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# Status

QUARTERLY

OF THE WESTERN AUSTRALIAN REGIONAL COMPUTING CENTRE

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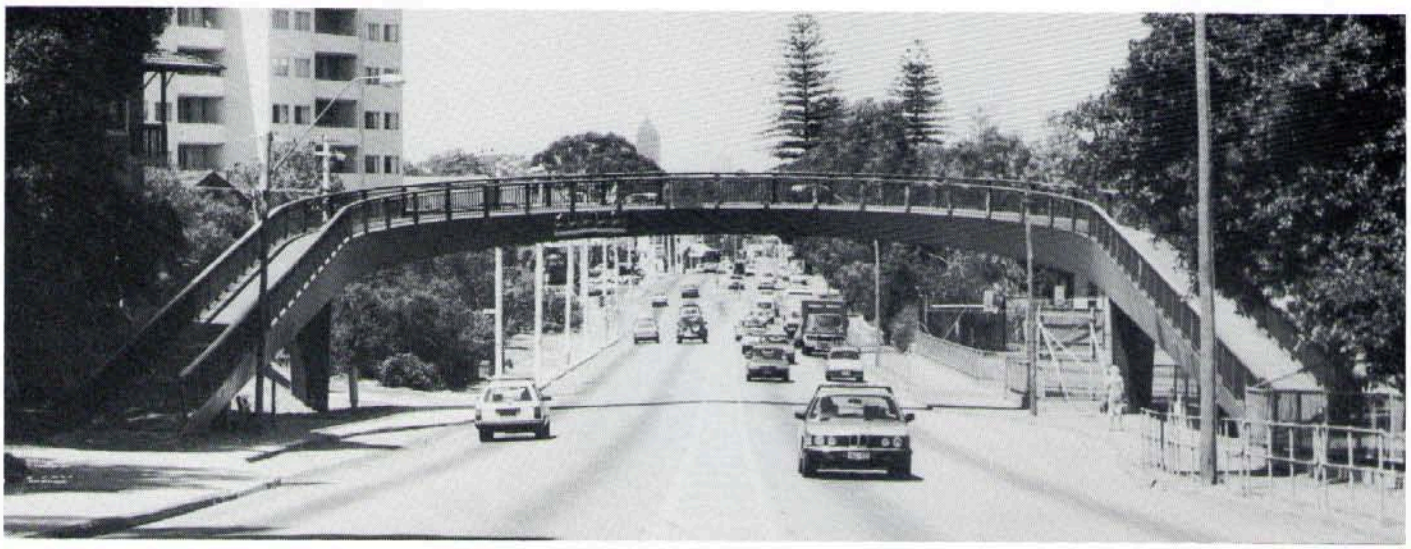

*Steel pedestrian overpass bridge in Claremont, Western Australia*

# WARCC On-Beam with BHP

Structural engineers involved with bridge design will soon have a state-of-the-art facility for the analysis of steel bridge superstructures.

A comprehensive software package known as STLBEAM (Steel Beams) has been developed by WARCC's Applications Programming Group for BHP Steel International Group.

The work was commissioned by the Structural Steel Development section within the BHP Group which aims to promote the use of fabricated steel by providing the engineering fraternity at large with design aids that can assist them in all fields of steel design.

BHP Marketing Engineer, Linus O'Brien said, "We're not in the software business, but we do want to facilitate the use of fabricated steel and provide engineers with better tools to use and become more familiar with steel design."

STLBEAM is all but ready to be presented by BHP to State and Commonwealth Road Authorities and major structural design consultants throughout Australia.

The new package is a more sophisticated version of the very well-proven CTBEMS program which was developed by the Main Roads Department more than a decade ago.

Extensive graphics and text screen dialogues have been added to the original (mainframe) program to provide a high quality user interface.

Importantly, STLBEAM has been designed to run on the IBM PC and PS/2 families of microcomputers, making it now possible for engineers to access the facility with ease.

The STLBEAM software will allow greater flexibility in the testing of alternative design options because solutions for a typical bridge deck can now be obtained very quickly. Design engineers will be able to investigate more design alternatives and so optimise the preliminary solutions for final design.

For example, evaluating the alternative steel options of using rolled universal beams, fabricated plate

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girder beams or fabricated box beams, can be determined quickly.

Illustrating the advantages, Mr O'Brien said, "A picture is worth a thousand words. The STLBEAM program will show the deflected shape of a structure very quickly and this is very useful in your analysis."

Because of its specific bridge design features, the STLBEAM program has the great advantage of providing very fast solutions for structural engineers.

The modelled structure incorporates an interconnected assembly of flat plates of varying thickness. When loads such as vehicles, dead load and temperature differences are applied, the plates shift and distort in accordance with these tests until a state of equilibrium is reached. The internal forces, or stresses, within the loaded plates and the deflected shape of the plates are the principal outputs from the package.

Elasticity is assumed throughout the analysis, so that stress and strain are linearly related and the structure returns to its original shape after the removal of the applied loads. Structures are always designed to stay within this elastic region under all working loads.

An innovative feature of STLBEAM is the provision for orthotropic plates. These have different stiffness properties (*i.e.* resistance to loads) measured longitudinally along the bridge to those measured transversely across the deck.

Bridge decks analysed by the program may be all steel or concrete or composite, as in the case of a concrete slab sitting on a steel box. Reinforced and pre-stressed concrete is handled by transforming the steel bars into equivalent areas of concrete.

Bridges analysed by STLBEAM may be single spans or multiple spans with intermediate supports. The program computes the magnitude of the restraining forces on the deck superstructure from the supports. These are the forces exerted by the piers to stop the deck hogging upwards or sagging downwards as it is loaded.

NAASRA's *Bridge Design Specifications* defines a number of standard loadings which must be investigated during the design of road bridges. These loadings have been incorporated into the STLBEAM package.

Former BHP Marketing Engineer, Mr Chris Turnell, initially led the project on behalf of BHP.

Taking fifteen months to develop, the project was managed using extensive Quality Assurance techniques.

STLBEAM was produced by Diana Rosman, Penny Dufty and Paul Taylor of WARCC based on engineering mathematics developed by Mr Gilbert Marsh, formerly of the MRD.

Enquiries about the STLBEAM package should be directed to Paul Taylor of the Applications Programming Group at WARCC, telephone 380 2515. ❑

# Director's Desk

Recently, WARCC has been undertaking a certain amount of corporate planning. This process is not yet complete, but we have so far addressed some crucial issues relating to the overall thrust of the Centre in the future.

WARCC started life in 1972 as a joint venture between The University of Western Australia and the State Government, by which each would be enabled to enjoy significant economies of scale. Much has happened since then. In particular, the State is no longer dependent on WARCC as it was in the early days. But this has not diminished WARCC's ability to provide an ever-widening range of relevant computing services to clients outside the University, including both public and private sector bodies.

In reviewing our roots and evaluating future computer needs, we have been led to reject two extreme models for the future: at one extreme, reverting to provide only for the needs of the University; and at the other extreme, of becoming a spun-off, fully commercial enterprise.

We believe that there continues to be very significant benefits to all our clients in the close links we enjoy with the University, and in the economies and diversity achievable through serving the wider community.

Our Mission Statement thus reflects this position, with a "foot in both camps":

*The mission of the Western Australian Regional Computing Centre (WARCC), a unit of The University of Western Australia, is to provide computing and related services in a financially viable manner.*

We are still firmly committed to a high level of professional ethics and competence, and to the quality and cost effectiveness of all our services. And we are firmly committed to finding ways in 1989 better to serve the needs of all our clients, at the University, within the Government sector, and in private business.

We want to take this opportunity at the end of the year to extend our very best wishes to all our readers and clients for an enjoyable and refreshing Christmas season, and a successful and rewarding New Year.

***Alex Reid, Director***

# Bar Codes Revamp Outback Chore

Life in the field for today's geologists has been considerably enhanced with the development of a revolutionary data logger.

With the help of WARCC's Applications Programming Group, local company Assist Computer Technology Pty Ltd has developed an innovative hand-held computer incorporating bar code technology, which has streamlined geological logging procedures in the mining industry.

Custom designed for Joint Venturers, Forsayth Mining and Reynolds Australian Mines, the Assist Data Logger was the answer to a request for a better method of entering field data than the traditional and tedious procedures in use, at the Company's Mt Gibson site.

Utilising the latest bar code technology, the Data Logger has a bar code reader which is simply passed over the bar codes on the menu card which correspond to the relevant appraisals. The hand-held computer has 256K of RAM which allows for in excess of 1,000 sample readings to be stored.The data is then transferred to a personal computer at day's end via a standard RS232 cable.

WARCC's Dr Michael Wheatley was called in to evaluate the most suitable bar code system for the Data Logger. Working to Assist's specifications, Michael presented a robust system of bar codes suitable for use in the dusty, bright conditions of Western Australia's harsh prospecting environment.

Using WARCC's high resolution Linotronic 300 Laser Typesetter, a series of bar codes was compiled and printed onto customised menu cards, for use at Mt Gibson. Now, Forsayth Mining personnel can effortlessly record the locality, colour and hardness of rock samples and their reactions to various chemicals.

Joint Venture Mining Superintendent, John Webster, said that when one considers that there can be as many as 15 variables in each sample, the need for accuracy in logging up to 400 samples of laterite gold deposit daily, becomes obvious.

Before the advent of the Data Logger, information was laboriously logged onto sheets of paper (which were invariably dusty and dirty) and then later keyed into a computer, often by someone other than the person who collected the data. This number of processes alone increased the error factor considerably on a batch of 400 samples.

As well as developing the bar code system and menu cards, Michael also devised software that makes it easy for programmers at Assist to describe a complicated page of labels.

*The Assist Data Logger showing bar code reader and menu card (top right) . Its use in the field (right) is revolutionising data collection in the mining industry.*

"Essentially, we came up with a system which was designed to write PostScript language from a label description file," he said.

The bar code technology makes it possible to use a free "data entry format". Data can be entered in any order or changed continuously until the SAVE bar code is struck. Data already stored in the database can be reviewed or modified with full editing facilities.

This is of particular importance in taking mining samples as it saves having to enter continuously, for example, a hole number and grid co-ordinates for each sample from a single hole. The Logger will automatically default to the values given for the previous sample.

Assist has already successfully adapted the Data Logger to a stock-taking application, again using the bar code technique. The apparatus can also be applied to stock control in industrial operations; the collation of livestock data in agriculture; and it may also have a place in Government departments and hospitals ❑

# Promoting Productivity

The effective use of computer and telecommunications technology in the public sector is to be again the highlight of the Government Technology Event in 1989.

*GTE 89* aims to promote the advanced use of new and innovative technologies that lead to productivity improvements throughout the public sector.

The Event comprises three parts: The Government Technology Productivity Awards; The National Technology in Government Conference; and The Government Technology Exhibition. *GTE 89* will be held in Canberra from 27th February to 2nd March 1989.

The Technology in Government Committee now invites any section within any area of the three tiers of Australian Government to nominate for the GTP Awards.

The aim of the Awards, to be presented on 27th February, is to recognise Federal and State Government Departments, Local Governments, Statutory Authorities and public sector groups throughout Australia which have introduced successful systems and innovative work practices that have resulted in more efficient methods of operation, increased job satisfaction (and ultimately, improved customer satisfaction) and innovations that have significantly benefited the community in both the public and private sectors.

Readers wishing to know more about the Government Technology Productivity Awards should contact the Technology in Government Committee, PO Box 255 Redfern, NSW 2016 or phone the Committee on (02) 552 1166 or fax (02) 660 3813.

# WARCC in the Public Sector

WARCC has a record of providing leading edge technology solutions to public sector clients. Last year, the following Government Departments and instrumentalities were among those utilising our services:

Agriculture Protection Board, Alcohol and Drug Authority, Canning College, Civil Aviation Authority, Council to Homeless Persons, CSIRO, Curtin University, Department of Agriculture, Department of Conservation and Land Management, Department of Corrective Services, Department of Land Administration, Department of Regional Development and the North West, Department for Sport and Recreation, Education Department, Environmental Protection Authority, Fisheries Department, Fremantle Port Authority, Health Department of WA, King Edward Memorial Hospital, Multicultural and Ethnic Affairs Commission, Music Examinations Board, Murdoch University, North Perth Migrant Resource Centre, Office of Govt. Accommodation, Royal Perth Hospital, S.A. Govt. Computing Centre, S.G.I.O. Marketing Services, Sir Charles Gairdner Hospital, State Energy Commission, TAFE Information Centre, Telecom Aust.,The University of Western Australia, Transperth, WA College of Advanced Education, Water Authority of WA, Waterways Commission, Westrail and the Western Australian Public Service.

# WARCC Help

Numerous credits published in research literature acknowledge WARCC's on-going contribution to important research underlying the design of high-power electricity transmission networks including the power grid in Western Australia.

Almost all power grid design in practice draws on modelling and computer simulation methods, says Professor Derek Humpage, Director of the Energy Systems Centre at The University of Western Australia.

His large-scale network modelling simulation has drawn extensively on WARCC resources, particularly the Cyber 840A mainframe computer and graphics facilities.

"We have used WARCC from the outset and have had excellent support, including access to software and consultation in numerous areas," said Professor Humpage.

"In all its aspects this is a very exacting area of computer-aided design. Many complex technologies underlie the generation, transmission, distribution and supply of power and the requirements for achieving and maintaining a continuity of power supply are especially stringent. Even the briefest disruptions can have the most adverse and extensive consequences."

One of the broad aims of his Centre's work is to develop methods of computer simulation which will allow the investigation of responses in the complex layered networks of integrated electricity supply systems.

"This is a very tall order. Evaluating what goes on in a network can cover periods of micro-seconds, for example in assessing the consequences of a lightning strike; periods of seconds, in relation to the stable operation of systems following major disturbances; and extended periods, for other aspects of system responses and continuity of supply."

Professor Humpage says investigation by direct measurement on large-

# Generate State's Power Solutions

scale systems is feasible only rarely. And reproducing system conditions and characteristics by reduced-scale modelling in the laboratory is invariably restricted by fundamental difficulties.

However, extensive investigation can be undertaken when systems are simulated in software.

Professor Humpage's work, carried out in collaboration with the State Energy Commission, has been widely reported in international literature. He and his team of research fellows and assistants are responsible for more than 30 simulation software packages and an impressive number of research publications and commissioned studies.

"The energy systems field is one for which a large nationwide industry has evolved," said the Professor, "with capital assets amounting to about $50 billion. Electricity supply in Australia is now bigger than BHP and CRA put together.

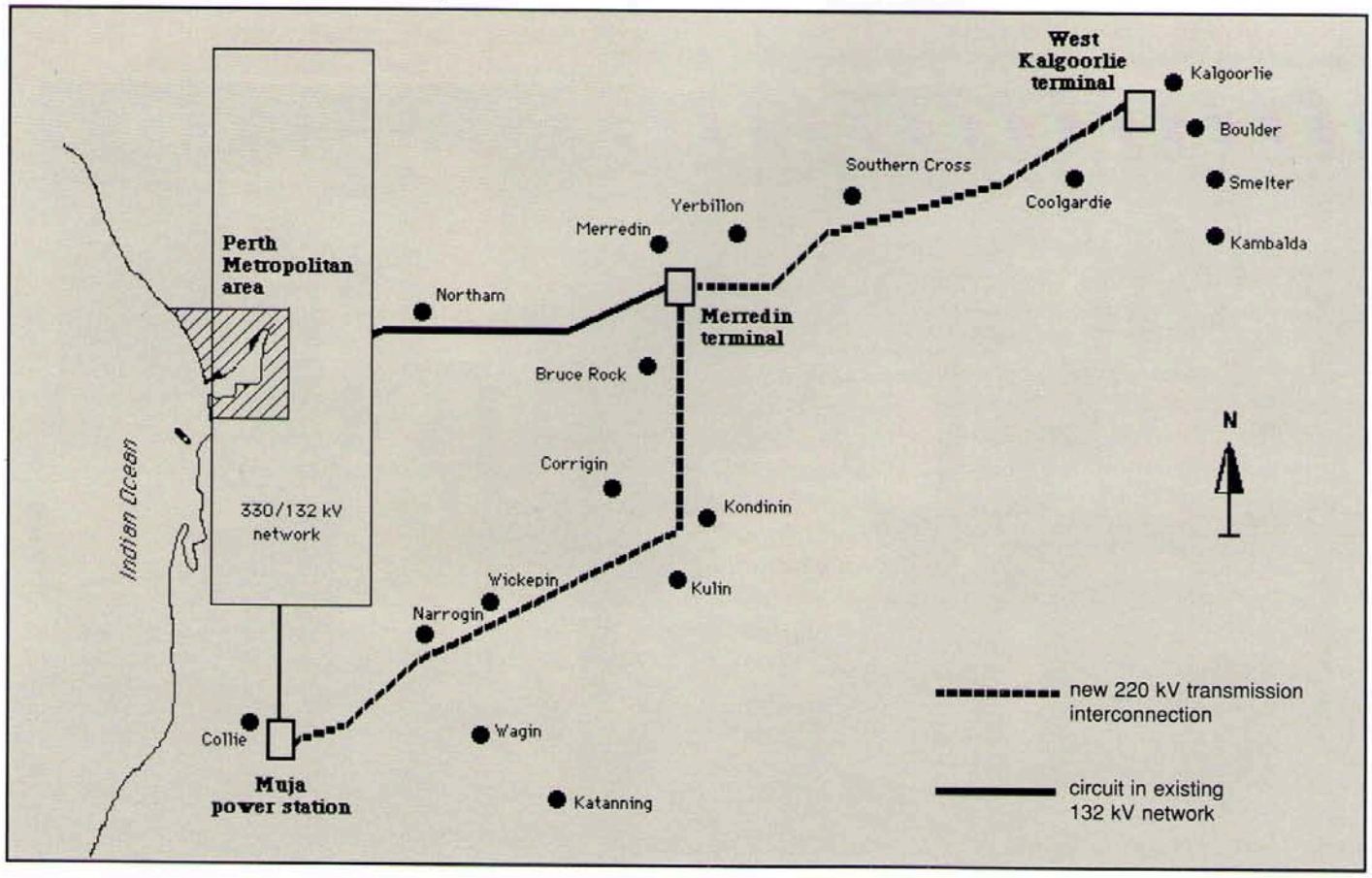
"Electric energy is the lifeblood of every modern economy. Networks have to be strengthened continuously to keep pace with the insatiable demand for power. In Australia this growth is around 8 - 10 per cent annually.

"Capital investment is very high. For example, the Muja interconnection to the Eastern Goldfields, commissioned in 1984, represents an investment of more than $90 million. And actual operation of this interconnection has confirmed the closeness with which computer simulation can reproduce actual operating conditions."

There has been wide international interest in the WA Eastern Goldfields Transmission Interconnection Project because of the inherent problems in very long-distance transmission. Proper operation of the electricity grid means that voltage and frequency variations are contained within acceptable bands and individual network elements operate safely within their limits of capability. The grid will be able to respond to unforeseen circumstances and maintain a continuity of supply.

The Energy Systems Centre was officially established in 1987 by the Senate of The University of Western Australia, although research in this field has been going on at UWA since 1974. The Centre is probably the only one of its kind in Australia, although several universities have long-established interests in the field. ❑

*The Muja Interconnection to the Eastern Goldfields in Western Australia*



# Operations without Hassles

Despite working round-the-clock, WARCC's Facilities Management service is possibly the least well-known of the Centre's activities. Yet the service represents a significant slice of WARCC's business, both in time and in revenue.

Facilities Management provides operating and technical support for other organisations' computers, which are most often housed in the Centre's computer hall.

Where preferred, WARCC can provide on-site computing expertise to outside bodies on a contract basis, for example, as it does at the Department of Conservation and Land Management in South Perth. CALM has a Concurrent System 3240 computer which services a network of terminals throughout the south-west of the State and is operated by WARCC personnel under the direction of CALM management.

But the Facilities Management service is usually enjoyed by clients at WARCC's premises where substantial economies of scale are apparent.

The Centre has perhaps the largest bank of computers in the State and a team of professionals who monitor operations 24 hours a day.

Clients utilising the service are permitted a very economical entry into computing. The financial considerations involved in having to set up a special machine room, install appropriate air-conditioning or chilling plants, and employ electricians and other trades people can be circumvented.

Once a computer system is installed, an organisation then faces the problems associated with hiring and training suitable staff. In addition, there are security requirements which must be addressed.

At WARCC, however, professional Operations personnel attend to the details of data communications, systems programming, site management, operations and the management of disk and tape files. A minimum of four staff is in attendance at any time so that systems can be monitored constantly and efficiently.

Essential procedures such as managing tape libraries and the off-site storage of files are also taken care of.

WARCC expects to increase its Facilities Management business in 1989 and is gearing up in anticipation of this additional work. While the service has been operating round-the-clock five days a week, with some weekend coverage, this is to be increased to a full, seven-day service in the near future.

*A view inside WARCC's Operations area. Staff are in attendance 24 hours a day.*

Assistant Director, Carole Herriman said, "We are planning to expand the Facilities Management service next year as well as promote off-site support as we do for CALM."

Clients already using the service include the Health Department of Western Australia, The University of Western Australia and Computer Aided Learning Services.

For many years WARCC has provided Facilities Management support for the Health Department by affording housing and operations support for the Cyber and IBM mainframe computers used by hospitals and other health services.

WARCC undertakes Facilities Management support for two VAX computers managed by Administration Computing Services, a special programming unit that serves UWA's central administration.

A major client, the University is also served in its partnership with the Western Australian College of Advanced Education in a Joint Library System which is one of the largest in Australia. A dual AWA Performance Enhanced Sequel 9200, housed and operated at WARCC, consists of 200 ports networked over 16 sites from Bunbury to Joondalup.

A Cyber 825 using the computer-based education product PLATO is supported and managed for Computer Aided Learning Services (CALS). Users throughout Australia, including the CSIRO, BP, Woodside Petroleum, RMIT, UWA and the Department of Corrective Services (Prisons), have access to a high quality courseware development and presentation product with excellent student facilities.

Carole Herriman says that the requirement to service such a wide range of computer systems produces Operations staff with extensive skills and high adaptability.

"Staff have been assigned to manage a diversity of operating systems which gives them a valuable breadth of experience and a great sense of challenge," she said. ❑

*Applications Manager Terry Woodings sets off for HQ on his new bike*

# "Apps." at 16 Parkway

With accommodation virtually bursting at the seams, WARCC's Applications Programming Group is helping defuse the situation with its move to 16 Parkway, near the southern edge of the campus.

Continued growth in business, staffing and computer hardware in recent years has prompted this interim measure until new premises near WARCC in Edward Street are ready for occupancy late in 1989.

Adding fuel to this need for extra floor space is the expansion of UWA's Department of Computer Science, also experiencing housing problems due to the popularity of its full-fee-paying students programme. The Department is taking over some of WARCC's former office space until new accommodation can be provided for its needs.

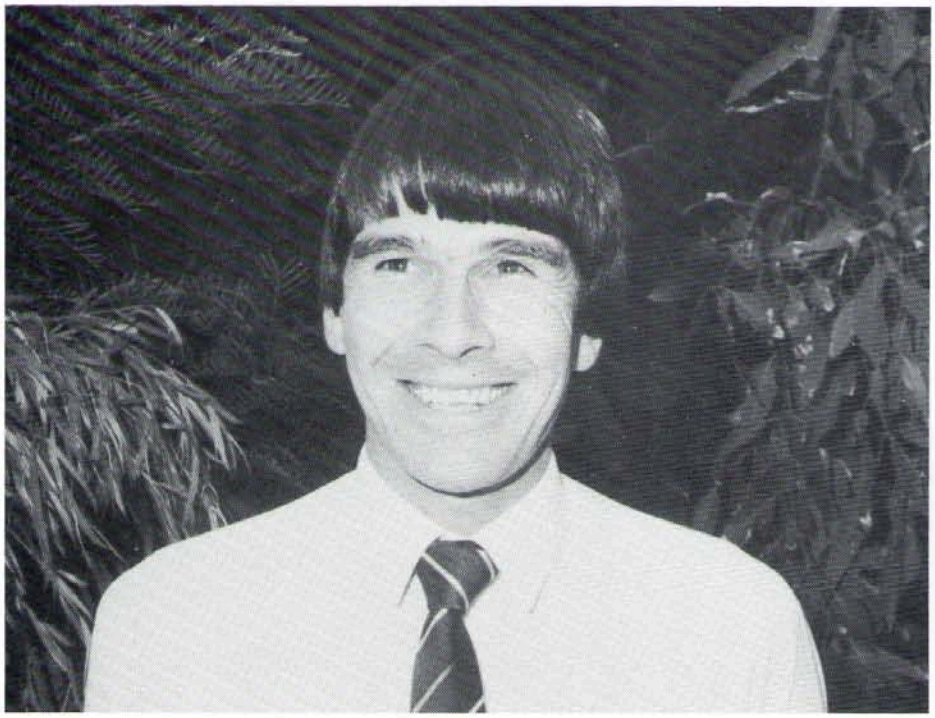
Staff supporting WARCC's WA Cybernet Services will possibly join the Applications Group at 16 Parkway when the offices there are fully vacated by UWA's Investment Services early next year.

The new building under construction in Edward Street will be shared by WARCC and the CSIRO's Division of Geomechanics which is relocating its headquarters to Perth.

Edward Street will become WARCC's "shopfront" to the business world and will house the more commercial aspects of its operations, in particular WA Cybernet Services. The possibility of relocating Microcomputer Support at Edward Street is being considered also. A new adjunct computer room will allow for expansion and backup of computer hardware.

Until then, WARCC personnel will be fragmented, utilising old and new technology to keep in touch. Bicycles, shank's pony, special lunchtime "concerts" and electronic mail should help inter-office communication.

16 Parkway can be reached on the old Applications telephone number (09) 380 2618 and new extension numbers 3203, 3204 and 3208. ❑



*John Langsford - looking to improve WARCC's client services*

# A Push for Better PR

The University's Computing Centre seems certain to assume a higher public profile with John Langsford's recent appointment as its Services Manager.

To help strengthen WARCC's corporate image John is already implementing various initiatives including upgrading existing publications, introducing new training courses and planning a broader consultancy role for the Centre. Improved customer service is also high on his list of priorities.

John's long association with WARCC and familiarity with all aspects of its services afford him a sound overview of the Centre's potential both on campus and in the wider business community.

"We've been too restrained in the past," he said. "We need to let more people know about our range of services. Even our regular customers are unaware of the diversity and breadth of these services, and of the unmatched depth of experience that enables Computing Centre staff to tackle virtually any project."

John's own wealth of experience reflects a truly dedicated WARCC professional. He has spent all his working years at the Centre and his latest promotion puts him just across the corridor from where he first started work in 1979.

Since graduating from The University of Western Australia with a BSc (Hons) in Computer Science, John's work assignments have been predominantly focused on university computing requirements, both at UWA and Murdoch University.

His projects have included writing a circulation system for the Reid Library (UWA); developing a new student records system for the Registrar's Office (UWA); and assessing the academic computing requirements of Murdoch University.

A specialist in establishing University computing systems, John diversified for a time on an assignment for ship chandler, Sealanes. New computer systems were acquired by the company as a result of his input, to deal with a large and diverse range of ship chandlery including the US Navy's requirements in WA waters.

In his new position as Services Manager, John intends to improve communication within WARCC and with WARCC's customers as well as broaden the range of training courses and seminars conducted by the Centre.

"We need to make computing easier for our clients by improving the quality of our documentation and offering better training," said John. "And we also need to establish and maintain closer contact with clients."

The Centre has a very large user base, within the University and in the Government and business sectors.

John is keen on the concept of "account representatives" to liaise between various sections of WARCC and its clients.

"These account reps would help to identify clients' computing needs, reasons for delays and problems and be able to advise on the ways in which the Centre could best help them," he said. ❑

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