

C.S.I.R.O. COMPUTING RESEARCH SECTION



NEWSLETTER NO. 5 - 25.6.65

1. SYSTEM STATUS

GRAPH PLOTTERS AND CARD PUNCH - CANBERRA

The two Calcomp Graph Plotters and the I.B.M. Card Punch which are all relatively slow output devices are now in operation "off-line". Data normally transmitted directly to these units is now held temporarily on magnetic tape and is then transmitted to the relevant output unit whenever the assigned data channel is free. While there are no changes required in the calls to these units by the programmer the following restrictions apply,

- a) In any program which requires both plotting and card punching it is essential to complete the card punching before plotting, except where the card output is by a buffer statement.
- b) The total estimated plotting time should be restricted to runs of less than one hour.

GRAPH PLOTTERS, PAPER TAPE INPUT - ADELAIDE, MELBOURNE, SYDNEY

The Calcomp graph plotters are now in use at the subsidiary computing centres. The routines PLOT and TEXT are available, AUTO PLOT is not yet implemented. (Ref. Technical Note No. 5 and Educational Publ. A.1)

Paper tape punched in Typetronics code can now be interpreted on the Control Data 3200 machines.

RELATIVE SPEEDS - 3200/3600

In general it can be taken that the 3200 machine is 4 times slower than the 3600. For programs which involve a considerable amount of floating point arithmetic the factor may rise to as much as 20. Such programs should therefore be sent to Canberra for economy on time and money.

## ALGOL

The leaflet and reply form enclosed with Newsletter No. 4 indicated that a new Algol compiler would shortly be available for the Control Data 3200 machines. It is now estimated that the compiler for the 3200 will be available about September and the equivalent version for the 3600 will arrive in 1966.

The response for basic Algol and Fortran-Algol conversion courses shows that there is a good deal of interest in Algol. When the compiler has been received and tested courses will take place in each of the centres. It is expected that the Basic Algol course will last for five days and the Fortran-Algol conversion course will take one day. In the meantime interested users might like to read the following, "An Introduction to Algol 60", by C. Anderson. Publ. Addison-Wesley.

## NETWORK COMPATIBILITY - PROGRESS REPORT

It is desirable that a program which is written in the 3200 FORTRAN language, using all of its available features, should be able to run on the 3600 without change.

Although for most programs which use only the more common features of FORTRAN, this is already possible, because of syntactic and semantic differences the FORTRAN on the 3200 as specified by Control Data, is not a true subset of that for the 3600.

In addition to these language differences, the Scope monitor control statements on the two machines are not the same.

The following is a list of changes that are being made to eliminate the differences. This work should be completed within the next two months.

- a) The 3200 machine condition and input/output operation checking functions and subroutines have been added to the 3600 Fortran Library.
- b) Paper tape drivers are being added to the 3200 Scope system to allow input and output of paper tape data (and source programs) with the translation of typetronics code to internal machine code if necessary.

- c) A Plotter driver has been added to Scope, and the PLOT and TEXT library routines on the 3600 are being made available to 3200 users.
- d) Changes have been made to the 3200 Fortran Binary input/output routine so that a binary magnetic tape written on the 3200 can be read on the 3600 and vice versa.
- e) Types Double and Complex are available on the 3200.
- f) A type INT48 or 48 bit integer has been provided on the 3200 to allow for a full equivalence between real and integer storage arrays on the 3200 and 3600, for common lists and buffer areas. The use of these variable types (equivalent to integer variables on the 3600) can eliminate all storage incompatibilities.
- g) The 3200 Fortran Compiler has been ammended to allow for double length octal, integer and hollerith literals. These will be equated to real variables, and allow masking operations and data lists to be made compatible for the two machines.
- h) Double length masking subroutines will be provided in the library to make use of this increased facility.
- i) The Job Stack program, which is used to transcribe customer card decks to a magnetic tape before air freight to the 3600, performs amongst other things, various editing functions. These will eventually make it capable of:-
  - (1) changing some 3200 Fortran declarative statements to their 3600 equivalents.
    - e.g. CHARACTER to TYPE BYTE5(/6)
    - TYPE INT48(2) to TYPE INTEGER
    - TYPE COMPLEX(4) to TYPE COMPLEX
  - (2) changing the 3200 Scope control cards to their 3600 equivalents.
    - e.g. FORTRAN,L.X to FTN,X,L,\*
    - FINIS to SCOPE
    - LOAD,56 to LOAD

j) Further mathematical subroutines will be continually added to the 3200 Fortran Library with the aim of making it as complete as that for the 3600. Some recent additions are:- ASIN, ACOS, TIMEF, CUBERT, RANF, MAXOF, MINOF, AMOD, BSPF, SKIP.

Future additions will include subroutines to correspond with the type Double arithmetic facility.

There remain some areas where incompatibilities still exist, namely:-

1. Implied logical variables on the 3200 can be generated, and remain unrestricted in their use, whereas they must be type logical on the 3600, and used only as such.
2. Type character variables may be used in input/output lists on the 3200, whereas type BYTE5(/6) variables on the 3600 may not. This facility will be added to the 3600 at a later date.
3. Computed GO TO statements in 3200 Fortran may include expressions, while the 3600 will only accept simple variables. This also will be changed at a later date.

## 2. VISITORS TO CANBERRA CENTRE

Customers visiting the Section at Canberra should leave their names and contact point whilst in Canberra with Miss C. Green at the Enquiry Counter. This will facilitate distribution of mail, telegrams and transfer of telephone calls and other messages.

## 3. PUBLICATIONS

Addressograph plates have been made for persons/institutions who returned answers to our questionnaire before 7th April, 1965.

The questionnaires returned by CSIRO Chiefs, Officer-in-Charge and Librarians will be dealt with this month by the C.R.S. Librarian.

Computer users who requested particular manual supplements etc., on their questionnaire forms can expect to receive them this month. Some publication numbers have been temporarily out of print, and some have been superseded. For a detailed list of publications see the last section in this newsletter.

4. COMPUTING STATISTICS FOR MAY

Users From	3200		3600	
	Number of Jobs	Total useful time	Number of Jobs	Total useful time
ADELAIDE	1207	96H 34M	182	16H 34M
CANBERRA			2541	159H 23M
MELBOURNE	1417	138H 6M	392	48H 6M
SYDNEY	991	74H 19M	706	41H 4M
Totals:	3615	308H 59M	3821	265H 7M

5. SIMULATION LABORATORY, C.S.I.R.O., DIV. OF CHEM. ENG.

A laboratory which will include a general purpose Analogue Computer (EAI 8800) is being established at Fisherman's Bend, Victoria. Persons interested should contact Mr. M.J. Cumming, CSIRO, Division of Chemical Engineering, Fisherman's Bend, Victoria.

6. SUBROUTINES

The following additional routines are available.

C3	CSIR EXPINT	Exponential Integral
D1	CSIR LINEPROF	Fourier unfolding of x-ray powder lines.
E3	CSIR DIVDIFF	Divided Difference Table
F1	CSIR CHOLESKI	Choleski Decomposition
F1	CSIR IMXINV	Integer Matrix Inversion
F1	CSIR ABSINV	Absolute Matrix Inversion
F1	CSIR CMTINV	Inverse of a Complex Matrix
F1	CSIR MATMPA )	
F1	CSIR MATMPB )	- Matrix Multiplications
F1	CSIR MATMPC )	
F1	CSIR SYMPY	Symmetric Matrix Multiply
F1	CSIR SYMINV	Symmetric Matrix Inversion with Accompanying Solution of Linear Equations
F1	CSIR MATINV	Matrix Inversion with Accompanying Solution of Linear Equations
F2	CSIR SIMLEQ	Simultaneous Linear Equation Solution
F3	CSIR DETERM	Determinant of Real Matrix
I1	CSIR BINARY	3200 Fortran Binary Input/Output Subroutine

The write-ups for the above routines can be obtained at any of the computer centres.

Any user requiring an up to date list of the CO-OP and CSIRO routines for which write-ups and card decks are available should contact the Librarian, C.R.S., Canberra.

7. SEMINAR

CANBERRA "Astronomic and Geodetic Survey Programs"  
Mr. A.G. Bomford, (Div. of National Mapping) .....  
Thursday, 8th July at 3.30 p.m. in the  
Lecture Room, Computer Building.

8. PROPOSED TWO-DAY SEMINARS

Arrangements are being made to hold a series of two-day seminars on the subject "Computing in the C.S.I.R.O." The seminars will not be aimed at the present CSIRO users of the computing network but at those members of the CSIRO who would appreciate the opportunity to be shown the range and scope of problems which can be processed by a computer. It is expected that the sessions will consist of short talks on computer applications by local CSIRO users and ample general discussion periods.

If you have an interesting application and/or you would like to be a member of the panel of speakers at the seminar in your area please contact J.S. Armstrong, Education Officer, C.R.S., Canberra.

9. COMPASS COURSES

Any user who would like to attend a four week COMPASS course is asked to contact J.S. Armstrong, C.R.S., Canberra

10. PUBLICATIONS

The following is a list of Computing Research Section publications to date:-

- Educational Publication No. 1 E.P.1 Lecture Notes for Basic Fortran Course. J.S. Armstrong - Jan 65.
- Educational Publication No. 2 E.P.2 Glossary of Computing Terms. Nov, 64.
- Educational Publication No. A1 E.P.A.1 Notes on the Use of the Cal-comp Plotters. J.S. Armstrong.
- Educational Publication No. A2 E.P.A.2 Notes on Word Structure, Relational and Logical operations and Masking. J.S. Armstrong - April, 1965.
- Educational Publication No. A3 E.P.A.3 Magnetic Tape Usage. J.S. Armstrong - April, 1965.
- Library Accession List No. 1 Up to August 1963.
- Library Accession List No. 2 July 1964.
- Library Accession List No. 3 Feb. 1965.
- Library Accession List No. S.P.1 Preliminary List of Serial Publications. March, 1965.
- Manual Supplement No. 1 Addenda and Errata to CDC 3600 FORTRAN Reference Manual (Pub. No. 60053700). D.J. Langridge. 18th June, 1964.
- Manual Supplement No. 2 Structure of Standard CDC 3600 FORTRAN Decks. (Pub. No. 60053700). J.P.Penny 30th June, 64.
- Manual Supplement No. 3 Structure of Standard CDC 3600 COMPASS Decks. (Pub. No. 60052500a). J.P.Penny 30th June, 64.
- Manual Supplement No. 4 Basic FORTRAN II, Reference Manual. (Pub. No. 60056900) Preferred Usage. T.S. Holden. July, 1964.
- Manual Supplement No. 5 FORTRAN-32 As a Compatible overset of Basic FORTRAN II, and a Compatible Subset of CDC 3600 FORTRAN. (Pub. No. 600537). J.J. Russell. August, 1964.
- Manual Supplement No. 6 Revision of Line Printer Facilities. Ref. CDC (Pub. No. 60053700). D.J. Langridge. October, 1964.



- Manual Supplement No. 7 Additional 3600 FORTRAN Compiler Errors.  
Ref. CDC (Pub. No. 60053700).  
J.R. Pendleton. October, 1964.
- Manual Supplement No. 8 Additions to FORTRAN Library Functions.  
Ref. CDC (Pub. No. 60053700 & Pub. No.  
60056400). J.G. Cleary. July, 1964.
- Manual Supplement No. 9 Additional Entry Points to the Execution  
Error Routine. Q8QERROR. Ref. CDC (Pub.  
No. 60053700). D.J. Langridge. November,  
1964.
- Manual Supplement No 10 3200 FORTRAN. Standard Deck Structure.  
(CDC Pub. No. 60057600). D.C. Knight.  
November, 1964.
- Manual Supplement No 11 Algol for the 3600. Ref. CDC (Pub. No.  
60083400a). T.S. Holden. February, 1965.
- Manual Supplement No 12 Paper Tape Input for Algo. Ref. CDC (Pub.  
No. 60083400a). P.H. Frost. March, 1965.
- Manual Supplement No 13 Additional Fortran functions and 576  
subroutines for the Control Data 3200.  
(Pub. No. 60057600).
- Manual Supplement No 14 Amendment to 3200 Binary Read/Write. (Ref.  
Fortran Manual Pub. No. 60057600).
- Memorandum No. 1 )  
Memorandum No. 2 ) - Superseded by Memorandum No. 4
- Memorandum No. 3 Character and Code Sets. T. Pearcey. June, 1963.
- Memorandum No. 4 Revised Equipment Configurations. T.S. Holden.  
July, 1964. Out of print. Under Revision.
- Miscellaneous Publication No. 1 Standard B.C.D. characters which  
are not available directly on the  
26 I.B.M. Card Punch.
- Miscellaneous Publication No. 2 Procedure for Submission of Jobs.
- Miscellaneous Publication No. 3 Reply form for Fortran Programming  
Courses.
- Miscellaneous Publication No. 4 Algol for the Control Data 3200/3600.
- Miscellaneous Publication No. 5 Reply form for Algol Programming  
Courses.

Miscellaneous Publication No. 6 Publication Mailing List.

Newsletter No. 1 T.S. Holden. July, 1964.

Newsletter No. 2 J.S. Armstrong. October, 1964.

Newsletter No. 3 J.S. Armstrong. January, 1965.

Newsletter No. 4 J.S. Armstrong. April, 1965.

Newsletter No. 5 J.S. Armstrong. June, 1965.

Technical Note No. 1 Planned Subroutines for the CSIRO CDC 3200  
Subsidiary Computing System. T. Pearcey.  
May, 1964.

Technical Note No. 2 Specifications of FORTRAN II/4K Language for  
the CDC 3200 (as known at 16/4/64). T. Pearcey.  
May, 1964.

Technical Note No. 3 Representation of Line Printer Characters on  
other Media. T.S. Holden. June, 1964.

Technical Note No. 4 Instructions for Conversion of I.B.M. 1620  
FORTRAN II Programs for use on a CDC 3600.  
S.R. Albright. June, 1964.

Technical Note No. 5 Use of the 3600 CALCOMP PLOTTERS. R.H. Hudson.  
August, 1964. (Revised 22.6.65).

Technical Note No. 6 The Use of Paper Tape on the CDC 3600.  
T.S. Holden. October, 1964.

Addendum

Technical Note No. T.S. Holden, J.W. Marquet. C.D.A. February,  
1965.

Technical Note No. 7 Paper Tape Standards. J.P. Penny. May, 1965.

C.S.I.R.O. COMPUTING RESEARCH SECTION

Newsletter No. 5. Addendum

STATISTICAL PROGRAMS

The set of UCLA BIMD statistical programs is now held in Canberra. Intending users should consult Mr. J.A.B. Palmer, Telephone 40455 Ext. 507.

3200 FORTRAN LIBRARY FUNCTION ALTERATION

The Control Data 3200 random number generator function RANF has now the same specification as for the 3600, namely RANF ( $\pm 1$ ). Manual Supplement No. 13 should therefore be amended accordingly.