go about the problem, since yet more intermediate languages will have to be developed. Application generators are more likely to succeed Cobol. (Computer Weekly, 21 April 1983.)

Roman meets Farsi

Electronic communications is hardly considered a problem in the day-to-day job of an employee, especially countries where only one alphabet is used. In the 32 countries where Farsi, the alphabet used by Arabs, Iranians, and many other Islamic societies, predominates, however, it's a major problem. It all has to do with entering Arabic text into a telex or computer terminal. Farsi characters not only run from right to left, but, depending on their location within a particular word (i.e., at the beginning, in the middle, or at the end),

they take on different shapes. Obviously, the alphabet was not "designed" for computers. It evolved over the centuries for moving hands that, having writ, move on. The modern day trouble comes, though, when Farsi and Roman characters mixed in the same text are entered into an electronic system: which way is the terminal's cursor to move as it switches back and forth from alphabet to alphabet?

A startup company in Elmsford, N.Y., (International Digital Electronics Associates) says it has come out with a telex terminal designed to solve just that problem. It is, the company claims, the first Farsi-Roman terminal able to make the transition on the fly, so that a bilingual operator need only hit one key to change character sets. The machine, based on a microprocessor, takes care of which characters go where and in what direction. The market for such a terminal would seem to be vast. Think of it: 32 countries, some of them the richest in the world on a per-capita basis, moving all those telex messages back and forth. The first iteration of Kaen's bilingual algorithm, which handles the cursor movement and character formation, was put on an Ontel intelligent terminal. Now the company has introduced a terminal it designed itself, which features an Intel 8085 microprocessor, floppy disk drives, and a variety of add-on features. The terminal, designated Bitelex-1, will sell for between $3,500 and $4,900, depending on features ordered. The machine has been designed around a direct memory access (DMA) architecture so that I/O is not a problem. Four ports in the system can be used to attach printers, communications lines, crt terminals, and disc drives. The system has 64K bytes of RAM, 32K bytes of erasable ROM, and up to 2K bytes of EPROM, which handles telex answer-back protocols and configures the system when it is turned on. Floppy disk storage is configured to resemble logically the traditional paper tape used in telex machines.

The company said initial customer shipments of the terminal are set for the first quarter of this year. The terminal's design also lends itself to handling Japanese characters, so that market will be approached as well. The company expects to sell at least 2,000 units this year, primarily to U.S. and Middle Eastern customers.

The closest competition for the Bitelex terminal, says one official, it a Siemens device that sells for more than double the price. Idea hopes to gain most of its sales through distributors and common carriers and has already signed up several of the latter in the Middle East. (Datamation, January 1983.)

Chinese keyboard

A Chinese keyboard has been developed at the Chinese University of Hong Kong under the leadership of Loh Shiu-chang, head of the Computer Science Department. Loh started by analyzing all Chinese words to see if there were any common rules governing them. He noted that most Chinese words were constructed by the combination of 2 or 3 component parts, called radicals, some of which are always out in the same position. Researchers constructed a keyboard that covers all radicals and is divided into 5 zones, the upper, lower, left, right and central zone, each with different colors. Special words that cannot be broken down into component parts appear whole on the key. The 10 Chinese numerals are placed vertically in the middle of the center to serve as the nucleus of the keyboard surface. Characters can be typed with an average number of 2.75 strokes, and an operator can obtain a speed of 4,000 char/hr after 3 wks of training. (Technology Update, 15 January 1983.)

Supercomputer language

Hitachi (Japan) developed a dedicated supercomputer language, said to be capable of reducing programming steps and speeding execution of instructions. The Differential Equation Solver (DEQSOL) appears to be similar to the variable differential equation that is used to write supercomputer programs for semiconductor processing, semiconductor devices and microelectronic analyses. When a researcher writes a simulation program in DEQSOL codes, it is automatically translated into Fortran codes by the DEQSOL translator, also developed by Hitachi, before it is coded into machine language for execution. In benchmark tests on a Hitac V-200H with a built-in array processor, a chemical vapor deposition program took only 127 steps on DEQSOL, vs 1,361 steps on Fortran. (Technology Update, 19 March 1983.)

Getting personal computers to understand Japanese

Imagine the hassle of trying to programme your personal computer in a foreign language. Until late last month, all Japanese personal computer buffs had to do so. Not only did they have to master the intricacies of a computer language like Basic or Pascal - a problem in itself - but they also had to wrestle with the English used by such languages. They should welcome the development of a new personal computer programming language called AFL (short for a fundamental language). Developed by Matsushita's R&D arm in Tokyo, AFL's structure allows

a programmer to write programmes in Japanese, without fussing about the complications of Basic or any other computer language. AFL is designed to function rather like a set of grammatical rules, from which expressions, sentences, and thus entire computer programmes can be written. It lays down the rules for programming by defining what statements are permitted. The grammatical rules are, say Matsushita's boffins, independent of any particular human language: using AFL, it is theoretically possible to write programmes in tongues as diverse as Thai or Arabic. But so far AFL has been developed only to cope with Japanese. The job of combining AFL's computer grammar with the Japanese language was carried out by a small Tokyo computer company, Kokusai Data Machine Systems. First, Kokusai devised a two-step method of putting Japanese programming instructions on to the screen of a personal computer. This is complicated by the fact that literate Japanese sentences are a mixture of two alphabets, katakana and kanji. (While katakana is a phonetic script, kanji characters are complex pictograms.) Instructions are first keyed into the personal computer in Katakana, a script that can be handled by a normal keyboard. These katakana statements are then converted into literate Japanese sentences with the aid of an electronic dictionary which hunts out kanji synonyms for katakana words - where they exist. It is tricky: the dictionary holds over 2,000 kanji characters.

The next step is to translate the programme written in Japanese into the grammatical rules of AFL. This is accomplished by a compiler, which puts the programme into a form that the computer's hardware can digest. Not that AFL has been developed just to cater for do-it-yourself Japanese beginners at programming. The hope is that, by being able to programme in Japanese, the Japanese will start to close the gap between them and the Americans in creating good, easy-to-use software packages. AFL is another good reason for IBM Japan's pursuit of a joint-venture with Matsushita. (The Economist, 19 February 1983.)

Software catalog

To keep the users informed of the number and variety of CP/M-compatible application-software products supplied by independent vendors, Digital Research Inc. has recently compiled a comprehensive catalog. The publication is divided into three parts. In section 1, domestic companies and their products are listed and described, followed by international companies and their software. Section 2 consists of a detailed directory of products, grouped according to their compatibility with the Digital Research language; separate language indexes are also provided. Finally, section 3 classifies companies by the specific application program they produce. Copies of the catalog may be obtained for $10 from Digital Research, P.O. Box 579, 160 Central Avenue, Pacific Grove, Calif. 93950, or call (408) 649-5500. (Electronics, 30 November 1982.)

APPLICATIONS

Micros help the handicapped help themselves

The advent of inexpensive computer power is altering offices, factories, schools and homes. But nowhere has that power made such dramatic contributions as it has in the world of the physically handicapped. Today paraplegics, quadriplegics, amputees and cerebral palsy victims are using computers to perform tasks that once seemed beyond their capabilities. Here are two young people whose daily lives have been transformed by the new technology.

Rob is one of 500,000 Americans suffering from paralysis of two or more limbs. In the past, quadriplegics like Rob were consigned to passive, sedentary lives. Today, with the aid of microcomputers, systems as ingenious as Rob's are getting easier and cheaper to build. "The past few years have witnessed a tremendous increase in individuals and small groups that develop special aids for disabled persons," says Gregg Vanderheiden, director of the Trace Center for the Severely Communicatively Handicapped at the University of Wisconsin. "Microcomputers are making it possible for designers to develop sophisticated electronic aids." ...

The ultimate hope of every spinal cord-injury victim is that crippled limbs will work again. That dream seems tantalizingly close for a 22-year-old paraplegic in Dayton. Using a computer-based locomotion system, Nan Davis, a senior at Wright State University, recently stood up in front of television news cameras, took half a dozen halting strides and said with a laugh, "one small step for mankind." Davis has been paralyzed from the rib cage down as the result of an auto crash in 1978, on the night of her high school graduation. Throughout her programmed "walk" at the Wright State biomedical engineering lab, Davis was bolstered by

props. She was strapped to a parachute harness that supported a third of her 130 lbs., and she gripped a pair of parallel bars as her legs stepped ahead of her down the 10-ft. walkway. Nonetheless, her achievement marked an important development: the marriage of 200-year-old electrical stimulation techniques to today's high-speed computers. To get Nan going, Dr. Jerrold Petrofsky, director of the lab, taped some 30 electrodes and sensors over the major muscle groups in her legs. Then he instructed a small desktop computer to fire successive bursts of electricity, each carefully orchestrated to trigger the right muscles at the proper time. A feedback system monitored the movements of Davis' ankles, knees and hips, making corrections as necessary. The resulting movements were crude and jerky. Moreover, extending the programme so that Nan can turn, sit, squat or climb steps will pose enormous difficulties. At present, the $200,000 system can only direct one foot to move in front of the other. Before it can be put to practical use, Petrofsky's 150-lb. device must be streamlined and miniaturized. "It's a mass of wires right now," says Wright State Technician Harry Heaton. "But it will eventually be a small microprocessor capable of being implanted, pacemaker-style." Petrofsky says his system might be ready for commercialization within a decade. (Excerpted from a report in Time, 13 December 1982.)

Development of a microcomputer urban information system in Colombo with assistance from UNCHS

Sri Lanka has been experiencing a greater than two per cent annual rate of population growth, with urban growth rates double those of the country as a whole. In mid-1977, the newly elected Government pronounced that physical improvements to metropolitan Colombo (the capital) and urban housing were to be among its highest priorities. The Urban Development Authority (or UDA) established in 1978, was granted broad powers to implement projects throughout Sri Lanka. The need for a flexible and continuous planning capability which recognizes change in key determinants as they occur and adapts policies periodically was recognized, and it was decided that there be a Strategic Planning Unit within the UDA. This unit would be responsible for preparing and updating a carefully structured Urban Development Information System, in addition to being concerned with the maintenance of the Urban Information System Unit and the formulation of the development strategy for the Colombo Metropolitan Region (CMR) and the nation as a whole.

Manpower: As the Urban Information System Unit was being established, there was a shortage of qualified computer-literate professionals in Sri Lanka - especially in the field of urban planning. Immediately prior to the purchase of any hardware or software, four members drawn from the middle to upper management levels of the UDA attended the UNCHS (Habitat) Workshop on Urban Data Management held in May/June 1981. This is significant because these are the organizational members who have some degree of control over the process of information system development and who are most directly linked to the products of such a system. The recommended staffing composition of the unit was for the initial implementation stage (in hierarchical order) a supervisor, a systems analyst, a programmer, and two clerical workers. Due to the scarcity of financial and labour resources, it appears unlikely that a system analyst will be acquired in the near future. Much of the remaining staff was drawn within the UDA. Since many of the staff were drawn from within UDA, one of the problems is to prevent certain organizational overlaps due to residual duties and shortage of trained staff in general. Use of vendor training programmes, a university-level course, and a continuing consultancy training programme on specialized topics have helped alleviate the lack of skilled personnel.

Hardware: Financial resources for the purchase of an appropriate computer system seemed inadequate at first. However, residual resources from a variaty of budgetary sources were pooled and used to purchase a microcomputer system.

Software: Problems of manpower and hardware become most painfully evident when considering the issue of software. As noted elsewhere, comprehensive microcomputer software for human settlements planning is practically non-existent. Therefore, the staff should have the capabilty to develop applications software.

Software developments - LUDB and PPMS: Since the hardware and staffing infrastructure of the UDA information system unit has largely been established, projects are being undertaken. One is the development of a Land Use Data Bank (LUDB). The other is the development of the Planning Permissions Monitoring System (PPMS).

Development of the LUDB arises out of a project to produce a Master Plan for the Colombo Metropolitan Region. It is therefore a relatively large but static data base, whereas the PPMS is a dynamic data base for monitoring land-use changes in the same region. A common design objective is for both data bases to be capable of interfacing with the UDMS analysis and mapping programmes. Thus, this represents an attempt at developing an integrated urban information system.

There are four major components to this integrated urban information system. Two components were established in early 1982. Besides the LUDB, PPMS, and UDMS, there are four geographic data bases providing mapping and spatial analysis capability when integrated with these three. The spatial data bases are hierarchic - proceeding from coarse scale to finer scale - and based on the political divisions of the CMR. These spatial data bases are:

1. Colombo Urban Area with 24 Local Authorities,
2. Colombo Municipal Council with 14 planning units,
3. Colombo Municipal Council with 47 wards,
4. Colombo Central Area with 69 blocks.

The general relationship between the four components of this integrated urban information system is shown in Figure 1.

Land Use Data Bank: The Land Use Data Bank (LUDB) consists of data files describing:

1. land areas,
2. land use,
3. socio-economic population characteristics,
4. public facilities, and
5. characteristics of new government projects.

Given current data resources, the LUDB emphasizes the land area, land use, and socio-economic data. A comprehensive survey of these variables has been conducted, and the data are available. This allows development of a data bank without the need to impose additional data collection burdens on the development authority - one of the traditional problems of implementing a local government urban information system.

The primary problems in the development of the LUDB were the design of efficient storage and retrieval schemes for the WANG microcomputer. These aspects were emphasized, since the function of the LUDB is primarily to provide access to data which are unlikely to be updated on a regular basis at a relatively rapid pace, and indeed may be unchanged from census to census (over 10 years). In contrast, the PPMS is a dynamic data base in which retrieval and updating are the primary functions.

Planning permissions monitoring system: Before there are any changes in a structure or portion of a structure (or parcel) in the CMR, one must obtain the approval of the UDA. Part of this process results in the collection of data regarding the characteristics of the site before it is changed and the nature of the proposed change. Thus, the objectives of the PPMS are to provide the capability to: provide timely statistics on short notice, be accessible to or through UDMS, generate reports, and provide user-friendly data entry or updating. Design specifications call for the internal capability of cross referencing and retrieval according to two levels of spatial aggregation, approval reference number, and approval date. Thus, the PPMS is divided into data files and a relational directory. The directory contains the relationships necessary for accomplishing the following machine operations:

1. date of approval to reference number,
2. reference number to both

   a) CMR local authority and
   b) CMR ward, plus

3. local authority to ward.

Data is stored on a ward-specific level with each permission being a logical record containing the following information:

1. reference number,
2. primary existing use,
3. extent of site,
4. number of floors,
5. by floor-use and space,
6. plot ratio, and
7. floor area ratio (F.A.R.)

This software development is potentially more useful on a daily basis than is the LUDB. Indeed, the PPMS promises to provide a highly visible user product which executive management will use. However, inclusion of the UDA Information System Unit in the flow of planning permissions data is not a trivial organizational matter. This further emphasizes the importance of human factors in the successful implementation of local government information systems, particularly in one based on microcomputer technology. Once the hardware is chosen, the linkage of software and human organisational development is critical.

Strategy and supporting policies: Potential organizational territory problems were minimized by the creation of an active information system steering committee made up of the heads of all UDA departments. This committee set implementation and software development policies; priorities were set by consensus. However, the lack of acrimony may be a function of the relative newness of the unit, and of United Nations funding, so that the unit is not perceived as a threat to anyone's scarce resources. Negative reactions are presently seen as unlikely since the UDA Information System Unit is not only now an autonomous department, but has been successful in carefully educating the heads of organisational units on both the potential and limitations of the system. Thus, harmonious relations exist between the unit and other departments.

Future compatibility: For an organization with the responsibilities of the UDA, it was necessary to purchase a system capale of being upgraded. In fact less than six months after the initial system purchase, a significant upgrade of the hardware has been undertaken. The single-user system with .75 megabytes of online storage has recently been upgraded to a three-user system with 10 megabytes of online storage and 15+ megabytes of offline storage. Software upgrade is a continuing concern evidenced by the software development projects described earlier.

Comprehensive training programme: Introduction of a new technology requires much more training than is usually provided by hardware or software vendors. This is an especially acute problem in human settlements planning, since software lags behind hardware by about five years. Hence the need for software development capability within the UDA and the combined programme of vendor training, university-level course work, and organization-specific instruction by a UNCHS (Habitat) software development consultant. (Excerpted from an article written by V. Robinson, Consultant in Data Management to the Sri Lanka Project, published in Habitat News, Vol. 4, No.3, November/December 1982.)

Microelectronics future for the grocery trade

The future of the grocery trade will be influenced by various technological advances, including bar-code scanning, electronic communications and electronic funds transfer (EFTS). The viability of scanning installations for independent retailers is presently unclear. More wholesalers will offer new computer-based services, and electronic wholesaler-retailer communications will grow rapidly. The electronic communication network is likely to be a combination of coaxial cable networks run by commercial suppliers and British Telecom's optical fibre technology. Such networks offer cheap and efficient information exchange and will enable more homes to use such techniques as home banking and shopping by TV. Shopping by TV will not benefit the major multiples alone, as the service implies delivery by the store. Many small grocers will be able to offer neighbouring households a convenient, if expensive, shopping service by TV. More large retail outlets may develop cash dispensing points, permitting banks to dispense cash cheaply, attract customers and recycle cash. Electronic retailer-bank links could form the basis for EFTS. Various companies including IBM and NCR, produce cash registers with built-in card reading devices, and there is a growing range of cheaper, add-on readers. (Technology Update, 15 January 1983.)

Electronic traction control in Volvo

Volvo has developed a microprocessor controlled system to provide lateral stability and optimize traction. The Electronic Traction Control system includes rolling-speed sensors on all 4 wheels feeding pulsed signals to a microprocessor. When the difference in wheel-rotation speed (front vs back on either side) indicates approaching spin, the control unit halts turbocharger operation and steps down fuel flow to the cylinders. Fuel delivery is regulated in half-cylinder steps by reducing by 50% the number of fuel-injection pulses to a cylinder. Initially, only 1 cyl is affected up to deactivation, followed by the other cylinders in turn until wheelspin is arrested and traction restored. (Technology Update, 15 January 1983.)

The Intelligent Thermometer

The Intelligent Thermometer described here is called "intelligent" because the particular programme in its memory allows many uses besides simple temperature measurements.

For instance, the Intelligent Thermometer analyzes the temperature data and stores the results in its semi-permanent memory. It measures temperatures between -56°F and +199°F (-49°C and 93°C) and does it with an accuracy better than ±1°F over its entire range. It stores the minimum and maximum temperatures, and calculates and stores the mean temperature up to a 255-day interval with an accuracy better than that of the U.S. Weather Service. The Intelligent Thermometer also calculates and stores heating degree-days (base 65°F), cooling degree-days (base 75°F) and growing degree-days (base 42°F). Up to 9999 degree-days can be stored in each of its degree-day registers.

The analyzing portion of the thermometer has three outputs that can be used to activate a relay or buzzer. The first signals a temperature of 32°F or below, while the other two signals indicate a temperature either above or below a preset threshold of the user's choice. The temperatures and degree-days can be displayed in either Fahrenheit or Celsius depending on the setting of a switch. (Celsius degree-days are rounded off to the nearest 100.) An optional battery allows memory retention during power failures. The versatility of the thermometer is further enlarged by the user's ability to erase and re-programme the EPROM - or plug a new EPROM into the socket. For instance, the thermometer could be transformed into an energy-saving digital thermostat by changing the EPROM and adding two relays. (Computers + Electronics.)

Chip-based controller for motors

A microprocessor based controller, which claims savings of up to 43 per cent in the cost of running large motors, is being made in Limerick by Eda Ltd. The company claims that the device - Powersense - can achieve dramatic energy reductions when connected to an induction motor. It does this by sensing both the mechanical load on the motor and the initial energy consumption, then computing an energy level which exactly meets the load requirement and limiting the power input to the motor accordingly. Eda also claims that Powersense increases motor life as, by using less power, the motor generates less heat. This decreases the risk of insulation breakdown within the motor, thereby reducing downtime and expenditure on rewinds. According to the company, standard features include:

- Failsafe contractor operating when any malfunction is detected;
- Savings indicator lamp;
- Several software options available to meet exact requirements.

Standard sizes are from 7.5kW to 150kW, though larger units are available to order. Eda says that Powersense can be installed in less than an hour by a plant electrician and that, for a plant operating an eight hour day, payback would be around one year. (Technology Ireland, January 1983.)

Touch screen

A touch screen is an addition that can be made to a display device to allow the user to easily communicate with a computer by touching the screen, instead of, or in addition to, using a keyboard, joy stick, digitizing tablet, or other input device. There are many advantages to using a touch screen, with or without any other method, for input. A touch system does not presuppose that a user can type. He or she can simply touch the desired option from the displayed choices. The format of the displayed information can be whatever the application requires and can be changed by simply changing the software. Also, only valid options can be offered at any particular time, reducing the need for elaborate input-error-checking schemes... Touch screens are used in a wide variety of applications. They are especially successful in applications where the users are not experienced with either typing or computers; where the user is experienced with computers, but the interactions are complex and make flexible control keys desirable; or where fast and accurate interaction is required, as in controlling a nuclear reactor during an emergency. Specific application areas include banking terminals, medical systems, computer-based education, command and control systems, computerized ordering systems, security systems, automatic test equipment systems, and point-of-sale terminals. One particularly successful application of touch screens in computer-based education is in the PLATO project at the University of Illinois. The host computer is connected to over 1,000 graphic terminals in about 150 locations around the world. Many of the lessons were designed specifically to use touch, and range from teaching children fractions to leading college students through chemistry labs. (Batelle - Columbus, December 1982.)

Automation comes home in Japan

After pouring energy into factory automation, the inventive Japanese want to do the same for people's houses and flats. A two-year research project has produced what is called the home bus system, a set of standards for wiring up the home with coaxial cable. From a control panel in the living room, a householder would supervise a number of appliances, ranging from heaters to door locks. The system carries signals in three frequency bands. One is used for control messages, another carries TV pictures and the third high-speed data. The universities and electronics firms participating in the project say the wiring scheme in each house will link up with digital telecommunications networks carrying messages between cities and individual homes. The project is supervised by researchers working at the Kansai Electronics Industry Promotion Centre. All this might sound far-fetched; but one firm, Sanyo, has already made a step in the direction of home automation. The firm has developed an electronic chip that can bring piecemeal systems under unified control. In this way, a mechanism for running the bath that automatically cuts off before the water overflows could be linked with, for example, a control unit for the central heating. Sanyo is selling the £5 chip to companies such as house-builders and sensor manufacturers which then incorporate it in their own projects. The electronics firm says it will make about 250 000 per month if the demand catches on. And later this year, Sanyo plans to enter the business of home automation itself - albeit in a limited way. It will sell a remote-controlled lighting system that incorporates the new chip. The system, incorporating a control panel similar to that used with TVs, will take a householder's living room from pitch black to blinding light in sixteen steps. (New Scientist, 10 March 1983.)

Marine instrument uses new technology to chart the ocean depths

A Canadian company is developing a sophisticated instrument that will chart the ocean floor and determine what resources may be found underneath the seabed. The new research tool, called Seabed 2, is being designed by Huntex ('70) Limited of Toronto and will be able to work in depths of more than 2 kilometres of water to identify resources that may lie as much as 100 metres underneath the seabed. The Seabed 2, considered unique by its inventors, is an electronic "fish" that will be towed beneath a research boat. Usually called towfish, they often take the form of streamlined canisters filled with equipment that send out sound waves and measure how long it takes the sound to hit non-liquid surfaces and bounce back. Seabed 2 is a rugged boxlike cage holding two devices that take three kinds of measurements in one pass over an area. The data will be sent along a cable connecting the device to the reasearch ship and will be entered into a computer on board. (Canada Weekly, 2 February 1983.)

High technology helps Third World farmers

Microprocessors are beginning to go to work to raise the quality of the Third World's agricultural products. Sorting machines incorporating microprocessors have been ordered in the past few weeks to upgrade rice, coffee and groundnuts. The machines are made by a London company, which launched the world's first microprocessor-based sorter in 1979. This machine was designed for sorting ore and waste heaps left from more extravagant eras. They needed a device able to scan lumps of rocks and pick out those worth processing at a rate that would make it possible to work on the huge scale required to make extraction from low-grade ores economical. The new ore-sorter has over 1000 photoelectric cells to scan rocks at a rate of 500 per second. The microprocessor makes it possible to pick out ore-bearing rocks fast enough for 64 separate air jets to deflect them.

The company, Gunson Sortext, is now applying the same technology to other jobs. A rice miller in Thailand, Riceland International, has bought a new rice-sorting machine with 11 microprocessors. The machines handle more than four tonnes of rice an hour, scanning 25 000 grains every second, and rejecting substandard colour grains in thousandths of a second. The machines can be adjusted in one minute to sort brown or parboiled rather than white rice, if necessary. In the past month, Gunson has also recieved an order to supply coffee grain sorters to Burundi in Central Africa. These machines work in pairs. The first machine's photoelectric cells pick out yellow, black or dark brown colour. The second machine takes a second look at the beans which pass the first scan using ultraviolet light. Any beans that are infected with the mould Aspergillus flavus, producer or the liver-cancer-causing toxin alfatoxin, fluoresce in the beam. A third recent order is for a groundnut-sorter, which could play an important role in a project to turn the Egyptian desert into fertile land. Eight machines scan the nuts before shelling to remove any of which are diseased or stained. Four other machines screen out diseased or damaged kernels after shells have been removed. Recent rials in Senegal have shown that the same machines can reduce

contamination with aflatoxin to safe levels. The latest Sortex machine, just on the market, is for potatoes. It uses ordinary light, not X-rays, to distinguish between potatoes, clods of earth and stones during harvesting at a rate of 25 tonnes per day. These applications and others like them for the microprocessors have growing importance in the Third World. In present-day conditions, farmers can sell crops such as coffee only if high and constant quality can be guaranteed. Microprocessor-based sorting could make this possible at a low cost. But the political cost of displacing labour remains a problem. (New Scientist, 17 January 1983.)

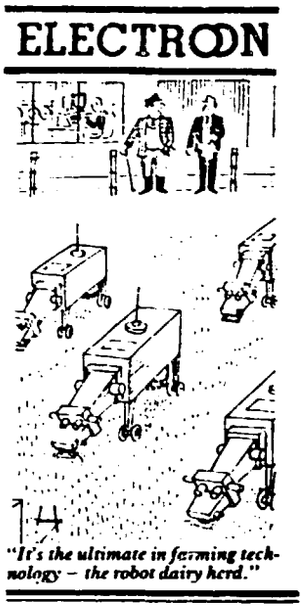
Farm of the future

A new data service is helping farmers of all sizes profit from computerization.

The idea of a computer in a barn might seem as ridiculous as that of a cow in the executive suite, but not to AgriData Resources Inc. and Tandy Corporation, which have set out to bring computers into the world of farming. Or is it farmers into the world of computing? In any case, these two fields (no pun intended) are not as disparate as they first appear. Farming is big business and, the thinking goes, big business required computers. AgriData is a publishing company in Milwaukee, USA, that has set up a nationwide data network geared specifically to farmers and their informational needs.

Commodity information is the main attraction of the AgriStar farming network. Hitched up through a public data carrier, farmers will be able to determine the latest prices for pork bellies, corn futures, and soybeans on the Chicago exchange and thus be able to plan their plantings and harvests more precisely. In addition, AgriStar offers the farmer weather outlooks for each and every country in the U.S. as well as weather forecasts for foreign countries. The latter are helpful in predicting crop yields and the resulting commodity prices, says AgriData president, Weening. Of today's farmer and his lack of technological savvy, Weening says. "His grandfather started the business. His father taught him all about production. And his production capability advanced tremendously with advances in agricultural chemicals, equipment, and genetics. But what today's farmer, by and large, did not learn was a technology that most businessmen take for granted - the technology of business, finance, marketing, and management." Weening notes that there are approximately 2.4 million farms in the U.S., but that about 200,000 of those control about 60 per cent of the total agricultural output and earn about 87 per cent of the total farm income. Of those 200,000, he estimates, about 20,000 run computers. Average production expenditures are about $US 400,000 per farm, he says. AgriStar went "live" last November, and in late January had approximately 2,000 users. The service is being promoted by Radio Shack in its retail outlets, many of which are located in farming country. The basic equipment needed is a simple crt terminal and a modem.

Weening says that additional sources of information will be added to the system over time. So far users can browse through commodity and weather reports, use farm management and analysis programmes, and receive some government bulletins. Soon a "business encyclopedia of agriculture" will be available, offering eventually some 25,000 entries on various farming techniques, a library of articles from FarmFutures magazine (another ot Weening's publications), and other publications. Also coming in June is a collection of commercially supplied databases on, for instance, the proper usage of various chemicals, feed, seeds, and tools. Weening said the service expects to offer a two-way capability on the system that would enable farmers to communicate with each other and, perhaps, with those involved in buying farm crops and livestock. Conversely, commercial entities wishing to advertise their wares would be able to use the network as a communications vehicle, he adds. "Farmers are very practical people," the Milwaukee entrepreneur says. "There is an urgent business need because the farmer has to deal with many factors entirely outside his control. In 1981, for instance," he elaborates, "a 700 acre Jowa corn farmer could have sold his crop, with average yields, in a range from $US 217,000 to $US 285,000. That crop cost him $US 252,000 to produce. So his net could have been a loss of $US 35,000 or a profit of $US 33,600. Or anything in between. The difference was knowledge." That knowledge, Weening hopes, will help the small farmer stay in business. At a time when taxes, fast-moving markets, and all the problems that agribusiness can bring to bear on the small farmer are pressuring the farmer, he needs all the help he can get, says Weening. "Technology could help the farmer survive because this is a low-margin business on a small-scale farm." (Datamation, April 1983.)



(Electronics Weekly, 13 April 1983)

Bangor to Gravesend - by microchip

Unperturbed by London transport's follies, British Rail has announced plans to spend more than £20 million on automated ticket machines. The new machines come in two versions. APTIS (the all-purpose ticket-issuing system) will be installed in stations, while PORTIS (the portable ticket-issuing system) will be carried by guards who have to give tickets to passengers getting on at unstaffed stations.

APTIS is a microchip machine about the size of an electric typewriter. It will replace the generation of mechanical machines, installed in the 1960s. APTIS will print the fare and other details on blank pieces of card the size of credit cards. The 18 most-popular destinations will be specially coded in the machine's memory. The rest of the 2,800 stations will be printed by keying in the first four letters of the name, followed by succeeding letters until a unique station is found. APTIS machines will be linked by a land line to BR's central computer in Nottingham, which will store details of all sales. BR hopes to install 1,800 APTIS machines at all its manned stations by the middle of 1986.

The 2000 PORTIS machines will record details of ticket sales on a memory, which will be "bled" at the end of the guard's shift by connecting the machine to an APTIS terminal and conveying the information to the central computer. So BR managers will know within 24 hours exactly how many second class returns from, say Bangor to Gravesend were sold on any day. The machines have been developed by BR's research centre at Derby in conjunction with Thorn EMI. (New Scientist, 23/30 December 1982.)

UK to control immigration by machine-readable passports

Computers will be used to keep track of passengers entering and leaving the country through ports and airports with the aid of machine-readable passports (MRPs). Terminals will be able to compare MRPs with lists of suspects stored in the computers. The government says that computers in various ports would not be linked together, although that would certainly be possible. So far, the system checks landing and embarkation cards to monitor the stay of visitors, as phase I of the Immigration & Nationality Dept Electronic Computer System (INDECS). Visitors who overstay visas are deported. The Home Office's confidential suspects list of 18,000 names will be entered in minicomputers and will instruct immigration officers what action to take if a suspect is trying to enter or leave the country. (New Scientist, 10 February 1983.)

A new entry in computer-aided chemistry

A new desk-top computer that is claimed to be the most advanced data processing system available for laboratory applications has been introduced by Perkin Elmer (Norwalk, Conn.). Product manager Edward Collins says that it is aimed at the laboratory researcher who otherwise would buy a personal computer to work on at home. Model 7500 operates like a minicomputer and performs laboratory functions in a wide range of analytical techniques including Fourier transform applied to infrared spectroscopy. The 16-bit machine, equipped with color graphics, sells for about $US 10,000. (Chemical Week, 23 February 1983.)

Computer controlled material test system

A computer controlled (Instron 1343) servohydraulic advanced materials test system has been installed at National Aeronautical Laboratory. It will be used as a general testing facility to evaluate, in particular, fracture and fatigue properties of materials and designs developed at NAL. Basic studies on fatigue and fracture mechanisms will also be carried out. The system consists of a 25 tonne load frame, air-cooled dual (30+6) litre/min powerpack, electronic controls for static and constant amplitude fatigue cycling under position, load and strain control, on line dedicated PDP 11/23 minicomputer system with hardware interface for computer control of the testing machine and accessories to enable conduction of low cycle fatigue, fracture and crack propagation studies. A programme on fatigue crack growth and fatigue life data generation on typical fighter aircraft materials has been initiated using this machine. This programme is part of the major project on fatigue life evaluation of a fighter aircraft. (Technological Awareness Service, No. 2, June 1982.)

Water data on tap

Golden River has developed an automatic data retrieval system designed for the water industry which utilises the public telephone network to reduce dramatically the manhours incurred in data collection. Designated Telmet, the system comprises a microcomputer and printer with hardware to interface to a telephone line and software package for complete automatic operation of over 200 remote data logging sites. A VDU screen and keyboard control the operation of the equipment. The system is user-programmed with details of the outstations, including provision for a 16-digit telephone number for each. Two 5 1/4in. mini floppy disk units hold the programme and retrieved data, and the system can be operated manually or automatically. In the manual mode, the oprator is asked for the site number to which it wishes to be connected. The dialling is then initiated by the equipment and after approximately five seconds the screen shows all the current data from that site such as number, time, date, status, channel values, number of recording available etc.

If any parameters are to be changed the operator positions the cursor on the screen next to the desired item, and the equipment prompts the new data entry and effects transmission of the new parameter to the remote Golden River Dataman or Waterman logger. A retrieve can be actioned and all data will be stored on the floppy disk with a file name set to the site number. While the data is being retrieved, it also appears on the screen. A real-time clock in the equipment is used to allow automatic generation of calls to the remote-logging sites. (Electronics Weekly, 13 April 1983.)

Launch for ships' aid

A computerized traffic routing system which will considerably improve sea safety and navigation in the sea lanes leading to Sweden's biggest port - Gothenburg on the west coast - will be introduced in 1983. As a result, ships will receive fast, accurate information on suitable routes, the docking situation and appropriate departure times, as well as on emergency situations, obstructions, ice conditions and buoy position. A centrally-situated traffic routing control centre equipped with sophisticated radar instruments will receive information from three strategically placed radar posts at different locations in the Gothenburg traffic region. The information, transmitted to the centre via relay stations, will be presented in colour on monitoring screens, enabling automatic monitoring of specific targets to be carried out. (Electronics Weekly, 16 April 1983.)

Doctors get their own DP doctor

Doctors in general practice are to have their own computing adviser. A Nottingham GP, Dr. Norman Stoddart, has taken the part-time job at the Royal College of General Practitioners, a professional and standard body which has half the UK's GPs among its 12,000 members. The job, called ICI Computer Fellow, is being funded by ICI Pharmaceuticals. "GPs

are in the dark about computing, but we expect explosive growth this decade," said Michael Drury, the college's research division chairman and professor of general practice at Birmingham University. "There is a lot of interest in what computing can do for a general practice and we expect 5,000 systems to be installed in the next few years." Some GPs are now installing microcomputers under a £1.5 million government scheme to put 150 machines into general practices. (Computer Weekly, 7 April 1983.)

Advanced entry control system uses plastic-card terminals

An advanced microcomputerized entry control system which uses a plastic card instead of keys has been introduced in Sweden by L.M. Ericsson Telematerial AB. Called Eripass, it requires that personnel wishing to enter a restricted area must insert a plastic card into a centrally-controlled pass terminal, which can be mounted indoors or outdoors.

The card, the same size as a credit card, is coded on a magnetic strip and read in the terminal, after which the door opens and, when the person has passed through, closes automatically. Since the code is read in the terminal, the latter can function off-line if a fault should occur in the link with the central unit.

The system can be programmed so that each entrance/exit is recorded in a printout in plain language. Alarms and attempts at unauthorized entry are printed out in a special text to facilitate identification of irregularities. During periods of intensified security, personnel may also be called upon to input a special code on the terminal keypad.

In its standard version, Eripass includes eight entry terminals, but the system can be expanded to 16, 24 or 32 terminals. The memory accepts between 500 and 2,000 card numbers in modules of 500.

Electronic data caliper makes forest inventory more effective

An electronic caliper with automatic data storage for use in forest inventory has been developed by Micronic AB, Stockholm, in collaboration with the Swedish College of Forestry in Umeå. Called the SMR Data Caliper, it consists of a hand-held data terminal joined by a cable to a mechanical-electronic caliper.

The caliper has built-in electronic system in which sensors transform the impulses to a diameter measurement for direct storage in the terminal's memory, which can accommodate up to 48,000 numerical characters. At the end of the work-day, all the registered values - mostly tree diameters - are transmitted via telephone to the forest company's main computer. If required, supplementary information can be fed into the terminal by using the keyboard. (Science and Technology, Newsletter on Industry and Research in Sweden, SIP, Linnégateu 42, S-114 47 Stockholm, November 1982.)

Computerized time clock automatically calculates wages

A computerized time and attendance recording system for both large and small companies which guarantees the right pay regardless of overtime, sickness, leave of absence and even power failure has been developed by Micronic AB, Danderyd, outside Stockholm. Employees key in a staff number (or, alternatively, run a bar-code pen across a bar code or a card through a card reader) and depress an "in" or "out" key on a recorder unit - called Micronic Time - with a memory containing all details of wage agreements, different attendance schedules, inconvenient working hours, etc. An additional key is depressed if overtime is being worked. Personnel can also ascertain how long they have worked during a given period, divided into ordinary and inconvenient hours, whether a colleague is present or not, and delete errors. The required information or changes are keyed into the unit and answer provided on a printout or display. When connected to a computerized wage system, Micronic Time automatically works out employees' salaries. If, however, a company prefers to calculate wages itself the unit is programmed to supply a final time and attendance report each week or month on a desk-top printer. Micronic Time is mains-connected but also has batteries which are continuously charged. If a power failure occurs, the batteries will support the system for 12 hours' continuous recording, while extra safety batteries ensure that all recorded data is saved for up to 2,000 hours. The system may also incorporate an attendance display so that when an employee checks in a lamp lights on the display and when he checks out the lamp switches off. The next step with Micronic Time will be to supply it with a keyboard which can be located outside a building. The system can then be used effectively to control access through selected doors. (Science and Technology, Newsletter on Industry and Research in Sweden, January 1983.)

Factory of the future

Computer technology is rapidly changing the configuration of manufacturing at all levels, e.g., in office procedures, engineering processes, maintenance opertions, and employee training for both large and small plants. Machinery and equipment in the plant of the future will be more complex, and consequently harder to design, install and maintain, and the need for reliability will be even more critical. For this reason, the purview of plant engineers will be geatly increased, especially when a full range of application software is developed to match the capabilities of existing hardware. However, obstacles may appear in the form of time-consuming data-base development, built-in in-house resistance, and greater-than-expected software costs. To prepare for the coming factory of the future, managers need to be sure they fully understand current operations, to become acquainted with data processing personnel, and to take the initiative to keep up with the latest developments. (Technology Update, 19 March 1983.)

ROBOTICS

Economic effects of industrial robots and felxible manufacturing system

A recent paper prepared by ECE (EC.AD./SEM.8/R.2) for a ECE Seminar on the Assessment of the Impact of Science and Technology on Long-Term Economic Prospects looked at the economic effects of automation:

Some examples of the IR and FMS economic effects gained in the automotive industry are mentioned in a study recently undertaken by OECD*:

- Chrysler replaced 200 welders over two shifts by the introduction of 50 robots in one plant; the production rate increased from 50 to 65 cars per hour.

- Fiat increased its number of robots by 30 per cent in order to increase automatic spot-welding operations by up to 98.5 per cent; direct labour time per car body decreased by 1.5 hours.

- The introduction of FMS for transmission units and engines at Mitsubishi reduced the required man hours per unit from 8.8 to 2.3; it results in a 2.5 fold increase in monthly production.

According to other sources** one robot can replace one worker per shift and increase productivity by 20 to 40 per cent; the pay-back time is from 1 to 3 years, annual savings from 4 to 9 thousand roubles and cost reduction in pre-production stages 25 to 30 per cent. Significantly greater benefits are achieved in group installations, e.g. productivity increases by a factor of from 2 to 4 (exceptionally of from 6 to 8). The resulting economic efficiency of the whole system is naturally greater than just the sum of the effects of individual FMS components (machine-tools, robots etc.), owing to the fact that interactions between various manufacturing and/or control functions are also taken into account. This is also one of the main reasons why the innovation programmes concerning the complex approach to flexible manufacturing receive not only the support of management at the enterprise or company level, but also government funding of pilot installations and related research.

Future market for robots

A report, entitled "Industrial Robots: A Delphi Forecast of Markets and Technology", was recently compiled as a joint project between The U.S. Society of Manufacturing Engineers and the Industrial Development Division of the University of Michigan's Institute of Science and Technology. The findings were based on three questionnaires sent to managers and engineers in the U.S., 80 per cent of whom work for robot-using firms. Some of the results: By 1985 the U.S. market for robots will be some 10,000 units, 2,000 of them imported. The average cost of an industrial robot will be $US 35,000. By 1990, 25 per cent of robots will have vision, 20 per cent tactile/touch sensing, and 75 per cent will be computer-equipped.

---

* "The Impact of Industrial Robots on the Manufacturing Industries of Member Countries"; draft of OECD study, Paris, October 1982.

** E. Jurevich, "Industrial Robotics - Important Field of International Co-operation", Economic Co-operation of CMEA Member Countries, No. 5, Moscow 1982.

45 per cent of the new assembly system will be programmable. U.S. national standards for robotic software will be established. 20 per cent of robots will have off-line computer programming. 40 per cent will be used in flexible automated systems and CAD/CAM systems. The U.S. robotics market will exceed $US 2 billion. 15 per cent of the robots sold will be self-propelled units, predominantly in aerospace. 60 per cent will be equipped with sensors and transducers. 50 per cent will use microprocessor controls, 38 per cent minicomputer controls. 20 per cent of the robots directly interfaced to CAD/CAM systems will have a load capacity of less than ten pounds. Robots with adaptive controls will comprise 26 to 47 per cent of the total in industry, with the exception of aerospace, where the total will be 70 per cent. By 1995, according to the study, 30 per cent of robots will be interfaced to CAD/CAM. 96 per cent will be intelligent, universal and programmable, with only 4 per cent following fixed routines. 50 per cent of robots will have feedback sensing capability. 10 per cent will be able to sort and select objects from a bin. (Industrial World, January 1983.)

Robots in the USSR

By 1990, according to current estimates, industrial robots are supposed to take the place of approximately 250,000 Soviet workers, especially those employed in welding and assembly jobs and also in jobs involving the performance of routine, monotonous functions, something which, as scientists have observed, leads to rapid fatigue. Approximately 6,000 robots, or more than 20 per cent of the total installed throughout the world, are already in service in the USSR. The first industrial robots came onto the scene in the USSR in 1972. It took around 7 years before the first prototypes went into mass production. The Design Office of Leningrad Polytechnic University is regarded as a leading research and development institution in this field. Soviet industry is now engaged in the mass production of approximately 50 models of so-called first-generation industrial robots. These robots are subdivided into two basic categories, i.e., pneumatic robots with a lift capacity of 10 kilograms and hydraulic robots capable of lifting heavy loads. It is generally believed that demand for these machines in the Soviet economy in 1985 will exceed 125,000 units, but the volume of output in 1985 is not supposed to go any higher than 40,000 units per annum. Soviet designers plan to base the entire production programme on 20 to 25 basic models and around 10 basic control sytems. (Translation from Warsaw Rzeczpospolita, 7 December 1982.)

USSR plans to raise the number of industrial robots in use to 40,000 - 45,000 units by 1985 from 7,000 units at end-1980. Some 200 models of automatic manipulators have been developed in the USSR, 40 of which are mass-produced. Supply is unlikely to match demand, and will be covered by imports as co-operation with western companies is unlikely. The USSR prefers to support its own R&D institutes, or co-operate within Comecon. Industrial robots will be mainly used to automate monotonous production stages, or those requiring hard physical labour, and to raise productivity. Industrial robots will partially overcome the shortage of workers, particularly in the metal processing industry. The for machine tool construction and the machine tool industry will build 25% of all industrial robots in its own plants in 1981 - 85. (Aussenhandel, 11 February 1982.)

In the co-operative for machine tool manufacture at Tbilisi, Georgia, USSR robots have taken over from 100 workers jobs that required hard physical labour. These workers were retrained in special courses and have qualified as adjusters and mechanics. Roubles 400 million have been allotted in the present five-year plan for Georgia for elimination of hard physical labour for humans. While only 6000 robots were operational in 1981 in the USSR, this figure is planned to increase to 100,000 until 1985, thereby freeing 400,000 workers to take on new more suitable jobs. Leningrad's industrial enterprises are leading in the utilization of robots and manipulators. 88 enterprises have formulated a regional programme for manufacture and utilization of robots until 1985. (Excerpted from "Neues Leben", Central Organ of Soviet Germans in the USSR, 13 April 1983.)

Robots pose no threat to Nissan car workers

Car-maker Nissan of Japan last week gave its union a world's first pledge that workers would not suffer from increasing use of robots. The novel social contract guaranteed that workers will not be demoted, suffer wage cuts, or worse employment conditions through introduction of robots. The agreement also requires management provide workers with proper retraining, and to consult with unions about bringing in new robots. The agreement comes as concern in Japan mounts about the long term effects of big robot populations. The Japanese equivalent of the TUC is preparing a report recommending that robots pay union fees and

social insurance contributions. And last year, a Socialist Member of Parliament declared that income taxes should be collected from owners of factories with robots. Nissan's revolutionary concord with its union may lead to all workers of large Japanese companies being protected against layoff. But the total number of jobs is falling as people leaving work are replaced with robots rather than school leavers. Japan's largest bank has halved its intake of high school girls to 450 this spring, mainly because of increased automation. But there are signs that Japan's robot industry is slowing down, as traditional markets like car assembly become saturated. Japanese industry leader Fanuc is now only making 70 robots a month, after a peak of 100 last September. The slowdown is only likely to be temporary however, as the next generation of robots, capable of more versatile operation are due soon. (Computer Weekly, 10 March 1983.)

UK Minister says robots create jobs

Robots create at least as many jobs as they destroy, the Commons was told last week by Under-Secretary for Industry John Butcher. A study of the impact of robot technology on employment in manufacturing industry had cleared robots of the charge that they were a cause of the current high unemployment, he said.. There were considerable benefits to employment as a result of increased competitiveness and investment, he said. Butcher also spelled out what government investment was available for companies developing robots. Grants of up to half the cost of consultancy studies of the installation or manufacture of robots were available form the Department of Industry. Companies could claim one-third the cost of installing robots, and one-third of the cost of developing new UK robots. The Science and Engineering Research Council also made grants available for joint projects between universities and industry. The Lords heard from Lord Glenarthur that the government had allocated £5 million for the development of information technology for the disabled this year. There were a number of initiatives to help the disabled with new technology. (Computer Weekly, 17 March 1983.)

Australian Robot Association

A new professional association formed to promote the development of robotics in Australia came into being early this year. The Australian Robot Association was formed by a steering committee comprising representatives from research organizations, industry and government departments. The Chief of the CSIRO Division of Manufacturing Technology, Mr. Bob Brown, is a member of the committee. Its convenor, Dr. Michael Kassler, heads a computing and communications consultancy. He recently completed a robotics study for the New South Wales Science and Technology Council. The Department of Science and Technology, the Australian Computer Society, the Productivity Promotion Council of Australia, and a number of other bodies over the past 18 months have promoted several national seminars and conferences dealing specifically with industrial robots and their application to the workplace. The Association is seeking links with similar bodies overseas and trying to promote Australian representation at international conferences.

The ARA is to be incorporated in the A.C.T. with regional divisions being established later in the year. Its first annual general meeting will coincide with the ANZAAS session on robotics at Macquarie University next May. For more information write to:

Dr. Michael Kassler,
9 Queens Avenue
McMahons Point, N.S.W. 2060.
Phone (02) 922 5026

Skill shortage hits robot usage

Increased use of robots in Australia is being hindered by a lack of engineers and technicians with relevant training and experience, according to a report tabled in the Federal Parliament. The report by the technological change committee of the Australian Science and Technology Council describes robot technology and its present and future applications, identifies direct and indirect effects on industry and society and recommends Government action to encourage increased robot use and manufacture in Australia. Unlike some other countries, such as Japan and Britain, the Australian Government has no specific policy relating to robots, though some State government programmes have been initiated to encourage local manufacture and use. ASTEC recommends the Federal Government increase its support by introducing a system of value-added bounties for locally made robots, establishing demonstration projects of robotic technology and increasing funding to tertiary institutions for research and development in robotics and automated system. (Electronics Weekly, 12 January 1983.)

Yugoslav industrial robots for USSR

Belgrade's scientific research institute MIHAJLO PUPIN will export industrial robots to the Soviet Union under a protocol recently signed in Moscow. The Moscow protocol provides for extensive joint research in the field of theoretical and applied robotics until the end of this decade. The ultimate goal of this cooperation is the joint production of prototypes of first-class industrial robots, those which possess elements of artificial intelligence. The Vukobratović is the Yugoslav comanager of this product, one of the largest intergovernmental scientific-research projects undertaken in Yugoslavia. Dr. Vukobratović and his associates Dragan Stokić, Sc. D., and Velijko Potkonjak, Sc. D., rank among world's leading experts in robotics. Books written by Dr. Vukobratović himself of in collaboration with his associates have been published in the Soviet Union, the Federal Republic of Germany and even in Japan, world's leading power in industrial robot production and application. The fact that Yugoslav experience and activity in this field are referred to in the world as "the Yugoslav school of robotics" is a credit to the work and achievements of these researchers. ("Yugoslavia", November 1982.)

Insistence on 'human' robots out of place in industrial use

University researchers can now build robots with rudimentary hands, feet, ears, eyes and mouths. They can be programmed to perform simple services, and if they don't understand a command, they can say so. In academia, such experimentation is logical; it is the stuff of which advances in knowledge are made. But for industrial applications, most robot designers contend that humanoid models would be grotesquely out of place. Nevertheless, the commercial demand for human-like robots persists, enven though none are available. Potential users see robots as one-for-one replacements for workers. They are considered instant enhancers of productivity when inserted into otherwise unchanged manufacturing operations. And the more human-like the robot, managers reason, the more productive it will be when replacing a person. Warren Seering, professor of mechanical engineering at the Massachusetts Institute of Technology, regards this belief - supposedly a strategy whereby the United States could close the robot gap with Japan - as a major misdirection for U.S. industry. It results from a confusion between what could be done - "gee-whiz" robotic capabilities - with what should be done, he said. A more rewarding strategy, Mr. Seering suggests, is to build robotic systems to replace other machines. "The biggest American market for robots is manufacturing assembly", he said, "but it has yet to be touched." The reason is that factories have been designed, until now, to benefit from the diverse and subtle skills of humans; commercial robots are not up to the job. Ironically, when manufacturers create robots with human skills, they often end up limiting their mechanical capabilities. Consider the robot "arm". Mr. Seering notes that it tightens bolts in semicircular turns, simply because that is the only way a human arm can do it. A continuous turn, however, is mechanically possible and would be more productive. Japan's industrial robots, by contrast, have been modeled after machines. This approach was an outgrowth of the country's commitment to maintaining its employment level. Whole new processes and plants had to be designed around "primitive" robots. ...

Improvements in applying robotic capabilities are already in effect at General Motors and Chrysler. And although the company has been secretive about it, Texas Instruments is said to be working on an advanced robotic assembly system as well. The robot's greatest immediate value is in replacing inflexible machines. "We think in terms of systems that replace other systems", says James A. Meehan, manager of GE's Automation Systems Department. "Our goal is not to simulate humans but to achieve flexibility."... (Herald International Tribune, 8 April 1983.)

Robots are put through their paces

Large industrial robots were the most striking equipment at Hannover Fair. German exhibits were dominant, but several foreign companies demonstrated their lighter and smaller machines. With Germany having the largest robot population in Europe - currently about 3,500 - some foreign companies stressed their microprocessor-based controllers based on programming languages. IBM demonstrated its commitment to robotic technology with the RSI, a programmable, multifunctional manipulator with six degrees of freedom. It is designed for light assembly, testing and materials handling, with its sophisticated controller programmed in IBM's own AML (A Manufacturing Language). IBM also demonstrated 7535 light robot being controlled by and IBM Personal Computer. A handful of Japanese companies occupied stands. One of these companies, Pentel, which makes light four-axis assembly robots, made its debut in Europe and was looking for distributors. Its main application is in injection moulding, and a feature highlighted at the exhibition was its PR2000 control system using Pentel's own robot language, which has 10Kbytes ROM and 2kbytes RAM. The other Japanese company was Hirata, whose AR H300 and AR H450 are used in television manufacturing both in the UK and in Germany. The Hitachi series of robots were demonstrated by German distributors Zeppelin.

The importance of the exhibition was not so much in novelty, but in the opportunity to view a comprehensive range of robots being put through their paces. These included large machines by Kuka, Asea, Volkswagen, GDA Amec, and others, and smaller ones from various companies including the American Unimation and the British Pendar company. Kuka, the German manufacturer of large robots for the car industry, presented the first of its IR100 series which can be mounted on the floor, overhead or on walls, used mainly for machining, manipulation and welding. The largest machine, the IR662/80, was demonstrated mounting car wheels with the aid of an external television position sensor which signals the hub hole pattern to the robot controller. The RC20/40 controller which comprises six transistor amplifiers was developed in a joint Siemens and Kuka programme. The leading Swedish robot manufacturer ASEA demonstrated its series of heavy robots, and introduced a new spot welding robot, the IRB90S/2, with a modified control system to cut programming time by 25%.

One British company attended the fair, the Welsh robot manufacturer Pendar, which showed its lightweight pneumatic driven Placemate 5 which is freely programmable in space, and which has three degrees of freedom. Many of the exhibits at Hanover also took part in the Automan Robotics Exhibition in Birmingham in May. (Computer Weekly, 21 April 1983.)

Robots displace slide rules from the classroom

Time was when a slide rule was the ultimate in classroom one-upmanship, but these days, it seems, no pupil should be without his, or her, robot. That at least was the impression given by an exhibition in Birmingham at which schools throughout the country demonstrated projects in electronic control. There were any number of cranes, cars and mechanical arms fashioned from the modern equivalents of Meccano. Under the control of the ubiquitous BBC Microcomputer, these creations whirred through their paces, lifting polysterene chips out of boxes, drawing pictures and finding their way around. Among the home-grown equipment were a number of cheap devices that are sold to schools. The most famous is the BBC Buggy, a box with two wheels and several sensors. The £120 Buggy, sold by a firm called Economatics, has light-sensitive cells, an infrared receiver, bumpers which sense collisions and a pen holder. It can also be equipped with a mechanical arm. The Buggy is connected to a BBC computer by an umbilical cable. Under the direction of 13 different programs, it can read codes like the ones found on supermarket goods, play music, find and describe objects and draw maps of its surroundings. Aimed at school physics departments is a device called the VELA. This £175 black box, produced by Leeds University, records measurements from pieces of laboratory equipment like digital thermometers, oscilloscopes, resistors, timers and so on. Measurements are shown on a liquid crystal display. Up to four devices can be attached to VELA at once. The speed at which VELA operates makes it possible to record results from experiments that are difficult to measure any other way. Apart from the battery of robots and electric motors under computer control, firms are selling gadgets for teaching the principles of microprocessors. Scientific Systems makes what is called the Exploded View Computer, a £150 machine which displays its workings on a board of coloured lights. The computer can be slowed down so that each step it takes can be followed on the display of lights.

The Birmingham extravaganza was organised by the Department of Education and Science, which has run a scheme called the Microelectronics Education Programme (MEP) for the past three years. Junior education minister William Shelton took the chance to announce a further £9 million cash injection for the MEP, bringing total government funding to £20 million. The programme trains teachers and produces software for use in schools. It has 14 regional information centres scattered around the country. Despite the large amount of funding that has been pumped into the scheme teachers are worried by the time it takes for materials and information to get through to them. "It's a very complex process," said one. "I am well aware that criticism is levelled at the MEP by classroom teachers who argue that too little has penetrated to the level of the teacher from the programme," said Roger Conibear, director of the programme's unit in the West Midlands. "But I promise the next 18 months will see the MEP having an effect." (New Scientist, 10 March 1983.)

Robots picks parts out of a bin

Until now, commercially available vision systems designed for use with materials-handling robots have been largely limited to guiding a robot arm in picking objects off flat surfaces such as conveyor belts. But a new system set to debut this week from Object Recognition Systems Inc., Princeton, N.J., will break new ground by enabling industrial robots to retrieve parts that are jumbled randomly atop one another in a tote box or bin. Known as the i-bot I, the system, which adds vision to an off-the-shelf robot arm, is believed to be the first to offer commercially such a "bin picking" capability. By lowering labor costs and eliminating the need for special fixturing for each part type, the system will prove ideal for batch manufacturing operations, company officials contend. In addition, i-bot I may facilitate new robotics application areas, such as stacking and unstacking casually positioned parts on a pallet or skid. (Electronics, 30 November 1982.)

ASEA sets robots on cleaning task

ASEA's Industrial Robot Division at Västeras in Sweden, has developed a complete, automated installation for the cleaning of castings. This installation, which is believed to be the first of its kind in the world, has been ordered by Volvo Komponenter, Arvika, Sweden. The cleaning installation is now in full operation and is working together with a handling and hopper system developed by the Swedish company AB MTH System of Säffle. The complete casting cleaning installation, which is built up around an ASEA IRB 60 industrial robot, involved an investment of about £175,000. After a period of test running, it is now in full operation. Manual cleaning (fettling) of castings is one of the most arduous and troublesome jobs in industry today, with turnover in personnel in cleaning departments substantially higher than in foundries as a whole. Growing knowledge of the harmful effects of vibrating hand tools on blood vessels, nerve fibres and bones in the hands and arms has led to an increasing demand for automatic aids all over the world. Instead of lessening the harmful effects of vibrations by reducing the size of the hand tools, and thereby also their efficiency, it is possible to utilise industrial robots. These can handle larger and more efficient tools in a flexible way. Robot cleaning of castings gives both economic and environmental benefits. The robot operates non-stop and is screened off from the operators, who are thus protected from a job that, in the long term, may cause occupational injury. Instead, the manual work can be concentrated on supervision of the robot, checking the quality of the cleaned castings and, where required, maintenance.

No specialized computer knowledge is needed for the programming of the robot, or for modifying the programme. An operator familiar with the cleaning of castings can manually set those points he wishes to be searched by the robot and then enter them in the program. The robot automatically compensates for tool wear. It searches for the edge of the tool befor it starts an opration. (Electronics Weekly, 16 March 1983.)

New control system for industrial robots features plain-text dialogue

A new microcomputer-based control system for industrial robots has been introduced by ASEA, the Swedish-based electrical engineering group. Programming takes place as a continuous dialogue with the control system, which poses questions in plain text. The operator can select the language he prefers to use, for instance English, Fench, German or Swedish. Programmes can be divided into main programmes and sub-programmes, which saves time when programmes are prepared for different variants of a component. Another time-saving feature is the possibility to run the robot around a defined working point (Tool Centre Point) such as the tip of the welding electrode for arc welding. Up to ten different working points may be programmed. (SIP - Science and Technology, January 1983.)

Work under way on security robot

Hais Moravec, of the Robotics Insititute at Pittsburgh's Carnegie-Mellow University, has developed a robot which can guide itself across a cluttered room by using a television camera in its head. He is also working with a Washington company which will start testing a £14,700 robot designed to fulfill the function of a security guard next year. (Electronics Weekly, 9 February 1983.)

Robot joins the guides at Thurnham Hall

A six-feet tall robot has taken over as guide at the 13th century Thurnham Hall, near Lancaster. Visitors are now met by an "Elizabethan Cavalier" with a "brain" built by a university microprocessing engineer. And his apprearance has made two human guides redundant. Stanley Crabtree, the Hall's owner, who has spent nearly 10 years restoring the house to its Elizabethan spledour, said: "The truth is that the robot is more efficient than a human. We used to find children got restless listening to the previous guides. With this fellow, they listen to every word and stay attentive. He can deliver 20 performances a day in great comfort."... (Electronics Weekly, 12 January 1983.)

The robot and his master's voice

Thanks to the systems like the Shadow/VET, a device produced by Scott Instruments of Denton, Texas, robots and computers are now capable of understanding human speech. This means that a robot's normal abilities, such as moving in various directions, sounding its horn or flashing its lights, even finding and using its battery charger, can be triggered by simple voice commands.

When other optional features are added, like a robotic arm, those movements too can be controlled by human speech. The VET (Voice Entry Terminal) was developed, essentially, to promote a more natural, flexible form of communication between human beings and machines, one that does not depend on advanced programming skill. Combining a knowledge of computer science with the science of human speech, Scott Instruments created a system that a person can use to control the computer simply by talking. (At this time, the Shadow/VET is only available for the Apple II microcomputer.) With this equipment, training the robot in speech recognition is simple. The Shadow/VET interfaces with a personal computer that interfaces to the robot. Using the robot's existing programs in a control mode, the operator speaks a command into his headset. Then, as Scott Instruments explains, the VET terminal digitises the spoken word and creates a template, or digital picture of that word, which is stored in memory. To "train" the VET, several prints of each command are made; that is, the operator pronounces the command perhaps six to eight times, allowing a number of templates to be digitised. This is worthwhile because so many characteristics of pronounciation exist in human speech that it is nearly impossible to say the same word twice in exactly the same way. Pitch, tone, speed, emphasis, and the sounds of vowels and consonants in a single word provide a great many variables from the computer's point of view - even though to the human ear the sounds might seem identical. The VET system adjusts well to such differences, and when several prints are made, it further reduces the likelihood of misunderstandings. (Electronics Weekly, 6 April 1983.)

Robot turns into a work-mate

Yes-Man, a prototype table top robot, unveiled this week needs human company. The two-armed machine's designers at Patscentre, Cambridge, say it will take over routine laboratory tasks such as assay work, culture transfer and chemical sampling. The prototype Yes-Man was made for Prutec, the venture capital arm of the Pru, which is now looking for a manufacturer. Patscentre made Yes-Man after it decided that robots were getting too complicated: manufacturers were trying to make them both cognitive and manipulative. The designers decided to supply the cognitive power of this machine by giving it a human. No one says you could train a monkey to use it, but "you could train a very unintelligent operative." It can be programmed by machine code, by taking it through the motions, or by keyboard. The arms have three degrees of freedom, and it is possible to fit wrists. The kind of tasks it might excel at are assembling keyboards and putting gearboxes or electric motors together. In fact, any sequence of tasks that requires testing before each step. The human hands Yes-Man a part, the robot fits and tests it. Yes-Man has built-in safety features. Screwdrivers bleds might have retractable sheath or ultrasonic guards, for example, and the arms cringe when they touch human flesh. (New Scientist, 28 April 1983.)

High-precision robot

A high-precision robot, available in the UK, that can be used in the handling and placing of high-precision light engineering components and in the assembly and testing of electronic and microelectronic components and circuits with an accuracy of 0.01 mm, is being launched in the UK by Concentric Production Research Ltd. Applications for the MR-02 machine include picking up tape-fed or matrix-oriented parts, applying components to PCBs and hybrid circuits, probe-testing micro-chips and thin and thick-film circuits, and accurate deposition of resins etc. A typical rate of working would be 1,000 cycles an hour. Changeover from one program to another is accomplished without machine downtime, and programs can be transferred to cassettes for use elsewhere. (Electronics Weekly, 9 February 1983.)

Robotics vendors turn to teaching

Factory engineers and others with a need to develop and maintain robotics-based manufacturing systems will be getting more help from automation suppliers, judging from new offerings at the Autofact 4 conference in Philadelphia. International Business Machines Corp. and Control Data Corp., for example, were among firms pushing robotics education at the show. CDC, of Minneapolis, added a new four-hour robotics course for use on its Plato computer-based training system, while IBM announced it has formed the IBM Robotic Assembly Institute in Boca Raton, Fla. "We think education is critical in helping our customers take advantage of these new productivity tools," says Bruce J. Haupt, director of marketing for IBM's Advanced Manufacturing division. At fees of $200 and $300 per day, the new institute will start offering in January up to three-week programs that include hands-on experience with IBM robot systems.... (Electronics, 15 December 1982.)

LEGISLATION, PATENTS AND STANDARDS

Japan court rules computer programs are covered by copyright

In a landmark decision that is expected to have far-ranging repercusssions in the Japanese data-processing industry, the Tokyo district court has ruled that computer programs come under the protection of the copyright law. The court took the standpoint that computer-language programs are original works protected by law. The ruling involved the arcade video game Space Invaders, part II, manufactured by Taito Corp. Another firm, ING Enterprises, copied the game's read-only memories and used them in 27 units that it assembled. The court ordered ING Enterprises to pay Taito $2,160 in damages. In a related development, MS-DOS developer Microsoft Inc. of Bellevue, Wash., has filed suit against Shuwa System Trading Co. and Tokyo Fugaki Printing Co. for allegedly publishing without permission manuals that detail the source program for the Nippon Electric Co.'s PC-8001 personal computer. (Electronics, 15 December 1982.)

'Landmark' piracy lawsuit to go ahead in US

Boole and Babbage, the US performance software house, has confirmed its intention to press a patent lawsuit against Candle Corp. B&B chief executive Jack van Kinsbergen said in London that the case would prove a landmark. "We are convinced our patent is valid, but even if it were not it is important to the future of the whole industry to set a precedent. In the current climate of worry about piracy it would be a big step backwards if we were unsuccessful." The patent concerns a data extraction technique which he claimed was a patentable invention, unlike most software which was merely a set of mathematical procedures. Candle in Los Angeles says that it is seeking a declaratory judgement to show that the patent is not valid. "We claim that their method of measuring the performance of a computer was not a new or useful process or product and therefore not an invention," said a spokesman. Candle says that all the information embedded in the patent had been known at least a year before the patent was granted in 1970. The spokesman added that they had been trading for five years and this was the first they had heard of any infringement charge.... (Computer Weekly, 6 January 1983.)

USA vs Japan patent laws

It is interesting to contrast the American system for protecting intellectual property with that of another highly developed technological society - Japan. As in the United States, there is no explicit provision in Japanese patent law for either computer programs or lifeforms. But although the United States has a well-developed body of case law - which, as we have seen, has given its patent statute a wide interpretation that includes these technologies - no comparable body of case law exists in Japan. This results from a number of factors, the most important being the nonlitigious Japanese social fabric and the explicit guidelines set by the Japanese Patent Office.

Litigation is frowned upon in Japan, a fact evidenced by the small number of general attorneys admitted to the Japanese Bar. Instead, discussion and compromise form the framework of the country's legal system. For example, it is common in Japanese contracts to add a clause that calls for "consultation in good faith." Such a clause legally requires parties to iron out their differences without the aid of the courts. Only in recent years, as Japanese international commerce has grown tremendously, has litigation affected Japanese companies. In most cases, however, they have been the defendants, not the instigators of the suits.

As early as March 1976, the Japanese Patent Office created guidelines for computer-related inventions. These guidelines did not have the legal force of a court decision, but their actual effect may have been similar: patent attorneys typically advise their clients to follow them. What is remarkable is that these guidelines closely anticipated the present-day interpretation of the U.S. patent law. The Japanese guidelines state that a mathematical method of calculation is not patentable. But a computer-programmed invention that controls the operating of a rolling mill or a chemical process is definitely a proper candidate for patent protection. In Japan the claimed invention is patentable when the "causal relationship" underlying the process results from utilizing a law of nature.

The Japanese Patent Office has also established guidelines about lifeforms. In 1970 these guidelines held that microorganisms were unpatentable because they lacked industrial utility, as required under the Japanese Patent Law. But the office reversed itself in 1979 after realizing the importance of the patent system for the young bioengineering industry - in Japan and among its major industrial competitors.

The United States and Japan have thus adapted their patent system to encompass new technologies. And although their styles and origins differ, it appears that there is no substantial difference between U.S. patent law and Japanese patent practice. (Technology Review, February/March 1983, excerjpted from an article by D.A. Blumenthal.)

Privacy bill is published in U.K.

The Home Office has made minor concessions to public pressure in the final draft of the Data Protection Bill which was published on the eve of Parliament's adjournment for the Christmas recess. Timothy Raison, junior Home Office minister, revealed the details in a briefing. The Government has accepted that there should be limited access to police, customs, immigration and tax authorities' computer-held records. But this will not go much further than establishing that such records exist. The government is not allowing disclosures which might handicap the authorities in preventing or detecting crime. The Bill is based mainly on proposals in the White Paper on Data Protection published in April. It will allow the UK to ratify the European Convention for the Protection of Individuals which deals with automated processing of personal data. The Bill confirms that there is to be an independent registrar, appointed by the Crown. His job will be to enforce observance of the principles set out on the manner in which computer data is kept. Individuals will be allowed access at reasonable intervals without undue delay or expense to data of which they are the subject.

The registrar will maintain a register of details of users of computers and the personal data which they hold. It will become an offense with a £1,000 penalty to operate unregistered or in contravention of the registered details. But the chief sanction will be the registrar's ability to have someone abusing the restrictions on the storage of data struck off and barred from operating his business. There will be a ban on the transfer of personal data to any place outside the United Kingdom where there is no similar data protection machinery. There is provision for appeals to a data protection tribunal against the registrar's decisions. Individuals can seek compensation in the courts for damage suffered because of inaccuracy or loss of unauthorised destruction or disclosure of information. (Computer Weekly, 6 January 1983.)

British Deparment of Industry concerned about IT standardization

An unofficial working group of the US Institute of Electrical and Electronic Engineers (IEEE) 802 committee on local area networks has been considering standards for data communication on cable television networks for over a year, but has had no UK proposals. Four proposals for access methods, including one from the French PTT, are being considered. The government set up the Focus Committee to identify areas of information technology that would benefit from accelerated standards development. The arrangement also was designed to facilitate sponsorship of UK representation on standards bodies such as the IEEE, one of whose future meetings the DoI has offered to host in London if delegates can persuade companies to pay for their attendance. But the Focus Committee has set its priorities in three areas - local area networks, open systems interconnection and videotex (viewdata and teletext). Cable system technical issues are being left to the Eden committee set up by the DoI to produce by March some draft interim standards for the British Standards Institution to take up. (Computer Weekly, 6 January 1983.)

Standard on computer graphics

For probably the first time in computer history, the US is to drop one of its standards, in favour of the International Standards Organisation's (ISO) Graphic Kernel System (GKS). But there may be problems getting individual companies to follow suit. The organisation published a draft standard on computer graphics at the end of March. The British Standards Institution will probably adopt it virtually word for word, as will the German DIN (nor surprising - the Germans did the original work). GKS is billed as the "first international computer-graphics standard". However, sales and industry standards are not always compatible in the computer world - and the Americans may be reluctant to fall into line.

Peter Jones, of the ISO in Geneva, said "The US is crying out for copies of the draft standard. It is a true, international standard; its importance to the industry is worth billions of dollars in the US. GKS is an enormous work of 280 pages that describes a set of functions for computer graphics programming." Sigma Electronic Systems of Sussex has already introduced a series of terminals that conform to GKS. (New Scientist, 21 April 1983.)

INFORMATION TECHNOLOGY

Cellular radio in Britain by 1985?

Britain hopes to have cellular radio from January, 1985. The theory is that hundreds of thousands of mobile people will be able to telecommunicate over the air just as easily as if they were talking (or sending computer data) over telephone lines. In practice, there are snags. Consultants at Britain's Patscentre believe that, to work effectively, cellular radio will demand an upgrading of the country's existing telecoms network. The number of frequencies at which radio signals can be transmitted over the airwaves is limited - and there is lots of competition for the space, eg, from the armed forces, radio and television broadcasting, emergency services and British Telecom.

The problem is to squeeze as many users as possible into the channels allocated. Existing mobile radio telephones are wasteful because they use fairly high-powered transmitters capable of sending signals 50 miles or so. If one person is transmitting on a particular frequency, no other would-be user can do so if he is within the 50-mile range without interference. Result: only a few thousand users can be accommodated. To squeeze in more users, cellular radio shrinks the distance any message travels over the air to as little as five miles. Mediating between airborne signals are base stations which relay them along ordinary telecom lines. The result is a patchwork quilt of radio cells - say, roughly 40 in an area the size of a city like London.

Mobile radio users employ low-powered transmitters and receivers. Each cell operates on a frequency different from any adjacent one (but need not worry about the frequency used by a more distant cell). The available radio channels are divided up among the cells as sets of different frequencies. When a mobile-radio user moves from one cell to the next, a computer (controlling the allocation of channels over several cells) automatically flips his transmission over to a free channel in the new cell. With the adapted American technology that Britain will be using, this so-called "hand-off" cuts out voice communication for about 50 milliseconds while the computer instructs the user's handset to retune itself.

Then there is the sheer complexity of the computer hardware and software needed to monitor and control a large cellular network. Although experiments have been carried out in America, nobody yet has any real experience with such a network. The two systems operating in Scandinavia and Japan have not had to cope with lots of traffice. Patscentre suspects furthermore that the capacity and switching speeds of Britain's present telecoms systems will not be able to cope with relaying signals generated by a big cellular network. They think that widespread use of cellular radio will demand the backing of digital telecoms networks based on devices such as System X. Switching on cellular radio may prove more difficult and expensive than first envisaged. (The Economist, 19 March 1983.)

'Cellular radio to create 12,000 jobs by 1990'

The good news from Parliament last week is that up to 12,000 UK jobs could be created by 1990 now that the government has endorsed British Telecom's choice of system for the national cellular radio networks. Information Technology Minister Kenneth Baker told the Commons that the decision had been made on the technology to be used by Racal Millicom and Sectel, the joint venture set up by British Telecom and Securicor, after taking account of the views of key European manufacturers and PTTs. The Minister said that Racan and Sectel could now go ahead with their plan to introduce what would be the first national service of its kind in the world by the beginning of 1985. In this World communications Year Britain is helping out developing countries with computer hardware, and finance. There are 18 broadcasting or telecommunications projects in 14 different countries, said Malcolm Rifkind, Minister of State at the Foreign Office. (Computer Weekly, March 1983.)

Database puts engineering firms in touch with buyers

Small precision engineering firms are to be linked up via a computer database with industrial buyers searching for specific manufacturing capacity. The scheme was launched last week by the London Enterprise Agency (LEntA) which was set up in 1979 with the sponsorship of nine major companies to help protect and create employment in London. Unilever UCSL's manager of information products data relate to the capacity, customer base, facilities, etc, of each engineering company, and the coding system is based on EEC standard decimal coding enabling foreign buyers to interrogate the system in their own language. (Computer Weekly, 13 January 1983.)

UK's IT industry in danger

Unless urgent steps are taken to strengthen Britain's information technology industry, and particularly its international competitiveness, the UK could be out of the IT business by 1990 according to a major NEDO policy report published yesterday. The report, prepared by the IT sector working party and a follow-up to its more general 1982 report, 'a Policy for the UK Electronics Industry', is based on the premise that on current trends the UK's present trade deficit in IT of £150 m will increase to at least £1 bn by 1990. The deficit could increase faster than this it says, particularly in telecommunications following liberalisation, since the UK industry continues to be very weak in peripheral equipment, and apparently "unable to take full advantage of the expanding world markets for IT products and services which would generate profit and employment opportunities in the UK". Despite some apparently satisfactory indicators - domestic sales and exports are still growing at 20 per cent a year - the report points to growth rates in the US and Japan which are double that of the UK. The objective of a national IT policy, says the SWP which is comprised of representatives from industry, unions and British Telecom, should be at least to break even on the balance of trade by 1990. This implies holding at least the current five per cent of the world market (assuming the UK economy improves its rate of growth but does not match that of its competitors) and achieving a higher share in those products where the UK can best compete. A number of major recommendations are directed speparately at industry, government and purchasers although many of them are overlapping and interdependent. Industry is urged to review its structure in terms of the international competition, considering acquisitions, mergers, product line exchanges and inter-company collaboration. As well as improving marketing capability in all respects companies should also collaborate more on R&D and exploit to a greater extent publicly funded research such as defence. The report adds that most successful companies in the industry already adopt many of its policies.

"Policy for the UK Information Technology Industry," £3, NEDO Books. (Electronics Weekly, 16 February 1983.)

UK: Computers may link MPs and their voters

Members of Parliament could soon have far better contact with their consituents - thanks to information technology. The consultancy EIU Informatics has been contracted to look at MPs' office automation needs in the light of growing concern about their office procedures. At present office automation in the Commons consists of an online information system in the library, using terminals to the big Scicon bureau, and a mish-mash of standalone word processors from a large variety of suppliers. The study will cover the needs of Members, research assistants and secretaries. EIU Informatics was formed a year ago as an automation consultancy offshoot of the market research and consultancy firm The Economist Intelligence Unit, part of the group which produces "The Economist" magazine. (Computer Weekly, 21 April 1983.)

Computer ring of confidence (UK)

The world of information technology took another big leap into the future last week when 150 computers at seven sites around the country were switched into one huge electronic system. Project Universe is remarkable in that it brings together for the first time computers of different makes, with a variety of functions and using several languages. It is the first such system anywhere in the world. The scheme is partly funded by the department of industry and has been set up to study the way computers can be joined up by high-speed digital links. Project Universe not only exchanges data, but runs an electronic mail system and allows designs to be displayed and worked on simultaneously at different centres. The participants are the universities of Cambridge and Loughborough, University College London, the Science and Engineering Research Centre, Marconi, British Telecom Research and Logica.

"This may be a prototype, but we plan it to be a catalyst for much wider industrial use," Professor James Merriman, chairman of Project Universe's steering group says. "It is very important to see just what can be used, so we know what will be ideal for future industrial and commercial systems." At the heart of Project Universe are what are known as local area networks (LANs) which may link up a number of computers and may be feeding in information, communicating graphics or distributing electronic mail. The great advantages of LANs are that otherwise incompatible computers can be linked up and that several computers can use the system simultaneously - so-called real time share. LANs were developed in Britain at Cambridge University. LANs are still very limited in Britain, though a growing number of firms and organizations, like BP, the Greater London Council and the BBC have had successful trials. Project Universe is ingenious in its use of cable and satellite to link a variety of systems. There are 15 different LANs at the seven sites. Some use the Cambridge Ring technology developed at the university and now marketed commercially by Logica as Polynet. Once the information leaves one site it goes to a switching device which re-codes the data

into information for a satellite. An earth station sends signals 36,000 kms to the Orbital Test Satellite (OTS). When it reaches OTS it is sent down to another earth station. The commercial potential demonstrates by Project Universe is enormous. Major organisations such as banks, will be able to link up their computer systems. And firms with many branches or outlets will be able to use the network to link with word processors, computers, printers and video. (The Sunday Times, 27 February 1983.)

Firms rush to join EEC IT project

The European Commission has been swamped with nearly 200 tenders for 16 one-year pilot projects in the Esprit programme, Europe's strategic plan for information technology. There are 620 individual organisations represented in the 200 applications, which have a total value of some £69 million. The successful applicants will have to pay half the cost of participating in the projects. The EC is putting up the other half to a total limit of about £7.2 million. The carrot to encourage applications is likely participation in the enormous European Strategic Programme for Research and Development in Information Technologies (Esprit) which is expected to have a budget in the region of £350 million a year for several years. The full proposal for the programme is being completed by the Commission and will be released in May.

The pilot projects are starters for the main project and will cover five study areas: advanced microelectronics, advanced information processing, software technology, office automation and computer integrated flexible manufacturing. The five areas are those which the Commission thinks will offer the best scope for European industry to close the technological gap with the US and Japan, and to apply new technologies without dependence on foreign sources of supply. The eventual aim is to enable the European high technology market to attain a 30% share of the world market by 1990. (Computer Weekly, 10 March 1983.)

Beware micros, says FT report

Moving Micros into offices might be all the rage, but it is costing companies dear. Keith Bedell-Pearce, author of the Financial Times management report on computers and information technology*, warns that widespread introduction of personal computing in many businesses is costly and inefficient, and that the hidden costs of programming bump up the price of "cheap" personal computing to unacceptable levels. "Senior management are being asked to make substantial financial commitments on microcomputer purchases," says Bedell-Pearce. "Even worse, they are sometimes not even asked at all, with the micros being managerial impulse buys out of petty cash. Many large organisations have no clear idea of the number of individual computing facilities they have under their wing." Users without computer experience or proper training often adopt an undisciplined approach to computing, he continues, which compounds the problems. Security of information is compromised, and limitations appear on the growth of the systems to match more ambitious user requirements. Bedell-Pearce urges a more cautious approach to substantial investments in office automation, pointing out that most suppliers are unlikely to survive in the market for long. Companies should form a group view of how personal computing should be provided for those that want it he believes. The approach will vary from company to company, but for most large organisations Bedell-Pearce advocates the provision of personal computing packages on mainframes rather than a multiplicity of microcomputers.

The report aims to offer a layman's guide to all aspects of computing, and is an updated edition of the report first published in 1979. The new sections cover the areas of office automation, personal computing, word processing, local area networks and information technology in general. There is also a contractual briefing, where Bedell-Pearce covers what users should seek in computer contracts. (Computer Weekly, 24 February 1983.)

Austrian PO plans TV datatext launch

The Austrian post office hopes now to have its TV datatext system Bildschirmtext fully operational in 1984. The system, currently on trial, now has 340 subscribers. Other novelties from the organisation include the cableless telephone. A trial series will be produced this year. If successful, the Post Office will start using them in 1983-84. The post office is celebrating World Communications Year by wiring up its 2.5 millionth telephone subscriber. It will be pushing its new digital handset range from February onwards as part of a Sch10bn (£350m) investment drive. The new comfort handset available this year enables subscribers to store numbers, repeat dialling and switch off sets. ... (Electronics Weekly, 23 February 1983.)

---

* Computers & Information Technology: the Essentials, Financial Times Business Information Ltd, Bracken House, 10 Cannon Street, London EC4P 4BY. Tel: 01-248 8000. £95.

RECENT PUBLICATIONS

Corrigendum

The penultimate entry in the list of UNIDO publications on page 55 of Microelectronics Monitor No. 5, January 1983, should read as follows:

ID/WG.372/4 Microelectronics and Telecommunications in Latin America by Edgardo Galli.

We apoligize to the author for not giving him due credit!

New UNIDO/UN publications

ID/WG.389/6 Report of the International Forum on Technological Advances and Development, Tbilisi, USSR, 12-16 April 1982.

UNIDO/IS.383 Problems of Software Development in Developing Countries.

ST/ESA/SER.E/32 Computer Software Programs for Demographic Analysis: Aspects of Technical Cooperation, United Nations, New York.

Microelectronics and Office Jobs: The Impact of the Chip on Women's Employment, by Diane Werneke. (ILO publication No. ISBN 92-2-103278-7)*

Office automation affects women employees in particular as they occupy the majority of lower clerical jobs and are under-represented in decision-making occupations. This monograph focuses specifically on the implications for women of changes in office technology; it shows that, while technology eliminates jobs, it does not eliminate work, and that women office workers whose jobs are at risk must therefore increase, through training, their technical and organizational knowledge and upgrade their skills.

The main conclusions the report comes up with are:

- The new office technology slows down demand for clerical workers engaged in routine information-handling activities;

- As new technology has been introduced, the rise in productivity has allowed more work to be done with the same number or even fewer people. In some countries an increase in part-time work was evidenced;

- Skills made redundant by new technology are, by and large, not appropriate for the new opportunities that are emerging; (jobs associated with the use of new technology require higher level skills of a more analytical nature). Due to the traditional and specific educational and training backgrounds that women have, it may be difficult for them to move into these higher level jobs;

- Women must acquire new skills to broaden their occupational base. Post-school training systems should be designed to suit the need of working women; on-the-job training should be carried out during office hours so that company training would not clash with household responsibilities; employers should not overlook women when selecting staff for training courses;

- As traditional skills of the clerical workforce were made redundant by machines, this resulted in deskilling of jobs;

- Decentralization leading to specialization of jobs, which prevent workers from gaining an overview of the total work process, reduces personal identification and statisfaction with work;

- Worker participation in decisions about new technology is necessary;

- Information on best practice should be disseminated at both interrational and national levels; studies on how systems can be designed to encourage the acquisition of skills and occupational mobility can be used for stimulating awareness of the issues and for providing satisfactory models for others to observe.

---

* The publication can be obtained from ILO Publications, ILO, CH-1211 Geneva 22 at a price of Swiss Francs 17.50.

Computers in Developing Nations, edited by John M. Bennett and Robert E. Kalman (The Netherlands, North-Holland Publishing Company, 1981), 272 pp. (Reviewed by Arlene Horowitz, programme assistant and in-house computer expert, Clearinghouse on Development Communication.

This volume is a collection of papers presented at a one-day seminar on computers in developing nations held in Melbourne, Australia, on 13 October 1980. The first few papers in the collection illustrate a broad theoretical knowledge of what computers should be able to do, but very little practical knowledge of what they actually do. Although computers are presented as problemsolvers in themselves, practical experience usually dispels that notion quickly. Computers can't do anything humans can't do - they just work faster and don't get tired or frustrated. Just as I was beginning to lose heart with the form and substance of this book, I came upon several papers well worth reading and attention. For instance, S.V. Deodhar, Manager of Computer Services at Ballapur Industries in New Delhi, India, cites guidelines for the introduction of large computer systems in developing nations. The advice he presents is of such value it should be applied universally. His realistic approach is summed up in the following: "It is important to recognize at this stage that application of computers is not an end in itself, but only a tool enabling us to perform better while attending to other jobs." Another thoughtful piece contained in this book was written by C.F. Iau of the Malaysian Computer Society. Iau relates the findings of two computer surveys he conducted. His findings can save developing countries hours of frustration surrounding the selection and installation of systems once the decision to computerize has been made.

"The Prospective Impact of Computers in Papua New Guinea" gives readers a good perspective on how developing nations can cope with the problems and pressures of too much "good advice" from computer salesmen eager to corner the market in a particular country. N.G. Cook, the author of this paper cautions: "I am convinced that in developing countries with a shortage of resources, the luxury of selecting different computers for similar tasks, at least within government, is one we can ill afford."

Then, in "A New Keyboard for Chinese Information Processing," S.C. Loh gives a fascinating account of the engineering problems associated with creating a Chinese ideograph keyboard. This should be read by any person still fearful that computers will replace humans. The solutions demanded human problem-solving and creativity and illustrate clearly that only humans can create, while computers merely simulate.

(Available for $US 39.75 from Elsevier North-Holland, Inc., 52 Vanderbilt Avenue, New York, N.Y. 10017, USA.)

Indian Electronics Directory 1982-83 (4th edn); ELCINA, 408 Sahyog, 58 Nehru Place, New Delhi. Price Rs 60.

The Directory gives full details of more than 150 Electronic Component Industries Association (ELCINA) members in alphabetical order. The range of manufacturing activity in which each of these units are involved is broadly indicated along with the name of foreign collaborator in some cases.

The most important part of the Directory is a product-wise guide. In this guide electronic products are categorised into 8 different types, namely, electronic components, materials, instruments for electronics development, consumer electronics, industrial electronics, computers and peripherals, capital equipment and foreign manufacturers' Indian representatives. Each of the product types is divided into specific items which are further subdivided, mainly for electronic components. Several electronic components manufacturers have given illustrative advertisements about their products.

The Directory also includes 2 articles entitled 'An Outline of Government Policies and Procedures' and 'The Electronics Industry in India'. The first article gives the industrial policy for different sectors of electronics and contains a list of electronic items reserved for the small scale sector, and a list of electronic items which are to be approved by the state-level Technical Committee of the Director of Industries and the Small Industries Service Institute in the states. Policy for 100% export oriented units, incentives for setting up units in SEEPZ, highlights of import policy, government approach to foreign collaboration, fiscal and financial incentives to the electronics industry, export incentives and salient features of the import and export policy and budget proposals for 1982-83 are briefly described in this article. The second article reviews the growth of different sectors of electronics industry from 1975 to 1980. It also gives the share of the public and private sectors in electronics production in 1980, as well as the contribution of different states towards the total electronics production. Information on infrastructural and training facilities existing in India in the area of electronics is also available. (Technological Awareness Service, Vol 8, No. 2, June 1982.)

Asian Labour Monitor

The Hong-Kong based Asia Monitor Resource Centre (2 Man Wan Rd., 17-C, Kowloon, Hong Kong) has announced plans to publish, beginning October 1983, the periodical Asian Labour Monitor. The Monitor, which will be cross-referenced and indexed, will carry news of working conditions and labor action in the Asian region. The publication will be organized along the lines of the Center's other periodical, Asia Monitor, which reports on capital movements in the region. It will contain industry reports, and a resources section. (Global Electronics Information Newletter, March 1983.)

Computers on the Job: Surviving Canada's Microcomputer Revolution (by H. Henzies and illustrated by T. Hutchings). Seen from a Canadian perspective, but broadly applicable elsewhere, it documents how some jobs are being eliminated and others are being changed. For example, office work is becoming more professional and existing professional work more demanding. A subtle de-skilling widens the gap of qualifications between clerical and other types of work, and affects women in particular, as they are already under-represented in research, analysis and decision-making occupations. While information technology allows for entry of part-time workers into the labour force by enabling people (again mainly women) to work at home, such part-time work is particularly vulnerable (lack of possibilities for advancement, pension entitlements, little opportunity for socialization). Employment in the service industries will contract as more and more self-service devices are installed. There are some thought-provoking ideas about the information profession: "participate in the design of more imaginative and flexible automated index systems to help people find out quickly what knowledge is available" (a chapter on videotex illustrates how); "creating the information economy and unleashing its potential for fresh and more enriched employment might take longer than originally thought - longer than we have time for ... Ideally, all jobs should be multifunctional, consisting of several tasks and functions. This would allow the inclusion of a learning and training component and would lend itself to occupational mobility. Thus, automation could lead simply to the redundancy of some functions (and their replacement with new functions) rather than the redundancy of people." "Very simply, the idea of a job to last a lifetime is becoming obsolete.... Hence, so is the idea of 'completing' one's education. A new concept of education is needed, one emphasizing not WHAT to learn, but HOW to learn."

For further information about Computers on the Job, contact: Jennifer Murray, James Lorimer Publishers, 35 Britain Street, Toronto, Canada M5A 1R7 (TP + 1 416/362-4762). (Reviewed in IOB Newsletter, January 1983.)

New Technology and Industrial Change, by Ian Benson and John Lloyd. Kogan Page, 224 pages, £11.95 (paperback £4.95). Sleepers, Wake! Technology and the Future of Work, by Barry Jones. Harvester Press, 285 pages, £15.95 (paperback £4.95).

In the flood of catchpenny junk being published about the impact of new technology on society, it is a pleasure to welcome two books which have somehting original and worthwhile to offer. These two both represent committed Labour party points of view - one is from the British Labour party and the other from the Australian. The parallels between them are strong. But the difference are significant. Both provide an essentially similar analysis of the displacement of labour by the microchip and other productivity-raising aspects of the new technology. The authors have good Labour credentials. Ian Benson is a computer scientist and member of the British Labour party's science and technology group. John Lloyd is labour editor of the Financial Times. Barry Jones was shadow minister for science and technology in Australian Labor party when his book was published; he now holds the same post in the new cabinet. ... (Reviewed in The Economist, 16 April 1983.)

New text explores development tools for microprocessor

If you want the whole story about microprocessor development systems, a recent publication, compiled and edited by Vincent Tseng, should fulfill your need. "Microprocessor Development and Development Systems", co-published by McGraw-Hill Inc. in the U.S. and Grenada Publishing Ltd. in England, takes you on a tour of all the possible means of generating and checking out microcomputer code, including methods for doing so without a development system. It contains contributions from specialists affiliated with Texas Instruments, Motorola, Intel, Tektronix, and Hewlett-Packard, as well as from independent microprocessor users. The book explains the need for a development system and also goes into the features that make each system different from all the others.

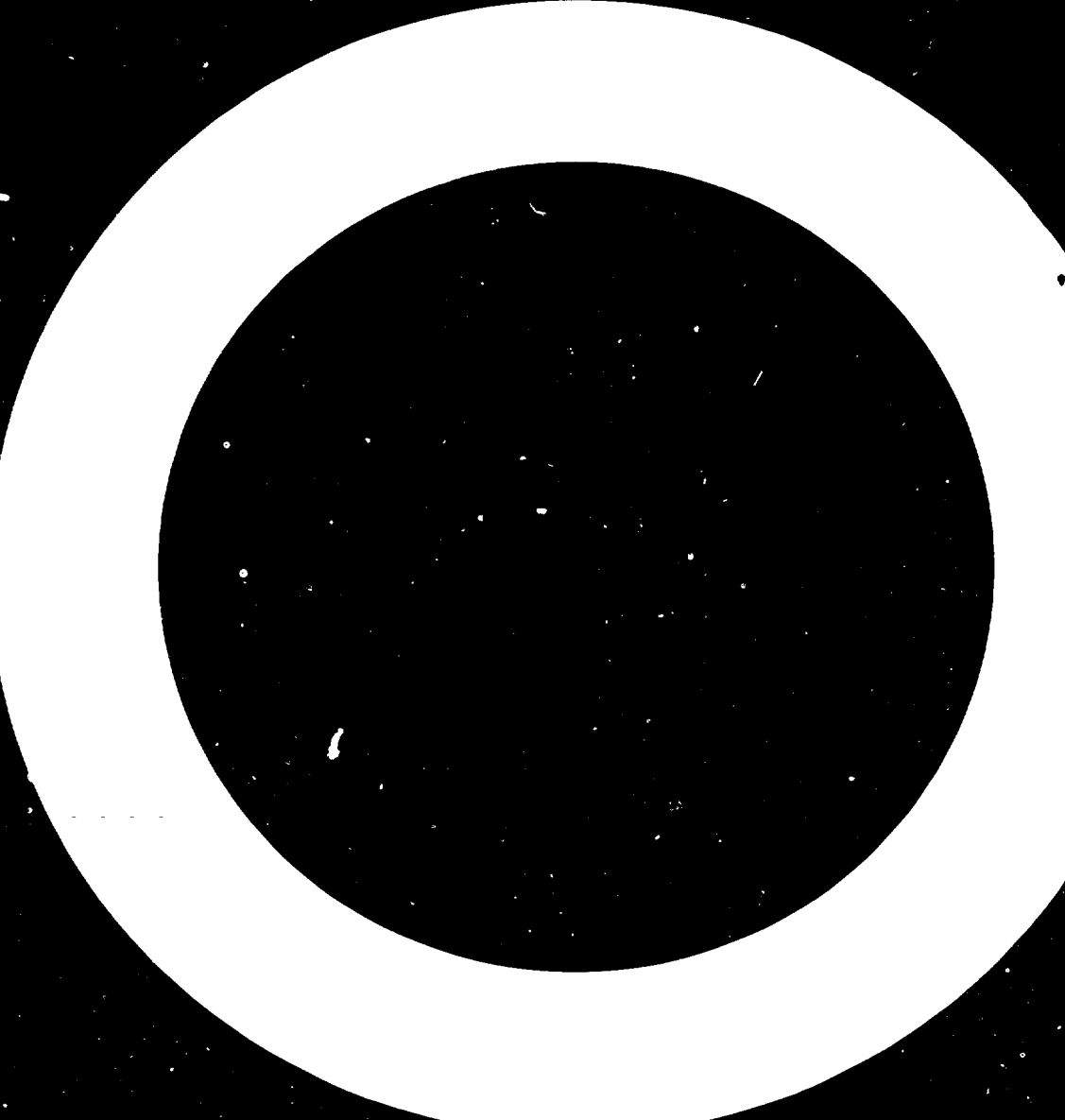
Cutting through the techno-babble of robotics

Because robots represent a complex melding of a wide number of engineering disciplines, a common vocabulary would help to bridge these worlds. Noting this need, the National Technical Information Service is offering "A Glossary of Terms for Robotics", a 90-page booklet that it claims includes the most important terms within the general field of industrial robotics. Developed as part of the Automation Technology Program at the National Bureau of Standards, the glossary groups approximately 350 terms into 14 different categories - such as types of manipulators and mechanical hardware.

Copies of the glossary in microfiche or paper for $4 and $10, respectively, can be obtained in the U.S. by sending payment and a request for publication PB82-251216/TAK to the Department of Commerce, National Technical Information Service, 5285 Port Royal Rd., Springfield, Va. 22161. (Reviewed in Electronics, 15 December 1982.)

Directory of Informatics and Data Processing (Lexikon der Informatik and Datenverarbeitung), edited by Hans-Jochen Schneider of the Institute for Applied Informatics of the Technical University, Berlin ar published by the R. Oldenbourg Verlag München Wien 1983, (pp. 667).

Over 110 experts contributed to this directory which lists 6000 technical terms in German and 2300 in English, gives their definitions, related subject areas, cross references and, if available, synonyms. The publication will be useful primarily for German-speaking managers in private industry and the public sector as well as scientists, teachers, students, pupils and hobby computer fans.



FOR NEW SUBSCRIBERS ONLY:

UNITED NATIONS NATIONS UNIES

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO MAILING LIST QUESTIONNAIRE

MICROELECTRONICS MONITOR
(Code 502)

UNIDO MAILING LIST, INDUSTRIAL INFORMATION SECTION,
P.O. BOX 300, A-1400 VIENNA, AUSTRIA

	Type or print clearly (one letter per box) and leave a space between each word
NAME (underline family name)	
TITLE OR POSITION	
ORGANIZATION	
STREET AND No. (or P.O. Box)	
CITY AND STATE OR PROVINCE	
COUNTRY	

PLEASE DO NOT WRITE IN THESE SPACES

S/A ☐ DISP. CODE ☐ COUNTRY ☐☐☐

CITY ☐☐☐☐☐☐☐☐☐☐☐☐☐☐