OPERATING PROCEDURES

FOR

160 FORTRAN-A

Operating Procedures will change as new modifications of 160 FORTRAN-A are issued. These changes will be issued with the new tapes.

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Revised

OPERATING PROCEDURES FOR 160 FORTRAN-A

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I. Operating equipment.

A. Minimum SWAP 160-A Computer

B. Flexowriter.

II. Listings and paper tapes involved in a typical run.

A. The FORTRAN program tapes -- furnished by Control Data.

1. Compiler I. (AC1.00-1D)
2. Compiler II. (AC1.00-2D)
3. Compiler III. (The Interpreter). (AC1.00-3D)

B. Tapes and listings furnished/generated by user for a given problem.

1. Source program -- Flexowriter tape with FORTRAN statements in standard format or cards for 088 card reader.
2. Listing of IDLIST (optional).
3. Compiler output -- a binary punched paper tape (odd parity) consisting of:
   a. Format specifications, if any, corresponding to format statements in the source code.
   b. The object code.
   c. Library subroutines, if any. (Object code format.)
   d. Varlist.
4. Interpretive listing of object code (optional).
5. Input-output tapes (during execution). If the compiled program involves input-output, this will be via paper tape reader and punch. These input-output tapes are of two types:
   a. Binary tapes, internal format.
   b. Flexowriter tapes, external format.

III. Detailed operating procedures.

We shall assume the source code has been generated on a Flexowriter or card punch and proceed to do a compilation and execution.

A. Compilation.

1. Machine load Compiler Tape I at P=0000. Check Sum: 0000
2. Compiler I will accept source code in two different media -- flex tape via paper tape reader or Hollerith cards via 088 card reader on the buffer channel.
   a. Flex tape - Position the source code tape in the reader, turn on punch, clear and run (from P=0000). Do not set Selective Jump Switch No. 1.
   b. Cards - Position card deck in primary read station of 088 card reader. Set Selective Jump Switch No. 1, turn on punch, clear and run (from P=0000).

      The first card entering the card reader should be a comment card or a valid FORTRAN statement (no blank cards) since the 160 FORTRAN-A language does not include a PROGRAM statement. Two additional cards should follow the two end cards in the source deck. For blanks in Hollerith fields in FORMAT statements use the $ character (instead of the ; as with flex tape). The two characters _ (11 punch minus) and - (8,4 punch minus) will both be interpreted as a minus.

      Error stop: P=1:1734. Card reader not ready.

3. If no source code errors have been detected during compilation, a stop will occur at P=3775 and 0000 will be displayed in the A-register. DO NOT CLEAR. At this point, a binary tape has been output which consists of FORMAT specifications (if any) and the bulk of the object code; however, some"end" coding still remains in memory. Do not remove the punched tape from the punch at this point.

   Error Stops:

   When an error stop occurs (at P=3606, 3763, or 3773) the A-register will contain the type of error. Run from here and another stop will occur (P=3611). Now the A-register contains the value of the last encountered statement number in the source coding. (This second stop does not occur for error types 20, 27, and 30.) Memory cell #40 will contain the number of statements between the statement given in the A-register and the statement where the error stop occurred.

Pressing run after an error stop will start compilation of the next FORTRAN statement. Either another error stop will occur or the final program stop at P=3775. At this point the A-register contains the number of errors detected during compilation. Thus for each error detected during compilation it is possible to determine the type of error and the source code statement in which the error occurs.

If error stops occur, the program cannot be executed, but it may be helpful to continue with steps 4 and 5 for diagnostic purposes.

4. Position Compiler Tape II in the reader and run. (P=3775). The remainder of the object code is punched out, including the required library functions and the variable list.

   Stop at P=0252 DO NOT CLEAR!

   Remove the binary tape from punch. (This will be used during execution and step 5 following.) The operator can proceed directly to execution at this point or implement step 5.

   Error Stops:
   P=0162, parity error stop.

   Note: If a parity error stop occurs at this time, it indicates reader/machine errors. (All the library functions and final service routines have been verified.) To reload the record in which a parity error is indicated, position the tape in the reader on the blank frames preceding the section in question, clear, set P=0134 and run.

   In addition, Compiler error stops ERR20, ERR27, and ERR30 can occur during this step.

5. Optional service routines.
   a. For a listing of IDLIST, press Run (P=0252). A Flexowriter tape is generated and a stop occurs at P=1706. DO NOT CLEAR.
   b. For an interpretive listing of the object code position the binary object code tape in the reader and run (from P=1706). A Flexowriter tape is then punched out and a final stop occurs at P=3711.

Error Stops:

P=2067	Name of macro not in table
P=3351	Parity error. (Recompile. Usually indicates punch trouble.)
P=3425	Search failure. (Varlist location not in IDLIST.)

Note: These Flexowriter tapes are designed to be listed on a Flexowriter with the standard OSAS tab settings (7, 10, 14, 17, 22, 26, 30, 40). However, it is possible to modify the tab settings to one tab per field of information. Also the select codes can be altered to permit listing on an on-line typewriter.

This is done preceding step 5.a. by inserting an appropriate number into the A-register as follows (P=0252 at this point):

A=1 Type IDLIST
A=2 Type object code
A=3 Change tab settings

After entering the appropriate parameter in the A-register, press run (P=0252). A stop occurs at P=0252, A=0000. Another change can be made in the dump routine by putting another parameter in the A-register, or step 5.a. can be implemented (with A=0000).

B. Execution

1. Machine load Compiler Tape III (the interpreter) at P=0000. Check sum = 0000.
2. Clear, position the binary object tape in the reader and run (from P=0000). Stop at P=0151 DO NOT CLEAR!

Error Stop:

P = 0051	Parity error stop. Usually indicates punch trouble.

Note: If a punch failure has caused three or more blank frames to be inserted in a binary object tape the program will hang up when the blank frames are encountered.

3. At this point the FORTRAN object program is in memory and ready to be executed. Turn on the punch, position input tapes in the reader as required, and run (from P=0151).

Error Stop:

P=0576	Invalid operation code. (Compiler Error.)

PROGRAM ERRORS DETECTED DURING COMPILATION

Contents of A-register	Type of Error
1	No variable following operation symbol
2	No (after function
3	Two adjacent variables
4	Two adjacent operation symbols
5	Unequal (and)
6	Two ** **
7	Initial **, *, or /
10	Compiler error
11	Unknown Character
12	Array name used as variable
13	Wrong IF format
14	Format error in GO TO
15	Format error in NON LOCAL
16	Not implemented in 160 FORTRAN
17	Problem too large
20	Undefined label
21	Format error in I/O list
22	Format error in I/O list
23	Numeric conversion
24	Too many characters in identifier
25	Identifier of wrong form
26	Format error in DIMENSION
27	Object code too large
30	Library routine not on tape
31	Error in Format Statement
32	Duplicate Label
33	Statement out of order