

C.S.I.R.O.

COMPUTING RESEARCH SECTION

NEWSLETTER NO. 19 - 1.12.66

I. GENERAL

Publications Distributed this Month

NL Newsletter No. 19
LM Library Accession List No. 8 April/July 1966
LM Library Accession List No. 9 August/October 1966

Other Publications this Month

I4 CSIR BCDINERR BCD INPUT ERROR ROUTINE
Author: A.L. Cook, C.R.S., (Melbourne) Language 3200 Compass
I4 CSIR READFREE FORMAT FREE CARD IMAGE INPUT
Author: R.H. Hurle, C.R.S., (Melbourne) Language: 3200/3600
Fortran.

EP 4 Educational Publication No. 4
Basic 3600 COMPASS Programming. Lecture Notes.
J.S. Armstrong. August 1966.
This Educational Publication is of restricted interest and
will not be distributed automatically. Copies may be obtained
from the Librarian, Canberra.

Future Courses

Basic Fortran

Melbourne - December 5th-9th. Enquiries J.J. Russell
Phone Melbourne 5446757
Canberra - December 12th-16th. Enquiries phone
40455 extension 503

Advanced Fortran

Canberra - Wednesday 7th December. 10.00 a.m.
"Error Analysis in Fortran Programming".
Wednesday 7th December. 2.00 p.m.
"Interpretation of the Assembly Listings
of Fortran Programs".

Seminars - Canberra

December 8 The Role of Analogue and M.J. Cumming
Hybrid Machines in Scientific
Computation Today.

December 22 Recent Advances in Numerical Dr. W.T. Willians
Classification.

The meetings will be held at 2.00 p.m. in the Lecture Room,
Computer Building, Clunies Ross Street, Black Mountain, A.C.T.

II. 3600

SRLIST

When calling the subroutine SRLIST the operating staff must informed via the Job Request Card that the CSIR ROUTINES tape is required. EQUIP cards are not required.

N.B. Binary decks for 3200 subroutines should not be specified as the resulting card deck will be a 3600 Binary deck which is not suitable for the 3200 machine.

Saving Logical Unit 61

Under DAD logical unit 61 can now be saved. This enables the programmer to inspect the program output on the Keyboard consoles. If the users name was for example C, ABCD where C is his charge code and ABCD the identification then the document written on to logical unit 61 can be accessed by a CIDER call to C, AB61.

BSPF under DAD and SCOPE

When a BSPF request is made, and the file involved is the first file on a tape reel, the tape is moved back to load point. The first record read after the request will be the tape label. Under SCOPE the tape is moved back to load point and then forward over the label before the next read so that the first record will be data.

Time Limit Parameter

It has been decided to change the JOB time implication if the time limit parameter is not specifically given. In the absence of such a parameter on JOB or EXECUTE statements only 1 minute is provided instead of the earlier, and SCOPE compatible, limit of 2236 minutes.

DAD - FORTRAN Tape Label Calling Sequence

CALL LABEL (LUNT,NAME,EDIT,REEL,CODE,TYPE)

where LUNT is a logical unit number

NAME is the first word of a two word array
containing desired identifying information

EDIT is edition number

REEL is reel number

CODE is retention code (ignored under DAD)

TYPE is hardware type.

Note: The four parameters LUNT, NAME, EDIT, REEL constitute the basic SCOPE 5 call and must appear in the calling sequence. CODE is included for SCOPE 6 compatibility. TYPE is a DAD parameter and is optional (if included provision must be made for CODE).

Displays Drum Document Requests

On the 210 keyboard consoles the drum document request form provided to the user by DAVE will be changed to the following:

REQUESTS FOR DRUM DOCUMENTS

LOCATE

EXECUTE

DELETE

PRINT

PLOT(PL)

PLOT(PB)

PUNCH(CP)

PUNCH(TP)

This arrangement somewhat simplifies the presentation of a LOCATE request since fewer TAB operations are required, and it specifies the hardware type for Plot or Punch requests.

3600 Paper Tape Input - PK Mode

A new packed character mode has been introduced into the DAD system. The use of the code mnemonic PK on a paper tape document header will result in the characters of the document being packed as six 8-bit bytes per word on the drum. Unpacking may be achieved by calls to the library subroutine NEXTCHAR. This mode has a cost advantage of 6 : 1 over NC mode.

N.B. PK mode is not available for output.

Since there are now six different paper tape modes available on the 3600, the following summary is included.

1. SD Standard (typetronic) mode. Obligatory for headers and EOD's. A parity checked mode, 6 information bits/char, 8 char/word. Automatic translation to and from internal BCD is provided by DAD. If no mode is specified, SD is assumed.
2. PA Parity and Assembly mode. 6 information bits/char, 8 char/word.
3. PK Packed Character Mode. 5,7 or 8 information bits/char, 6 char/word.
4. PC Parity and character mode. 6 information bits/char, 1 char/word.
5. NA Non-parity and assembly mode. 6 information bits/char, 8 char/word.
6. NC Non-parity and character mode. 5,7 or 8 information bits/char, 1 char/word.

Of the above, the last three are not recommended, NC and PC being wasteful by factors of 6 and 3 respectively compared with PK and PA which correspond, and NA is a peculiar format of no particular merit.

DAD Control Cards

Programmers are reminded that DAD control cards have either * or $\frac{7}{9}$ in column one. Any card with this format will be scanned by the system to see which of the standard names follows. E.g. JOB, DOC, EOD, SEQUENCE etc. As the format is field free a data card such as ***** END OF FIRST SEQUENCE will be interpreted as *SEQUENCE.

To avoid this effect the user should place a comma after the first *. e.g. *, (ANY ALPHANUMERIC MESSAGE).

Simulated *EXECUTE Facility

```
*JOB,CHARCODE,GENERATE,4
*EQUIP,1=(CHARCODE,JOBTOGO,2),SV
*EQUIP,2=(CHARCODE,TRIGGER),SV
*FTN,X,L
      PROGRAM GENERATE $WRITE(1,1)
1  FORMAT( 1H* *EQUIP,1=(CHARCODE,JOBTOGO,1)* /
-        1H* *FTN,X,L...*/
-        6X *PROGRAM JOBTGO $DIMENSION IT(2)* /
-        6X *DATA(IT=15H(10H IT WORKED))* /
-        6X *PRINT IT $END*/
-        9X *SCOPE*/
-        1H* *LOAD*/
-        1H* *RUN,4,10*      )
2  FORMAT( * TRIGGER*)
      WRITE(2,2) $END
      SCOPE

*LOAD
*RUN,4,10
*EOD
```

```
*JOB,CHARCODE,JOBTOGO,4
*EQUIP,1=(CHARCODE,TRIGGER),RO
*FTN,X,L.
      PROGRAM BAD $DIMENSION IT(2)
      DATA(IT=15H(10H IT FAILED))
      PRINT IT $END
      SCOPE

*LOAD
*RUN,4,1
*EOD
```

RATIONALE:

The JOB named JOBTGO is entered into EL1 together with GENERATE when these documents are input to the DAD system. JOBTGO cannot run until a DOCUMENT TRIGGER is made available by GENERATE. GENERATE, however, makes up EDITION 2 of JOBTGO along with TRIGGER, and when the JOB is executed the most recent edition is selected. The EQUIP card in the generated JOB is for the purpose of DELETING the document from the system.

PURPOSE:

This enables programmers away from the CONSOLES to execute a document which is computed. It is not necessary to wait until a RUN is back from Canberra before moving on to the next step. The above example worked when given valid charge codes.

(This contribution was from Dr. P.J. Claringbold, Division of Animal Genetics, C.S.I.R.O.)

III. 3200**FORMAT/DATA-LIST INCONSISTENCY DIAGNOSTIC**

The execution diagnostic

FORMAT/DATA-LIST TYPE ERROR

has been provided in 3200 Fortran to indicate that an attempt has been made to input or output a real variable under I FORMAT specification or an integer variable under E or F FORMAT specification. The diagnostic is fatal.

LIMIT TO NUMBER OF EXECUTION DIAGNOSTICS

Fortran programs are now terminated after 100 non-fatal execution diagnostics (B.C.D. input errors excepted) with the message:

100 CALLS TO Q8QERROR.

Graphical Output on the Keyboard Consoles - II. 3600 Late Item

A prototype subroutine is now available for producing graphical output which can be presented on the screen of the Keyboard consoles. The output is similar in form to that for QUIKPLOT and AUTOPLOT. It is expected that where the user wishes to generate and scan a large number of graphs this approach may be attractive. As several people have already shown an interest in this use of the consoles, development of a display program incorporating graphical format will be continued. If you are interested in this application would you please contact the Education Officer, phone 40455, extension 503.

Puzzle Corner

Correct answers to last month's puzzle were submitted by Messrs. Kovarik, Clarke, Lane, Harper, Colless, Adderley and Comrades I.I. Ivanov and Yura Klotzki (near correct).

Readers will be interested to know that the reaction of the C.R.S. staff at Canberra was to use the Fortran Interpretive System implemented on the display consoles to solve the problem. The program checked the valid values for n from 1 to 1000 in about 11 seconds.

A full proof submitted by P.H. Frost, C.R.S. (Canberra) follows.

$$\begin{aligned} a^n - b^n &= (a-b)(a^{n-1} + a^{n-2}b + \dots + a^{n-p}b^{p-1} + \dots + b^{n-1}) \\ &= (a-b) \left[a^{n-2}(a+b) + a^{n-4}b^2(a+b) + \dots \right] \end{aligned}$$

So $a^n - b^n = (a-b) \left[q(a+b) \right]$ for some q if n is even

$= (a-b) \left[r(a+b) + b^{n-1} \right]$ for some r if n is odd

Thus for $a \neq b$, $n > 0$ $a^n - b^n$ is divisible by $a-b$ for all n and divisible by $a+b$ if and only if n is even

Now $20^n + 16^n - 3^n - 1 = (20^n - 3^n) + (16^n - 1)$

and is thus divisible by 17 if and only if n is even.

$$20^n + 16^n - 3^n - 1 = (20^n - 1) + (16^n - 3^n)$$

and is thus divisible by 19 if and only if n is even.

Therefore, as 17 and 19 are co-prime and $323 = 17 \cdot 19$

$20^n + 16^n - 3^n - 1$ is divisible by 323 if and only if n is even and non-zero.

N.B. That 17 always divides $20^n - 3^n$ and 19 always divides $20^n - 1$ is essential to this proof.

This month's puzzle was sent in by W.M. Harper of the Defence Standards Laboratories. It is,

L Y N D O N
 B
 J O H N S O N

In this multiplication each letter uniquely represents a digit from 0 to 9 and always represents the same digit. There is a unique solution.

