ELLIOTT 900 SERIES SIMULATOR

MTFORTRAN SUBROUTINES.

The MTFORTRAN subroutines enable the programmer using 903
FORTRAN to write and read files and blocks of data to and from
magnetic tapes. It is distributed as a source code FORTRAN
code section (i.e., SIR code bracketed by a CODE and FORTRAN
statemen). The subroutines are analogous to the MTALGOL
procedures for 903 ALGOL. Any of the MTFORTRAN subroutines
used within a program unit must be included in the GLOBAL
statement for that unit.

Formats on tape.

All tapes start with a header block and the first two words of
every block are used to hold a block number and block size (in
words) respectively. The same format is used by the standard
utilities, and by the SIR and ALGOL library routines, to
enable interchange of data between these systems.

File protection and initialization.

Before a tape can be used it must be opened by the subroutine
MTOPEN. Unless the tape is named "SCRATCH" in the header
block, the header block name must correspond exactly to the
name used by MTOPEN. A tape may be prepared initially using
the MTINIT utility (see 903 Utilities).

Closing files.

Before finishing a program, all files should be closed by the
subroutine MTCLOSE. If a file has been written or updated, it
must be closed for writing so that an end-of-file (EOF) block
is written.

Transfer of data.

Data is read and written in blocks, corresponding to the
blocks physically recorded by the hardware. These are written
to and from buffers in store, specified by the user as integer
arrays within the program. Data is written and read my means
of subroutines MTWRITE and MTREAD respectively. If it is
desired to transfer real numbers then either the programmer
has to write their own FORTRAN code sections to do this, or
putting overlapping real and integer arrays in COMMON as
illustrated by 903 FORTRAN DEMO12.

MTCHECK (NH, NB, NSTAT)

This integer function is used to check the operation of the
other subroutines and should be called after any call of the
of the other subroutines and before any further calls. Its
exact effect depends on the individual subroutine, subject to
the following general rules:
  1. The handler number HN must correspond to that used in the
     previous procedure, except when checking the completion
     of a rewind in MTCLOSE.
  2. If the previous procedure was successful, the result of
     MTCHECK is +1 and parameter NB will hold the block
     number of the last block read or written and NSTAT will
     hold the status word read from the magnetic tape
     controller on completion of the operation. If the
     previous procedure was not successful, MTCHECK returns -1
     and NB contains an error number. NSTAT again hold the
     status word, which will indicate the most recent hardware
     error state.

Error codes are:
  1. Repeated hardware error (in the simulator can only arise
     if a tape file has not previously been closed).
  2. File not opened as names incompatible.
  3. Specified block cannot be found.
  4. Handler in manual or otherwise not available.
  5. Instruction rejected as "do nothing" (due to hardware or
     manual interference – cannot arise in the simulator using
     the standard libraries).
  6. Attempt to read or write beyond the physical end of tape.
  7. File not opened for reading or writing before an attempt
     to read or write respectively.
  8. Write permit ring not fitted when attempting to write.

9. Long block – the block read from tape is longer than the buffer allocated.

The following cases are not errors, but MTCHECK returns +0 as special action may be required:

0 The end of tape marker has been detected, the file should be closed for writing
-1 The block specified to be read is a label block, other than an EOF block.
-2 The block specified to be read is an EOF block.
-3 The handler is still busy rewinding after a call of MTCLOSE.

MTOPEN (NH, IA, NT)

This procedure is used to open a file on a magnetic tape, mounted on handler NH (NH=0,1,2,3).

The name of the file to be opened must be specified. This is normally specified by writing a numbered FORMAT statement immediately following the call to MTOPEN. The first item in this FORMAT statement must be an H description, and when the program calls MTOPEN this field must contain the name of the file.
IA is an integer array used as a buffer and must be at least 56 words long.

NT indicates the type of operation required:
    -1 open file for reading only. The name of the file must correspond exactly to the name specified. The tape is positioned ready to read the first data block.
     0 open file for updating. The name of the file must correspond exactly to the name specified. The tape is positioned ready to read or write the first data block.
    -1 open file for writing. The original name on the file must correspond to the name specified, or be 'SCRATCH'. IA(29) to IA(56) must be set up as to appropriate values.

If the file is opened for updating the existing header is checked but not overwritten. If information is to be added to the end of the file, the program should read forward until the EOF block is detected, go back one block and start writing.

If the file is opened for writing, a new header is written and a complete new file must be written.

In each case after a call of MTCHECK following MTOPEN, the original header will be left in IA(1) to IA(28). When open for writing, the header block is written from locations IA(29) to IA(56). These locations should be set to zero, or appropriate values for header block locations 0; to 27; before MTOPEN is called. (See SIR magnetic tape routines for details of header format).

If the call of MTOPEN is followed by a numbered FORMAT statement, it must start with an H descriptor, and there must not be any separator (i.e, /Z) before it. The H descriptor may specify up t0 12 characters, further characters will be ignored.

If the call of MTOPEN is not followed by such a statement, the file name is taken from IA(31) to IA(34) as 12 characters in SIR internal code, packed three to a word.

MTWRITE (NA, IA, NP)

This procedure is used to write a block of data, or a label block to tape. NH is the handler number required. IA must hold the block to be written: the first two words must not contain significant data as they will be overwritten when the block is written to tape. NP should be set to the number of words to be written, including the two locations at the start of the buffer. The call of MTCHECK that should follow the call of MTWRITE will give the number of the block just written. If blocks are to be written other than following the last block accessed, MTREAD should be used to position the tape. If a block is written in this way, further blocks along the tape will become unreadable: it is not possible to update blocks at random.
If a label block rather than a data block is to be written, NP should be given the value (number of words-131072).

MTREAD (NH, IA, N)

This procedure is used to find and read a block on a tape. Since all blocks are numbered sequentially a block can be found by searching up and down a tape for the block with

number N (numbering starts at 1 with the header block). If N = 0, the next block in sequence will be read. NH is the handler number required. IA is an integer array used as a buffer. After reading and checking with MTCHECK the block specified by N will be held in IA. The first two words will contain the standard block header, in particular the second word will contain the block length. The search will start with a rewind or number of backspace movements as appropriate, then will continue forward until the block is found. Note if the block read is a label block, MTCHECK will return +0, but the label block content will be in IA and the block length will be in IA(2) in the form (length-131072).

MTCLOSE (NH, NT)

This procedure is used to close a magnetic tape file: files that have been written or updated must be closed after the final block has been written so that a correct EOF block can be added to the end of the file. NH is the handler number required. NT specifies the type of operation required:
  0. Rewind tape without closing file.
  1. Close file for writing. Write and EOF label and rewind.
  1. Close file for reading and writing. Write an EOF label and rewind.
  2. Close file for reading only. Rewind tape (only use if file not opened for writing).

After closing for writing (NT = 1 or 2) MTCHECK must be used before any other reference to tape. After this (and any other call of MTCLOSE) MTCHECK may be used at any time to check whether the rewind operation is complete.