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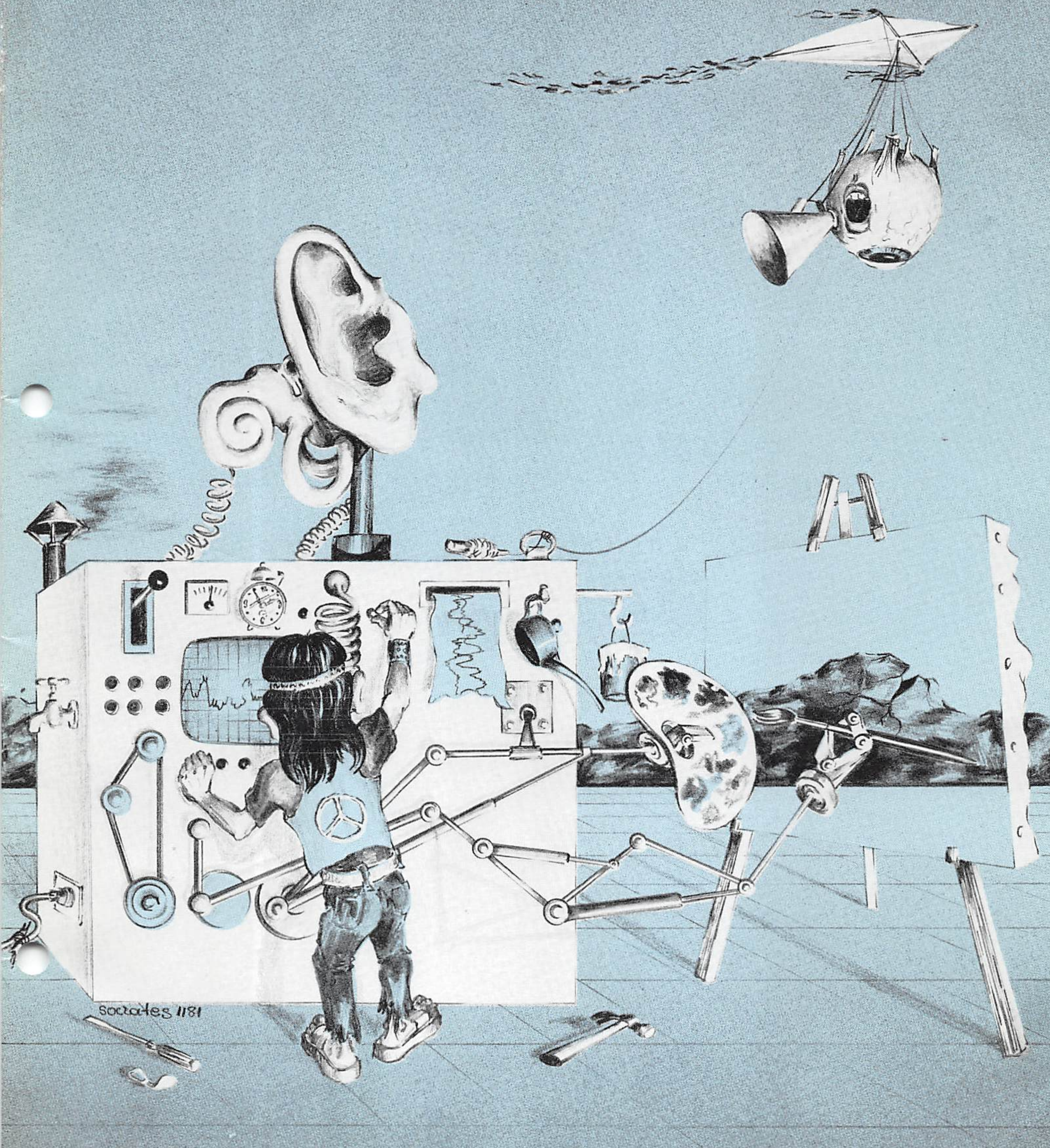

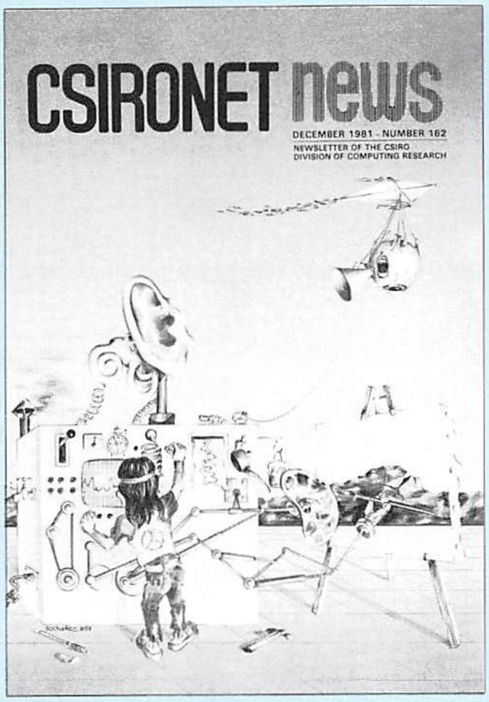

CSIRONET NEWS

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OUR COVER

An alternative method for obtaining and analysing remotely-sensed data for the Broken Hill project, as devised by our designer.

CONTENTS

Topographic Data Processing

Ian Briggs

Graphic Systems Section, DCR Canberra

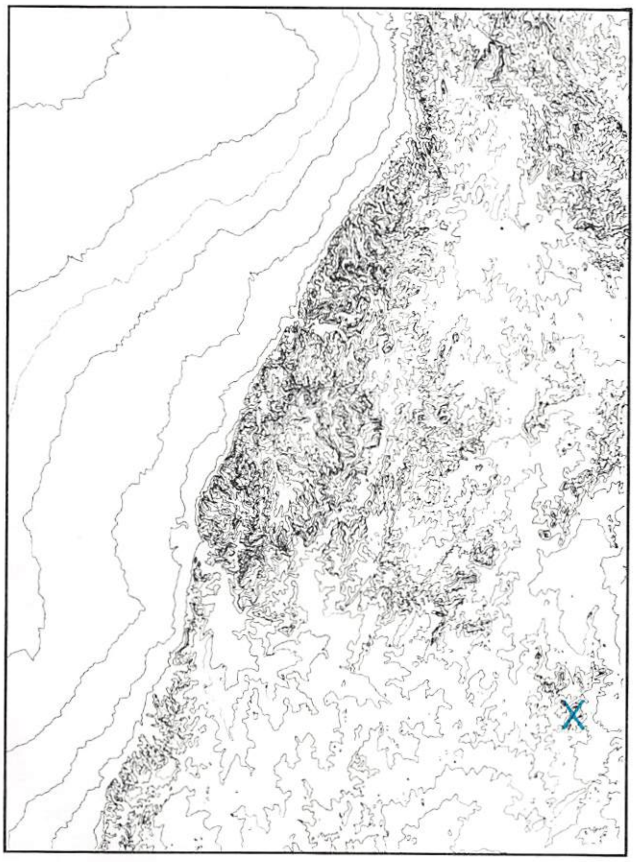
This paper is modified from one presented at Landsat 81, the Second Australian Remote Sensing Conference, held in Canberra, August-September 1981. The original version, titled 'Integration of Elevation Data with Remotely Sensed Data', appeared in the conference proceedings.

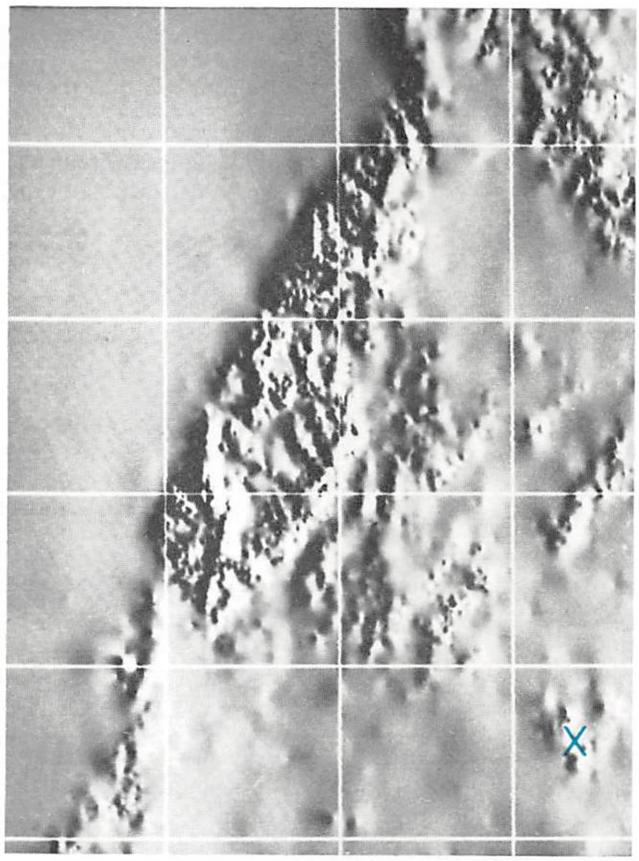
The benefits of Landsat data increase when they can be integrated with additional data of a different type. Such additional data are mostly spatial and can vary discretely or continuously.

Elevation is a natural spatial variable which not only has interest for its own sake but often predicates or correlates with other variables commonly studied with the aid of Landsat. Examples of these variables are hydrology (and drainage), soil type, vegetation type and geology. Moreover, elevation is an intrinsic variable of Landsat data. The amplitude of the reflected light from a patch of the earth is governed not only by the land cover but also by the illumination of the patch, and this is determined by the derived elevation variables, slope and aspect. Thus there are many reasons for wishing to have elevation data integrated with Landsat data.

Currently, we find that the elevation data most readily available are in the form of analogue contour maps. This is the form of the elevation data used in the work described here. However, elevation models can be produced on a regular grid by stereographic machines. Some difficulties to be mentioned here stem from the way contours form a biased sample of elevation, but this should not detract from the results.

Broken Hill area (X marks Broken Hill township). (Left) Elevation contours taken from the 1:100 000 topographic map series; contours were digitized by the Division of National Mapping. (Right) Computer-generated relief shaded elevation image, produced by interpolating the contour data to an image and synthesizing the shading from a specified sun position (NE in this case). This view simulates the observer looking straight down from above, as is the case with most maps.





Given that it is desirable to have elevation data available to Landsat users, the question arises as to how this is best done. Since the Landsat data are in the form of an image, it is natural to use this form for the elevation data also, and specifically an image such that the two types of data corresponding to the same geographic location are presented at the same place in the image. The latter constraint allows two images to be overlaid and compared increment by increment. Computer systems which can create, manipulate and store different types of data in this way are called image-based geographic information systems. Computer programs described here are part of such a system, SISDIM [1].

Some results of work done to transform contour data into elevation images, to allow operations on the elevation images to form images of derived topographic variables, and to present Landsat data in new ways using elevation data, are described here.

Source Data

The area chosen for the study is delineated by the following four 1:100 000 scale first edition map sheets: Thackaringa, Broken Hill, Taltingan and Redan. The area, centered on the city of Broken Hill in New South Wales, is about 120 km by 100 km. The contours on the maps were obtained in digital form from the Division of National Mapping, Department of National Development and Energy. The contour interval is 20 m on these maps, but some 10 m lines were used.

A brief description of the surface is that, out of a plain of elevation 100 m, there rise two north-south trending ranges of average height 300 m. There are four lower ranges with an east-west trend linking these two. The complexity of the elevation features confirms the complexity of the geology.

The Landsat data used in the study were taken from a scene recorded in January 1980, covering the area of the maps.

Creation of the Elevation Model

After smoothing and sampling, the digital contour data (in the form of strings of easting, northing and height triples) were used as the input to an interpolating program [2]. This program develops new elevation values on a grid wherever the contour data do not provide a value directly. The created values are chosen to make the whole surface as smooth as possible.

The spacing of the grid is an important parameter. It must be suffiently small to reproduce the detail of the topography and to allow an image to be formed, and yet not so small that computing becomes a burden. The spacing used here was 100 m, and this resulted in over one million elevation values to be computed. The interpolating program was initially developed for data of a fundamentally smooth character, and would be more appropriate for elevation data if it contained a facility for accommodating discontinuities in the suface and first derivative, corresponding to cliffs and ridges or drainage lines.

Landsat Data

The Landsat data were geometrically corrected by means of the CSIRO-ORSER system [3]. By using control points selected from the image and the maps mentioned above, the Landsat image was rectified to form a new image that could be overlaid on the maps or the elevation image. CSIRO-ORSER was used again to do this. The spacing between the Landsat samples was chosen to be 100 m, so that there was an exact spatial correspondence between the two images.

Procedures and Resulting Images

In this section operations for obtaining derived images suitable for enhancement of Landsat and related images are described, and the results are discussed.

Elevation

The elevation model as an image in grey scale, where black represents the lowest point on the model and white represents the the highest point, is of interest on its own. It presents the landscape in a way which allows the features to be easily perceived, perhaps more easily than with a contour map. It accords with the shading depth frequently employed in coloured contour maps.

There are signs in the image that it is derived from a contour map. The regions between the original contour lines are steeper than they should be.

Relief Shading

The technique of relief shading has a long history, and attempts to automate it have been numerous [4]. It can be used to show the variation in illumination between different points on the Landsat image at the time the image was made. (An example is shown on the previous page.) The sun azimuth and elevation are the same in the model as they were when the Landsat image was made. This type of image can be used to correct the Landsat values for the effect of varying illumination.

Classification

Elevation data can be incorporated as an additional variable in the common classifiers, in an attempt to improve the accuracy of classification [5].

Perspective View

As part of an investigation into new ways of presenting Landsat data, programs have been written to create images of perspective views. The elevation data are used to calculate visibility and perspective, while the Landsat data are used to 'colour in' the visible points. A perspective view of the elevation data alone, or of the sun-illuminated elevation model, can also be produced.

Geophysical Data

An image created from remotely sensed geophysical data can be combined with an elevation image in the following way. The value of the observed magnetic field, for example, can be represented by a colour in a fixed range, while the elevation can be represented by the brightness of that colour.

Stereo Pairs

Elevation models can be used to generate stereographic views of an image. This technique can be applied to perspective as well as orthographic projections.

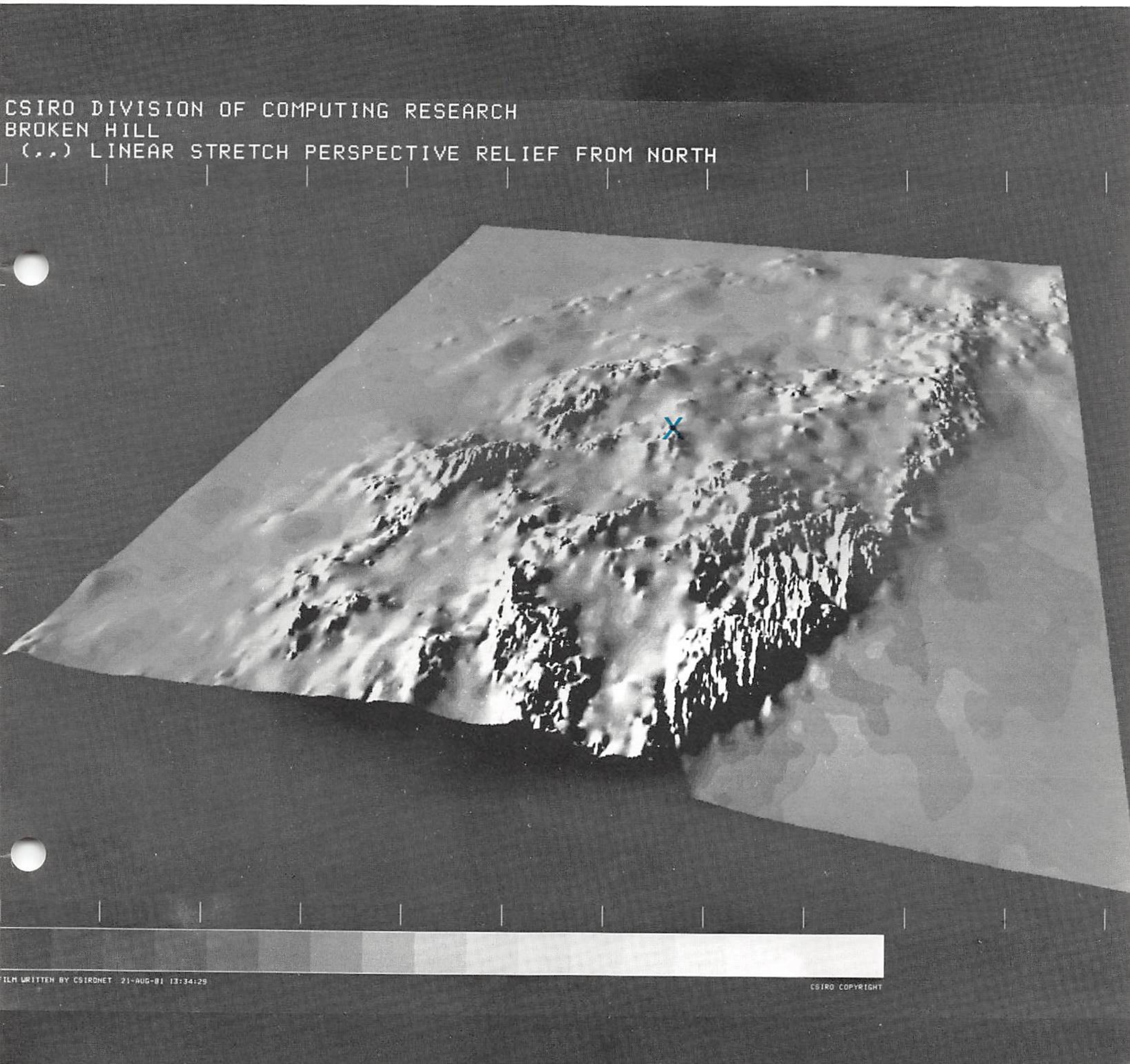
Acknowledgements

The Division of National Mapping supplied the contour data; Max Gentle and Roger Pech of the CSIRO Division of Land Resources Management, Deniliquin, provided a rectified image of Broken Hill.

References

1. O'Callaghan, J.F., Briggs, I.C. and Wilson, M.A. 'SISDIM: Software for integrating spatial data by images.' A paper presented at Workshop on Geographic Information Systems, Australian National University, 1979.
2. Briggs, I.C. 'Machine contouring using minimum curvature.' *Geophysics* **30**, 39-48, 1974.
3. Wilson, M.A. *The CSIRO-ORSER User's Manual,* Division of Computing Research, CSIRO, 1979.
4. Horn, B.K.P. 'Hill shading and the reflectance map.' *Proc. IEEE* **69**, 14-47, 1981.
5. Tom, C., Miller, L.D. and Christenson, J.W. 'Spatial land-use inventory, modeling and projection, Denver metropolitan area, with inputs from existing maps, airphotos, and Landsat imagery.' *NASA Technical Memorandum* **79710**, 1978.

Computer-generated relief shaded elevation image of same area as the illustrations on page 1, this time viewed obliquely from the north, from 40 km height rather than the 900 km of Landsat. Again, X marks Broken Hill. ■



Broken Hill Project Slide Set

John O'Callaghan

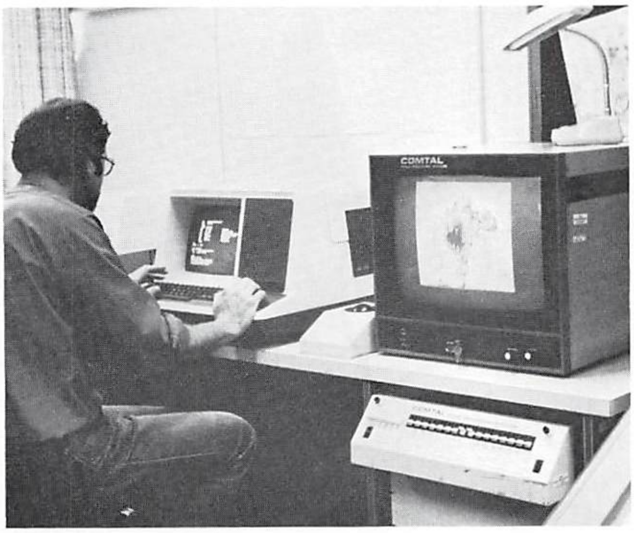
Leader, Image Processing Systems Section, DCR Canberra

A set of 20 slides illustrating some of the image processing techniques used in the Broken Hill Project has been prepared by DCR, for distribution by INDUSAT (Industry Remote Sensing Satellite Group) to its members.

The Broken Hill Project is an experimental study of an image-based geographic information system designed to support applications in land resource management and geological and geophysical data interpretation. Participants in the project are CSIRO Division of Land Resources Management (Deniliquin), C.R.A. Exploration Pty. Ltd. and CSIRO Division of Computing Research.*

The tasks of the information system are to integrate different kinds of spatial and spectral data and to permit analysis, interrogation and display of the data sets. The term 'image-based' refers to the approach of representing spatial data by geocoded image formats, and processing the representations with image handling techniques.

The study area covers the four 1:100 000 Topographic Map Series sheets of Broken Hill, Redan, Thackaringa and Taltingen. The images have been rectified and sampled to a 100-metre grid.



The COMTAL image display system and the VT-100 alphanumeric terminal which are part of the Image Processing Laboratory at DCR . The Broken Hill slides were produced from photographs of the COMTAL TV Monitor.

Landsat data for five dates between 1972 and 1980 have been rectified for the project. Aeromagnetic and aeroradiometric images have been generated by interpolating flight line data supplied by the Bureau of Mineral Resources (1975 Detailed Survey). Elevation and derived topographic images have been generated by interpolating elevation contours digitized by the Division of National Mapping, Canberra.

The slides demonstrate some of the methods for integration, enhancement and presentation of these data sets. A copy of the slide set may be purchased for $50 from the Publications Assistant, CSIRO Division of Computing Research, P O Box 1800, Canberra City, ACT 2601.

Slide 1: Landsat false colour image of part of the study area.
Slide 2: Landsat false colour image of the subscene with a 10 km grid.
Slide 3: Landsat false colour image of the subscene with the land tenure (property ownership) boundaries overlaid on the image.
Slide 4: Aeromagnetics image of the same area.
Slide 5: Aeromagnetics image with a 'sawtooth' stretch.
Slide 6: Aeromagnetics image with pseudo colour.
Slide 7: Aeromagnetics graphic contours corresponding to a high input value.
Slide 8: Aeromagnetics graphic contours overlaid on the Landsat image.
Slide 9: Aeromagnetics edge-enhanced image.
Slide 10: Uranium channel, aeroradiometrics image.
Slide 11: Thorium channel, aeroradiometrics image.
Slide 12: Potassium channel, aeroradiometrics image.
Slide 13: Aeroradiometrics false colour image.
Slide 14: Uranium/thorium (U/Th) ratio image.
Slide 15: Uranium/thorium ratio in pseudo colour (low-high = blue-red).
Slide 16: Elevation image of the sub-area displayed with a linear stretch.
Slide 17: Relief shaded image of the elevation data.
Slide 18: Relief shaded image and high aeromagnetic values.
Slide 19: Elevation image as seen in perspective.
Slide 20: Perspective view of Landsat image of the whole project area.

**Part of this project is described in the article, 'Topographic Data Processing', by Ian Briggs, this issue of* CSIRONET News, *page 1.* ■

Image Processing Systems Section

John O'Callaghan

Leader, Image Processing Systems Section, DCR Canberra

The Image Processing Systems Section is responsible for image processing facilities on CSIRONET. The Section operates an interactive image processing system as a user service and undertakes collaborative projects with user groups. An important task of the Section is to develop software systems and advanced techniques for applications of image processing. This article describes activities of the Section relevant to processing remotely sensed imagery.

Hardware

The Division's Image Processing Laboratory comprises the following hardware:

PDP-11/44 computer

- 512 Kbyte central memory
- RP04 88 Mbyte disc
- floating point hardware
- RSX-11M operating system

COMTAL 8400 colour image display system

- four 512 x 512 x 8 bit image planes
- four 512 x 512 x 1 bit graphics planes for overlay
- image-enhancement look-up tables
- track-ball and cursor

Optronics Colorwrite C-4300 colour film recorder

- up to 250 x 250mm sheet film
- 25, 50, 100μ pixel size
- 10 000, 5000, 2500 squared pixels resolution

Tektronix 4014 graphics terminal
Summagraphics ID-4000 manual digitizer
EMR Schlumberger image digitizer
Alphanumeric terminals

The laboratory acts as a special-purpose workstation on CSIRONET. The PDP-11 is connected to the Cyber 76 by a communication system capable of transmission rates up to 50 Kbps, while a 50 Mbps connection to the NSC HYPERchannel is under development.

Consideration is being given to methods for connecting similar image processing workstations on CSIRONET.

Software

CSIRO-ORSER

The Section has installed and developed the ORSER package (from Pennsylvania State University) for analyzing multi-spectral data.

CSIRO-ORSER consists of a set of programs for the Cyber 76 which can be executed in a conversational mode through CSIRONET to analyze and classify Landsat and ancillary imagery.

Special software has been developed to geometrically correct, register, rectify and classify full Landsat scenes. Techniques for mosaicking to form large image databases are being designed.

SLIP (Software for Landsat Image Processing)

Interactive software has been designed and developed by the Section on the PDP-11/44 (under RSX-11M). The software covers areas of image management, transfer, analysis, transformation and display. Emphasis has been given to interactive enhancement techniques.

Data files used by SLIP can be transferred between the PDP-11 and the Cyber 76 for use by CSIRO-ORSER (and vice-versa).

SLIP and CSIRO-ORSER are based on a general image handling package, called DISIMP.

SISDIM

SISDIM is a major software development project involving several large packages (including SLIP and CSIRO-ORSER) for processing geographic (geocoded) data. SISDIM has been designed to support applications in image-based geographic information systems.

The main tasks of SISDIM are to format and integrate different kinds of spatial data for digital analysis, modelling, interrogation and display.

To date, SISDIM has been concerned with graphic data from maps, geological and geophysical survey data, topographic variables and remotely sensed imagery.

User Services

The Image Processing Laboratory is offered as a service to CSIRONET users. Assistance in operating the system is provided to permit efficient processing. Standard charges apply to the facilities.

The Colorwrite film recorder provides a service to users requiring partial or combined scenes or special enhancements of images. In particular, special Landsat products involving 'principal component analysis', 'ratios' and other transformations are available.

A computer-compatible tape (CCT) catalogue is maintained by the Section on CSIRONET and may be accessed by users. It currently contains over 250 scenes of Australia.

The CSIRO-ORSER system may be operated by any CSIRONET user. A *CSIRO-ORSER Users' Manual* is available on CSIRONET, and additional assistance is provided when necessary.

Collaborative Projects

The Section engages in collaborative projects with user groups. Members of the Section process the images under user guidance and develop special software as required by the project.

Recent projects have included:

- Broken Hill Image-based Geographic Information System to support applications in rangeland management (with CSIRO Division of Land Resources Management, Deniliquin) and geological and geophysical data interpretation (with C.R.A. Exploration Pty. Ltd.).
- Horsham Land Use Study, to determine land cover classes within the Wimmera catchment area near Horsham (with Victorian State Rivers and Water Supply Commission).
- Land salinity around Kerang to examine the potential of Landsat imagery to determine the extent of salinity (with Victorian State Rivers and Water Supply Commission).
- Study to determine the capability of multi-temporal Landsat imagery to detect specific crops (with NSW Department of Agriculture and Department of Administrative Services).
- Forest logging in Tasmania to determine the extent of forest logging in the Great Lake area of Tasmania (with Tasmanian Hydro-Electric Commission).

From 1982 (when office space will be available), users will be encouraged to spend time at the Division as part of collaborative projects.

Research Projects

The Section undertakes research into advanced image processing techniques under sponsorship.

Current projects include:

- Transformations for colour image display, to improve the display of numerical imagery as colour products. The approach is to represent the informative dimensions of an image within a uniform colour space, and to compensate for any distortions introduced by the recording and viewing processes.
- Topographic data processing, involving techniques to interpolate elevation samples to form images, and to integrate images of topographic variables (slope, aspect, relief shading, etc.) with remotely sensed imagery.
- Statistical and graphic techniques for interactive interpretation of imagery, as a development of the SLIP package.

Contacts

Access to the image processing services can be arranged by contacting the Manager, Image Processing Laboratory (Pam Cohen).

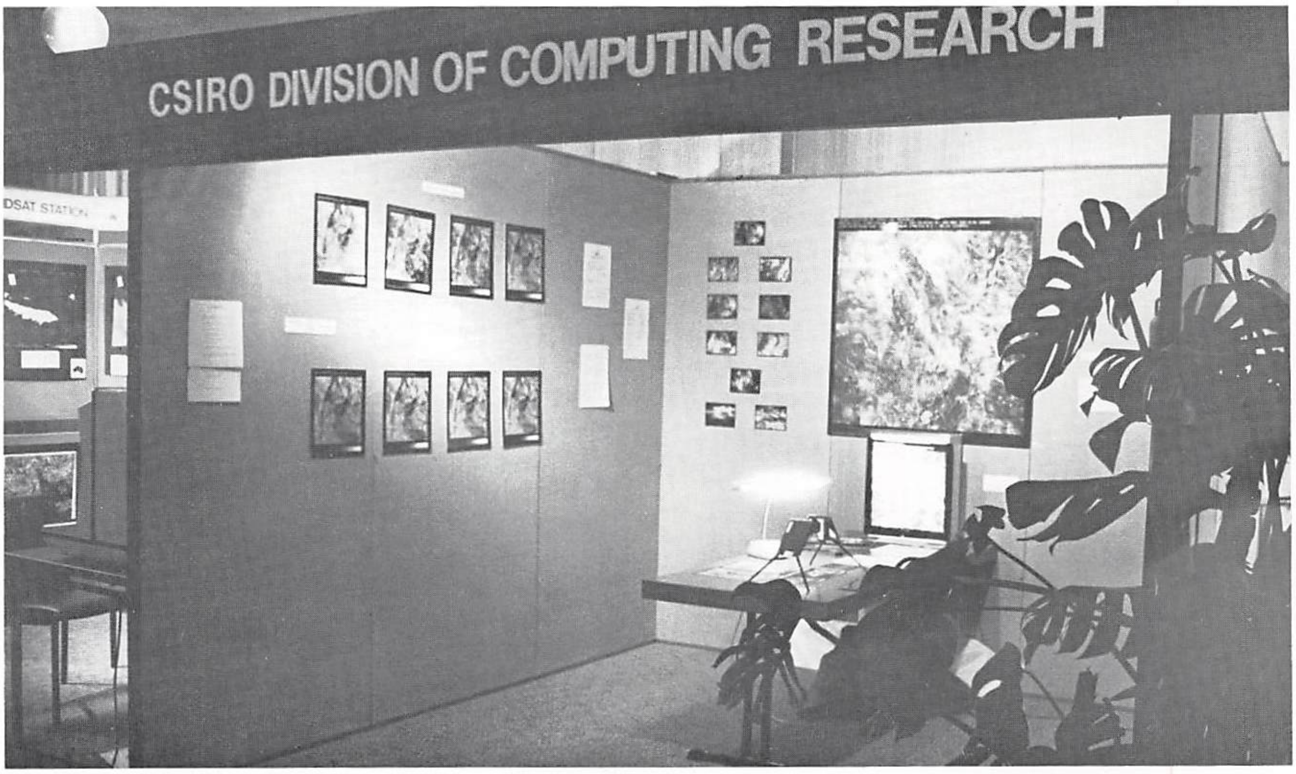
Proposals for collaborative projects and sponsored research must be discussed with the leader, Image Processing Systems Section (Dr John O'Callaghan).

Information on CSIRONET facilities and charging can be obtained from the Publications Assistant.

Correspondence, marked to the attention of one of the above, should be addressed to:

The Chief, CSIRO Division of Computing Research,
P O Box 1800, Canberra City, ACT 2601. ■

DCR's display at 'Landsat 81'.



Landsat 81

Donald Fraser
Image Processing Systems Section, DCR Canberra

The second Australasian remote sensing conference, Landsat 81, was held in Canberra in early September. Formal sessions were augmented by poster-display sessions and a permanent exhibition by individual companies and research groups. The conference attracted over 300 participants, including about 20 from overseas. The Division was represented by John O'Callaghan, Ian Briggs, Pam Cohen, Philip Robertson, Murray Wilson and myself.

Remote sensing is a term used for the gathering of data about the world from aircraft or satellites. Since the most convenient way to handle and interpret the data is in image form, the Division's Image Processing Systems Section has become deeply involved in techniques for processing, display and interpretation of such data.

A paper on the Section's work on colour transformation was presented. This work has been supported by Control Data (Australia) and has two main goals – firstly, to be able to model colour output processes which occur with a colour TV monitor display or a colour film recorder, so that predictable results are obtained; and secondly, to be able to use three-dimensional colour space (intensity, hue and saturation) for informative display of given data. As an example of the latter technique, Landsat data of the Broken Hill area were displayed with plant cover-bare soil on the intensity axis (good cover dark), dryness-greenness of the plant material on the cyan-red axis, showing the changes in these parameters over a number of years. Greenness refers to 'ephemeral', or fresh, new growth. The colour axes were chosen to produce a visual effect similar to a standard, false-colour Landsat reproduction. However, the resulting colours bear a quantitative relationship to the data (cover, greenness), which is nearly invariant with time. Interpretation of the raw Landsat data to yield cover and greenness parameters was by Dean Graetz and his team at the Division of Land Resources Management, Deniliquin, as part of a joint project with this Division.

Other work discussed by the Section included the conversion of other forms of geographic data to image format so as to be able to merge and display them with the same techniques and alongside Landsat data. Such data include, for example, aeromagnetic and aeroradiometric data, obtained from airborne instruments flown in a pattern over a large area; and elevation data, currently obtained from maps or directly from aerial stereo photographs. Ian Briggs produced some eye-catching perspective views of the Broken Hill area, by combining elevation data with Landsat data, to give the impression of looking obliquely at a mountainous landscape from 40 km up instead of the 900 km height of Landsat.

In addition to formal presentations of the Section's work, a display was mounted in the permanent exhibition area (see photograph facing page) and included examples of colour transformations, stereoscopic views of oblique Landsat scenes and some large-scale Landsat prints, both on paper and transparent material.

Much interest was shown in future satellite technology, discussed by NASA and French speakers. Current Landsat data have a resolution of about 70 m square, whereas Landsat D, to be launched in a year or so, will have a resolution of about 30 m square. It will also have additional spectral bands at longer wavelengths, to improve spectral classifications of ground data. The French are to launch a satellite, 'SPOT', which will have a resolution down to 10 m square, and the ability to look sideways, to give additional coverage of the same spot on different passes, and stereo imaging for direct elevation modelling. Both of these satellites would require additional expense by the Australian Landsat Station, if it wishes to receive the improved data.

Two other overseas speakers created interest: J Mueller, of the Naval Post Graduate School, California, spoke on atmospheric corrections and oceanographic interpretation of Nimbus-7 data, which introduced a whole new world to most of the land-based audience – problems with specular reflection from the water surface, estimation of plankton masses by light scattering and absorption in the water and so on. F J Doyle, a photogrammetrist with the US Geological Survey in Washington, spoke about very large and high resolution photographic cameras in space, and pushed the theme that telemetry was not the only way to obtain remotely sensed data from space. But, somehow, the thought that film must be retrieved from a spacecraft, and processed before use seems off-putting compared to the comparative simplicity of other methods.

Once again Mike McDonnell, of the DSIR in New Zealand, combined a visit to an Australian remote sensing conference with an extended visit to DCR. Mike discussed his latest techniques for processing Landsat data and his recent working visit to the United States.

It was interesting to see how the user community in Australasia has matured since the first Landsat conference in 1979, and to note that, in many ways, the locals are as advanced as their American counterparts. Certainly the data being obtained by the Australian Landsat Station, which had an extensive poster display at the exhibition, have been in demand beyond all expectation. ■

Language Standards on Cyber Hosts

Don Cameron and Ian Munro

Cyber Systems Section, DCR Canberra

The occasional scientific programmer should be aware that there is a gradual process whereby computer language standards are enhanced and updated, to provide more useful and manageable facilities. Computer manufacturers, and hence DCR, will always try to keep up with this process. The changes are hardly ever dramatic, but can cause programs to fail if not modified appropriately.

Fortran

CSIRONET users who occasionally run Fortran programs may be concerned about the impact of the new standard (of which FORTRAN 5 is Control Data's implementation).

Control Data (CDC) will fully support FORTRAN 4 (the old familiar version) until June 1983. 'Support' means to fix bugs, keep in step with changes to the Loader and Record Manager, and so on. Even after June 1983, FORTRAN 4 will still be available on CSIRONET, but it will not be supported by CDC. This means that it will probably still work for many years, but eventually the operating system will be changed sufficiently that FORTRAN 4 will cease to function. As an example, a recent Loader change in SCOPE 2 would have caused RUN FORTRAN (CDC's predecessor to FORTRAN 4) to fail, had DCR not added code to support such old programs.

It has been asserted in the newsletter of the American Fortran Standards Subcommittee that Fortran 77 (the standard on which FORTRAN 5 is based) will still be actively used by the year 2000, although a successor language standard to replace Fortran 77 is now being developed.

Other Languages

Standards activity is affecting CDC compilers of the following languages, which are used mostly on the Cyber 730.

Pascal

With the impending standardisation of Pascal, CDC will probably be providing Pascal for NOS and NOS/BE.

Cobol

The COBOL 5 compiler supports the Cobol 74 ANSI standard, and is constantly updated to reflect proposed changes and additions to the standard. For instance, COBOL 5 offers the structured END verb statements for IF, PERFORM and SEARCH. Other proposed ANSI features included in COBOL 5 are:

- INITIALIZE (to preset categories of data items)
- REPLACE (to substitute source program text during compilation)
- CONTINUE (as in Fortran)
- ACCEPT DAY-OF-WEEK
- Reference modification for accessing part of a data item
- Mixing of indexing and subscripting
- Subscripting to 48 levels

These proposed ANSI features can of course be turned into trivial or fatal compilation errors by use of the ANSI parameter on the COBOL 5 control statement.

Basic

BASIC version 3.5 conforms to the American National Standard for minimal Basic, and is available to both interactive and batch users.

PL/I

The PL/I compiler implements a subset of the language defined by the document, *American National Standard Programming Language PL/I*, X3.53-1976. Extensions, differences, deviations and implementation-defined values are listed in an appendix of the PL/I Reference Manual.

Reference Manuals

The following manuals are available from Control Data:

- FORTRAN Version 5 Reference Manual 60481300
- COBOL Version 5 Reference Manual 60497100
- BASIC Version 3 Reference Manual 19983900
- PL/I Version 1 Reference Manual 60388100 ■

Index to CSIRONET News 1981

With this issue of CSIRONET News, you should receive an index to the 6 issues published in 1981 (numbers 157 to 162). This index is a trial exercise, and includes only a few 'subject' headings in addition to authors and titles. Your comments and suggestions on improvements for next year's index are invited. ■

VLSI Program

J Craig Mudge
Head, VLSI Program, DCR Adelaide

The VLSI Program, established by DCR earlier this year, is a microelectronics research effort in the design of VLSI (Very Large Scale Integrated) circuits; such circuits have 100 000 devices per chip. The program is led by Dr J Craig Mudge, who played both technical and entrepreneurial roles in the development of structured chip design at Caltech and at Digital Equipment Corporation's VLSI Advanced Development Group in the United States.*

The specific goals of the VLSI group are to establish, within 3 years, an international reputation in VLSI design and in applied microsystem architecture. Another program goal is to demonstrate that VLSI chips can be designed locally, and fabricated remotely, in close to state-of-the-art technology.

Research will be done in the following: composition systems, hierarchical verification, symbolic layout, chip assembly, concurrent chip architectures and distributed computer-aided design (CAD) systems.

At full strength, the new group will have 15 members (plus overseas visitors), with technical expertise split equally between hardware and software. The group will work with other divisions of CSIRO (Radiophysics, Mineral Physics and Manufacturing Technology, for example), Australian industry, and tertiary educational institutions. Existing links with overseas laboratories and universities will be maintained.

The technical bases for the group are recent breakthroughs in structured chip design in the United States. The group will focus on the complexities of chip design and will not establish facilities for the manufacture of chips. Experimental designs produced by the group will go to wafer fabrication facilities in Australia and overseas.

Multi-Project Chip System

Because the new design technology being developed is so important to Australia in the mid to late 1980s, the VLSI Program seeks to help in its propagation. To this end it will offer a Multi-Project Chip (MPC) implementation system (following the pioneering work of Lynn Conway and Carver Mead in the USA) for Australian experimental designs. This should provide an extra motivation for designers (in industry and universities) to learn VLSI design techniques.

The MPC system, which subcontracts mask making, wafer fabrication and packaging, will be operational in mid-1982. The VLSI Program's role in the MPC is information management and vendor interfacing.

Equipment

As chip complexities approach 100 000 devices per circuit (one million devices at the end of the decade), the limiting problem has shifted from fabrication to design time. Unless rapidly escalating design costs can be contained, the full potential of silicon technology will not be realised.

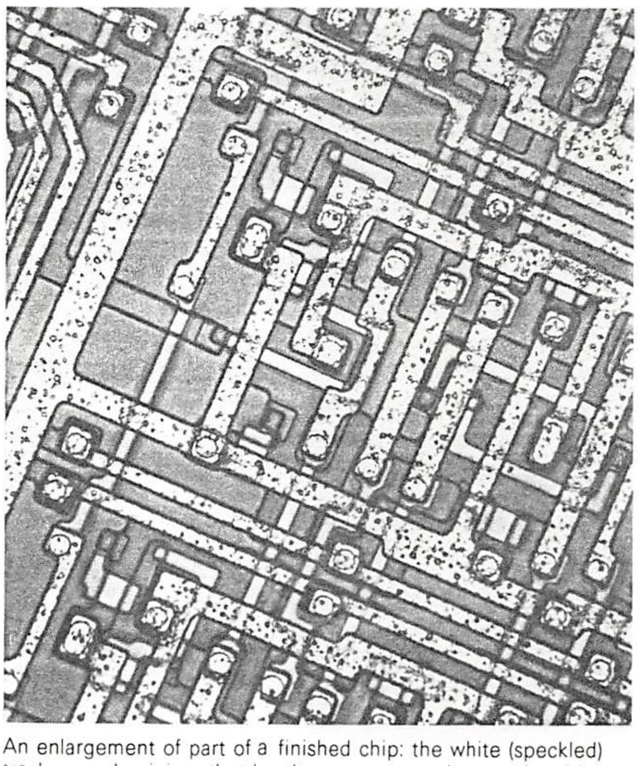
The VLSI Program is being equipped to the same level as other international laboratories in the chip design field. A Digital Equipment Corporation VAX-11/780 is the laboratory's chip database machine and a component of a distributed CAD system. Communication links to a variety of CSIRONET hosts (Cyber 76, for example) form the basis of the distributed CAD system and an electronic mail link with Australian collaborators.

Other laboratory equipment includes colour graphics designer work stations and a digital electronics laboratory for prototyping and testing.

Potential Applications of VLSI

Australia has, because of its superior applications engineering skills, an opportunity to exploit user-designed silicon. Areas which appear well matched to the new technology include seismic analysis for oil and mineral exploration, animal-borne instrumentation, medical microelectronics, radio-telescope signal processing, telecommunications, and computer vision.

* *See 'VLSI Design Section, DCR's new venture' by E M Palandri,* CSIRONET News *No 155, October 1980, page 1.*



An enlargement of part of a finished chip: the white (speckled) tracks are aluminium that has been evaporated on to the chip, to connect the various parts of the circuit. A VLSI chip has features of about 3 micron size, or about 6 wavelengths of visible light. ■

The PUFF Subsystem

User Services Group, DCR Canberra

Documentation on the PUFF subsystem has been released as *CSIRONET Manual* No **15** and is called 'PUFF - The Subsystem for Registering CSIRONET Users'. It is included on the regular microfiche issue of CSIRONET Manuals. Copies of the PUFF Manual may be obtained by logging into ED and typing:

```
U/PUBLIC/[/DOCORD,/$
```

and using MPUFF as the identifier.

There are two versions of PUFF available. All users may access the CYI version as follows:

```
*CYI,pid,uid,node,PUFF
```

where 'pid' is a six-character project ID,
'uid' is a six-character user ID, or its permitted contraction, connected to the project ID,
and 'node' is a two-character node mnemonic.

The interactive system will prompt for the entry of ID passwords if they are required.

The program is self-documenting, with instructions on how the logged-in user's password can be changed. The new password will not usually be in effect until after about 19:00 EST on the day it is changed.

Access to the CIO version of PUFF is restricted, as it is intended for use by Group Control Officers and DCR's Accounts Section. Group Control Officers can be nominated by CSIRONET user organizations to have the authority to make changes to the attributes of their organization's user and project IDs and to create or delete user IDs and change their connections to project IDs.

Creation of project IDs is via a Project Registration form and requires the permission of the Group Finance Control Officer, who is a person registered by a CSIRONET user organization as having the power to incur expenditure on behalf of that organization. The form comes in a set which includes the following:

Authorized Personnel Registration
Group Registration
Project Registration
User Registration

and is available from the Publications Assistant, DCR Canberra, P O Box 1800, Canberra City ACT 2601, or from any DCR Regional Office.

Once a Group Control Officer is nominated, there is less need for user groups to submit forms to DCR to effect changes to IDs. ■

The MIDAS Connection

Joe Fernandez and John Gibbons
Network Gateway Systems Section, DCR Sydney

When the CSIRONET connection to MIDAS was originally installed, a mode of operation was selected where lines of input are delimited by a line feed. This was chosen because most CSIRONET users were accustomed to 'line feed' as a line terminator. However, most of the networks and hosts accessible through MIDAS expect 'carriage return' as a line terminator. (This is reflected in much of the documentation provided by the hosts and networks.) Hence the MIDAS gateway machine replaces the user's line feed by a carriage return before transmission to MIDAS.

Transparent Mode of Input

A DLE sequence is now available to allow a user to choose a transparent mode of input, where the gateway does not intercept line terminators. A MIDAS user can select this mode at any stage during a session by typing:

```
DLE X
```

In this transparent mode, any character in the ASCII character set except the DLE character can be transmitted to the host computer. CSIRONET DLE sequences are still recognised. Transmission of input to the host is effected whenever an ASCII control character is typed. The control characters consist of those with ASCII representation below 40 octal, and include carriage return and line feed. Thus a user can choose to terminate lines of input with *either* carriage return or line feed, and the lines will be transmitted as typed to the MIDAS host. In addition, the other ASCII control characters, which often have special significance to hosts, are transmitted immediately when typed, without the requirement of additional terminators.

The local editing of a line of input can be performed by preceding each normal local editing character – e.g. BS(backspace), VT – with a DLE.

Type-Ahead

In the longer term, CSIRONET nodes will support full duplex terminal handling with type-ahead. It is not yet possible to provide the type-ahead feature due to the shortage of memory in some nodes.

Currently, in order to transmit a character while output is being received, the character must be prefaced with a DLE. This facility is useful for interrupting a host program that is transmitting a large amount of unwanted output. The interrupt character is host-dependent. The combination of the DLE and the interrupt character must *not* be a DLE sequence recognised by CSIRONET. ■

Accessing the Cyber 730

Barry McDowall
User Assistance Section, DCR Canberra

This article is intended for users who wish to access the Cyber 730, but who have little or no knowledge of INTERCOM or the Cyber 730. Much of the following is detailed in *Computing Note* No 34 (The Cyber 730 CSIRONET Host) and *Services Note* No 13 (Cyber 730 System Services). Both documents are relatively small (approximately 20 pages) and can be printed at a hard copy terminal or node line printer.

Learning to use the system may be easier if one initially creates the input jobs on the Cyber 76 using ED, submits these to the Cyber 730 and routes the output back to CYI so that it can be picked up with a K// command in ED.

General Features

The Cyber 730 has approximately 1/10 of the processing speed of the Cyber 76, reflected in the charging algorithms detailed in *Services Note* No 1 (Accounting, Computing Charges, and Crediting). However, the file storage charge is marginally less. The Cyber 730 has 262K of SCM (but no LCM); 131K = 377000B is available for a single job. This may appeal to users who have acquired large complex programs where the process of segmentation or overlaying to fit on the Cyber 76 may require a considerable programming effort.

INTERCOM, the counterpart of CYI on the Cyber 76, has an interactive editor, batch job submission, queue enquiry and routing commands, and supports interactive usage by Fortran, Cobol, etc.

Cyber 730 operator station: the computer can be controlled from this interactive terminal. In the background are some of the 9-track tape drive units connected to the Cyber 730.

In general, users have adapted quite readily to the NOS/BE system on the Cyber 730, as the job control language is much the same as for SCOPE 2 on the Cyber 76. FORTRAN 4 and 5, COBOL 5, SPSS version 8, OUTFOL, UPDATE and PASCAL 3.2 are available and are tried and reliable products. UPDATE is the same as on the Cyber 76, and the same manual is applicable for both systems. EDITLIB is the equivalent of LIBEDT and is fully described in the NOS/BE Reference Manual.

The two main differences are:

(a) The COPY utilities can not be used on the Cyber 730, as they are on the Cyber 76, to change the record/block structure of files by use of appropriate FILE statements for input and output. The COPY utilities do straight copies of files and ignore FILE statements; one must use the utility FORM to copy a file and change its structure.

(b) The default record structure for files is RT=Z (cf. SCOPE W type). This can lead to pitfalls when using GETPF/SAVEPF to attach or catalog files on a different mainframe. Only files on the SYSTEM set of the Cyber 76 can be accessed this way (i.e. not Cyber 76 subsets); the files on user sets on the Cyber 730 can be accessed from the Cyber 76.

One minor difference is that there is no STAGE statement; all reading of tapes is done on line. The LABEL statement has been extended and can be used in place of both the LABEL and REQUEST statements on the Cyber 76. There are also differences in the way MOUNT and SETNAME statements are handled (MOUNT must be used first and both SETNAME and VSN parameters must be specified).

Magnetic Tapes

Scratch tapes are not automatically allocated to users by the operating system as on the Cyber 76. The user must request that scratch tapes be assigned, by running a special job REQTAPE (*CSIRONET Users' Reference Manual,* 7-53.1) on the Cyber 76 and then including the VSN thus allocated in the output LABEL statement. Similarly, for security and operational requirements, tapes are flagged in the TRS database as belonging to a specific host; attempts to access them from a different host will not be honoured. The user must again run a preliminary job MOVTAPE (*CSIRONET Users' Reference Manual,* 7-53.2) on the Cyber 76, to move the tape from one host to another.

Some Sample Jobs

1. Catalog a file on the Cyber 730

This job will copy and catalog the records after *EOS as a file on the Cyber 730. The file will be in default record structure (RT=Z) and can be edited using INTERCOM or attached in other batch jobs.

```
CAT.
ROUTE(OUTPUT,DC=DR,ST=CYI,DEF)
REQUEST(A,*PF)
COPY(INPUT,A)
CATALOG(A,CATA,ID=CCSEXY,RP=9)
<end of section>
<program or data records to be
catalogued>
```

The job in the workspace is submitted to the Cyber 730 by the ED command:

```
*/DISPOSE(*,IN,ST=CYA)/
```

The ROUTE statement in the job ensures that the output will return to CYI where it can be picked up with a K// command.

2. Access an UPDATE library

The first step is to convert the random UPDATE library to a sequential UPDATE library (refer to the UPDATE manual; a SCOPE random UPDATE library is not compatible with NOS/BE). The following job will perform this task:

```
UPD(P2000)
ATTACH(OLDPL,ID=CCSEXY)
FILE(NEWPL,RT=S,BT=C).   note this file statement
REQUEST(NEWPL,*PF)
UPDATE(B)                create sequential update
CATALOG(NEWPL,ID=CCSEXY)
```

To access the UPDATE library from the Cyber 730:

```
UPD(P2000)
ROUTE(OUTPUT,DC=DR,ST=CYI,DEF)
GETPF(OLDPL,NEWPL,ID=CCSEXY,ST=CYB)
UPDATE(N,L=A1234)
```

3. Read a foreign labelled tape on the Cyber 730

The following is a straightforward job to read a foreign tape, with an internal label of CRPMF and tape number of P02355, using the FORM utility. Note the uses of the VSN statement – this informs the system and operators that the Visual Reel Number (VRN of F0041), the number assigned by DCR for the tape on an external sticky label, differs from the Volume Serial Number (P02355) and ensures that assignment will occur automatically. Nine-track tape densities of 1600 bits per inch (PE) and 6250 bits per inch (GE) are acceptable.

```
PF0041(P1000,PE1,T400)
ROUTE(OUTPUT,DC=DR,ST=CYI,DEF)
VSN(IN=F0041=P02355)
LABEL(IN,R,D=PE,F=L,N=EB,L=CRPMF,
      VSN=P02355,NORING)
FILE(IN,RT=D,LL=4,LP=0,BT=E,MRL=6120,
      CM=YES,MBL=8000)
FILE(OUT,RT=D,LL=4,LP=0,BT=C,MRL=6120,
      MBL=8000)
FORM(INP=IN,OUT=OUT)
CATALOG(OUT,PSDATA,ID=CCSEXY,RP=99)
```

4. Other packages

- SPSS version 8 (cf. version 6 on the Cyber 76) is available, and can be accessed as follows:

```
JOB(P1000)
ROUTE(OUTPUT,DC=DR,ST=CYI,DEF)
ATTACH(SPSS)
SPSS.
<end of section>
<SPSS directives>
```

- PASCAL release 3.2 (cf. Cyber 76 version 2.0) is available and is accessed as follows:

```
PAS(P1000)
ROUTE(OUTPUT,DC=DR,ST=CYI,DEF)
BEGIN(PASCAL,DCR)
PASCAL(parameter list)
LGO.
<end of section>
<Pascal source>
```

  The documentation is available on microfiche and may be ordered via the DOCORD program on the Cyber 76. The publication code is PAS3.

- OUTFOL (cf. INFOL on the Cyber 76) is also available, and is documented in the *CSIRONET Manuals* microfiche.

- SIMULA is available; for help, run

```
BEGIN(SIMULA,DCR,HELP=YES)
```

Status

After a job has been routed to the Cyber 730, the user has no way of monitoring its execution status. The USEQS status command (*/U,S/ in ED) will only reveal if the job has already been returned or is yet to be sent.

To get execution status, one must log in to the Cyber 730 as follows:

```
*CYL,project ID,user ID.
  :
```

When LOGON has been initiated, respond with MYQ; this will detail all information for the user queues on the Cyber 730, and user SFT's on the Cyber 76. MYQ,CYA restricts INTERCOM to look at the Cyber 730 queues. ■

Joint Advisory Committee Meeting

Garth Wolfendale
Leader, FACOM Systems Section, DCR Canberra

Members of the Joint Advisory Committee, and other DCR and FACOM personnel, pose outside DCR headquarters in Canberra.

The Joint Advisory Committee of the CSIRO/FACOM Joint Development Project met on 3 November at DCR Canberra, to review the status of projects and to agree on new projects. The main outcome of the meeting was the agreement to undertake three new proposals under the Joint Development Project during the next 18 months:

1. OSIRIS (Open Systems Interconnection Implementation System) - a system implementing International Standards Organization (ISO) TC97 Open Systems Interconnection (OSI) standards models, services and protocols.
2. Continued development of a computer-aided systems design, simulation and verification system.
3. Testing and measurement of a trial relational database system on the FACOM M-190.

Along with these developments, high priority was agreed for the implementation of a production system to interface the FACOM hosts to the CSIRONET communications network via the Network Systems Corporation (NSC) HYPERchannel (aimed for January 1982). Continued involvement with the Australian contribution to the ISO, OSI standards workk was also agreeed. ■

Assistant Chief Terry Holden points out features of the new wing of the DCR Canberra building, to members of the Joint Advisory Committee.

Cyber Record Manager File Organizations

Shane MacPhillamy
Control Data Australia, Canberra Office

The file processing capabilities of Cyber Record Manager (CRM), available on the Cyber 730, are divided into two categories: the Basic Access Methods (BAM) and the Advanced Access Methods (AAM). BAM refers to Cyber Record Manager modules that process sequential and word-addressable file organizations. AAM refers to the Cyber Record Manager routines that process indexed sequential, direct access, and actual key file organizations.

File Organizations Available Under Basic Access Methods

A **sequential** file is collection of records stored in the same physical order in which they were generated.

A **word addressable** file is a collection of contiguous computer words stored on disc. Each word has an ordinal, called a word address, indicating its offset from the origin of the file. By stating a word address, the contents of that word (or that word and those following) can be accessed.

File Organizations Available Under Advanced Access Methods

An **indexed sequential** file is a collection of records stored in logical order according to the value of the primary key. In addition to the data, index blocks are written within the file. The index blocks contain information that allows records to be accessed randomly by primary key. Records within the chain of data blocks are ordered sequentially by primary key. Indexed sequential file organization is best suited to applications that handle very large files or files that are to be accessed both randomly and sequentially.

An **actual key** file is a collection of records stored in data blocks according to the record number specified by the primary key value. The record number is converted to a block number and record slot number by AAM for record storage and retrieval. Actual key file organization is best suited for applications that require the fastest random access to file records; specifically, a large data base file with many external keys into the same record.

A **direct access** file is a collection of records stored randomly in blocks. Each record contains a primary key field; the value in this field is hashed to a number that indicates a home block in this file. The hashing routine provided by the system, or a routine provided by the user, hashes the key value. When a direct access file is accessed, a hashing algorithm transforms the key for a particular record into one of the permissable block numbers. The block number is used to retrieve or store a record, usually with one disc access.

Multiple Index Processing (MIP) provides an extension to the AAM file structuring and management feature. The term multiple-index file refers to an indexed sequential, direct access, or actual key file for which additional keys, called alternate keys, have been defined. (The term multiple-index file and alternate key file are interchangeable.) AAM can locate a record in a multiple-index file by the primary keys or by one of the alternate keys.

Record Types Supported

Fixed length, F type records always contain the same number of characters in every record.

Record mark, R type records are terminated by a special character known as a record mark.

Trailer count, T type records each consist of a fixed-length leader, followed by a variable number of fixed- length trailer items.

Undefined, U type records have a format that differs from the other record types. This record type can be specified when an existing file has records that do not correspond to any other supported record type.

Decimal character count, D type records each contain a field that specifies the exact number of characters in that record.

Control word, W type records are prefixed with a record control word supplied by Cyber Record Manager, indicating record length, etc.

Zero byte, Z type records are terminated by 12 zero bits in character positions 8 and 9 of the last central memory word in the record.

Product Set Interfaces

COBOL

The COBOL 5 user can select the appropriate CRM organization via the use of the various options available in the SELECT clause in the INPUT-OUTPUT SECTION of the ENVIRONMENT DIVISION.

FORTRAN

The FORTRAN 4 and FORTRAN 5 user may make direct calls to CRM modules via standard calls to routines, e.g.

—FILExx - where xx can be DA, SQ, WA, IS, AK, etc.,
—GET, GETP, PUT, PUTP - to read and write records,
—OPENM, CLOSEM - to open and close the file,

plus many other routines to accomplish file manipulation tasks. All these routines are described in the FORTRAN 4 and FORTRAN 5 reference manuals. ■

DMS-170 Query Update

Shane MacPhillamy

Control Data Australia, Canberra Office

DMS-170 refers to the Data Management System on Cyber 170 series computers. This article will give a brief overview of Query Update's capabilities.

Query Update is a nonprocedural system that performs data storage and retrieval operations. These search, retrieval, update and display operations can be performed through commands called directives. Files can be joined in relations so that data from more than one file can be displayed to the user with a single query. Query Update provides a report-writing capability, allowing the user to format output.

Query Update functions independently or with CDC Cyber Database Control Systems (CDCS) when a Query Update sub-schema is present. Two components of DMS-170 enable Query Update to operate in the data management environment: the Data Description Language (DDL), which creates the sub-schema, and Cyber Record Manager (CRM), which handles input/output processing. Figure 1 represents an overall view of Query Update processing within DMS-170. For the purpose of this article, Query Update is considered as a stand-alone facility, and its interfaces will not be discussed.

The Query Update user begins a session by entering the name of the sub-schema and, optionally, the specific area of the database or the data base relations that are to be accessed. All input/output processing uses standard CRM access methods and file organizations.

The processing environment of Query Update varies depending upon the two types of files (database and independent) being accessed. The basic requirement for either type of file access is the existence of a directory that describes the physical storage and characteristics of the individual data items. Figure 2 illustrates Query Update processing in a stand-alone environment. The shaded areas in the figure apply to database file operations only and indicate the presence of a previously compiled sub-schema directory. The non-shaded areas apply to both types of file operations.

Documents that are applicable to the user of Query Update are:

- Query Update Version 3 User's Guide Manual No. 60387700
- Query Update Version 3 Reference Manual Manual No. 60498300
- DDL Version 3 Reference Manual Manual No. 60482100
- Cyber Record Manager Advanced Access Methods Version 2 Reference Manual Manual No. 60499300
- Cyber Record Manager Basic Access Methods Version 1.5 Reference Manual Manual No. 60495700 ■

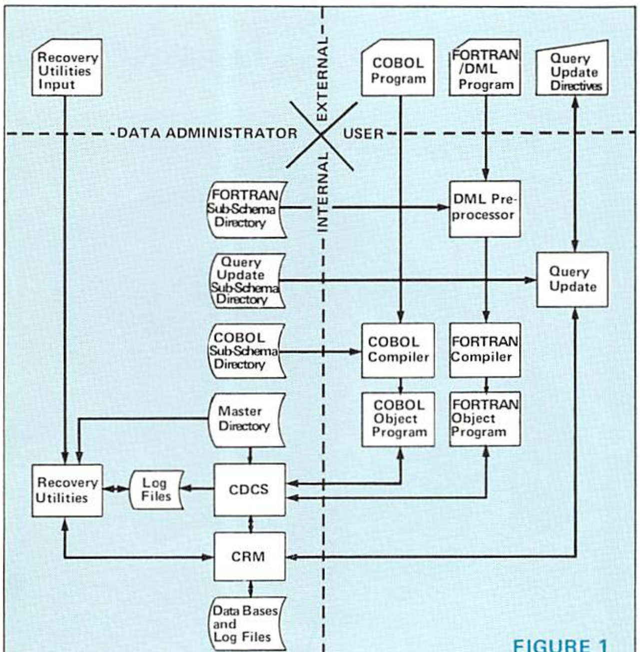


FIGURE 1

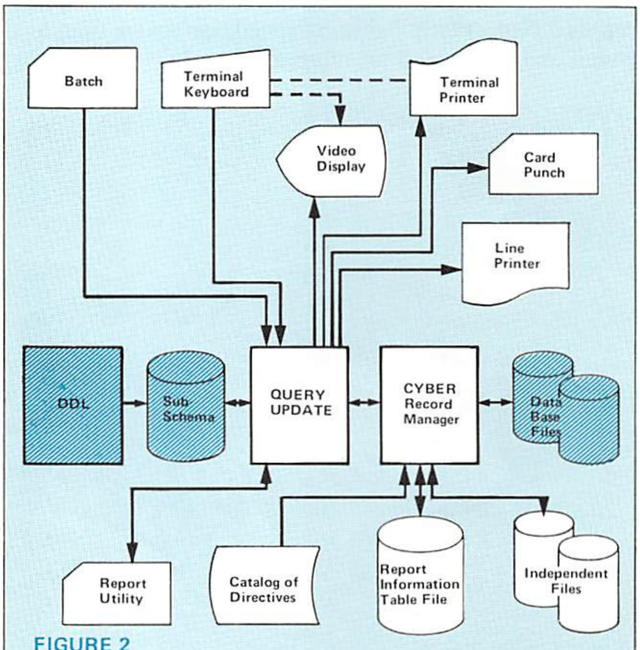


FIGURE 2

Calculating Artefacts

Peter Heweston
DCR Canberra

Peter Heweston is leader of the Applications Software Section at DCR. One of his hobbies is the collection of old calculating and computing relics, and he currently has about 40 items, of assorted ages. In the following article he discusses a few of the more interesting pieces in his collection.

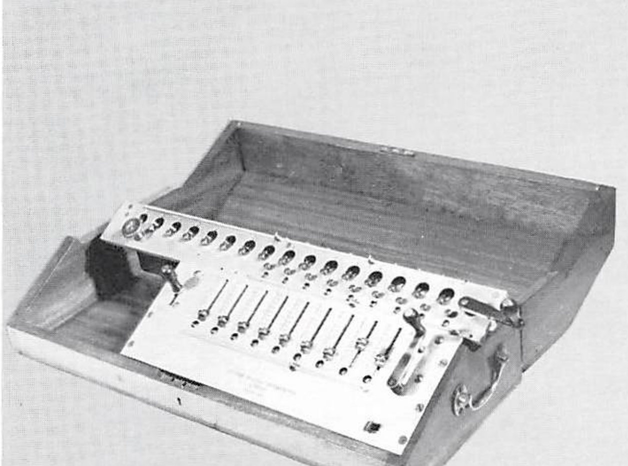
The history of computing started with ten fingers, and progressed rapidly through the next million years or so to beads on strings, notches on sticks and other advanced techniques. (Incidentally, by using binary you can count up to $2^{10}-1$, or 1023, on your fingers. Strangely enough this technique has never taken the world by storm!) However, it was not until last century that the industrial revolution made possible the construction of machines which were cheap and reliable enough to have significant impact on the marketplace.

One of the earliest calculating machines to be made in any quantity was the Arithmometer of Thomas de Colmar. These machines were produced from about 1830; the example shown in Figure 1 is a late model, manufactured about 1909. The machine could add, subtract, multiply and divide. Multiplication and division were performed using mechanical analogues of long multiplication and division, namely repeated addition or subtraction combined with shifts. Thus to multiply 1234 by 567, the longer number is set up on the sliders. With the gearshift in 'add', the handle is rotated 7 times. The carriage is then manually shifted to the right one place, and the handle rotated 6 times. One more shift and 5 more rotations, and the answer is available in the upper register. Not exactly lightning speed, but faster than a pencil and paper, and far more accurate!

In 1884 Dorr E. Felt built a prototype adding machine from a wooden macaroni box, meat skewers, staples and rubber bands. By 1886 the Comptometer was in production. It remained in production, in essentially the same form, until well after the Second World War. As Felt observed, 'I knew that many accountants could mentally add four columns of figures at a time, so I decided I must beat that in designing my machines'.

Figure 2 shows a Comptometer from early this century. Note that the keys from 1 to 5 are so worn that the numbers are illegible, while 6 to 9 appear untouched. A skilled operator would work entirely by touch, reading the figures from a ledger alongside. It was easier to add numbers greater than 5 in two strokes, e.g. 5 and 4 instead of 9, as this minimised finger excursion and ensured accuracy. On machines of this type subtraction was done by using nines-complement addition, and the keys can be seen to be engraved with the nines complement in smaller figures to the left of the main figures. The small levers at the bottom of the columns of keys could be used to suppress carry when adding in nines complement, thus obviating the necessity for entering all the leading nines when subtracting small numbers. Multiplication could be easily performed by setting up the hand over the keys of one of the numbers, then combining multiple depressions and left shifts of the hand, as for long multiplication.

Figure 1 (left), Arithmometer. Figure 2 (below), Comptometer.



The machine illustrated is set up for Pounds, Shillings and Pence. However in many offices decimal machines were preferred, as multiplication and division were easier. The operator would learn the decimal fractions of a pound for every amount from a half penny to nineteen shillings and eleven pence halfpenny, in half penny steps, and could convert to and from decimal notation instantly!

In 1874 a Swedish engineer, W T Odhner, invented a calculating machine based on the 'pinwheel' principle. In essence his machine consisted of a number of gears with the number of teeth on each gear being controlled by a lever. Thus once the wheels were set up, one rotation of the handle would add the corresponding number into a register. Many machines were developed using this principle, including Brunsviga, Facit, Marchant, Friden and others. Figure 3 illustrates two Facit machines. The one on the left probably dates from the 1920's, and shows the sliders which directly set the number of teeth in the pinwheel. The model on the right, of much more recent vintage, uses a keyboard to introduce the digits onto the pinwheels. Statistics students of even quite recent years will no doubt have laboured on such devices at some stage!

The development of machines based on the Comptometer and Burroughs models led to more and more sophistication, with the Monroe illustrated in Figure 4 showing an interesting innovation, a handle on the front of the machine which shifted the carriage either left or right. Combined with a button which locked down any keys which had been depressed, this made multiplication and division a positive breeze, albeit one which still involved a good deal of coordinated handle turning!

Meanwhile, the US Census of 1880 proved to be a real problem. The results were still being produced in 1887 (sounds familiar, doesn't it?) and it was realised that the 1890 figures would be obsolete before they could be analysed. To the rescue came Herman Hollerith, with a system for tabulating punched cards. The card was designed to be the same size as a dollar bill, and had 40 columns. Hollerith formed the Tabulating Machine Company, which eventually came to be part of an up-and-coming company with the prosaic name of International Business Machines. Card tabulating became a major tool in business during the first half of this century. Figure 5 illustrates two card punches, the one on the right being an IBM model.

The history of our profession is tied up with the development of calculation and tabulation. There are not many artefacts remaining from the early days, and there are very few collectors preserving what remains.
I appeal to anyone about to throw out an old calculator, card punch, computing relic (including manuals), or whatever, to spare a thought for the past. Keep it, or find someone else who will, and help preserve some part of our scientific and cultural history. I am always on the lookout myself, and am prepared to negotiate with anyone wishing to sell anything. In particular I am very keen to locate a 'Millionaire' calculator, of which there were many in use in universities and government departments at one time. ■

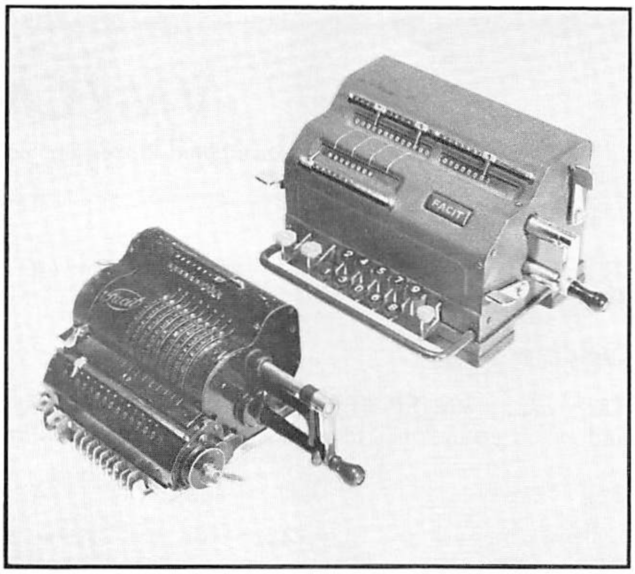


Figure 3, Facit calculators.

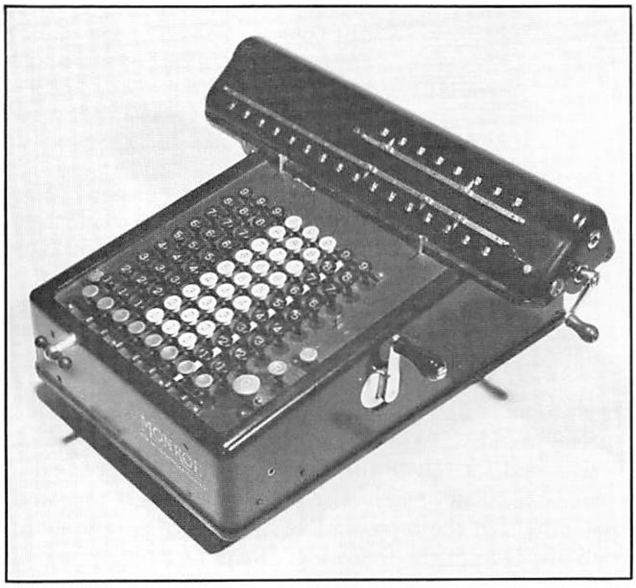


Figure 4, Monroe calculator.

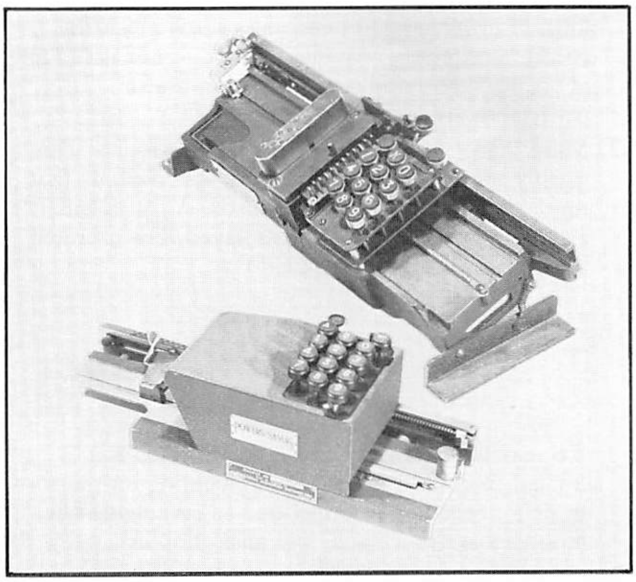


Figure 5, card punches.

VM/CMS News

Distributed Processing Systems Section, DCR Melbourne

This column presents items of interest to users and potential users of the VM/CMS - CSIRONET service.

On-line HELP

The standard VM/SP HELP facility has been modified and enhanced by DCR to include HELP information in several new categories. As the need arises, further HELP notes are added. Hence, the documentation on the HELP command as described in the CMS manuals is not completely correct for the DCR system. The HELP system itself should be used to obtain up-to-date information on what is currently available. Typing HELP alone causes the following to be displayed:

```
Help notes are available for the folowing areas:
    CP         - CP (Control Program) commands
    CMS        - CMS (Conversational Monitor System) commands
    XEDIT      - XEDIT (enhanced editor) subcommands
    SET        - Options available on the XEDIT 'SET' command
    LANGUAGE - Languages/Compilers information
    GENERAL   - Locally written Commands (Programs and EXECs)
    EXEC       - CMS command file EXECution commands
    EXEC2      - Enhanced EXEC processor commands
    EDIT       - Editor subcommands
    DEBUG      - CMS Debug environment commands
    SCRIPT     - The SCRIPT text-formatting processor commands
    FORLIB66 - General-purpose subroutines for FORTRAN
To get a menu (an index of topics) for an area, type: HELP area MENU.
To get help notes for a topic, type: HELP topic or HELP area topic.
From within XEDIT type $HELP rather than HELP.
```

Each topic within each area is held as a HELP file on a special minidisk. When HELP is invoked, this minidisk is searched for HELP files which match the specified topic/area. If no match is found, the search is repeated assuming that the topic and/or area specified are abbreviations. One of the following situations then occurs:

1. One (only) matching HELP file is found. The file is displayed at the terminal if it is less than 20 lines long. If it exceeds 20 lines, the user is given the choice of either displaying it at the terminal (20 lines at a time if required), or outputting it at a CSIRONET line printer.
2. More than one matching HELP file is found. This usually means that 'area' was not specified, or that too brief an abbreviation was used. A list of possible HELP commands to try is displayed. For example, the response to HELP QUERY is:

```
Please try the following:
      HELP CMS QUERY
      HELP CP QUERY
      HELP XEDIT QUERY
```

3. No matching HELP files are found. The user is invited to enter a message, commenting on the sort of help needed. Please feel free to comment. The messages are processed, and answered, every few days.

HOW is another command which aids in using the HELP facility. HOW scans the HELP files looking for files which match the parameters passed to HOW. For example, the response to 'HOW DO I SHARE ANOTHER USER'S DISK' is

```
Please try the following:
      HELP CMS DISK
      HELP GENERAL SHARE
      HELP SCRIPT DO
```

Pascal

Pascal 8000 has been acquired from the Atomic Energy Commission and installed on VM/CMS. Stanford Pascal is still available, but Pascal 8000 is the recommended version as it is faster and has better compiler and run-time checking. For further information type 'HELP Pascal'.

New Equipment

There are now over 160 registered VM/CMS users. To cope with the increasing demand for minidisk space, a fourth 200 mb disk drive has been installed on the Two Pi V32. The hardware will be further upgraded as the need arises. ■

Stings & Things

by Scorpio

The views expressed in this column are not necessarily those of DCR.

In the last issue, I made a plea for something to be done in the short term to reduce the load on the Cyber 76 in peak periods, and for flagfalls and charging rates on low priority jobs to be lowered greatly to use up some of the Cyber-76 idle time overnight and at weekends. Subsequently, I saw in the same issue the article by the Chief of DCR outlining steps being taken to alleviate the overloading, and to encourage the use of more of the idle time. I do not claim to have influenced the decision, but I think I can claim a minor scoop.

To reduce the load in prime shift, the maximum time limits on immediate priority jobs are to be halved. I think this is long overdue; as an example, I believe that a P4000 job using 64 seconds processing time makes an unduly high demand on the system. Even the proposed limit of 32 seconds seems too large at this priority. In addition, actions are to be taken to limit the DCR research and development load during peak periods. This is an important step. It has long been argued by DCR and others that the only practical way to regulate the usage of a computing facility is to have a charging system. However, this system fails to be fair if any users work outside the charging system, and this is what DCR users have been doing, since they do not pay for most of their computing. Thus biasing the system against DCR users is a step towards a fairer allocation of resources between DCR and non-DCR users.

To encourage greater use of the Cyber 76 when it would otherwise be idle, a new range of very low charging rates is to be introduced. The lowest rate, P10, is to be $36 per hour, a quarter of the previous lowest rate. However, the flagfalls are to be horrendous. At P10, the first 30 seconds of resources cost $52.05, an effective rate of $6246 per hour, which is higher than the rate for P5000. However, after that the rate drops to $36 per hour. So at P10, for the first $52.05 you get 30 seconds of resources, and for the next $52.05 you can get 5205 seconds of resources. Effectively, once the job gets past the first 30 seconds, it costs almost nothing to continue. A job which uses all of SCM and LCM for the maximum time of 20 000 B seconds (2 1/4 hours) will cost about $380 compared with about $1330 previously on P0.

The new rates are to be introduced with the object of expanding the use of unattended Cyber-76 time from the present 25% usage. With an elastic demand, the reduction of the lowest rate to 25% of the previous rate should do the trick. However, the awful flagfalls mean that the new rates are only attractive to users with enormous jobs, using over 1150 seconds of resources. At this size of job, I am sure that the demand will not be elastic, and so I suspect that unless the proposed flagfalls are reduced, there will be little expansion in the use of the Cyber 76 during unattended time.

******

All of this business about charging and fair allocation of resources being determined by the charging rates depends on users being responsive to the charging algorithm and cost restraints. Some users are, but I suspect many are not, so the system fails. I saw one user recently run the same job about 30 times on the Cyber 76, with the only difference from one run to the next being one number in a Fortran Data statement. The job did a Fortran compilation of about 0.5 second, a load (with map), and an execution of about 0.01 second. The total cost was about $30. If the user had simply altered the program to read the required numbers from a file, the cost would have been about $1.20. So the cost could have been reduced by a factor of 25, and the results could have been better presented by not being attached to pages of useless printout. With that sort of extempore computing being done, one begins to wonder about the correctness anyway.

******

The Post Mortem Dump (PMD) feature is at last working with the Fortran compilers on the Cyber 76. This package diagnoses the failure of a program in terms of the source code, instead of leaving a user to puzzle his way through an octal dump (see *DCR Newsletter* No 148, p. 16, and the liftout debugging guide). PMD could save hundreds of man-hours, and it is a pity that CDC did not provide it years ago. On the other hand, modern programming techniques and compilers result in many more errors being detected at the design and compilation stages of a project, so now there is less need for PMD. Nevertheless, the overheads of PMD are so low that it is worth using almost all the time in case an error occurs which was not catered for in the original design of a program.

******

I have been promoting the idea of shared software for some time now. I was therefore slightly saddened by an incident recorded in the minutes of a recent Programming and Documentation Standards Committee meeting. A senior member of DCR is reported to have suggested recently that a tool was needed to compare two files and produce the UPDATE deck to convert one to the other. Such a tool, called DIFF, has been available for at least eight months, and has been publicised in *CSIRONET News* and *Cybarite*. It is fortunate that the senior member of DCR did not go ahead and write his own program to do the job. The incident shows the advantage in keeping up to date with the available software.

DIFF has been enhanced recently to accept ASCII coded files, and to optionally provide output in a special form which the text formatting program JUSTIFY can process to produce documentation with changed portions marked in the margin as in CDC manuals. This would be a great help for those who look at things like update pages for the *Users' Manual* and wonder what has been changed. The sooner changed text is marked in this way in all DCR documentation the better.

******

One of the strengths or weaknesses in the SCOPE 2 operating system is the concept of a global library. By defining a global library, a user can call programs from the library with a single name call statement which looks like a system control statement. For example, if the file MYLIB contains programs with names EDIT, COMPUTE and GRAPH, then a job can contain sequences like

```
ATTACH(MYLIB,,ID=CCSEXY)
LIBRARY(*,MYLIB)
EDIT.
COMPUTE.
GRAPH.
```

and it is hard to imagine anything much simpler.

The problems with global libraries come when more than five are required or inadvertently invoked, or when a library contains an entry point name which is the same as a SCOPE 2 control statement or CCL verb, or an entry point name in another library. For example, users of the Minnesota Fortran compiler (MNF) might have discovered in the old days that the RETURN control statement did not work because the run time library containing a subroutine called RETURN had been made global. Similarly, the NCAR graphics packages contain subroutines called SET and DISPLA which conflict with the CCL verb SET and the FORTRAN 5 utility DISPLA.

The CCL procedure DCR adds one library to the global library set, and then most of the procedures in this library add more to the global library set. This can lead to a shortage of global libraries as well as potential name conflicts. I suggest that DCR procedures for getting subroutine libraries like NAGS and IMSL should not add to the global library set but should simply attach a file. The user would then need to insert a statement of the form LDSET(LIB=IMSL/NAGS) in the load sequence to obtain access to the required routines. As an example, the NCAR procedure in DCR does not declare any global libraries.

Incidentally, since a fix to the system in July, a particular library can be deleted from the global library set by simply doing a return statement for the logical file name of the library. This is useful at the end of a CCL procedure to reduce the number of global libraries. ■

Coming Events

Information for this column must be received by the Editor at least four months before the scheduled date of the event. Only meetings to be held in Australia or New Zealand will be listed. No responsibility is taken by CSIRONET News *for the accuracy of information supplied, nor is any guarantee given that notices submitted will appear.*

ACSC-5

(Fifth Australian Computer Science Conference)
Perth, 8-10 February 1982
Theme: Computing, Theory and Practice
Contact: Graham Lee, ACSC-5 Organiser
Department of Computing Science
University of Western Australia
Nedlands, WA 6009

ANZAAS 52ND CONGRESS

Sydney, 10-14 May 1982
Theme: Australia's Industrial Future
Section 41: Information Processing and Computer Science; programme includes Computers and the Law, The Continuing Information Revolution, Communications and Computer Networks, Tools for Australia's Information Industy, and New and Experimental Ideas.
Contact: Dr C N G Dampney
Secretary, Section 41, 52nd ANZAAS
School of Mathematics and Physics
Macquarie University
North Ryde, NSW 2113

SIMULATION SOCIETY OF AUSTRALIA, 5th Biennial Conference

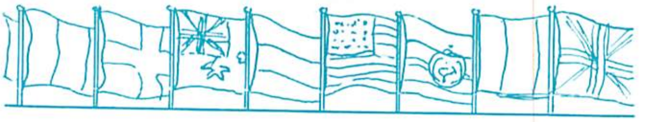
Armidale, 10-12 May 1982
Contact: SSA Conference 1982
Dr I H Fisher
Department of Resource Engineering
University of New England
Armidale, NSW 2351

MICROELECTRONICS '82

Adelaide, 12-14 May 1982
Contact: Conference Manager
Institution of Engineers
11 Bagot Street
North Adelaide, SA 5006

4th INTERNATIONAL CONFERENCE IN AUSTRALIA ON FINITE ELEMENT METHODS

Melbourne, 18-20 August 1982
Contact: Professor L K Stevens
Professor of Civil Engineering
University of Melbourne
Parkville, VIC 3052. ■



Milestones and Millstones

Documentation Section, DCR Canberra

CNIO

CNIO is a program, usually running in smaller computers, which manages CSIRONET communications. It runs in some of the smaller hosts and some of the nodes on the network. CNIO may be used in an existing large (i.e. 124K words of memory) PDP-11 system running under RSX-11 to turn the system into a node or host, after suitable connection to the network.

Control Data Manuals

Control Data have recently increased the prices, by about 38%, for the 'automatic distribution of updates' service for their manuals. Some examples of the new prices for manuals with this option are (in Australian dollars):

SCOPE 2.1 Reference Manual	$101.08
Fortran Extended Reference Manual	$ 61.59
NOS/BE Reference Manual	$ 79.79

DCR is conducting a feasibility study into the possibility of microfiching a number of common manuals for internal use. It is also possible that microfiched manuals may be able to be supplied to other users.

Magnetic Tape Reliability

The experience of the User Assistance Section with magnetic tapes is that phase encoding is superior to the older NRZ-I method used for 800 bpi and all 7-track tapes. The best chance of being able to recover data successfully from a tape is if 9-track tape is used with a density of PE (1600 bpi). Nevertheless, hope for old tapes should not be abandoned. Recently the User Assistance Section successfully read, on the Cyber 76, a 7-track tape created on the CDC 3600 back in June 1971!

MNF

As far as is known, there are no plans to upgrade the MNF Fortran compiler (see *CSIRONET Manual* No 4) to accept Fortran 77, and support for MNF will probably diminish. Users are warned against relying too heavily upon the continued availability of this compiler.

PDS Committee

Much DCR business is directed through a number of committees. Most users will be aware of the activities of the OPS (Operations) and DAD (Design and Development) committees. There is also a PDS (Programming and Documentation Standards) committee, whose function is to make recommendations about programming and documentation standards within the Division.

The PDS committee recently made some recommendations about documentation, which are detailed in PDS paper P12. Of particular interest is a recommendation to start a new series: the ID (internal documentation) series. This series will collect documentation about the internal workings of systems written or maintained by DCR. Publications in the series will not be generally available to users, but the effects will be apparent as more easily modified and maintained systems. Other recommendations of the committee are to move some of the present *Computing Notes* to the *CSIRONET Manuals* series and to give an explicit indication as to the level of support enjoyed by each of the systems described.

Charges

Two new charges were introduced recently:

- Charges for using the ATL have been approved, and they are very competitive with disc storage (e.g. roughly $0.12 per megacharacter month for the ATL, compared with about $6.67 per megacharacter month for a subset). Availability of the ATL is expected to be announced soon after the distribution of this issue of *CSIRONET News*.
- Charges are now made for dial-in access to CSIRONET. The basic charge is 3 cents per minute, and no user-type factor applies. A new service is available from Telecom (the Interim Data Switched Facility, IDSF; see *CSIRONET News* No 160, August 1981) whereby remote users can dial in and do not pay STD charges. Telecom charges to CSIRONET (currently about 18 cents per minute) for this service are passed on to the user. ■

Wanted - Spikey Data

Don Langridge

Image Processing Systems Section, DCR Canberra

In *CSIRONET News* No 160 (August 1981), I outlined a new method that I have developed for curve approximation. I would be interested to learn if anyone has data that give unsatisfactory results using existing methods. Data with visible spikes (or discontinuities in the first derivative), where automatic detection of these discontinuities is required, would be most suitable. Please contact me at Node CX, or P O Box 1800, Canberra City ACT 2601, or phone (062) 433258. ■

Research Papers

Library, DCR Canberra

The following papers by DCR staff have been published recently. Enquiries should be directed to the respective authors.

Briggs, I.[1] 'Integration of elevation data with remotely sensed data'. In *Landsat 81* (P. Laut, ed.), Proc. 2nd Australasian Remote Sensing Conference, Canberra, August-September 1981, pp. 4.1.1 - 4.1.4.

Buckley, I.K.[2], **Raju, T.R.**[2], and **Stewart, M.**[9], 'Claims that intermediate filaments contain F-actin are unwarranted'. *J. Cell Biology* **90,** 309-311, 1981.

Clarke, R.J.[3], 'Problems and solutions for VLSI technology'. Paper presented at 2nd Applied Physics Conference of the Australian Institute of Physics, November-December 1981.

Currey, D.T.[4], **Wilson, M.A.**[1], and **O'Callaghan, J.F.**[1], 'Mapping salinised land from Landsat'. *Landsat 81*, pp. 8.1.1 - 8.1.4.

Ford, W.S.[5], 'CNFTP: The CSIRONET file transfer protocol'. *CSIRO Division of Computing Research Technical Report* No. 4, Version 1.3, October 1981.

Graetz, R.D.[6], **O'Callaghan, J.F.**[1], **Gentle, M.R.**[6] and **Pech, R.P.**[6], 'The Broken Hill image-based geographic information system: its application to rangeland assessment and monitoring'. *Landsat 81*, pp. 4.3.1 - 4.3.2.

Leggett, E.K.[7], **Dawbin, K.W.**[7], **O'Callaghan, J.F.**[1], and **Guerin, P.**[8], 'Signature identification of specific crops using multi-temporal Landsat data' (abstract). *Landsat 81*, pp. 2.14.1.

Mudge, J.C.[3], 'VLSI chip design at the crossroads'. In *VLSI 81* (J.P. Gray, ed.), Proceedings of First International Conference on Very Large Scale Integration, University of Edinburgh, August 1981. London: Academic Press, 1981, pp. 205-215.

O'Callaghan, J.F.[1], **Robertson, P.K.**[1], and **Fraser, D.**[1], 'Colour image display - it's not that simple'. *Landsat 81*, pp. 6.8.1 - 6.8.5.

O'Callaghan, J.F.[1], **Wilson, M.A.**[1] and **Morris, W.A.**[4], 'Horsham flood study: land uses determined by Landsat analysis'. *Landsat 81*, pp. 9.6.1 - 9.6.5.

Stewart, M.[9], **Somlyo, A.P.**[10], **Somlyo A.V.**[10], **Shuman, H.**[10], **Lindsay, J.A.**[11], and **Murrell, W.**[11], 'Scanning electron probe X-ray microanalysis of elemental distributions in freeze-dried cryosections of *Bacillus coagulans* spores'. *J. Bacteriology* **147,** 670-674, 1981.

1. *CSIRO Division of Computing Research, Canberra.*
2. *John Curtin School of Medical Research, Australian National University.*
3. *CSIRO Division of Computing Research, Adelaide.*
4. *State Rivers and Water Supply Commission of Victoria, Armadale.*
5. *CSIRO Division of Computing Research, Melbourne.*
6. *CSIRO Division of Land Resources Management, Deniliquin, NSW.*
7. *NSW Department of Agriculture, Sydney.*
8. *Australian Survey Office, Canberra.*
9. *Formerly DCR Canberra; present address: Medical Research Council Laboratory of Molecular Biology, Cambridge, England.*
10. *Pennsylvania Muscle Institute, University of Pennsylvania, Philadelphia, USA.*
11. *CSIRO Division of Food Research, North Ryde, NSW.* ■

On the Shelves

Library, DCR Canberra

CSIRONET USERS - PRIORITY IN INTER-LIBRARY LOAN REQUESTS

When requesting loans via your libraries, you can expedite loans from DCR Library by quoting your user ID. CSIRONET users are given priority in our inter-library lending system.

New Items:

Australian Landsat Station Newsletter. Vol.1, no. 3 (Aug. 1981), *et seq.* Belconnen, ACT, Australian Landsat Station. Irregular.

Comparative Analysis of Packaged Software: CAPS Report No. 1. (Financial modelling). Summer Hill, NSW, Australasian Software Centre, 1981.

Eisenbach, S. and Sadler, C. *PASCAL for programmers.* Berlin, Springer-Verlag, 1981, 201 pp.

IEEE Computer Graphics and Applications. Vol. 1, no. 1 (Jan. 1981), *et seq.* Los Alamitos, California, IEEE Computer Society. Quarterly.

International Conference on Very Large Scale Integration, 1st, 1981, University of Edinburgh, 18-21 August 1981 (VLSI 81). Proceedings. P. Gray, ed. London, Academic Press, 1981.

International Electronics Convention and Exhibition, 18th, 1981, Melbourne (IREECON International). Digest of papers. Sydney, Institution of Radio and Electronics Engineers Australia, 1981, 490 p.

Peterson, J.L. *Computer programs for spelling correction: an experiment in program design.* (Lecture Notes in Computer Science; 96) Berlin, Springer-Verlag, 1980, 213 p.

Symposium on Computer Architecture, 8th, 1981, Minneapolis, Minnesota. Conference proceedings. New York, IEEE, 1981, 517 p. Sponsored by the IEEE Computer Society and the Association for Computing Machinery.

Technology; the management challenge, 1980, Sydney. Seminar papers. Sydney, Graduate Management Association, 1981. (On permanent loan to one of the Regional Offices.) ■

Applications Software News

Applications Software Support Section, DCR Canberra

PASCAL

The Australian Atomic Energy Commission's Pascal compiler has been installed on the FACOM M-150. The compiler, Pascal 8000, is a very good implementation, conforming closely to the ISO draft Pascal Standard. A number of extensions are also available, although their use should be strongly discouraged. A microfiche copy of the reference manual is available through the MANUAL system, and may be ordered by running the DOCORD box program from ED, as follows:

```
U/PUBLIC/[/DOCORD,/$
```

and requesting publication code PAS8. Pascal 8000 is accessed via procedures with a similar naming convention to other compilers, e.g.

PASC	compile only
PASCG	compile and execute
PASCI	compile and link edit
PASCLG	compile, link edit and execute
PASG	load and execute

FORLIB

The development of the FORLIB utility libraries is continuing. The Fortran 66 version is now available under SCOPE 2, VM and RSX-11, and a version is being developed for a Hewlett Packard at the Division of Protein Chemistry. The Fortran 77 version is available under SCOPE 2 and NOS/BE, with an OSIV/F4 version under development. Recent additions to the Fortran 77 version include:

ASSRTZ	Assert a condition and abort if not true
CHSUBZ	Substitute part of a string by another of possibly different length
JUSTZ	Left justify, centre or right justify a string

Users are invited to submit routines for inclusion in FORLIB. *Computing Note* No 33 outlines the programming and documentation standards required of FORLIB modules. Users are also welcome to submit suggestions for routines which they would find useful.

IMSL

Discussions have been held with IMSL concerning the high level of surcharges. In order to relieve CSIRO users, DCR has agreed to take out a second IMSL licence, for internal CSIRO use only. This allows CSIRO usage of the package at considerably reduced rates. Unfortunately there appears to be no solution in sight for non-CSIRO users, short of each user organization taking out its own licence (at an annual subscription of US$2000).

SIMULA

SIMULA is now available under NOS/BE. The compiler is NDRE SIMULA, developed by the Norwegian Defence Research Establishment. A procedure has been installed on the DCR CCL library to run SIMULA. To obtain details of the parameters available, run

```
BEGIN,SIMULA,DCR,HELP=YES.
```

To compile a SIMULA program, run

```
BEGIN,SIMULA,DCR,parameters.
```

The users' manual, containing the complete user description of the SIMULA system, is titled *NDRE SIMULA Implementation, Users' Manual,* Technical Note S-370. The manual costs 100 Norwegian Kroner, or US$20, and may be ordered from:

Control Data Norway A/S, Attention Eileen Midtdal, PO Box 112 Refstad, Oslo 5, Norway. ■.

Not a Book Review

Terry Holden
DCR Canberra

Gödel, Escher, Bach: An Eternal Golden Braid, by Douglas R Hofstadter. New York, Penguin Books, pp. 777. $16.95*.

This is an extraordinary book in a number of ways. Directed chiefly at the lay (!) reader, it 'illuminates one of the great mysteries of modern science: the nature of human thought processes'.

I will not pretend that the material presented in this book is always (or even very often) simple. I personally have considerable difficulty with the propositional calculus, molecular genetics, Gödelian self reference, Zen koans, and even with Bach canons; however, I do admit to a penchant for Escher's drawings. The genius of Hofstadter is that all this (and much more) is bound together in such a fascinating way that I found myself reading the book from cover to cover.

This is not a book review. I certainly do not feel qualified to write a serious review of such a monumental edifice, and I seriously doubt if any readers of *CSIRONET News* are pretentious enough to believe themselves so qualified.

I have written this non-review to urge you to read the book, in the hope you may be as amused, educated and generally rewarded as I was.

* A colleague suggested to me that I should read Hofstadter's book whilst on my recent overseas visit. 'Buy a copy in Singapore, it will be cheaper.' At $44.85 (Singapore), and an exchange rate of 2.33, it wasn't; but the copy I bought for a friend in San Diego at US$8.50 did seem a little better! ■

Cybaritten

(Items of interest from the latest Cybarites)

Cybarite is a weekly system publication issued usually on Tuesdays.
It gives users operational information, announces new system features, and promulgates programming and system advice. It is, in fact, the main 'awareness' publication put out by the Division. Hence all CSIRONET users are urged to make a habit of reading *Cybarite* regularly.

Cybarite is held on the Cyber 76 as an ASCII permanent file called CYBARITE with an ID of PUBLIC.

Copies of *Cybarite* are printed at each CSIRONET node, where users may collect them. Users may also cause the latest issue of *Cybarite* to be output to a line printer at node *tt* by using the control statements:

```
ATTACH(A,CYBARITE)
DISPOSE(B,ST=RIOtt,*PE,FID=CYB)
COPY(A,B)
```

(disposition type PE must be used).

Further information on *Cybarite* is given in the *CSIRONET Users' Reference Manual*, Appendix G, section G.4.1.

389 81-SEP-15

2. Level 545 SCOPE 2.1 products available in TRYLIB.
3. Spurious second tape reel problem reported in *Cybarite* 381.2 fixed.
4. MAP option overridden when PMD selected.
5. SCOPE 2.1 LOADER message LD610 changed to give additional information.

390 81-SEP-22

3. CYACC being replaced by CHGDAT and CHGSUM.
4. *Users' Manual* updated to document splitting CYJ headers to avoid passwords being output on node control terminals, and the CHGDAT and CHGSUM facilities for monitoring computing charges.
5. IFTRAN changes.

391 81-SEP-29

4. Users reminded of need to back up ED libraries.
5. Default ATTACH mode under NOS/BE being changed to multi-read access (MR=1).
6. Hard copy update pages for the *Network Operations Reference Manual* distributed to registered holders.

392 81-OCT-07

4. Adelaide node changes.
5. Multi file tape handling on the Cyber 76.
6. *Users' Manual* updated to clarify the criteria for inclusion of files in output from the SCOPE 2.1 AUDIT control statement.

393 81-OCT-13

2. Production versions of SCOPE 2.1 products being upgraded to level 545.
4. Update to *Network Operations Reference Manual.*

394 81-OCT-20

1. System times changing over to Eastern Summer Time.
2. Compacting passworded ED libraries.
3. Reminder that documentation files are held on subset UTILITY; use interactive program DOCORD to print them.
4. *Users' Manual* updated to give full list of reserved LFN's under SCOPE 2.1.

395 81-OCT-27

1. Maximum time limits under SCOPE 2.1.
2. MOVIE.BYU Computer Graphics System for displaying 3-dimensional objects.
3. *Computing Note* No 46, 'Using MIDAS via CSIRONET', released.

396 81-NOV-04

1. Changes to SCOPE 2 Dayfile record of special software package surcharges.
2. Interim Data Switching Facility (IDSF) service operational.
3. *Computing Note* No 33, 'FORLIB', reissued.
4. ED fault causing ill-formed ED library files fixed. ■

Computer Operations Schedule Christmas - New Year Holiday

The expected operating schedule for the Cyber 76, Cyber 730, FACOM M-150F (OSIV/F4) and Two Pi (VM/CMS) host computer systems over the holiday period is as follows. No service will be provided on the Cyber 76 from 1700 EST on 24 December until 0915 EST on 26 December. The Cyber 76 will be in unattended mode at the times given in the table below for the remainder of the holiday period. However, there will be no remote monitoring on 26 December nor on 1 January as, on these days, no emergency maintenance is provided. If failures occur, resumption of service should not be expected until the following day. Variations to these arrangements will be notified through *Cybarite*.

Day		Scheduled mode operation	Unattended mode operation
Thu	24 Dec 81	0800-1700[1]	—
Fri	25 Dec 81	—	—
Sat	26 Dec 81	—	0915-2400
Sun	27 Dec 81	—	0000-2400
Mon	28 Dec 81	—	0000-2400[3]
Tue	29 Dec 81	—	0000-0600[4]
Wed	30 Dec 81	0900-1730[2]	1730-0600[4]
Thu	31 Dec 81	0900-1730[1]	1730-2400
Fri	1 Jan 82	—	0000-2400[3]
Sat	2 Jan 82	—	0000-2400
Sun	3 Jan 82	—	0000-0600[4]
Mon	4 Jan 82	0800-2000[2]	2000-0600[4]

1. Two Pi scheduled mode operations 0900-1700 on these days.
2. Two Pi scheduled mode operations 1030-1700 on these days.
3. Systems will not be remotely monitored on these days.
4. Following day. ■

STAFF NEWS

Dennis Godley joined the Adelaide Regional Office in September as an Administrative Officer. Dennis came from the CSIRO Division of Land Resources Management in Perth.

Karen Spencer, Linda Argall, Jela Stojanovic and **John Kempton** have all joined the Central Operations staff recently. Karen has previously worked at the Australian Coal Industry Research Laboratories, Ipswich, Queensland, and as medical technologist at Ipswich Hospital. Prior to establishing a family, Linda had extensive experience on Control Data equipment at the Australian Bureau of Statistics as operator, shiftleader, and training officer. Jela has worked as data processor/ computer operator on DEC and IBM systems with Macreadie and Associates Data Processing and Korilior Pty Ltd in Canberra. John gained experience with IBM (UK) in London as computer operator and shiftleader, after a period in the insurance field.

Ian Caire left the Division in September, after working at the Adelaide Regional Office for fourteen years. Ian joined the Division as a Technical Assistant and was reclassified through the technical ranges until 1973 when he became an Experimental Officer. He has now opened a private consulting company.

Gail Mecklem left in October, after five years with the Adelaide Regional Office. Gail started as Trainee Computer Operator and ultimately reached the classification of Technical Officer earlier this year.

Brian Savvas left DCR in October after working with the Adelaide Regional Office for fifteen years. Brian joined the Division as a Scientific Services Officer and became Officer-in-Charge of the Adelaide Branch in 1971.

Linda Pharaoh commenced duty as the Accounts Clerk at DCR Canberra in November, having previously worked in various offices of CSIRO.

David Zeven joined the Site Management Section in November as a Technical Assistant. David previously worked as a refrigeration mechanic with PB & JJ Kelly, where his duties included repair and maintenance of the Liebert air-conditioning units in our computer halls.

Duncan Stevenson joined the Image Processing Systems Section in November as an Experimental Officer. Duncan had been working with the Bureau of Transport Economics as a Research Officer.

Pauline Alcock of the Staff Section, who handled personnel matters, left the Division in November to move to Perth.

Another November departure was **Lorraine Dixon**, who had been in charge of the Division's Word Processing Section. After seven years with DCR, Lorraine has joined the Department of National Development and Energy. ■

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