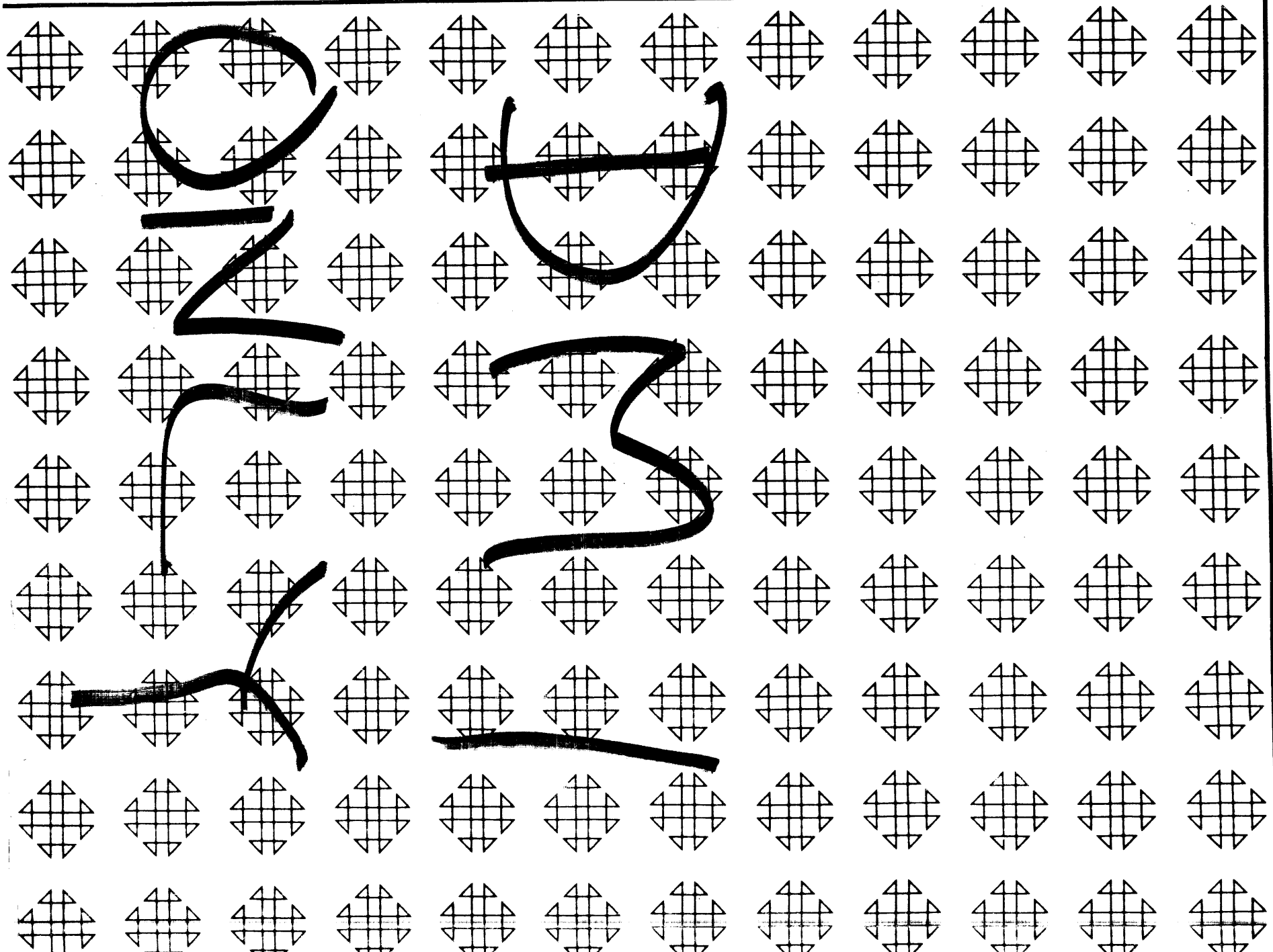

Magnetic Tape Subroutines For Assembler And Fortran Compiled 1130 00.3.003
Programs For The IBM 1130

MAGNETIC TAPE SUBROUTINES FOR ASSEMBLER AND FORTRAN COMPILED PROGRAMS FOR THE IBM 1130

Martin J. Michel
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Direct Inquiries To:

Mr. Martin J. Michel
C/O Mr. R. W. Allphin
IBM Corporation
180 South Main Street
Providence, R. I. 02901

Modifications or revisions to this program, as they occur, will be announced in the appropriate Catalog of Programs for IBM Data Processing Systems. When such announcements occur, users should order a complete new program from the Program Information Department.

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DMI only

3. DECK KEY

1. Subroutine MAGT: 1130 Object Deck - sequence # in cc 78-80, 14 cards (BASIC)

2. Test program for MAGT (with control cards and five data cards): 1130 Object Deck - sequence # in cc 78-80, 25 cards (OPTIONAL)

3. Subroutine ILS04: 1130 Object Deck - sequence # in cc 78- 80, 4 cards (BASIC)

4. SUBROUTINE MAGTZ: 1130 Object Deck - sequence # in cc 78-80, 11 cards (BASIC)

5. Test program for MAGTZ (with control cards and five data cards): 1130 Object Deck-sequence # in cc 78 - 80, 22 cards (OPTIONAL)

6. Subroutine IOU: 1130 Object Deck - sequence # in cc 78-80, 3 cards (BASIC)

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8. Subroutine SFIO: 1130 Object Deck - sequence # in cc 78-80, 24 cards (BASIC)

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10. Subroutine MAGTA: 1130 Object Deck - sequence # in cc 78-80, 9 cards (BASIC)

11. Test program for MAGTA (with control cards and five data cards): 1130 Object Deck - sequence # in cc 78-80, 19 cards (OPTIONAL)

12. Complete System Update Deck with Control Cards and Object Decks - 90 cards (OPTIONAL)

4. ABSTRACT

This subroutine package includes three main routines - one for use with assembler language programs and two for Fortran compiled programs. The purpose of these routines is to perform standard magnetic tape I/O functions on an 1130 system (running under the 1130 Monitor System) for up to eight series - 2400 magnetic tape units (connected to the CPU via a special RPQ Selector Channel).

The routine for assembler programs conforms to the standard ISS format and conventions used on the 1130 System. Read, Write, Test and associated tape control operations are executed by the routine when it is called by a LIBF sequence in a user's program. The routine utilized standard tape error-checking and recovery procedures and passes error codes to the user's program in the event of errors and/or special conditions (EOT, EOF, etc.). This routine requires the ILS04 ILS subroutine and the MAGT ISS subroutine.

The two routines for use with Fortran programs (but written in assembler language) can be used separately or together in the same user program as desired by the user. Both routines provide read, write, backspace, end file and rewind magnetic tape functions. Error checking and recovery procedures are more limited than in the routine for assembler programs since it was desirable to keep program length to a minimum (however, these procedures can be expanded by the user if it is desirable and if the needed space is available). One routine reads and writes via standard Fortran READ/WRITE statements; hence, all conversion and data formatting provided by the Fortran Compiler is automatically available to the user. The second routine is a called subroutine with the command, tape unit number, data length, and data location as parameters. This routine is quite similar to the first, but moves data directly out of or into core. Hence, it is considerably faster than the first routine, but requires the user to take care of any formatting and conversion that may be necessary for his purposes. These two routines do NOT require the ILS04 routine. However, the first requires the IOU, REWNZ, and the SFIO routines supplied with the package. Also, the first requires that certain recognition sequences in the version 1, Mod. 4 Fortran Compiler be enabled with a "patch" program that is also supplied (on later versions, different compiler changes may be necessary).

This program and its documentation were written by an IBM employee. They have been submitted to the Program Information Department for general distribution in the expectation that they may prove useful to other members of the data processing community. The program and its documentation are, essentially, in the author's original form and have not been subjected to any formal testing. IBM only serves as the distribution agency in supplying this program. It is the user's responsibility to determine the usefulness of and technical accuracy of the program in his own environment. This program is not part of the IBM product line as are Programming Systems (Type I) and Application Programs (Type II).

Questions concerning the use of the program should be directed to the author. Any changes to the program will be reflected in the appropriate Catalog of Programs; however, the changes will not be distributed automatically to users.

CONFIGURATION: (for both assembler and Fortran support)

1130 Monitor System (CPU, disk, card read/punch or paper tape read/punch)

2400 series Magnetic Tape Units (2401's, 2415's, etc.)

2954 RPQ Selector Channel

8K Core

Assembler and/or Fortran Software

DM1 only

5-1. SUBROUTINE FOR ASSEMBLER LANGUAGE PROGRAMS (MAGT)

The MAGT subroutine performs all read, write, and control functions relative to IBM 2400 series magnetic tape units. See Figure 5-1. for calling sequence set-up.

5-11. Control Parameter

This parameter consists of four hexadecimal digits. See Figure 5-2.

I/O Function

The I/O Function digit specifies a particular operation performed on the magnetic tape unit. The functions, associated digital values, and required parameters are listed in Figure 5-3.

Test

Branches to LIBF+2 if the previous operation has not been completed, or to LIBF+3 if the previous operation has been completed.

Read

Reads the requested number of words into the I/O area from the record at which the tape is positioned. If a read check occurs, the subroutine retries the operation up to 50 times. Each attempt includes backspacing the tape one record and then reading the record. A standard error recovery procedure is used, including checking for noise records and backspacing three records every third attempt. If at any time the record is read correctly, the subroutine exits as if no error occurred.

If a read check still exists after 50 attempts, the subroutine exits to the user's error routine with an error code in the accumulator. Also, if the requested number of words is not equal to the record size, or if a tape mark is read, the subroutine also exits to the user's error routine with an error code in the accumulator. NOTE: The number of words read will never exceed the specified word count.

Write With Error Retries

Writes the requested number of words from the I/O area as one record on the specified tape. When the operation is completed, the subroutine determines whether a write check or end-of-tape indicator was encountered. If not, the subroutine exits normally.

If a write check is detected, a retry counter is set for three attempts to write correctly. Each attempt consists of backspacing the tape one record, erasing several inches of tape, and then rewriting that record. If at any time the record is written correctly, the subroutine exits as if no error occurred. If the write check remains after three retries or an

end-of-tape indicator is encountered, the subroutine exits to the user's error routine.

Write Without Error Retries

Writes the requested number of words from the I/O area as one record on the specified tape. When the operation is completed, the subroutine determines whether a write check or an end-of-tape indicator was encountered. If not, the subroutine exits normally.

If a write check or an end-of-tape indicator was encountered, the subroutine exits to the user's error routine; no rewrites are attempted.

Rewind

Initiates a tape rewind and returns control to the user.

Rewind and Unload

Initiates a tape rewind and unload and returns control to the user.

Backspace

Backspaces one record. If the tape is at the load point marker, no backspace occurs. Note that a backspace does not check for a tape mark.

Write Tape Mark

Writes a tape mark on the tape. When the operation is complete, the subroutine processes write checks and end-tape indicators in the same manner as the write with error retries function.

Mode Set

The mode set function must be used to change the current status of the control unit and tape drive. This is the only function that uses digits 2 and 3 of the Control Parameter; these digits are ignored for all other functions Refer to SRL Form A22-6866 under mode set commands for a description of setting and resetting mode. Care is urged in using this instruction, since different model tape units have different mode capabilities: incorrect mode commands result in no-ops with NO error indication. Digits 2 and 3 are set according to Figure 5-4.

Device Identification:

This digit specifies which magnetic tape unit is to be used. The digit will be 0-7 corresponding to tape drive zero through seven.

5-12. I/O Area Parameter

The I/O area parameter is the label of the control word which precedes the user's I/O area. This control word contains the word count, which is the number of 16-bit words to be transferred and must not be less than six for a read operation nor less than eight for a write operation.

5-13. Error Parameter

The error parameter is the label of the entry point of the user's error routine. If an error occurs, the subroutine will use a BSI instruction to enter this routine (hence, this label should reference the word just preceding the first instruction of the user's error routine). The user's routine must always return to the tape subroutine via the BSI link. The user should consult SRL Form C26-5929 (IBM 1130 Subroutine Library) before writing this routine to ensure that the requisite conventions are followed under "user's error routine implications". Error handling includes the error branches and recovery choices specified in Appendix A and B. If an error branch occurs for the write or write tape mark functions, the record in error will have been erased; otherwise the tape will be positioned beyond the record in question. A description of terms follows:

Error - Specifies any of the following errors remaining after three retries (write or write tape mark), after fifty retries (read), or after no retries (write without retries): tape data error, program check, or overrun.

EOF - Specifies a tape mark (end-of-file record) read.

EOT - Specifies a tape indicator (end-of-tape reflective marker) sensed during a write or write-tape-mark operation or a tape mark encountered on each of two consecutive read operations.

Long Record - Specifies a partial tape record read since it contained more words than the user's word count.

Short Record - Specifies a tape record read containing fewer words than the user's word count.

Termination - Specifies clearing the routine busy indicator, decrementing the ISS counter (location 50) by 1, and returning to the ILS.

Retry - Specifies initiating another three or fifty retries, according to the function.

Reinitiate - Specifies initiating a read on the next record.

RWU - Specifies initiating a rewind/unload.

Correct Count - Specifies setting the word count in the I/O area to the number actually read.

EOF (under "subroutine action" in Appendix B) - Specifies initiating the writing of one tape mark.

Detailed error procedures are contained in Appendices A and B.

5-14. Sample Program

The MAGT test program reads the first 72 columns from each of five data cards, writes these records on tape unit 0, writes two tape marks, and then rewinds the tape. The records are transferred from unit 0 to unit 1; an extra read is performed on unit 0 so that the first tape mark will be sensed. The reinitiate recovery choice is made, causing the second tape mark to be sensed (thus satisfying the EOT condition) and the RWU/terminate choice is executed. Two tape marks are then written on unit 1 and the tape is rewound, after which the records are read and printed. Five backspace commands are executed, and the records are read and printed a second time. An extra read is performed on unit 1 so that the first of the two tape marks is sensed. The reinitiate choice is executed, causing the second tape mark to be sensed; the RWU/terminate choice is again executed. Tape unit 0 is now spaced forward five records (the operator must reload the tape in response to the 4000 code) by reading five records and an extra read is executed, causing the first tape mark to be sensed; the reinitiate choice is again made, but when the second tape mark is sensed (EOT condition) the terminate choice is made. The fifth record is written on the tape (e.g. beyond the two tape marks), and the tape is backspaced three records. The sequence of reads is again executed, but on EOT, the reinitiate choice is made, causing the block written beyond the tape marks to be read. The tape is then rewound. Another read/print loop is now initiated, during which the RWU/reinitiate choice is executed: the five records are read and printed, the RWU/reinitiate choice is made (after EOT detected), the five records are rea again and printed (the operator must reload unit 0 in response to the 4000 code) and the RWU/terminate choice is made (after EOT detected for the second time). Since the test program is in a read/print loop, the last record is printed a secon time after the RWU/terminate choice.

Finally, the Long and Short Record procedures are tested. A read is executed (the operator must reload unit 0 again) that requests a block shorter than the one on the tape; first, the operation is retried, then it is terminated. The short input block is then printed. Next, a block longer than that on the tape is requested; the correct count/terminate choice is executed and the input block is printed. Finally, the last three blocks are read and printed using the corrected word count, tape 0 is rewound-unloaded, and the program exits.

If at any time a non-correctable read error occurs, the program pauses with/ DEAD in the accumulator: the program should be cancelled and retried in this case. However, if Program Start is pressed, the operation will be retried. The error routines in this test program do NOT check for all possible errors that might occur: if an unexpected error occurs, the test program may hang up in a loop (e.g. a retry loop, etc.). The program should be cancelled and retried in this case.

5-15. CONFIGURATION

1130 Monitor System (CPU, disk, card read/punch or paper tape read/punch)

2954 RPQ Selector Channel

2400 Series Tape Units (2401's, 2415's, etc.)

8K Core

5-16. SUPPORT

MAGT and ILS04 subroutines only.

Calling Sequence

```
        LIBF    MAGT
        DC      /XXXX     (Control parameter)
        DC      AREA      (I/O Area)
        DC      ERROR     (Error Routine)
         .        .
         .        .
         .        .
ERROR   Return Link
        Error Routine
        BSC  I  ERROR
AREA    Control Word
        I/O Area
```

Fig. 5-1.

Control Parameter

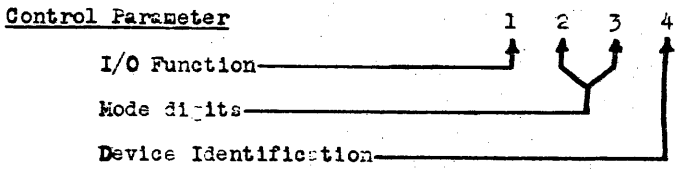


Fig. 5-2.

Function	Digital Value	Required Parameters*
Test	0	Control
Read	1	Control, I/O area, Error
Write/with error retries	2	Control, I/O area, Error
Write/without error retries	3	Control, I/O area, Error
Rewind	4	Control
Rewind and Unload	5	Control
Backspace	6	Control
Write Tape Mark	7	Control, Error
Mode Set	8	Control

*Any parameters not required for a particular function must be omitted.

Fig. 5-3.

7-track mode digit specifications

Density(bpi)	Parity	Convert Feature	Translate	Digits 2	Digits 3
200	odd	on	off	1	0
200	odd	off	off	3	0
200	odd	off	on	3	8
200	even	off	off	2	0
200	even	off	on	2	8
556	odd	on	off	5	0
556	odd	off	off	7	0
556	odd	off	on	7	8
556	even	off	off	6	0
556	even	off	on	6	8
800	odd	on	off	9	0
800	odd	off	off	B	0
800	odd	off	on	B	8
800	even	off	off	A	0
800	even	off	on	A	8

9-track mode digit specifications

Density(bpi)	Digits
800	C 8
1600	C 0

Fig. 5-4.

5-2. SUBROUTINE FOR FORTRAN COMPILED PROGRAMS (MAGTZ)

The MAGTZ subroutine (when used with the required associated routines and compiler changes as described in 6-132), performs read and write operations with standard Fortran Read/Write statements of the form:

READ (5,n) LIST

Where 5 denotes "magnetic tape, n specifies the format statement, and LIST is a list of variable names. Since standard Read/Write statements are used, all conventional Fortran formatting and data conversion can be used. In addition, backspacing, rewinding, and writing tape marks can be accomplished by use of the statements BACKSPACE n, END FILE n, and REWIND n, where n specifies the desired tape unit. ('Magnetic Tape' must be included in the IOCS card of any Fortran job in which any of the above tape functions are to be performed.)

5-21. WRITE

DMI only

Execution of a Fortran WRITE statement results in a block of 120 characters in packed format being written from the I/O buffer at location 3D onto the tape for each call from the SFIO I/O subroutine (the buffer is in unpacked format, but prior to transfer, each data block is packed). If an error occurs during the operation, a retry counter is set for three attempts to write correctly. Each attempt consists of backspacing the tape one record (i.e. to the beginning of the record in error), erasing several inches of tape, and then rewriting that record. If at any time the record is written correctly, program execution continues as if no error occurred. If the write check remains after three retries, the subroutine pauses with an error code in the accumulator (see Appendix C and 6.2 for error procedures). If the end-of-tape (EOT) reflective marker is sensed during a write operation, two tape marks are written (to signify EOT when the tape is read at a later time) and the tape is rewound-unloaded (see 6.2).

READ

DMI only

Execution of a Fortran READ statement results in a block of 120 characters being read from the tape and placed into the I/O buffer at location 3D in unpacked format for each call from the SFIO I/O subroutine (each input block is in packed format, but after transfer, each data block is unpacked). If an error occurs during the operation, a retry counter is set for fifty attempts to read correctly. Each attempt consists of backspacing the tape one record (i.e. to the beginning of the record in error) and re-reading that record (any noise records are ignored). If at any time the record is read correctly, program execution continues as if no error occurred. If the read check remains after fifty retries, the subroutine pauses with an error code in the accumulator (see 6.2 and Appendix C for error procedures). If a tape mark indicating end-of-file (EOF) is sensed during a read operation, the subroutine pauses with EOFX in the accumulator, where X is the number of the tape unit (see 6.2). If tape marks are sensed on two consecutive read operations, the EOT condition is satisfied and the tape is rewound-

unloaded (see 6.2). Hence, the user should always write two tape marks at the end of the last file of data on every tape.

BACKSPACE

Execution of the BACKSPACE n command causes tape unit n to be backspaced one record (if the tape is already at load point, no backspace occurs).

END FILE

Execution of the END FILE n command causes one tape mark to be written on unit n. Error procedures are the same as for WRITE.

REWIND

Execution of the REWIND n command causes tape unit n to be rewound to its load point (if the tape is already at load point, no action is taken).

5-22. TAPE UNIT SELECTION

The RPQ Selector Channel for the 1130 can handle up to eight tape units, but only "Magnetic tape' and NOT the specific tape unit desired can be specified in a Fortran READ/WRITE statement; hence, a method of selecting the desired tape unit has been provided. The MAGTZ subroutine maintains a tape unit indicator which is reset each time a BACKSPACE, END FILE, or REWIND command is executed. All read/write operations use this indicator to select the tape unit for that operation.

For example:

```
8     BACKSPACE 1
      READ (5, n) LISTA
      READ (5,m) LISTB
      BACKSPACE 2
      WRITE (5, n) LISTA
      WRITE (5, m) LISTB
      GO TO 8
```

would cause unit 1 to be backspaced one record (no effect if at load point) and LISTA and LISTB to be read from it; then unit 2 would be backspaced one record (again, no effect if at load point) and LISTA and LISTB would be written on it. Now if the operation (i.e. read from unit 1, write on unit 2) were to be repeated, a serious inefficiency would result. Unit 1 is now positioned past LISTB; hence, a BACKSPACE 1 would re-position the tape at the beginning of LISTB, so the READ/LISTA command would result in LISTB being read again (to avoid this, an extra read would be necessary). Similarly, the command sequence would cause LISTB on unit 2 to be overwritten with the next record from unit 1. To eliminate this problem, a no-op instruction that resets the unit indicator but causes no tape motion has been provided. When BACKSPACE n, END FILE n, or REWIND n, where n=8 through 15, is encountered, the command is no-oped, but the unit indicator is reset as follows:

n	unit indicator
8	0
9	1
10	2
.	.
.	.
.	.
15	7

Hence, the previous example when rewritten becomes:

```
8     BACKSPACE 9
      READ(5,n) LISTA
      READ (5,m) LISTB
      REWIND 10
      WRITE (5,n) LISTA
      WRITE (5,m) LISTB
      GO TO 8
```

ERROR PROCEDURES (EXTENSION)

Error Procedures have been held to a minimum; however, expanded procedures are possible if the user desires (see 7-11).

5-23. SAMPLE PROGRAM

The sample program for the MAGTZ subroutine reads the first 72 columns of each of five data cards and writes these records onto tape unit 0. Two tape marks are then written on unit 0 and the tape is rewound. Next, the records are transferred to tape unit 1. An extra read on unit 0 is executed so that the first of the two tape marks will be sensed: the routine pauses with EOFO in the accumulator. The operator should press program start at this time - the routine will execute another read on the next record, which turns out to be another tape mark. Since two consecutive tape marks have been sensed, unit 0 is rewound/unloaded. Two tape marks are now written on unit 2 and this unit is rewound. Finally, the records on unit 2 are read back and written on the printer. An extra read on unit 2 is executed so that the first of the two tape marks will be sensed: the routine pauses with EOFI in the accumulator. The operator should press program start again at this time -- EOT processing will continue as above. The routine then exits via a CALL EXIT. (cf. listing and sample output for MAGTZ test program).

5-24. CONFIGURATION

1130 Monitor System (CPU, Disk, Card Read/Punch or Paper Tape Read/Punch)

2954 RPQ Selector Channel

Series 2400 Magnetic Tape Units (2401's, 2415's, etc)

8K Core

5-25. SUPPORT

MAGTZ, IOU, REWNZ, SFIO, Fortran Compiler Patch

5-3. SUBROUTINE FOR FORTRAN COMPILED PROGRAMS (MAGTA)

5-31. The MAGTA subroutine is an assembler language routine that can be called from Fortran compiled programs to perform read, write, backspace, end file, and rewind magnetic tape functions. The call instruction for reading and writing is:

CALL MAGTA (n, m, len, name)

where n specifies the command (0=read, 2=write), m specifies the specific tape unit (0-7), 'len' specifies the word count of the data to be transfered, and 'name' is a single variable name specifying the location of the data (the routine transfers 'len' words of data sequentially, starting at location 'name'). The call for backspace, end file, and rewind is:

CALL MAGTA (n, m)

where n and m are as described in the above paragraph. (n=4 backspace; n=5, end file; n=3, rewind).

The advantages of this routine with respect to the MAGTZ routine are: the ability to specify the tape unit directly (rather than with a no-op instruction), a higher rate of data transfer, and the ability to write variable length data blocks (MAGTZ transfers data via the standard Fortran I/O buffer in blocks of 120 characters and interfaces with the SFIO Fortran I/O routine in order to provide formatting and conversion facilities. This sometimes leads to inefficiencies. For example, to transfer an array of 100 integers, the SFIO routine passes only one element at a time into the buffer. Consequently, 100 blocks of 120 characters each are written on tape for the array. The MAGTA routine, on the other hand, transfers the entire array together as a single block of 100 words.)

The major disadvantage of the MAGTA routine is the loss of the formatting and conversion facilities provided by the Fortran compiler via READ/WRITE statements. The MAGTA routine transfers data from core to tape sequentially in core image format: the user must be responsible for formatting and block length.

Both MAGTA and MAGTZ can be used in the same Fortran program; either can be used alone (if MAGTA is used alone, 'MAGNETIC TAPE' should NOT be added to the IOCS cards).

Error procedures for all of the following commands are exactly the same as for the MAGTZ routine (see Appendix C).

WRITE

n=2 'len' words of data are transferred from core to tape unit m sequentially and unchanged, starting at core location 'name'.

READ

n=0 'len' words of data are transferred from tape unit m to core sequentially and unchanged, starting at core location 'name'.

BACKSPACE

n=4 tape unit m is backspaced one record (if at load point, no backspace occurs

END FILE

n=5 a tape mark is written on tape unit m.

REWIND

n=3 tape unit m is rewound to its load point (if at load point, no action is taken)

ERROR PROCEDURES (EXTENSION)

Error procedures have been held to a minimum; however, expanded procedures are possible if the user desires (see 7-11).

5-32. SAMPLE PROGRAM

The sample program for the MAGTA subroutine reads the first 72 columns of each of five data cards and writes these records onto tape unit 0. Two tape marks are then written on unit 0 and the tape is rewound. Next, the records are transferred to tape unit 1. An extra read on unit 0 is executed so that the first of the two tape marks will be sensed: the routine pauses with EOFO in the accumulator. The operator should press program start at this time -- the routine will execute another read on the next record, which

turns out to be another tape mark. Since two consecutive tape marks have been sensed, unit 0 is rewound/unloaded. Two tape marks are now written on unit 2 and this unit is rewound. Finally, the records on unit 2 are read back and written on the printer. An extra read on unit 2 is executed so that the first of the two tape marks will be sensed: the routine pauses with EOFI in the accumulator. The operator should press program start again at this time -- EOT processing will continue as above. The routine then exits via a CALL EXIT. (cf. listing and sample output for MAGTA test program).

33. CONFIGURATION

1130 Monitor System (CPU, disk, card read/punch or paper tape read/punch)

2954 RPQ Selector Channel

Series 2400 Magnetic Tape Units (2401's, 2415's, etc.)

8K Core

34. SUPPORT

MAGTA

6-1. SYSTEM SET-UP

6-11. HARDWARE

1130 Monitor System (CPU, disk, card read/punch or paper tape read/punch), 2400 series tape units (2401's, 2415's, etc.), 2954 RPQ Selector Channel, 8K core.

NOTE: The Tape Control Unit address should be set to 8. The tape units should have addresses 0-7.

6-12. SOFTWARE

Assembler and/or Fortran software

6-13. SUPPORT

6-131. MAGT System -

Subroutines required: MAGT
ILS04

Procedure: the 1130 subroutine library must have the MAGT and ILS04 routines added to it. One update deck only is required (see Figure 6-1). If only object decks are supplied, just add the indicated control cards. Updating job is run just as any ordinary job, either stacked with other jobs or alone with a cold start card.

6-132. MAGTZ System -

Subroutines required. MAGTZ
IOU
REWNZ
SFIO
Fortran Compiler Patch

Procedure: the 1130 subroutine library must have the MAGTZ, IOU, REWNZ, and SFIO routines added to it; in addition the Fortran compiler must be patched (the version 1, mod. 4 compiler requires only that certain recognition sequences be enabled -- newer versions may require different patching from that which is presented here). The updating and patching job is run just as any ordinary job, either stacked with other jobs or alone with a cold start card (see Figure 6-2.). If only the object decks are supplied, just add the indicated control cards.

6-133. MAGTA System -

Subroutines required: MAGTA

Procedure: the 1130 subroutine library must have the MAGTA routine added to it. One update deck only is required (see Figure 6-3.). If only the object deck is supplied, just add the indicated control cards. Updating job is run just as any ordinary ob, either stacked with other jobs or alone with a cold start card.

6-2. ERROR HALTS AND PROCEDURES

Error conditions, codes, and user/operator procedures are detailed in Appendixes A, B, and C.

6-3. TAPE UNIT OPERATION

Reloading a tape always causes a level 4 interrupt; hence, care must be taken to avoid reloading a tape at a time when the proper routines for handling the interrupt are NOT in core (e.g. while the system is being loaded, while a new job is being loaded or compiled, between stacked jobs, etc.). An easy method to do this is to always wait to reload the required tapes until the program displays the tape "not ready" code in the accumulator. Users unfamiliar with magnetic tape device operations should read 'IBM System/360 Component Description 2400 - Series Magnetic Tape Units and 2816 Switching Unit' (A22-6866-3) Page 4-11, (Magnetic Tape Unit Principles), and Page 34-48 (2400 Tape Unit Keys and Lights; Tape Handling and Organization, Tape Unit Loading and Unloading Procedures).

Except for the above procedures (6-2. and 6-3.), no special console settings, etc. are required.

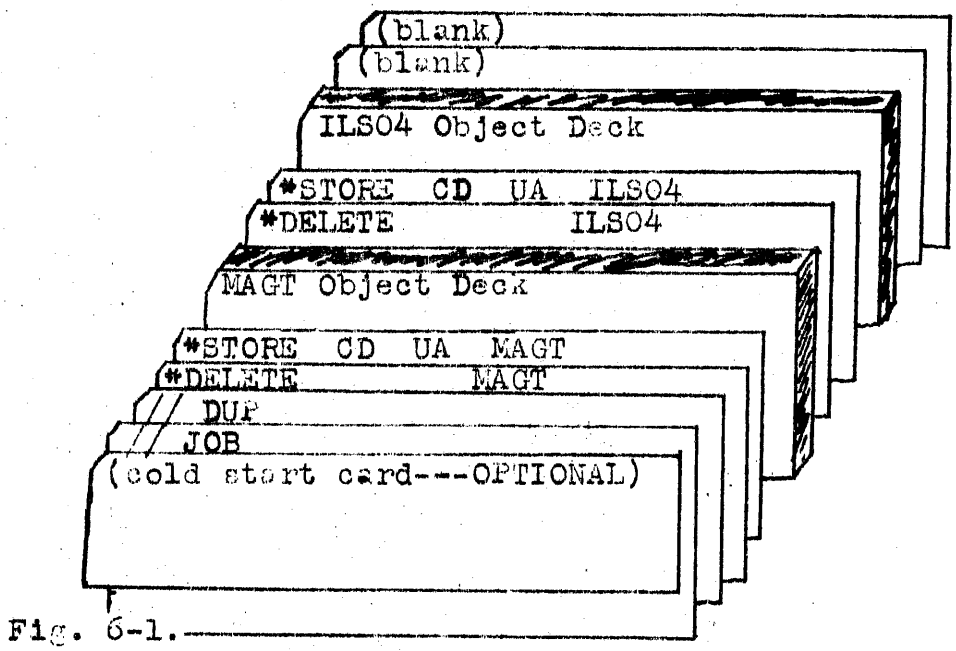

(blank)
(blank)
ILS04 Object Deck
*STORE CD UA ILS04
*DELETE ILS04
MAGT Object Deck
*STORE CD UA MAGT
*DELETE MAGT
// DUP
// JOB
(cold start card---OPTIONAL)

Fig. 6-1.

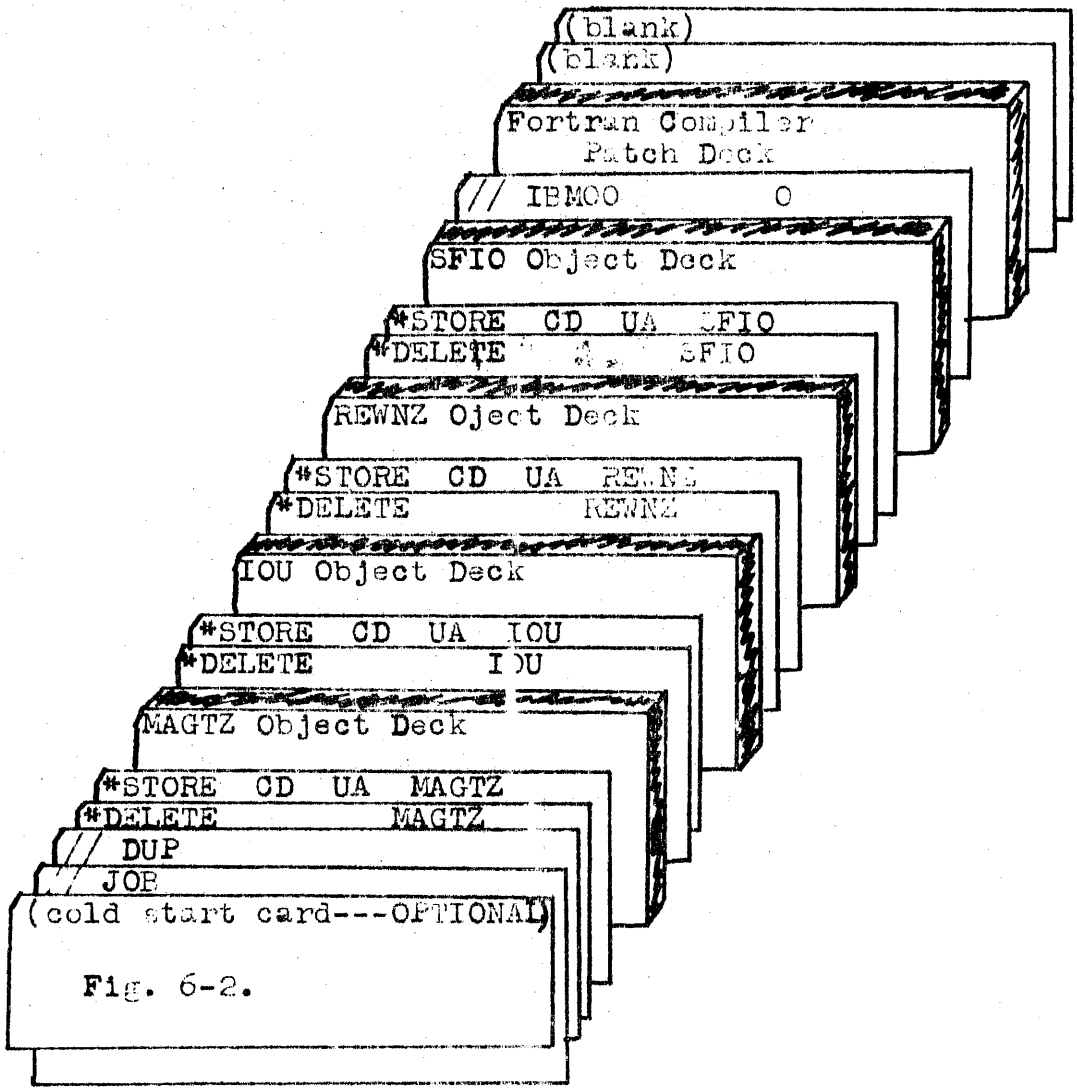

(blank)
(blank)
Fortran Compiler
Patch Deck
// IBMCO O
SFIO Object Deck
*STORE CD UA SFIO
*DELETE SFIO
REWNZ Oject Deck
*STORE CD UA REWNZ
*DELETE REWNZ
IOU Object Deck
*STORE CD UA IOU
*DELETE IOU
MAGTZ Object Deck
*STORE CD UA MAGTZ
*DELETE MAGTZ
// DUP
// JOB
(cold start card---OPTIONAL)

Fig. 6-2.

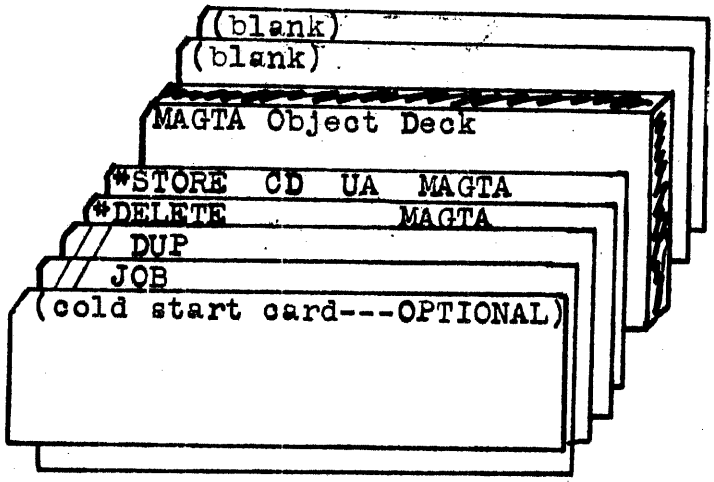

(blank)
(blank)
MAGTA Object Deck
*STORE CD UA MAGTA
*DELETE MAGTA
// DUP
// JOB
(cold start card---OPTIONAL)

Fig. 6-3.

7-1. POSSIBLE PROGRAM MODIFICATIONS

7-11. EXPANDED ERROR PROCEDURES (MAGTZ, MAGTA)

1. cf. label "A" - in a similar manner to the present coding, the user can set-up DEDX (to be stored in 'FBADA') at this point, instead of having just "DEAD".

2. cf. label 'B' - insert:

```
BSI          TREDY
LD           DATA
SLA          14
BSC  L       PRO, -
LIBF         PAUSE
DC           FPRCT

PRO (next instruction)
```

and add set-up for FEFX (to be stored in 'FPRCT') at 'A'. The above coding will display FEFX if a tape is file-protected on a write command. The user can terminate the job, or can replace the file - protect ring and press program start, which will cause the write command to be executed. (Note: the above coding may necessitate some addressing changes in other sections of the program.)

3. cf label 'WTEOR' - change the coding as follows:

```
WTEOR    LIBF          PAUSE
         DC            FEOTD
BRN      MDX           *
         MDX     L     C003,-1
         MDX           TMEOT
         MDX     L     C003, +3
         MDX           RWU
```

and add set-up for FEOX (to be stored in 'FEOTD') at 'A'.

The above coding will display FEOX when the end-of-tape marker is sensed during the execution of a write or write tape mark command. If the user presses program start, normal EOT action will be taken; if the user puts /70FB into 'BRN' from the console and then presses program start, the routine will exit without writing the tape marks or unloading the tape (hence, blocks could be written beyond the EOT marker). If another write or write tape mark command is executed (but before a backspace, which would reset the EOT indicator), the routine will again pause with FEOX in the accumulator. If the user now wants to execute normal EOT procedures, he must put /7000 into 'BRN' and press program start.

4. cf label 'A' and 'PERM' - for the non-correctable read/write error message, the user could set-up /BDNX (to be stored in 'FBAD') at 'A' so that N denoted read, write, or write tape mark and X denoted the tape unit. In addition, the coding at 'PERM' could be changed in a manner similar to the change noted in 3. above, so that the operator could cause a branch to 'ERROR', thus causing the operation to be retried when program start is pressed.

NOTE: the user could write his own LIBF routines to act as error routines: the LIBF calls would replace the LIBF PAUSE calls. Then these error routines could do the necessary program resetting without the need for operator intervention.

7-12. WORD COUNT TO BYTE COUNT CONVERSION (MAGT)

For some applications, it may be desirable for the user to be able to specify a byte count rather than a word count. The 2954 RPQ Selector Channel transfers data on an even byte count. If the count is odd and the command is write, the rightmost byte of the last word is ignored and just the desired number of bytes is transferred; however, if the command is read, the rightmos byte of the last word is zeroed -- hence, this last byte must be saved and restored when the count is odd and the command is read. The following coding will accomplish this.

delete the SLA 1 command from location labelled 'ONE'
delete the SRA 1 command from location labelled 'TWO'

```
just before 'MTBEN', insert    LD           INITA
                               BSC  L       ODD,E

just before 'BYTCT', insert    LD           INITA
                               BSC  L       ODSET,E
```

at the end of the program, insert:

```
ODD      SRA           1
         A             INITA+2
         STO           LOAD+1
LOAD     LD      L     *-*
         AND           OOFF (label 'MTMK3')
         STO     L     LASTW
         BSC     L     MTBEN
ODSET    LD      I     LOAD+1
         OR            LASTW
         STO     I     LOAD+1
         BSC     L     BYTCT
LASTW    DC            0
```

at location labelled 'THREE', replace S MT006 with S MTCMN.

```
// JOB
// ASM
*LIST   7-21.
*PRINT SYMBOL TABLE
*LEVEL 4

                        LIBR
0000     140478C0       ISS   05 MAGT      4
0000 0   6A17    MAGT    STX    2 MTRET+1       LIBF ENTRANCE
0001 00  66800000        LDX   I2 0             LOAD A(LIB+1)
0003 0   7004            MDX      *+4
0004 0   0000    MINT    DC       0             INTERRUPT ENTR
0005 01  4C0000D7        BSC   L  MTRRR
0007 0   0001            DC       1
0008 0   6911            STX    1 MTRET+3       SAVE XR1
0009 01  6500009A        LDX   L1 MTSV          SET ADDRESSING
000B 0   D900            STD    1 0             SAVE ACC & EXT
000C 0   280E            STS      MTRET+4       SAVE STATUS
000D 0   C200            LD     2 0             LOAD CONTROL P
000E 0   180C            SRA      12            ISOLATE FUNCT.
000F 01  740000A1        MDX   L  MTBSY,0        TEST ROUTINE B
0011 0   700C            MDX      MTRET+7       NOT BUSY,BRANC
0012 01  4C20000F        BSC   L  *-5,Z         BUSY, LOOP IF
0014 0   7201            MDX    2 +1            FORM LIBF+2
0015 0   6A07            STX    2 MTRET+6       FSTORE RETURN
0016 0   C900            LDD    1 0             RESTORE ACC &
0017 00  5E000000  MTRET  LDX   L2 0             RESTORE XR2
0019 00  66000000        LDX   L1 0             RESTORE XR1
001B 0   2000            LDS      0             RESTORE STATUS
001C 00  4C400000        BOSC L   0             EXOT TO USER/I
001E 01  4C200022        BSC   L  *+2,Z         IF NOT TEST, C
0020 0   7201            MDX    2 +1            FORM LIBF+2
0021 0   70F2            MDX      MTRET-3       RETURN VIA LIB
0022 0   6A7A            STX    2 MTSV+3        STORE A(LIBF+1
0023 01  74FF00A1        MDX   L  MTBSY,-1       SET ROUTINE BU
0025 0   1000            NOP
0026 0   D13A            STO    1 MTFUN-MTSV    SAVE FUNCTION
0027 0   D138            STO    1 RWRSW-MTSV    SET READ/WRITE
0028 0   910A            S      1 MTFMX-MTSV    TEST FUNCTION
0029 01  4C300063        BSC   L  MTILL,Z-      IF+, ILLEGAL F
002B 0   8159            A      1 MTRGO+1-MTSV  RESTORE FUNC.
002C 0   D01E            STO      MTGO          STORE FUNCTION
002D 0   D158            STO    1 MTRGO-MTSV    SET RECOV ENTR
002E 0   C200            LD     2 0             RELOAD CONTROL
002F 0   E10D            AND    1 MTOOF-MTSV    ISOLATE DEVICE
0030 0   E90C            OR     1 MTMK7-MTSV    FORM DD8X
0031 0   D119            STO    1 INIT+1-MTSV   STORE IN IOCC
0032 0   D121            STO    1 TSSEA+1-MTSV  STORE IN XSENS
0033 0   D10F            STO    1 GEST+1-MTSV   STORE IN RECOV
0034 0   100C            SLA      12
0035 0   1804            SRA      4
0036 0   D13B            STO    1 MTINT-MTSV    /0X00
0037 0   C108            LD     1 TSRET-MTSV
0038 0   D157            STO    1 ILSGO+1-MTSV  SET RETURN
0039 0   0920    MTCSS   XIO    1 TSSEA-MTSV    FETCH SENSE DA
003A 0   70FF            MDX      *-1           WAIT INTERUPT
003B 0   C116    WARET   LD     1 MTUST-MTSV    LOAD UNIT STAT
003C 0   E136            AND    1 M0050-MTSV    ISOLATE BUSY,        BITS
003D 01  4C600039        BOSC L   MTCSS,Z       IF BOTH OFF, C
003F 0   C13C            LD     1 CSTAT-MTSV    LOAD CHANL STA
0040 01  4C280063        BSC   L  MTILL,+Z       IF NON-EXIST,
0042 0   C11D            LD     1 TSDAT-MTSV    LOAD SENSE DAT
0043 0   100A            SLA      10            SET TU-A, TU-B
0044 01  4C020047        BSC   L  REDY,C         IF READY, BRAN
0046 0   7019            MDX      MTNR          NOT READY, EXI
```

```
0047 01 4C680039    REDY   BOSC L  MTCSS,Z+       IF BUSY, RETES
0049 01 6680009D           LDX  I2 MTSV+3         RESTORE A(LIBF
004B 0  7000       MTGO   MDX     *               INITIAL BRANCH
004C 0  7021              MDX     MTRD            READ
004D 0  7025              MDX     MTWEN           WRITE/W
004E 0  7024              MDX     MTWEN           WRITE/WOUT
004F 0  7009              MDX     MTLP            REWIND
0050 0  7038              MDX     MTIEN           REWIND-UNLOAD
0051 0  7007              MDX     MTLP            BSP
0052 0  7033              MDX     MTBEN           WRITE TAPE MAR
0053 00 C6800000          LD   I2 0               LOAD CONTROL P
0055 0  1804              SRA     4               POSITION CODE
0056 0  E069              AND     MTMK3           FORM 000X+3
0057 0  E937              OR   1  MT003-MTSV
0058 0  7034              MDX     MTIEN+4         PROCEED TO STOR
0059 0  C05D       MTLP   LD      TSDAT           IF AT LOAD PT,
005A 0  100C              SLA     12                   BACKSPACE   D
005B 01 4C100089          BSC  L  MTIEN,-
005D 01 740100A1          MDX  L  MTBSY,+1
005F 0  70B4              MDX     MTRET-3
0060 0  C13B       MTNR   LD   1  MTINT-MTSV      LOAD 0X00
0061 0  E85F              OR      MTMK6           FORM 4X00
0062 0  7001              MDX     MTILL+1         EXIT THRU DV N
0063 0  C062       MTILL  LD      MTECD           LOAD ILLEGAL C
0064 01 6680009D          LDX  I2 MTSV+3         RELOAD A(LIBF+
0066 0  72FF              MDX  2  -1              FORM A(LIBF)
0067 00 6E000028          STX  L2 40              STORE A(LIBF)
0069 0  6229              LDX  2  41              SET 41 AS RETU
006A 0  6AB2              STX  2  MTRET+6
006B 01 740100A1          MDX  L  MTBSY,+1        SET ROUTINE NT
006D 0  70A9              MDX     MTRET
006E 0  6233       MTRD   LDX  2  51    *         SET RETRY CNT
006F 0  6A3A              STX  2  RECNT
0070 0  6210              LDX  2  16              SET READ MIN
0071 0  6A60              STX  2  RWRSW           SET READ/WRITE
0072 0  7C03              MDX     *+3
0073 0  6204       MTWEN  LDX  2  4               SET WRITE CNT
0074 0  6A35              STX  2  RECNT
0075 0  620C              LDX  2  12              SET WRITE MIN
0076 0  6A25              STX  2  MTSV+2          SAVE MIN
0077 01 6680009D          LDX  I2 MTSV+3         RELOAD A(LIBF+
0079 00 C6800001          LD   I2 1               LOAD WORD CNT
007B 0  D024              STO     MTSV+6          SAVE WORD COUN
007C 0  1001       ONE -> SLA     1               MULT COUNT=BYT
007D 0  D036              STO     INITA           STORE BYTE COU
007E 0  901D              S       MTSV+2          IS CNT OVER MI
007F 01 4C280063          BSC  L  MTILL,Z+        IF NO, BRANCH
0081 0  7201              MDX  2  +1              FORM LIBF+2
0082 0  C200              LD   2  0
0083 0  D01B              STO     MTSV+5          SAVE A(AREA)
0084 0  8027              A       M1              INCRM, TO A(EF
0085 0  D030              STO     INITA+2         STORE A(AREA)
0086 0  C201       MTBEN  LD   2  1               LOAD A(ERR)
0087 0  D016              STO     MTSV+4          SAVE A(ERR)
0088 0  7201              MDX  2  +1              FORM LIBF+3
0089 01 658000D4   MTIEN  LDX  I1 MTFUN
008B 01 C50000C6          LD   L1 MTCCS-1         SET CODE
008D 0  D027              STO     INITA+1         INTO CCW
008E 0  C01F              LD      AILL2           RESET ILSGO AD
008F 0  D061              STO     ILSGO+1
0090 0  71FF              MDX  1  -1              TEST FOR READ
0091 0  6841              STX     EOTSW           SET EOT SWT IF
```

```
0092 00 74000032          MDX   L   50,0
0094 0  7002              MDX       *+2
0095 00 74010032          MDX   L   50,+1       INCRM ISS COUN
0097 0  081A        EXEC  XIO       INIT        INITIATE I/O O
0098 01 4C000014          BSC   L   MTRET-3     RETURN TO USER
009A    0007        MTSV  BSS   E   7           STORAGE AND CO
00A1 0  0001        MTBSY DC        1
00A2 1  00B8        TSRET DC        WARET
00A3 0  DF03        TSCSW DC        /DF03
00A4 0  0008        MTFMX DC        8
00A5 0  0000        MTWSV DC        0
00A6 0  DD80        MTMK7 DC        /DD80
00A7 0  000F        MTOOF DC        /000F
00A8 1  00AA        GEST  DC        GEST+2
00A9 0  DD00              DC        /DD00
00AA 0  0000        RECNT DC        0
00AB 0  0000              DC        0
00AC 0  0001        M1    DC        1
00AD 0  DF06        INSTA DC        /DF06
00AE 1  00F2        AILL2 DC        ILSGO+2
00AF 0  DF00        INSTB DC        /DF00
00B0 0  0000        MTUST DC        0
00B1 0  000C        MTCMN DC        12
00B2 1  00B4        INIT  DC        INITA
00B3 0  0000              DC        0
00B4 0  0000        INITA DC        0
00B5 0  0000              DC        0
00B6 0  0000              DC        0
00B7    0003        TSDAT BSS       3
00BA 1  00BC        TSSEA DC        TSSEA+2
00BB 0  0000              DC        0
00BC 0  0006        MTO06 DC        6
00BD 0  0004        MTO04 DC        4
00BE 1  00B7              DC        TSDAT
00BF 0  0011        MTMK2 DC        /0011
00C0 0  00FF        MTMK3 DC        /00FF
00C1 0  4000        MTMK6 DC        /4000
00C2 0  000A        M10   DC        10
00C3 0  0003        BSPCT DC        3
00C4 0  0004        BSPSW DC        4
00C5 0  0003        FSPSW DC        3
00C6 0  4001        MTECD DC        /4001
00C7 0  0002        MTCCS DC        /0002
00C8 0  2001              DC        /2001
00C9 0  2001              DC        /2001
00CA 0  0007              DC        /0007
00CB 0  0C0F        RWUC  DC        /000F
00CC 0  0C27        BSPC  DC        /0027
00CD 0  001F        TMC   DC        /001F
00CE 0  0017        ERASC DC        /0017
00CF 0  0037        FSPC  DC        /0037
00D0 0  0050        M0050 DC        /0050
00D1 0  0003        MTO03 DC        3
00D2 0  0000        RWRSW DC        0
00D3 0  0001        EOTSW DC        1
00D4 0  0000        MTFUN DC        0
00D5 0  0000        MTINT DC        0
00D6 0  0000        CSTAT DC        0
00D7 0  08D6        MTRRR XIO       INSTB-1     TEST CHANL STA
00D8 01 6500009A          LDX   L1  MTSV
00DA 0  6A3A              STX   2   TEMP+1
00DB 0  6200              LDX   2   0           INITIALIZE ERR
```

```
00DC 0  700F        SKP    MDX        OVER
00DD 0  0000        TENSE  DC         0
00DE 01 74F600DC           MDX   L    SKP,-10
00E0 0  0920               XIO    1   TSSEA-MTSV      FETCH SENSE DA
00E1 0  7032               MDX        TEMP
00E2 0  08BF               XIO        TSCSW-1         FETCH UNIT STA
00E3 01 740A00DC           MDX   L    SKP,+10
00E5 0  C11D               LD     1   TSDAT-MTSV
00E6 01 4C9000DD           BSC   I    TENSE,-         IF COM REJ, GO          CODE
00E8 01 660001D4           LDX   L2   RTST+2
00EA 01 4C000192           BSC   L    RWUT+3
00EC 0  D0E9        OVER   STO        CSTAT
00ED 0  08B4               XIO        TSCSW-1         FETCH UNIT STA
00EE 0  D0C1               STO        MTUST
00EF 0  100E               SLA        14              SET UC, UE BIT
00F0 01 640000F2    ILSGO  LDX   L    *               BRANCH TO INT
00F2 0  7000        MTRGO  MDX        *
00F3 0  7007               MDX        READ
00F4 0  7033               MDX        WOWTM
00F5 0  7025               MDX        WWOR
00F6 0  7021               MDX        EXITA
00F7 0  7020               MDX        EXITA
00F8 0  701F               MDX        EXITA
00F9 0  702E               MDX        WOWTM
00FA 0  701D               MDX        EXITA
00FB 0  C0B4        READ   LD         MTUST           CHK FOR TM(EOF OR EOT)
00FC 01 4C04015D           BSC   L    MTEOF,E         UE ON(ODD), BR
00FE 0  D0D4               STO        EOTSW
00FF 0  08AC        BYTCT  XIO        INSTA-1         FETCH BYTE CNT          E
0100 0  80B3               A          INITA           SUBTR CCW COUN
0101 0  90AA               S          M1              ADJUST ACTUAL
0102 0  1801        TWO    SRA        1
0103 0  D0A1               STO        MTWSV           SAVE CORRECT C
0104 0  90B7        THREE  S          MT006
0105 01 4C2801D2           BSC   L    RTST,+Z         IF NOISE, REIN
0107 0  C0A8        F      LD         MTUST           RELOAD UNIT ST
0108 0  100E               SLA        14              SET UC BIT
0109 01 4C28015A           BSC   L    M,+Z            IF ON, BRANCH TO RETRY
010B 0  C0CA               LD         CSTAT           FETCHCHANL STA
010C 0  1006               SLA        6               SET LENGTH BIT
010D 01 4C280177           BSC   L    LORSH,+Z        IF ON(NEG),BRA
010F 01 740100A1    EXIT   MDX   L    MTBSY,+1        SET ROUTINE NO
0111 00 74FF0032           MDX   L    50,-1           DECRM ISS COUN
0113 0  1000               NOP
0114 00 66000000    TEMP   LDX   L2   0               RESTORE XR2 AN
0116 01 4CF00004           BSC   I    MINT            RETURN TO USER
0118 01 4C02010F    EXITA  BSC   L    EXIT,C          IF DE ON (ODD), EXIT
011A 0  70F9               MDX        TEMP            IF NO, AWAIT S          R,
011B 01 4C280121    WWOR   BSC   L    ERRA,+Z         IF UC ON, ERR
011D 0  C116        NOER   LD     1   MTUST-MTSV       LOAD UN STAT
011E 01 4C040125           BSC   L    MTWOT,E         IF EOT , BRANC
0120 0  70FE               MDX        EXIT            TERMINATE IF N
0121 0  40BB        ERRA   BSI        TENSE           CHK FOR COM RE
0122 0  620E               LDX    2   14              TERM IF NT EOT
0123 0  4029               BSI        CDSET           INDICATE ERROR
0124 0  70F8               MDX        NOER
0125 0  620F        MTWOT  LDX    2   15              LOAD WWOR EOT
0126 0  4026               BSI        CDSET           USER VIA ACTIO
0127 0  70E7               MDX        EXIT            TERMINATE
0128 01 4C280131    WOWTM  BSC   L    ERRB,+Z         IF UC ON, ERR
012A 0  C116        NOTER  LD     1   MTUST-MTSV       LOAD UN STAT
012B 01 4C04012E           BSC   L    *+1,E           IF EOT, BRANCH          29
```

```
012D 0  70E1          MDX      EXIT          IF NOT EOT, EX
012E 0  620C          LDX   2  12            SET EOT CODE
012F 0  401D          BSI      CDSET         INFORM USER
0130 0  7018          MDX      FUTRY
0131 0  40AB  ERRB    BSI      TENSE         CHK FOR COM RE
0132 0  7002          MDX      *+2
0133 0  C123  H       LD    1  TSSEA+3-MTSV   SET RETRY COUN
0134 0  D110          STO   1  RECNT-MTSV
0135 0  4079          BSI      RETRY
0136 0  C116          LD    1  MTUST-MTSV     LOAD UN STAT
0137 01 4C04013D      BSC   L  EOTON,E        IF EOT, BRANCH
0139 0  620B  ERALO   LDX   2  11            SET ERROR CODE
013A 0  4012          BSI      CDSET         INFORM USER
013B 0  4073          BSI      RETRY
013C 0  70F9          MDX      ERALO-3
013D 0  620D  EOTON   LDX   2  13            SET ERR/EOT CO
013E 0  400E          BSI      CDSET
013F 01 4C280133      BSC   L  H,+Z           RETRY
0141 01 4C040149      BSC   L  FUTRY,E        EOF/RWU/TERM
0143 01 440001A4      BSI   L  WTM            EOF/RWU/RETRY
0145 01 44000199      BSI   L  RWU
0147 0  4047          BSI      RWUT          AWAIT RELOADIN
0148 0  70EA          MDX      H
0149 0  405A  FUTRY   BSI      WTM           EOF/RWU/TERM
014A 0  404E          BSI      RWU
014B 0  70C3          MDX      EXIT
014C 0  0000  MTSAV   DC       0
014D 0  0000  CDSET   DC       0             RETURN LINK
014E 0  C13B          LD    1  MTINT-MTSV     LOAD 0X00 DEVI
014F 0  6AFC          STX   2  MTSAV          SAVE ERR CODE
0150 0  80FB          A        MTSAV         FORM 0X0M(FULL
0151 01 4480009E      BSI   I  MTSV+4         GO TO USERS ER
0153 0  4F18          BSC      +-            USERS RETURN,
0154 0  70BA          MDX      EXIT          IF ZERO, TERM
0155 01 4C800140      BSC   I  CDSET         IF NO, RECOVER
0157 0  6233  RERE    LDX   2  51            RESET RETRY CN
0158 01 6E0000AA      STX   L2 RECNT
015A 0  4054  M       BSI      RETRY
015B 0  40F1  ERR     BSI      CDSET         ERROR ALONE-CH
015C 0  70FA          MDX      RERE          RETRY
015D 01 740000D3  MTEOF MDX    L  EOTSW,0     LAST COMM SENS
015F 0  700B          MDX      EOF           IF NO, SET EOF
0160 0  6206  FOFOT   LDX   2  6             SET EOF/EOT CO
0161 0  40EB          BSI      CDSET
0162 01 4C280170      BSC   L  RWREI,+Z       RWU/REINIT
0164 01 4C0401D2      BSC   L  RTST,E         REINIT
0166 0  4032  RWTM    BSI      RWU           RWU/TERM
0167 0  70A7          MDX      EXIT
0168 01 4C0201D2  BRN BSC   L  RTST,C          DE ON
016A 0  70A9          MDX      TEMP          IF DE NT ON, A        R
016B 0  1010  EOF     SLA      16
016C 0  D139          STO   1  EOTSW-MTSV     SET EOT SWITCH
016D 0  6202          LDX   2  2             SET EOF ALONE
016E 0  40DE          BSI      CDSET         GO TO USER FOR
016F 0  7062          MDX      RTST          REINITIATE
0170 0  4028  RWREI   BSI      RWU           RWDUN/REINIT
0171 0  401D          BSI      RWUT          AWAIT RELOADIN
0172 0  705F          MDX      RTST
0173 0  C108  CWCTM   LD    1  MTWSV-MTSV     LAAD ACTUAL CN
0174 01 D480009F      STO   I  MTSV+5         STORE IN USER
0176 0  7098          MDX      EXIT          TERMINATE
0177 0  0912  LORSH   XIO   1  INSTA-1-MTSV   CHK FOR LENGTH
```

```
0178 01 4C30017D          BSC  L  LONG,-Z          IF +, BRANCH C
017A 0  6208              LDX    2 8              SHORT ALONE
017B 0  40D1              BSI      CDSET          SHORT INPUT RECORD
017C 0  70F6              MDX      CWCTM          CORRECT WRD CN
017D 0  5207        LONG  LDX    2 7              LONG INPUT RECORD
017E 0  40CE              BSI      CDSET
017F 0  70D7              MDX      RERE           RETRY
0180 0  D111        GSTAR STO    1 GEST+3-MTSV    EXEC BKSP, FSF
0181 0  090E              XIO    1 GEST-MTSV            RWU, 0
0182 0  7052              MDX      T
0183 01 6600018B    WRT   LDX  L2 WSP              WRITE RETRY
0185 0  6AE3              STX    2 BRN+1
0186 0  C11D              LD     1 TSDAT-MTSV      FETCH SENSE DA
0187 0  1809              SRA      9
0188 01 4C04018B          BSC  L  WSP,E            SKIP BSP IF NO
018A 0  704D              MDX      BSONE          GO TO BKSP
018B 01 74030169    WSP   MDX  L  BRN+1,+3
018D 0  704E              MDX      ERASE
018E 0  7043              MDX      RTST
018F 0  0000        RWUT  DC       0              AFTER RWU/RETR        OICES
0190 01 66000197          LDX  L2 BACK                WAIT AT 41       D
0192 00 6E000028          STX  L2 40
0194 0  C13E              LD     1 MTINT-MTSV
0195 0  E927              OR     1 MTMK6-MTSV
0196 0  6029              LDX      41             AWAIT UNIT REL
0197 01 4C80018F    BACK  BSC  I  RWUT
0199 0  0000        RWU   DC       0              RWU ROUTINE
019A 01 660001A2          LDX  L2 RWURE
019C 0  6ACC              STX    2 BRN+1
019D 0  C131              LD     1 RWUC-MTSV
019E 0  D111        GO    STO    1 GEST+3-MTSV
019F 0  C037              LD       ARENT
01A0 0  D157              STO    1 ILSGO+1-MTSV
01A1 0  70DF              MDX      GSTAR+1
01A2 01 4C800199    RWURE BSC  I  RWU
01A4 0  0000        WTM   DC       0              WTM ROUTINE
01A5 01 660001AA          LDX  L2 WTMRE
01A7 0  6AC1              STX    2 BRN+1
01A8 0  C133              LD     1 TWC-MTSV
01A9 0  70F4              MDX      GO
01AA 01 660001AD    WTMRE LDX  L2 WTW2
01AC 0  70FA              MDX      WTM+3
01AD 01 4C8001A4    WTW2  BSC  I  WTM
01AF 0  0000        RETRY DC       0              MAIN RETRY ENT
01B0 01 74FF00AA          MDX  L  RECNT,-1         RETRY FINISHED
01B2 0  7003              MDX      *+3            IF NO, RETRY
01B3 0  6201              LDX    2 1              SET ERROR CODE
01B4 01 4C8001AF          BSC  I  RETRY            RETURN
01B6 0  C020              LD       ARENT          RESET ILSGO AD
01B7 0  D157              STO    1 ILSGO+1-MTSV
01B8 0  C138              LD     1 RWRSW-MTSV
01B9 0  100C              SLA      12
01BA 01 4C200183          BSC  L  WRT,Z            IF NOT ZERO, I
01BC 01 660001D2          LDX  L2 RTST             READ RETRY
01BE 0  6AAA              STX    2 BRN+1
01BF 01 74FF00C3    RSP   MDX  L  BSPCT,-1         TEST BSP CNT
01C1 0  7016              MDX      BSONE          IF 1 BSP, BRA
01C2 01 74F20169          MDX  L  BRN+1,-14        RESET ENTRY
01C4 01 74FF00C4          MDX  L  BSPSW,-1         3 BSP COMPLETE
01C6 0  7011              MDX      BSONE          IF NO, BSP AGA
01C7 01 74050169          MDX  L  BRN+1,+5         IF YES, RESET
01C9 01 74FF00C5          MDX  L  FSPSW,-1         2 FSP COMPLETE
```

```
01CB 0  700E                    MDX     FSONE           IF NO, FSP AGA
01CC 01 740300C3                MDX  L  BSPCT,+3
01CE 01 740300C5                MDX  L  FSPSW,+3
01D0 01 740400C4                MDX  L  BSPSW,+4
01D2 0  C114            RTST    LD   1  AILL2-MTSV      EXEC RETRY OR
01D3 0  D157                    STO  1  ILSGO+1-MTSV    RESET ILSGO AD
01D4 0  0918                    XIO  1  INIT-MTSV
01D5 01 4C000114        T       BSC  L  TEMP
01D7 1  0168            ARENT   DC      BRN
01D8 0  C132            BSONE   LD   1  BSPC-MTSV       SET
01D9 0  70A6                    MDX     GSTAR             APPROPRIATE
01DA 0  C135            FSONE   LD   1  FSPC-MTSV          COMMAND
01DB 0  70A4                    MDX     GSTAR                FOR
01DC 0  C134            ERASE   LD   1  ERASC-MTSV             GSTAR
01DD 0  70A2                    MDX     GSTAR
01DE                            END
```

SYMBOL TABLE

AILL2	00AE	ARENT	01D7	BACK	0197	BRN	0168	BSONE	01D8
BSPC	00CC	BSPCT	00C3	BSPSW	00C4	BYTCT	00FF	CDSET	014D
CSTAT	00D6	CWCTM	0173	E	0107	EOF	016B	EOFOT	0160
EOTON	013D	EOTSW	00D3	ERALO	0139	ERASC	00CE	ERASE	01DC
ERR	015B	ERRA	0121	ERRB	0131	EXEC	0097	EXIT	010F
EXITA	0118	FSONE	01DA	FSPC	00CF	FSPSW	00C5	FUTRY	0149
GEST	00A8	GO	019E	GSTAR	0180	H	0133	ILSGO	00F0
INIT	00B2	INITA	00B4	INSTA	00AD	INSTB	00AF	LONG	017D
LORSH	0177	M	015A	MAGT	0000	MINT	0004	MTBEN	0086
MTBSY	00A1	MTCCS	00C7	MTCMN	00B1	MTCSS	0039	MTECD	00C6
MTEOF	015D	MTFMX	00A4	MTFUN	00D4	MTGO	0048	MTIEN	0089
MTILL	0063	MTINT	00D5	MTLP	0059	MTMK2	00BF	MTMK3	00C0
MTMK6	00C1	MTMK7	00A6	MTNR	0060	MTRD	006E	MTRET	0017
MTRGO	00F2	MTRRR	00D7	MTSAV	014C	MTSV	009A	MTUST	00B0
MTWEN	0073	MTWOT	0125	MTWSV	00A5	MTW2	01AD	MTOOF	00A7
MT003	00D1	MT004	00BD	MT006	00BC	M0050	00D0	M1	00AC
M10	00C2	NOER	011D	NOTER	012A	OVER	00EC	READ	00FB
RECNT	00AA	REDY	0047	RERE	0157	RETRY	01AF	RSP	01BF
RTST	01D2	RWREI	0170	RWRSW	00D2	RWTM	0166	RWU	0199
RWUC	00CB	RWURE	01A2	RWUT	018F	SKP	00DC	T	01D5
TEMP	0114	TENSE	00DD	TMC	00CD	TSCSW	00A3	TSDAT	00B7
TSRET	00A2	TSSEA	00BA	WARET	003B	WOWTM	0128	WRT	0183
WSP	018B	WTM	01A4	WTMRE	01AA	WWOR	011B		

NO ERRORS IN ABOVE ASSEMBLY.

```
// JOB
// ASM
*LIST  7-22.
0000 0  0000          SPACE DC      0
0001 20 176558F1            LIBF    PRNT1
0002 0  3100                DC      /3100
0003 20 176558F1            LIBF    PRNT1
0004 0  0000                DC      0
0005 0  70FD                MDX     *-3
0006 01 4C800000            BSC  I  SPACE
0008 0  40F7          BEGIN BSI     SPACE
0009 0  6105          RD    LDX   1 5
000A 20 03059130            LIBF    CARD0
000B 0  1000                DC      /1000          READ
000C 1  0153                DC      INPUT
000D 20 225C5144            LIBF    SPEED
000E 0  0000                DC      /0000          CARD TO EBCDIC CODE
000F 1  0154                DC      INPUT+1        CARD AREA
0010 1  019D                DC      INPTA+1        EBCDIC CODE AREA
0011 0  0048                DC      72             CHARACTER CNT
0012 20 03059130            LIBF    CARD0
0013 0  0000                DC      0
0014 0  70FD                MDX     *-3
0015 20 140478C0            LIBF    MAGT
0016 0  2000                DC      /2000          WRITE ON ZR
0017 1  019C                DC      INPTA
0018 1  00F5                DC      ERRTP
0019 20 140478C0            LIBF    MAGT
001A 0  0000                DC      0
001B 0  70FD                MDX     *-3
001C 0  71FF                MDX   1 -1
001D 0  70EC                MDX     RD+1
001E 0  406D                BSI     WTM0
001F 0  406C                BSI     WTM0
0020 0  4071                BSI     RWD0
0021 0  6105                LDX   1 5
0022 20 140478C0      TRAN  LIBF    MAGT
0023 0  1000                DC      /1000
0024 1  019C                DC      INPTA
0025 1  00F5                DC      ERRTP
0026 20 140478C0            LIBF    MAGT
0027 0  2001                DC      /2001
0028 1  019C                DC      INPTA
0029 1  00F5                DC      ERRTP
002A 20 140478C0            LIBF    MAGT
002B 0  0000                DC      0
002C 0  70FD                MDX     *-3
002D 0  71FF                MDX   1 -1
002E 0  70F3                MDX     TRAN
002F 20 140478C0            LIBF    MAGT
0030 0  1000                DC      /1000
0031 1  019C                DC      INPTA
0032 1  00F5                DC      EOTSK
0033 0  4063                BSI     WTM1
0034 0  4062                BSI     WTM1
0035 0  4067                BSI     RWD1
0036 0  6105                LDX   1 5
0037 20 140478C0      PRN   LIBF    MAGT
0038 0  1001                DC      /1001
0039 1  019C                DC      INPTA
003A 1  00F5                DC      ERRTP
003B 0  406B                BSI     PRNT
003C 0  71FF                MDX   1 -1
003D 0  70F9                MDX     PRN
```

```
003E 0  4063                BSI     BKSP1
003F 0  4062                BSI     BKSP1
0040 0  4061                BSI     BKSP1
0041 0  4060                BSI     BKSP1
0042 0  405F                BSI     BKSP1
0043 0  40BC                BSI     SPACE
0044 0  6105                LDX   1 5
0045 20 140478C0    RPD     LIBF    MAGT
0046 0  1001                DC      /1001
0047 1  019C                DC      INPTA
0048 1  00F5                DC      EOTSK
0049 0  405D                BSI     PRNT
004A 0  71FF                MDX   1 -1
004B 0  70F9                MDX     RPD
004C 20 140478C0            LIBF    MAGT
004D 0  1001                DC      /1001
004E 1  019C                DC      INPTA
004F 1  00F5                DC      EOTSK
0050 0  6105                LDX   1 5
0051 20 140478C0    PRO     LIBF    MAGT
0052 0  1000                DC      /1000
0053 1  019C                DC      INPTA
0054 1  00F5                DC      ERRTP
0055 0  71FF                MDX   1 -1
0056 0  70FA                MDX     PRO
0057 20 140478C0            LIBF    MAGT
0058 0  1000                DC      /1000
0059 1  019C                DC      INPTA
005A 1  00D8                DC      ETERM
005B 20 140478C0            LIBF    MAGT
005C 0  2000                DC      /2000
005D 1  019C                DC      INPTA
005E 1  00F5                DC      ERRTP
005F 20 140478C0            LIBF    MAGT
0060 0  6000                DC      /6000
0061 20 140478C0            LIBF    MAGT
0062 0  6000                DC      /6000
0063 20 140478C0            LIBF    MAGT
0064 0  6000                DC      /6000
0065 20 140478C0            LIBF    MAGT
0066 0  1000                DC      /1000
0067 1  019C                DC      INPTA
0068 1  00E2                DC      REINT
0069 0  4028                BSI     RWDO
006A 0  4095                BSI     SPACE
006B 0  610B                LDX   1 11
006C 20 140478C0    LAST    LIBF    MAGT
006D 0  1000                DC      /1000
006E 1  019C                DC      INPTA
006F 1  00E7                DC      RWURE
0070 0  4036                BSI     PRNT
0071 0  71FF                MDX   1 -1
0072 0  70F9                MDX     LAST
0073 0  408C                BSI     SPACE
0074 20 140478C0            LIBF    MAGT
0075 0  1000                DC      /1000
0076 1  0106                DC      BLKLW
0077 1  00CE                DC      ERLOW
0078 0  403B                BSI     PRNLO
0079 20 140478C0            LIBF    MAGT
007A 0  1000                DC      /1000
007B 1  0120                DC      BLKHI
```

```
007C 1  00F5              DC      ERRHI
007D 0  4043              BSI     PRNHI
007E 0  6103              LDX   1 3
007F 20 140478C0    SKIP  LIBF    MAGT
0080 0  1000              DC      /1000
0081 1  0120              DC      BLKHI
0082 1  00CE              DC      ERLOW
0083 0  403D              BSI     PRNHI
0084 0  71FF              MDX   1 -1
0085 0  70F9              MDX     SKIP
0086 20 140478C0          LIBF    MAGT
0087 0  5000              DC      /5000
0088 20 140478C0          LIBF    MAGT
0089 0  0000              DC      0
008A 0  70FD              MDX     *-3
008B 0  6038              EXIT
008C 0  0000        WTM0  DC      0
008D 20 140478C0          LIBF    MAGT
008E 0  7000              DC      /7000
008F 1  00F5              DC      ERRTP
0090 01 4C80008C          BSC   I WTM0
0092 0  0000        RWD0  DC      0
0093 20 140478C0          LIBF    MAGT
0094 0  4000              DC      /4000
0095 01 4C800092          BSC   I RWD0
0097 0  0000        WTM1  DC      0
0098 20 140478C0          LIBF    MAGT
0099 0  7001              DC      /7001
009A 1  00F5              DC      ERRTP
009B 01 4C800097          BSC   I WTM1
009D 0  0000        RWD1  DC      0
009E 20 140478C0          LIBF    MAGT
009F 0  4001              DC      /4001
00A0 01 4C80009D          BSC   I RWD1
00A2 0  0100        BKSP1 DC      0
00A3 20 140478C0          LIBF    MAGT
00A4 0  6001              DC      /6001
00A5 01 4C8000A2          BSC   I BKSP1
00A7 0  0000        PRNT  DC      0
00A8 20 140478C0          LIBF    MAGT
00A9 0  0000              DC      /0000
00AA 0  70FD              MDX     *-3
00AB 20 176558F1          LIBF    PRNT1
00AC 0  2000              DC      /2000
00AD 1  019C              DC      INPTA
00AE 1  00F5              DC      ERR
00AF 20 176558F1          LIBF    PRNT1
00B0 0  0000              DC      0
00B1 0  70FD              MDX     *-3
00B2 01 4C8000A7          BSC   I PRNT
00B4 0  0000        PRNLO DC      0
00B5 20 140478C0          LIBF    MAGT
00B6 0  0000              DC      0
00B7 0  70FD              MDX     *-3
00B8 20 176558F1          LIBF    PRNT1
00B9 0  2000              DC      /2000
00BA 1  0106              DC      BLKLW
00BB 1  00F5              DC      ERR
00BC 20 176558F1          LIBF    PRNT1
00BD 0  0000              DC      0
00BE 0  70FD              MDX     *-3
00BF 01 4C8000B4          BSC   I PRNLO
```

```
00C1 0  0000        PRNHI DC      0
00C2 20 140478C0          LIBF    MAGT
00C3 0  0000              DC      0
00C4 0  70FD              MDX     *-3
00C5 20 176558F1          LIBF    PRNT1
00C6 0  2000              DC      /2000
00C7 1  0120              DC      BLKHI
00C8 1  00F5              DC      ERR
00C9 20 176558F1          LIBF    PRNT1
00CA 0  0000              DC      0
00CB 0  70FD              MDX     *-3
00CC 01 4C8000C1          BSC   I PRNHI
00CE 0  0000        ERLOW DC      0
00CF 0  4029              BSI     ERRCK
00D0 0  7000              MDX     *
00D1 01 740400D0          MDX   L *-3,+4
00D3 01 4C8000CE          BSC   I ERLOW
00D5 0  1010              SLA     16
00D6 01 4C8000CE          BSC   I ERLOW
00D8 0  0000        ETERM DC      0
00D9 0  401F              BSI     ERRCK
00DA 0  7000              MDX     *
00DB 01 740400DA          MDX   L *-3,+4
00DD 01 4C8000D8          BSC   I ETERM
00DF 0  1010              SLA     16
00E0 01 4C8000D8          BSC   I ETERM
00E2 0  0000        REINT DC      0
00E3 0  4015              BSI     ERRCK
00E4 0  1801              SRA     1
00E5 01 4C8000E2          BSC   I REINT
00E7 0  0000        RWURE DC      0
00E8 0  4010              BSI     ERRCK
00E9 0  100D              SLA     13
00EA 01 4C2800EE          BSC   L EOT,+Z
00EC 01 4C8000E7          BSC   I RWURE
00EE 0  7000        EOT   MDX     *
00EF 01 740400EE          MDX   L EOT,+4
00F1 01 4C8000E7          BSC   I RWURE
00F3 0  1801              SRA     1
00F4 0  70FC              MDX     *-4
00F5 0  0000        ERRTP DC      0                 RETRY ONLY
00F6 0  4002              BSI     ERRCK
00F7 01 4C8000F5          BSC   I ERRTP
00F9 0  0000        ERRCK DC      0
00FA 0  E00A              AND     FOFF
00FB 0  9007              S       ONE
00FC 01 4C200100          BSC   L NO,Z
00FE 20 17064885          LIBF    PAUSE
00FF 1  0104              DC      DEAD
0100 0  8002        NO    A       ONE
0101 01 4C8000F9          BSC   I ERRCK
0103 0  0001        ONE   DC      1
0104 0  DEAD        DEAD  DC      /DEAD
0105 0  FOFF        FOFF  DC      /FOFF
0106 0  0019        BLKLW DC      25
0107    0019              BSS     25
0120 0  0032        BLKHI DC      50
0121    0032              BSS     50
0153 0  0048        INPUT DC      72                COLUMN CNT
0154    0048              BSS     72
019C 0  0024        INPTA DC      36                WORD CNT
019D    0024              BSS     36
```

```
00F5                    ERRHI  EQU     ERRTP
00F5                    EOTSK  EQU     ERRTP
00F5                    ERR    EQU     ERRTP
01C2    0008                   END     BEGIN

    NO ERRORS IN ABOVE ASSEMBLY.
```

// XEQ TESTM 7-22A.

THIS PROGRAM TESTS THE MAGT SUBROUTINE FOR MAGNETIC TAPE I/O FOR THE IBM 1130. FIVE CARDS ARE READ AND STORED ON TAPE UNIT 0, ARE TRANSFERED TO UNIT 1, AND ARE THEN PRINTED. UNIT 1 IS THEN BACKSPACED AND THE RECORDS ARE RE-READ. FINALLY, A TEST OF THE EOT-ON-READ RECOVERY CHOICES AND THE INCORRECT LENGTH RECOVERY CHOICES ARE TESTED ON TAPE UNIT 0.

THIS PROGRAM TESTS THE MAGT SUBROUTINE FOR MAGNETIC TAPE I/O FOR THE IBM 1130. FIVE CARDS ARE READ AND STORED ON TAPE UNIT 0, ARE TRANSFERED TO UNIT 1, AND ARE THEN PRINTED. UNIT 1 IS THEN BACKSPACED AND THE RECORDS ARE RE-READ. FINALLY, A TEST OF THE EOT-ON-READ RECOVERY CHOICES AND THE INCORRECT LENGTH RECOVERY CHOICES ARE TESTED ON TAPE UNIT 0.

THIS PROGRAM TESTS THE MAGT SUBROUTINE FOR MAGNETIC TAPE I/O FOR THE IBM 1130. FIVE CARDS ARE READ AND STORED ON TAPE UNIT 0, ARE TRANSFERED TO UNIT 1, AND ARE THEN PRINTED. UNIT 1 IS THEN BACKSPACED AND THE RECORDS ARE RE-READ. FINALLY, A TEST OF THE EOT-ON-READ RECOVERY CHOICES AND THE INCORRECT LENGTH RECOVERY CHOICES ARE TESTED ON TAPE UNIT 0.
THIS PROGRAM TESTS THE MAGT SUBROUTINE FOR MAGNETIC TAPE I/O FOR THE IBM 1130. FIVE CARDS ARE READ AND STORED ON TAPE UNIT 0, ARE TRANSFERED TO UNIT 1, AND ARE THEN PRINTED. UNIT 1 IS THEN BACKSPACED AND THE RECORDS ARE RE-READ. FINALLY, A TEST OF THE EOT-ON-READ RECOVERY CHOICES AND THE INCORRECT LENGTH RECOVERY CHOICES ARE TESTED ON TAPE UNIT 0.
THE INCORRECT LENGTH RECOVERY CHOICES ARE TESTED ON TAPE UNIT 0.

THIS PROGRAM TESTS THE MAGT S BRO TINE FOR MAGNETI
1130. FIVE CARDS ARE READ AND STORED ON TAPE UNIT 0, ARE TRANSFERED TO UNIT 1, AND ARE THEN PRINTED. UNIT 1 IS THEN BACKSPACED AND THE RECORDS ARE RE-READ. FINALLY, A TEST OF THE EOT-ON-READ RECOVERY CHOICES AND THE INCORRECT LENGTH RECOVERY CHOICES ARE TESTED ON TAPE UNIT 0.

```
// JOB
// ASM
*LIST   7-23.
*LEVEL 4
                                    ILS   04
0000 0   0438           ADDR4  DC         /0438   <--
0001 0   0734                  DC         /0734
0002 0   0435                  DC         /0435
0003 0   0436                  DC         /0436
0004 0   0000           ILS04  DC         0
0005 0   D812                  STD        TEMP4
0006 0   280C                  STS        NT46
0007 0   690A                  STX     1  NT44+1
0008 0   6104           NT42   LDX     1  4
0009 0   0810                  XIO        SENS4-1
000A 0   1140                  SLCA    1  0
000B 01  C500001E              LD     L1  DEVC4
000D 01  4C180023              BSC    L   SCTST,+-   <--
000F 01  4580FFFF              BSI    I1  ADDR4-1
0011 00  65000000       NT44   LDX    L1  0
0013 0   2000           NT46   LDS        0
0014 0   C803                  LDD        TEMP4
0015 01  4CC00004              BOSC   I   ILS04
0018     0002           TEMP4  BSS    E   2
001A 0   0000                  DC         0
001B 0   0300           SENS4  DC         /0300
001C 0   0000                  DC         0
001D 0   DB00           INST   DC         /DB00
001E 0   0000           DEVC4  DC         0
001F 0   0000                  DC         0   <--
0020 0   1701                  DC         /1701
0021 0   0F01                  DC         /0F01
0022 0   1F01                  DC         /1F01
0023 0   08F8           SCTST  XIO        INST-1   }
0024 0   100C                  SLA        12       }
0025 01  4C100011              BSC    L   NT44,-   }  <--
0027 01  44800000              BSI    I   ADDR4    }
0029 0   70F7                  MDX        NT44     }
002A                           END

     NO ERRORS IN ABOVE ASSEMBLY.
```

```
// JOB
// ASM
*LIST   7-24.
*PRINT SYMBOL TABLE
                                       LIBR
0000       140478E9                    ENT        MAGTZ
0000 0     7005              MAGTZ     MDX        ENTRY        ISS CALL ENTRY
0001 00    4CC00000          EXIT      BOSC  I    *-*          CALL EXIT
0003 0     0032              C100      DC         50           READ RETRY COUNT
0004 0     0003              C003      DC         3            WRITE/WTM RETRY  CNT
0005 0     0000              AREA      DC         0            SAVE
003C                         IOBUF     EQU        60
0006 01    650000E1          ENTRY     LDX   L1   EXINT        SET INTER ADDR
0008 00    6D00000C                    STX   L1   12
000A 0     613C                        LDX    1   IOBUF
000B 0     907D                        S          C002
000C 0     D07D                        STO        RDWRT        SAVE OP CODE
000D 01    4C280013                    BSC   L    *+4,+Z       IF READ, BRANCH
000F 0     1010                        SLA        16            IF NT READ, SET EOTSW OFF
0010 01    D40000B3                    STO   L    EOTSW
0012 0     C077                        LD         RDWRT
0013 0     4808                        BSC        +          TETEST FOR RD/W  IF NT SKP
0014 0     C87D                        LDD        UNIT-1       IF RD/W, USE OLD UNIT
0015 0     1090                        SLT        16
0016 01    940000A4                    S     L    IOCC2
0018 01    4C3000ED                    BSC   L    PAT,Z-       IF NO-OP, BRANCH
001A 01    840000A4                    A     L    IOCC2
001C 0     D076                   A  [ STO        UNIT         RESET UNIT
001D 0     E86F                      [ OR         EOFO         FORM EOFX
001E 0     D06D                      [ STO        EOFD            AND STORE
001F 0     C079                        LD         IOCC+1
0020 0     E06F                        AND        FF00
0021 0     E871                        OR         UNIT         IOCC DEVICE
0022 0     E86D                        OR         0080
0023 0     D075                        STO        IOCC+1          SET UP
0024 0     D072                        STO        TSSEN+1
0025 0     D079                        STO        SDATA+1
0026 0     623D                        LDX    2   61           SET COUNT
0027 0     6ADD                        STX    2   AREA
0028 0     C061                        LD         RDWRT        LOAD OP CODE
0029 01    4C280042                    BSC   L    READ,+Z      READ
002B 01    4C180048                    BSC   L    WRIT,+-      WRITE
002D 0     905A                        S          C001
002E 01    4C180037                    BSC   L    REWD,+-      REWIND
0030 0     9057                        S          C001
0031 01    4C180039                    BSC   L    BSPC,+-      BACKSPACE
0033 0     1010                        SLA        16           SET RDWRT TO WRITE FOR WTM
0034 0     D055                        STO        RDWRT              RETRIES
0035 0     C073                        LD         CEOF         END OF FILE
0036 0     7021                        MDX        ENTIO
0037 0     C06C              REWD      LD         CREWD
0038 0     7001                        MDX        BSPC+1
0039 0     C06B              BSPC      LD         CBSPC
003A 0     1890                        SRT        16
003B 0     403B                        BSI        TREDY        TEST DEV RDY
003C 0     C073                        LD         DATA
003D 0     1803                        SRA        3            SET LP MARKER
003E 01    4C040001                    BSC   L    EXIT,E       EXIT IF ON
0040 0     1090                        SLT        16
0041 0     7016                        MDX        ENTIO
0042 0     C0C0              READ      LD         C100         READ
0043 0     D047                        STO        ERTST        SET RETRY COUNTER
0044 0     C04D                        LD         OCNT
0045 0     D100                        STO    1   0            SET WORD COUNT
```

```
0046 0  C055          LD      CREAD
0047 0  7010          MDX     ENTIO
0048 0  C0BB    WRIT  LD      C003          WRITE
0049 0  D041          STO     ERTST
004A 0  623C          LDX   2 IOBUF         PACK BUFFER FOR OUTPT
004B 0  7102    LOOP1 MDX   1 2
004C 0  7201          MDX   2 1
004D 0  C1FE          LD    1 -2
004E 0  1008          SLA     8
004F 0  E9FF          OR    1 -1
0050 0  D200          STO   2 0
0051 01 74FF0005      MDX   L AREA,-1
0053 0  70F7          MDX     LOOP1
0054 0  C03D          LD      OCNT
0055 00 D400003C      STO   L IOBUF
0057 0  C04E          LD      CWRIT
0058 0  D05B    ENTIO STO     HOLD
0059 0  1010    IOOPA SLA     16
005A 0  D03F          STO     ERCNT         INIT ERROR CNT
005B 0  C059    IOOPB LD      HOLD          LOAD COMMAND
005C 0  D051          STO     CCW+1         SET COOMAND INTO CCW
005D 0  10A0    IOOP  SLT     32
005E 0  D235          STD     ERSW          CLEAR ERROR SWITCH
005F 0  4C75          BSI     TNRDY          EXEC OP AND AWAIT INTER
0060 0  C033          LD      ERSW
0061 01 4C20008B      BSC   L ERROR,Z       BRANCH IF ERROR
0063 0  C026    ENTEF LD      RDWRT
0064 01 4C100001      BSC   L EXIT,-        EXIT IF NOT READ
0066 0  1010          SLA     16
0067 0  D04B          STO     DOTSW          SET SWT TO OFF
0068 0  6278          LDX   2 120           UNPACK INPUT
0069 0  6178          LDX   1 IOBUF+60
006A 0  C101          LD    1 1
006B 0  1808          SRA     8
006C 0  D23C          STO   2 IOBUF
006D 0  C100    LOOP2 LD    1 0
006E 0  18C8          RTE     8
006F 0  D23A          STO   2 IOPUF-2
0070 0  1010          SLA     16
0071 0  1088          SLT     8
0072 0  D238          STO   2 IOBUF-1
0073 0  71FF          MDX   1 -1
0074 0  72FE          MDX   2 -2
0075 0  70F7          MDX     LOOP2
0076 0  708A    EXITA MDX     EXIT
0077 0  0000    TREDY DC      0             TEST UNIT READY ,NT RDY
0078 0  1010          SLA     16
0079 0  D02E          STO     NBSW          SET INTER SWT TO OFF
007A 0  0823          XIO     SDATA         FETCH SENSE DATA
007B 0  4061          BSI     WAIT           AWAIT INTER
007C 0  C033          LD      DATA
007D 0  100A          SLA     10            SET TUA, TUB BITS
007E 01 4C020083      BSC   L REDY,C        IF READY, BRANCH
0080 20 17064885      LIBF    PAUSE         IF NT RDY, INDICATE
0081 1  0087          DC      FBADA
0082 0  70F5          MDX     TREDY+1       RETEST
0083 01 4C680078  REDY  BOSC L TREDY+1,+Z    IF BUSY, RETEST
0085 01 4C800077      BSC   I TREDY         IF READY, GO
0087 0  DEAD    FBADA DC      /DEAD
0088 0  0001    C001  DC      1
0089 0  0002    C002  DC      2
008A 0  0000    RDWRT DC      0
```

```
008B 0  0000        ERTST DC      0
008C 0  0000        EOFD  DC      0
008D 0  E0F0        EOF0  DC      /E0F0
008E 0  FFC7        WCTST DC      -57
008F 0  FF00        FF00  DC      /FF00
0090 0  0080        0080  DC      /0080
0092    0000              BSS   E 0
0092 0  403D        OCNT  DC      /403D
0093 0  0000        UNIT  DC      0
0094 0  0000        ERSW  DC      0
0095 0  0000        NOISE DC      0
0096 1  00AA        TSSEN DC      CCWA
0097 0  DD00              DC      /DD00
0098 1  00AD        IOCC  DC      CCW          START
0099 0  DD00              DC      /DD00           I/O
009A 0  0000        SENSE DC      0            SENSE U STAT W/ RESET
009B 0  DF03              DC      /DF03
009C 0  2002        SNSWC DC      /2002        READ
009D 0  DF06              DC      /DF06        SENSE BYTE CNT
009F 1  00A0        SDATA DC      SDATA+2
009F 0  DD00              DC      /DD00
00A0 0  0006              DC      6
00A1 0  0004              DC      4
00A2 1  00BC              DC      DATA
00A3 0  0017        IOCC1 DC      /0017        ERASE
00A4 0  0007        IOCC2 DC      /0007        REWIND
00A5 0  0027        CBSPC DC      /0027        BACKSPACE
00A6 0  2001        IOCC3 DC      /2001        WRITE
00A7 0  000F              DC      /000F        RWU
00A8 0  0000        NRSW  DC      0
00A9 0  201F        CEOF  DC      /201F        WTM
00AC        00A6    CREAD EQU     SNSWC
00A3        00A3    CWRIT EQU     IOCC3
00A4        00A4    CERAS EQU     IOCC1
00AA        00A5    CREWD EQU     IOCC2
00AA        00A9    ERCNT EQU     SENSE
00AA 0  0000        CCWA  DC      0            TEST I/O(CCW)
00AB 0  0000              DC      0
00AC 0  0000              DC      0
00AD 0  007A        CCW   DC      122          BYTES
00AE 0  0000              DC      0            COMMAND
00AF 0  003D              DC      /003D        IOBUF+1 ADDR
00B0    0003        DATA  BSS     3
00B3 0  0000        EOTSW DC      0
00B4 0  0000        HOLD  DC      0
00B5 0  C0E3        TWEOT LD      CEOF         WTM
00B6 0  00E7              STO     CCW+1
00B7 01 4C4000B9          BOSC L  *
00B9 0  401F              BSI     TNRDY
00BA 0  70BB              MDX     EXITA
00BB 0  C0CE        ERROR LD      RDWRT
00BC 01 4C300001          BSC   L EXIT,-Z      EXIT IF NT RD/WRT
00BE 01 4C2000E3          BSC   L CKNOS,Z      BRANCH IF READ
00C0 0  C0E4              LD      CBSPC          (WRITE ERROR)
00C1 0  00EC              STO     CCW+1
00C2 0  4012              BSI     TNRDY        BACK SPACE
00C3 0  C0CF              LD      CERAS        SET ERASE
00C4 0  00E9              STO     CCW+1
00C5 0  400F        ERDWT BSI     TNRDY        EXEC ERASE OR BSP
00C6 0  C0D3              LD      ERCNT
00C7 0  8000              A       C001         INCRM ERR CNT
00C8 0  00D1              STO     ERCNT
```

```
00C9 0  90C1          S       ERTST     CNT OVER MAX
00CA 01 4C08005B      BSC  L  IOOPB,+    NO, RETRY OPERATION
00CC 0  C0E1          LD      CCW+1
00CD 0  F0DB          EOR     CFOF      TEST FOR WTM
00CE 01 4C2000E8      BSC  L  PERM,Z    IF NT WTM, INDIC, PERM, ERR
00D0 01 740000B3      MDX  L  EOTSW,0
00D2 0  70E2          MDX     TMEOT     IF EOT, RETRY
00D3 0  D0C6          STO     ERCNT
00D4 0  7088          MDX     IOOP      IF WTM, RETRY
00D5 0  0000    TNRDY DC      0
00D6 0  40A0          BSI     TREDY     UNIT READY
00D7 0  1010          SLA     16
00D8 0  D0CF          STO     NBSW
00D9 0  08BE          XIO     IOCC      EXECUTE OP
00DA 0  4002          BSI     WAIT      AWAIT INTER
00DB 01 4C800005      BSC  I  TNRDY     RET AFTER INTER
00DD 0  0000    WAIT  DC      0
00DE 0  C0C9          LD      NBSW
00DF 01 4C1800DE      BSC  L  WAIT+1,+-   IF NO INTER YET, WAIT
00E1 01 4C8000DD      BSC  I  WAIT      RETURN AFTER INTER
00E3 0  C0B1    CKNOS LD      NOISE
00E4 01 4C200059      BSC  L  IOOPA,Z   SKIP NOISE RECORD
00E6 0  C0BF          LD      CBSPC     BACKSPACE
00E7 0  70DC          MDX     ERDWT-1
00E8 20 17064885  PERM  LIBF  PAUSE       IF ERR, INDICATE
00E9 1  00EC          DC      EBAD
00EA 01 4C000063      BSC  L  ENTEF     CONTIN & EXIT IF RETURNED
00EC 0  BADC    EBAD  DC      /BAD0
00ED 0  E0B9    PAT   AND     IOCC3+1
00EE 0  9099          S       C001
00EF 0  D0A3          STO     UNIT        SET NEW UNIT
00F0 0  70C9          MDX     ERROR-1
00F1 0  0000    EXINT DC      0         ISS INTER RET LINK
00F2 0  08A9    INTRP XIO     SNSBC     IOCC BYTE SENSE
00F3 0  909A          S       WCTST     CHK NOISE
00F4 0  4828          BSC     +Z
00F5 0  D09F          STO     NOISE
00F6 0  08A3          XIO     SENSE     UNIT STAT, RESET
00F7 0  100D          SLA     13          SET DE
00F8 01 4C100112      BSC  L  OUTIN,-     IF DE NT ON, AWAIT SECND INT.
00FA 0  1001          SLA     1           SET UC BIT
00FB 0  4828          BSC     +Z
00FC 0  6897          STX     ERSW      SET ERSW NON ZERO
00FD 0  68AA          STX     NBSW      SET NBSW NON ZERO
00FE 0  1001          SLA     1         SET UE(EOT,EOF)
00FF 01 4C100112      BSC  L  OUTIN,-   IF NT ON, EXIT
0101 0  C0AC          LD      CCW+1
0102 0  70A3          S       IOCC3
0103 01 4C180114      BSC  L  WTEOR,+-  IF WRITE, WTM(2)
0105 01 4C080112      BSC  L  OUTIN,+   IF NT READ, EXIT
0107 01 740000B3      MDX  L  EOTSW,0   IF READ, IS EOT ON
0109 0  7006          MDX     RWU       IF YES, RWU/TERM
010A 01 740300B3      MDX  L  EOTSW,+3  IF NT ON, SET ON
010C 20 17064885      LIBF    PAUSE     EOF INDICATE
010D 1  008C          DC      EOFD
010E 01 4C400059      BOSC L  IOOPA
0110 0  C096    RWU   LD      IOCC3+1
0111 0  70A4          MDX     TMEOT+1     EXEC RWU/TERM
0112 01 4CC000F1  OUTIN BOSC I  EXINT
0114 01 74FF0004  WTEOR MDX  L  C003,-1
0116 0  709F          MDX     TMEOT
0117 01 74030004      MDX  L  C003,+3
```

```
0119 0   70F6          MDX     RWU
011A                   END
```

SYMBOL TABLE

	AREA	0005	BSPC	0039	CBSPC	00A5	CCW	00AD	CCWA	00AA
	CEOF	00A9	CERAS	00A3	CKNOS	00E3	CREAD	009C	CREWD	00A4
	CWRIT	00A6	C001	0088	C002	0089	C003	0004	C100	0003
	DATA	00B0	ENTEF	0063	ENTIO	0058	ENTRY	0006	EOFD	008C
	EOFO	008D	ECTSW	00B3	ERCNT	009A	ERDWT	00C5	ERROR	00BB
	ERSW	0094	ERTST	008B	EXINT	00F1	EXIT	0001	EXITA	0076
	FBAD	00FC	FBADA	0087	FF00	008F	HOLD	00B4	INTRP	00F2
A	IOBUF	003C	IOCC	0098	IOCC1	00A3	IOCC2	00A4	IOCC3	00A6
	IOOP	005D	IOOPA	0059	IOOPB	005B	LOOP1	0048	LOOP2	006D
	MAGTZ	0000	NPSW	00A8	NOISE	0095	OCNT	0092	OC80	0090
	OUTIN	0112	PAT	00ED	PERM	00E8	RDWRT	008A	READ	0042
	REDY	0083	REWD	0037	RWU	0110	SDATA	009E	SENSE	009A
	SNSWC	009C	TMEOT	00B5	TNRDY	00D5	TREDY	0077	TSSEN	0096
	UNIT	0093	WAIT	00DD	WCTST	008E	WRIT	0048	WTEOR	0114

NO ERRORS IN ABOVE ASSEMBLY.

```
// JOB
// FOR
*LISTALL 7-25.
*NAME TAPEF
*IOCS(CARD,MAGNETIC TAPE,1132 PRINTER)
      DIMENSION X(20)
      END FILE 8
      DO 5 K=1,9
      K=K+1
      READ(2,1)(X(I),I=1,18)
5     WRITE(5,1)(X(I),I=1,18)
1     FORMAT(18A4)
      END FILE 0
      END FILE 0
      REWIND 0
      DO 10 K=1,11
      K=K+1
      REWIND 8
      READ(5,1)(X(I),I=1,18)
      REWIND 9
10    WRITE(5,1)(X(I),I=1,18)
      END FILE 1
      END FILE 1
      REWIND 1
      REWIND 9
      DO 15 K=1,13
      K=K+1
      READ(5,1)(X(I),I=1,18)
15    WRITE(3,1)(X(I),I=1,18)
      CALL EXIT
      END

VARIABLE ALLOCATIONS
 X     =0026  K     =0028  I     =002A

STATEMENT ALLOCATIONS
 1     =0038  5     =0070  10    =0089  15    =0100

FEATURES SUPPORTED
 IOCS

CALLED SUBPROGRAMS
 FLD     FSTO     SRED     SWRT     SCOMP    SFIO     SIOFX    SUBSC    EOFZ     REWNZ

INTEGER CONSTANTS
     8=002E       1=002F       9=0030       2=0031       18=0032      5=0033       0=0

CORE REQUIREMENTS FOR TAPEF
 COMMON       0  VARIABLES      46  PROGRAM      242

END OF COMPILATION
```

// XEQ TAPEF 7-25A.

THIS PROGRAM TESTS THE MAGNETIC TAPE SUPPORT FOR FORTRAN PROGRAMS ON THE IBM 1130 SYSTEM. THE TEST CONSISTS OF READING 72 COLUMNS FROM EACH OF FIVE DATA CARDS, WRITING THE CONTENTS OF EACH CARD ONTO TAPE UNIT 0, TRANSFERING THE FIVE RECORDS FROM TAPE UNIT 0 TO TAPE UNIT 1, AND FINALLY, READING THE RECORDS FROM TAPE UNIT 1 AND PRINTING THEM.

```
// JOB
// ASM
*LIST   7-26.

                                LIBR
0000     095A4000               ENT     IOU
0000 0   900A           IOU    S       M16          IS UNIT LEGAL
0001 00  66800000               LDX   I2 *-*
0003 0   6A06                   STX    2 RET+1
0004 01  4C100009               BSC   L  RET,-      IF NT EXIT
0006 0   1008                   SLA     8
0007 0   E804                   OR      T0005
0008 0   E004                   AND     T0F05
0009 00  4C000000       RET     BSC   L *-*
000B 0   0010           M16     DC      16
000C 0   0005           T0005   DC      /0005
000D 0   0F05           T0F05   DC      /0F05
000E                            END

    NO ERRORS IN ABOVE ASSEMBLY.
```

```
// JOB
// ASM
*LIST   7-27.
                                    LIBR
0001     19166569                   ENT      REWNZ
0017     020D28A9                   ENT      BCKSZ
001B     05586A40                   ENT      EOFZ
0000 0   0003          THREE     DC         3
0001 0   C0FE          REWNZ     LD         THREE
0002 00  66800000                  LDX   I2   *-*
0004 0   D01E          COM       STO        SAVAQ
0005 0   C019                     LD         H4C00
0006 0   D00E                     STO        RET
0007 0   10A0                     SLT        32
0008 00  C6800000                 LD    I2   0
000A 0   7201                     MDX    2   1
000B 0   6A0A                     STX    2   RET+1
000C 20  095A4000                 LIBF       IOU
000D 0   4808                     BSC        +
000E 0   7006                     MDX        RET
000F 0   18D8                     RTE        24
0010 0   90CF                     S          H0500
0011 0   4820                     BSC        Z
0012 0   7002                     MDX        RET
0013 0   C00F                     LD         SAVAQ
0014 20  140478E9      MAG       LIBF       MAGTZ
0015 00  4C000000      RET       BSC   L    *-*
0017 0   C00A          BCKSZ     LD         FOUR
0018 00  66800000                 LDX   I2   *-*
001A 0   70E9                     MDX        COM
001B 0   C005          EOFZ      LD         FIVE
001C 00  66800000                 LDX   I2   *-*
001E 0   70F5                     MDX        COM
001F 0   4C00          H4C00     DC         /4C00
0020 0   0500          H0500     DC         /0500
0021 0   0005          FIVE      DC         5
0022 0   0004          FOUR      DC         4
0023 0   0000          SAVAQ     DC         0
0024                               END

   NO ERRORS IN ABOVE ASSEMBLY.
```

```
// JOB
// ASM
*LIST         7-28.
*PRINT SYMBOL TABLE
0000       140478C1             ENT       MAGTA
0000       0000         MAGTA BSS         0
0000 0     0000         EXIT  DC          0
0001 01    660000D3     ENTRY LDX   L2 EXINT             SET INTER. ENTRANCE ADDR
0003 00    6E00000C           STX   L2 12
0005 01    66800000           LDX   I2 MAGTA
0007 00    C6800000           LD    I2 0                 COMMAND
0009 0     9065               S        C002
000A 0     D065               STO      RDWRT             SAVE OP CODE
000B 01    4C280010           BSC   L  *+3,+Z             IF READ, BRANCH
000D 0     1010               SLA      16                 IF NT READ, SET EOTSW OFF
000E 01    D400009B           STO   L  EOTSW
0010 00    C6800001           LD    I2 1                  UNIT
0012 0     D068           A [ STO      UNIT              RESET UNIT
0013 0     E85F             [ OR       EOFO              FORM EOFX
0014 0     D05D             [ STO      EOFD                  AND STORE
0015 0     C06B               LD       IOCC+1
0016 0     E05E               AND      FF00
0017 0     E863               OR       UNIT              IOCC DEVICE
0018 0     E85D               OR       0080
0019 0     D067               STO      IOCC+1
001A 0     D064               STO      TSSEN+1               SET UP
001B 0     D06B               STO      SDATA+1
001C 00    C6800002           LD    I2 2                  LOAD WORD CNT
001E 0     D078               STO      CCW+2
001F 0     1001               SLA      1
0020 0     D074               STO      CCW
0021 0C    C6000003           LD    L2 3                  LOAD ADDR OF I/O AREA
0023 0     9073               S        CCW+2
0024 0     804A               A        C002
0025 0     D071               STO      CCW+2
0026 0     C049               LD       RDWRT             LOAD OP CODE
0027 01    4C280040           BSC   L  READ,+Z           READ
0029 01    4C180044           BSC   L  WRIT,+-           WRITE
002B 0     9042               S        C001
002C 01    4C180035           BSC   L  REWD,+-           REWIND
002E 0     903F               S        C001
002F 01    4C180037           BSC   L  BSPC,+-           BACKSPACE
0031 0     1010               SLA      16                SET RDWRT TO WRITE FOR WTM
0032 0     D03D               STO      RDWRT                   RETRIES
0033 0     C05D               LD       CEOF              END OF FILE
0034 0     7014               MDX      ENTIO
0035 0     C056         REWD  LD       CREWD
0036 0     7001               MDX      BSPC+1
0037 0     C055         BSPC  LD       CBSPC
0038 0     1890               SRT      16
0039 0     4023               BSI      TREDY             TEST DEV RDY
003A 0     C05D               LD       DATA
003B 0     1803               SRA      3                 SET LP MARKER
003C 01    4CC40000           BOSC  I  EXIT,E            EXIT IF ON
003E 0     1090               SLT      16
003F 0     7009               MDX      ENTIO
0040 0     C037         READ  LD       C100              READ
0041 0     D02F               STO      ERTST             SET RETRY COUNTER
0042 0     C041               LD       CREAD
0043 0     7003               MDX      ENTIO-2
0044 0     C034         WRIT  LD       C003              WRITE
0045 0     D02B               STO      ERTST
0046 0     C047       B ----> LD       CWRIT
0047 01    74020000           MDX   L  MAGTA,+2
```

```
0049 0  D030        ENTIO STO      HOLD
004A 01 74020000           MDX  L  MAGTA,+2
004C 0  1010        IOOPA SLA      16
004D 0  D034              STO      ERCNT          INIT ERROR CNT
004E 0  C02B        IOOPB LD       HOLD           LOAD COMMAND
004F 0  D046              STO      CCW+1          SET COOMAND INTO CCW
0050 0  10A0        IOOP  SLT      32
0051 0  D82A              STD      ERSW           CLEAR ERROR SWITCH
0052 0  4069              BSI      TNRDY           EXEC OP AND AWAIT INTER
0053 0  C028              LD       ERSW
0054 01 4C2000A2          BSC  L   ERROR,Z        BRANCH IF ERROR
0056 0  C019        ENTFF LD       RDWRT
0057 01 4CD00000          BOSC I   EXIT,-         EXIT IF NOT READ
0059 0  1010              SLA      16
005A 0  D040              STO      EOTSW           SET SWT TO OFF
005B 01 4CC00000    EXITA BOSC I   EXIT
005D 0  0000        TREDY DC       0              TEST UNIT READY ,NT BSY
005E 0  1010              SLA      16
005F 0  D030              STO      NBSW           SET INTER SWT TO OFF
0060 0  0825              XIO      SDATA          FETCH SENSE DATA
0061 0  4062              BSI      WAIT            AWAIT INTER
0062 0  C035              LD       DATA
0063 0  100A              SLA      10             SET TUA, TUB BITS
0064 01 4C020069          BSC  L   REDY,C         IF READY, BRANCH
0066 20 17064885          LIBF     PAUSF          IF NT RDY, INDICATE
0067 1  006D              DC       FBADA
0068 0  70F5              MDX      TREDY+1        RETEST
0069 01 4C68005E    REDY  BOSC L   TREDY+1,+Z     IF BUSY, RETEST
006B 01 4C80005D          BSC  I   TREDY          IF READY, GO
006D 0  DEAD        FBADA DC       /DEAD
006E 0  0001        C001  DC       1
006F 0  0002        C002  DC       2
0070 0  0000        RDWRT DC       0
0071 0  0000        ERTST DC       0
0072 0  0000        FOFD  DC       0
0073 0  E0F0        EOF0  DC       /E0F0
0074 0  FFF4        WCTST DC       -12
0075 0  FF00        FF00  DC       /FF00
0076 0  0080        0080  DC       /0080
0078    0000              BSS  E   0
0078 0  0032        C100  DC       50             READ RETRY COUNT
0079 0  0003        C003  DC       3              WRITE/WTV RETRY  CNT
007A 0  0000        HOLD  DC       0
007B 0  0000        UNIT  DC       0
007C 0  0000        ERSW  DC       0
007D 0  0000        NOISE DC       0
007E 1  0092        TSSFN DC       CCWA
007F 0  DD00              DC       /DD00
0080 1  0095        IOCC  DC       CCW            START
0081 0  DD00              DC       /DD00             I/O
0082 0  0000        SENSE DC       0              SENSE U STAT W/ RESET
0083 0  DF03              DC       /DF03
0084 0  2002        SNSWC DC       /2002          READ
0085 0  DF06              DC       /DF06          SENSE BYTE CNT
0086 1  0088        SDATA DC       SDATA+2
0087 0  DD00              DC       /DD00
0088 0  0006              DC       6
0089 0  0004              DC       4
008A 1  0098              DC       DATA
008B 0  0017        IOCC1 DC       /0017          ERASE
008C 0  0007        IOCC2 DC       /0007          REWIND
008D 0  0027        CBSPC DC       /0027          BACKSPACE
```

```
008E 0  2001      IOCC3  DC     /2001       WRITE
008F 0  000F             DC     /000F       RWU
0090 0  0000      NBSW   DC     0
0091 0  201F      CEOF   DC     /201F       WTM
0084              CREAD  EQU    SNSWC
008E              CWRIT  EQU    IOCC3
008B              CERAS  EQU    IOCC1
008C              CREWD  EQU    IOCC2
0082              ERCNT  EQU    SENSE
0092 0  0000      CCWA   DC     0           TEST I/O(CCW)
0093 0  0000             DC     0
0094 0  0000             DC     0
0095 0  007A      CCW    DC     122         BYTES
0096 0  0000             DC     0           COMMAND
0097 0  003D             DC     /003D       IOBUF+1 ADDR
0098    0003      DATA   BSS    3
009B 0  0000      EOTSW  DC     0
009C 0  C0F4      TMEOT  LD     CEOF        WTM
009D 0  D0F8             STO    CCW+1
009E 01 4C4000A0         BOSC L *
00A0 0  401B             BSI    TNRDY
00A1 0  70B9             MDX    EXITA
00A2 0  C0C9      ERROR  LD     RDWRT
00A3 01 4CF00000         BOSC I EXIT,-Z     EXIT IF NT RD/WRT
00A5 01 4C2000CA         BSC  L CKNOS,Z     BRANCH IF READ
00A7 0  C0F5             LD     CBSPC         (WRITE ERROR)
00A8 0  D0E9             STO    CCW+1
00A9 0  4012             BSI    TNRDY       BACK SPACE
00AA 0  C0E0             LD     CERAS       SET ERASE
00AB 0  D0EA             STO    CCW+1
00AC 0  400F      ERDWT  BSI    TNRDY       EXEC ERASE OR BSP
00AD 0  C0D4             LD     ERCNT
00AE 0  80BF             A      C001        INCRM ERR CNT
00AF 0  D0D2             STO    ERCNT
00B0 0  90C9             S      ERTST       CNT OVER MAX
00B1 01 4C0900AE         BSC  L IOOPB,+     NO, RETRY OPERATION
00B3 0  C0E2             LD     CCW+1
00B4 0  F0DC             EOR    CEOF        TEST FOR WTM
00B5 01 4C2000CF         BSC  L PERM,Z      IF NT WTM, INDIC, PERM, ERR
00B7 01 74000098         MDX  L EOTSW,0
00B9 0  70E2             MDX    TMEOT       IF EOT, RETRY
00BA 0  D0C7             STO    ERCNT
00BB 0  7094             MDX    IOOP        IF WTM, RETRY
00BC 0  0000      TNRDY  DC     0
00BD 0  409F             BSI    TREDY       UNIT READY
00BE 0  1010             SLA    16
00BF 0  D0D0             STO    NBSW
00C0 0  08BF             XIO    IOCC        EXECUTE OP
00C1 0  4002             BSI    WAIT        AWAIT INTER
00C2 01 4C8000BC         BSC  I TNRDY       RET AFTER INTER
00C4 0  0000      WAIT   DC     0
00C5 0  C0CA             LD     NBSW
00C6 01 4C1800C5         BSC  L WAIT+1,+-   IF NO INTER YET, WAIT
00C8 01 4C8000C4         BSC  I WAIT        RETURN AFTER INTER
00CA 0  C0B2      CKNOS  LD     NOISE
00CB 01 4C2000D0         BSC  L IOOPA,Z     SKIP NOISE RECORD
00CD 0  C0BF             LD     CBSPC       BACKSPACE
00CE 0  70DC             MDX    ERDWT-1
00CF 20 17064885  PERM   LIBF   PAUSE       IF ERR, INDICATE
00D0 1  00D2             DC     FBAD
00D1 0  7084             MDX    ENTEF       CONTINUE & EXIT IF RETURNED
00D2 0  BAD0      FBAD   DC     /BAD0
```

```
00D3 0  0000        EXINT DC      0              ISS INTER RET LINK
00D4 0  08AF        INTRP XIO     SNSWC          IOCC BYTE SENSE
00D5 0  909E              S       WCTST          CHK NOISE
00D6 0  4828              BSC     +Z
00D7 0  D0A5              STO     NOISE
00D8 0  08A9              XIO     SENSE          UNIT STAT, RESET
00D9 0  100D              SLA     13              SET DE
00DA 01 4C1000F4          BSC  L  OUTIN,-         IF DE NT ON, AWAIT SECND INT.
00DC 0  1001              SLA     1               SET UC BIT
00DD 0  4828              BSC     +Z
00DE 0  689D              STX     ERSW           SET ERSW NON ZERO
00DF 0  68B0              STX     NBSW           SET NBSW NON ZERO
00E0 0  1001              SLA     1              SET UE(EOT,EOF)
00E1 01 4C1000F4          BSC  L  OUTIN,-        IF NT ON, EXIT
00E3 0  C0B2              LD      CCW+1
00E4 0  90A9              S       IOCC3
00E5 01 4C1800F6          BSC  L  WTEOR,+-       IF WRITE, WTM(2)
00E7 01 4C0800F4          BSC  L  OUTIN,+        IF NT READ, EXIT
00E9 01 7400009B          MDX  L  EOTSW,0        IF READ, IS EOT ON
00EB 0  7006              MDX     RWU            IF YES, RWU/TERM
00EC 01 7403009B          MDX  L  EOTSW,+3       IF NT ON, SET ON
00EE 20 17064885          LIBF    PAUSE          EOF INDICATE
00EF 1  0072              DC      EOFD
00F0 01 4C40004C          BOSC L  IOOPA
00F2 0  C09C        RWU   LD      IOCC3+1
00F3 0  70A9              MDX     TMEOT+1         EXEC RWU/TERM
00F4 01 4CC000D3    OUTIN BOSC I  EXINT          INTER. EXIT
00F6 01 74FF0079    WTEOR MDX  L  C003,-1
00F8 0  70A3              MDX     TMEOT
00F9 01 74030079          MDX  L  C003,+3
00FB 0  70F6              MDX     RWU
00FC                      END
```

SYMBOL TABLE

BSPC	0037	CBSPC	008D	CCW	0095	CCWA	0092	CEOF	0091
CERAS	008B	CKNOS	00CA	CREAD	0084	CREWD	008C	CWRIT	008E
C001	006E	C002	006F	C003	0079	C100	0078	DATA	0098
ENTEF	0056	ENTIO	0049	ENTRY	0001	EOFD	0072	EOFO	0073
EOTSW	009B	ERCNT	0082	ERDWT	00AC	ERROR	00A2	ERSW	007C
ERTST	0071	EXINT	00D3	EXIT	0000	EXITA	005B	FBAD	00D2
FBADA	006D	FF00	0075	HOLD	007A	INTRP	00D4	IOCC	0080
IOCC1	008B	IOCC2	008C	IOCC3	008E	IOOP	0050	IOOPA	004C
IOOP3	004E	MAGTA	0000	NBSW	0090	NOISE	007D	0080	0076
OUTIN	00F4	PERM	00CF	RDWRT	0070	READ	0040	REDY	0069
REWD	0035	RWU	00F2	SDATA	0086	SENSE	0082	SNSWC	0084
TMEOT	009C	TNRDY	00BC	TREDY	005D	TSSEN	007E	UNIT	007B
WAIT	00C4	WCTST	0074	WRIT	0044	WTEOR	00F6		

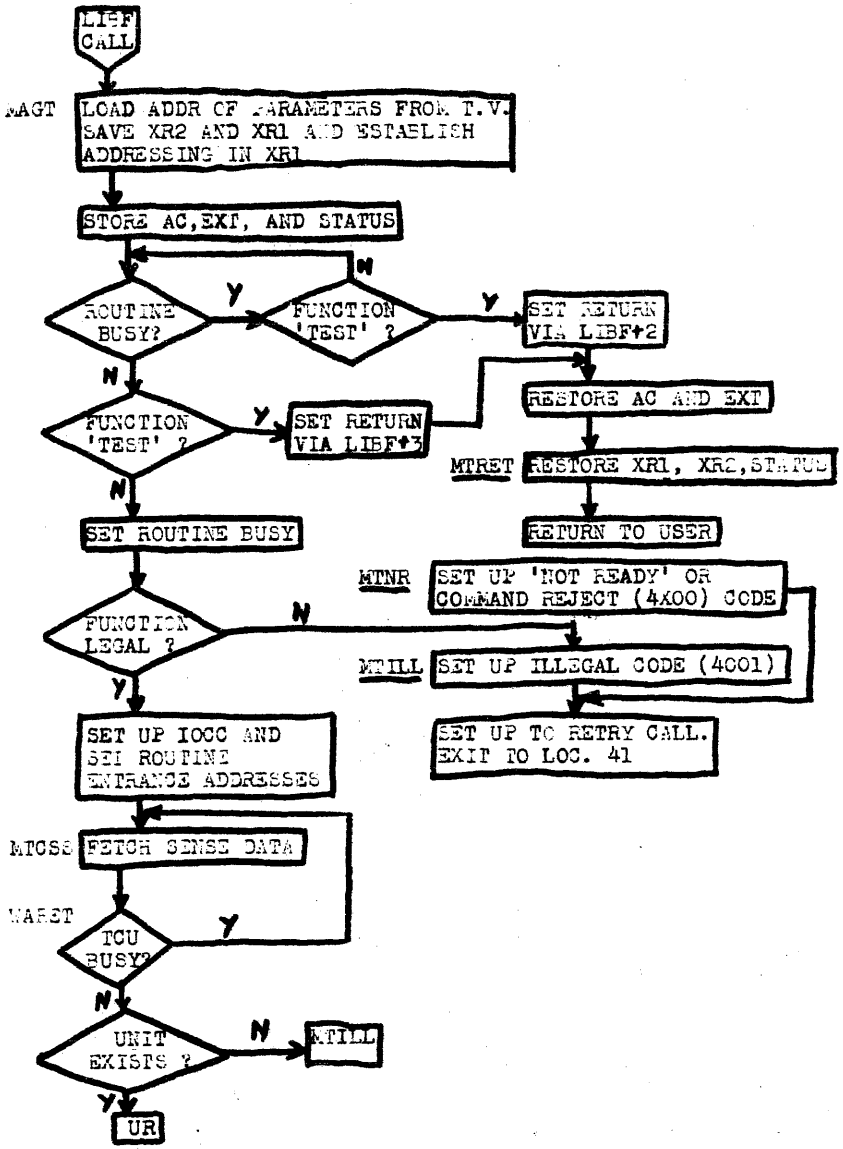
NO ERRORS IN ABOVE ASSEMBLY.

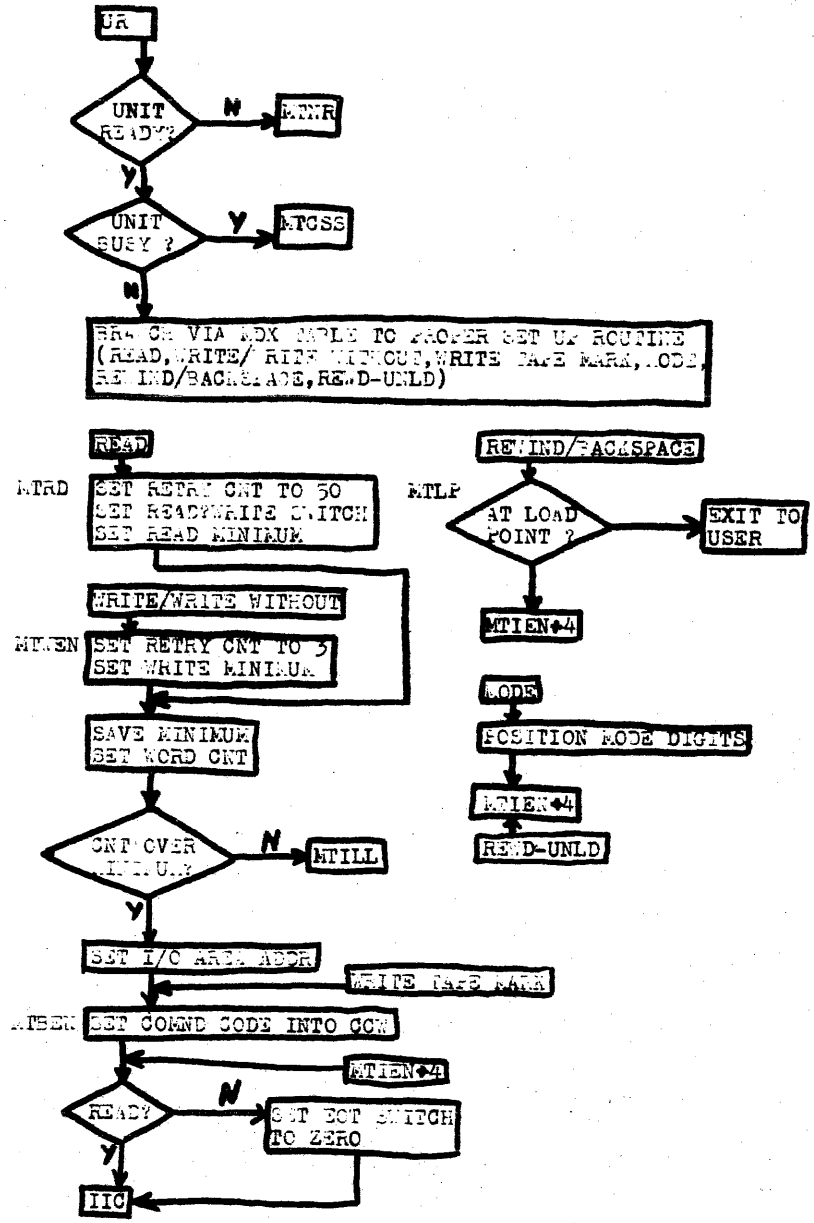
```
// FOR
*LISTALL   7-29.
*NAME TAPEM
*IOCS(CARD,1132 PRINTER)
      DIMENSION X(20)
      DO 5 K=1,9
      K=K+1
      READ(2,1)(X(I),I=1,18)
5     CALL MAGTA(2,0,36,X)
1     FORMAT(18A4)
      CALL MAGTA (5,0)
      CALL MAGTA (5,0)
      CALL MAGTA (3,0)
      DO 10 K=1,11
      K=K+1
      CALL MAGTA(0,0,36,X)
10    CALL MAGTA(2,1,36,X)
      CALL MAGTA (5,1)
      CALL MAGTA (5,1)
      CALL MAGTA (3,1)
      DO 15 K=1,9
      K=K+1
      CALL MAGTA(0,1,36,X)
15    WRITE(3,1)(X(I),I=1,18)
      CALL MAGTA(0,1,36,X)
      CALL MAGTA(0,1,36,X)
      CALL EXIT
      END

VARIABLE ALLOCATIONS
 X     =0026  K     =0028  I     =002A

STATEMENT ALLOCATIONS
 1     =0037  5     =006D  10    =0097  15    =00C1

FEATURES SUPPORTED
 IOCS

CALLED SUBPROGRAMS
 MAGTA    FLD      FSTO     SRED     SWRT     SCOMP    SFIO     SIOFX    SUBSC    CARDZ

INTEGER CONSTANTS
     1=002E       9=002F       2=0030       18=0031       0=0032       36=0033       5=

CORE REQUIREMENTS FOR TAPEM
 COMMON       0  VARIABLES      46  PROGRAM     192

END OF COMPILATION
```

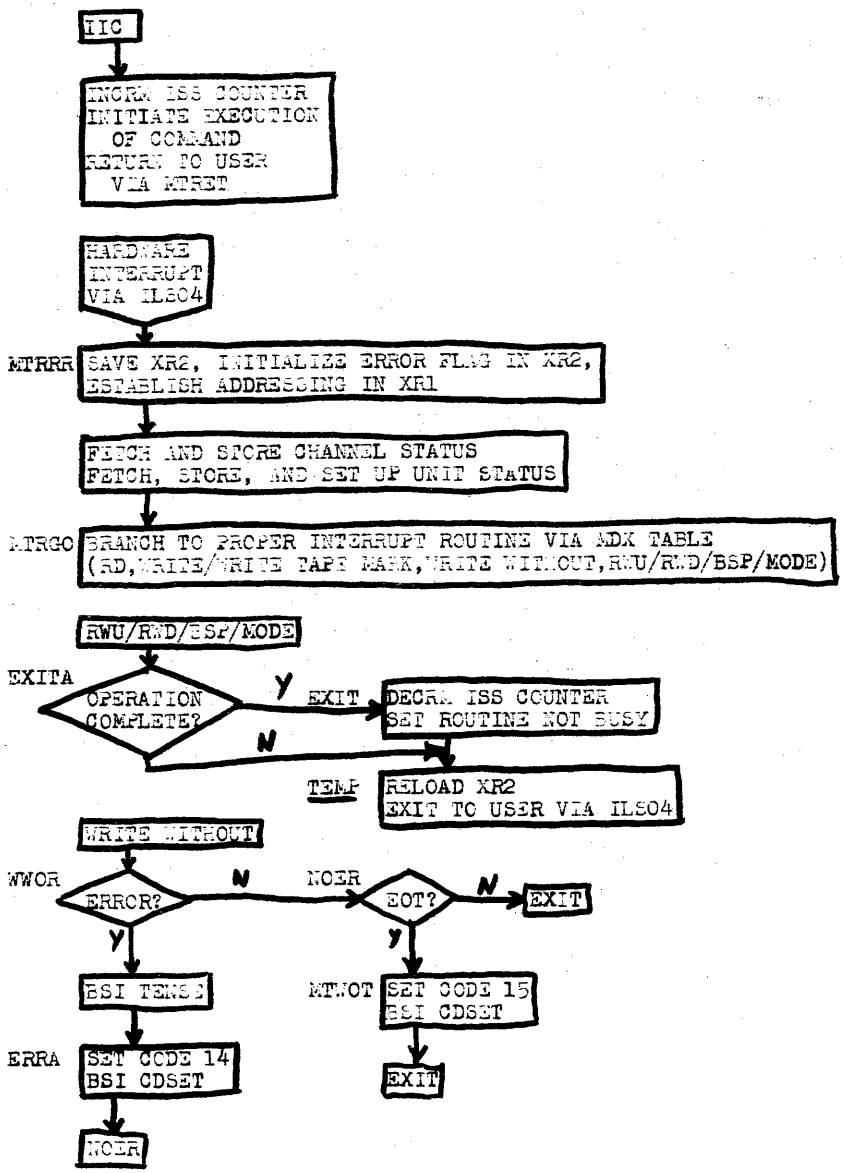
// XEQ TAPEM 7-29A.

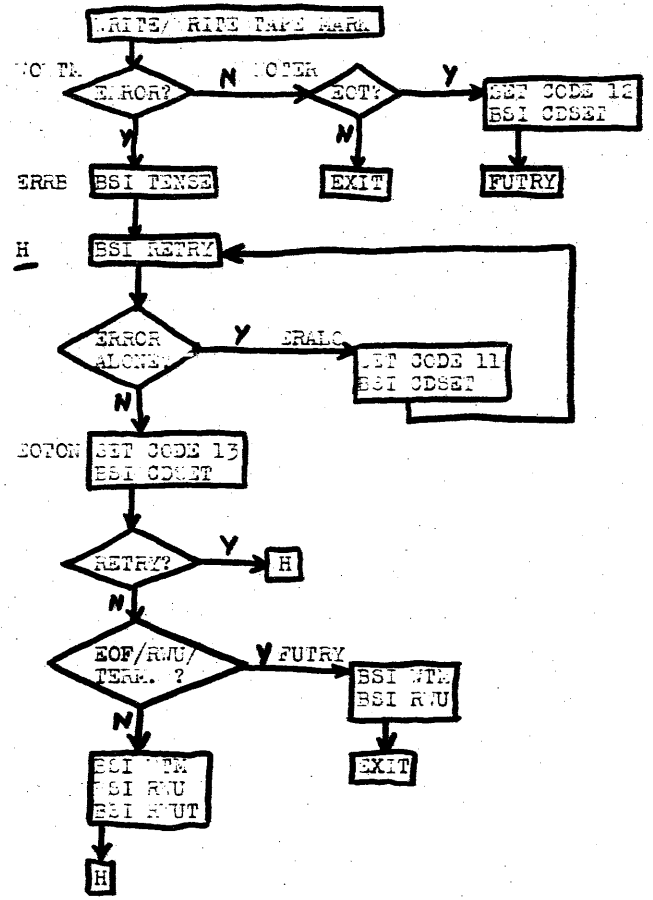
```
*THIS PROGRAM TESTS THE MAGNETIC TAPE SUPPORT FOR ASSEMBLER PROGRAMS ON
THE IBM 1130 SYSTEM.  THE TEST CONSISTS OF READING 72 COLUMNS FROM
EACH OF FIVE DATA CARDS, WRITING THE CONTENTS OF EACH CARD ONTO TAPE
UNIT 0, TRANSFERING THE FIVE RECORDS FROM TAPE UNIT 0 TO TAPE UNIT 1,
AND FINALLY, READING THE RECORDS FROM TAPE UNIT 1 AND PRINTING THEM.
```

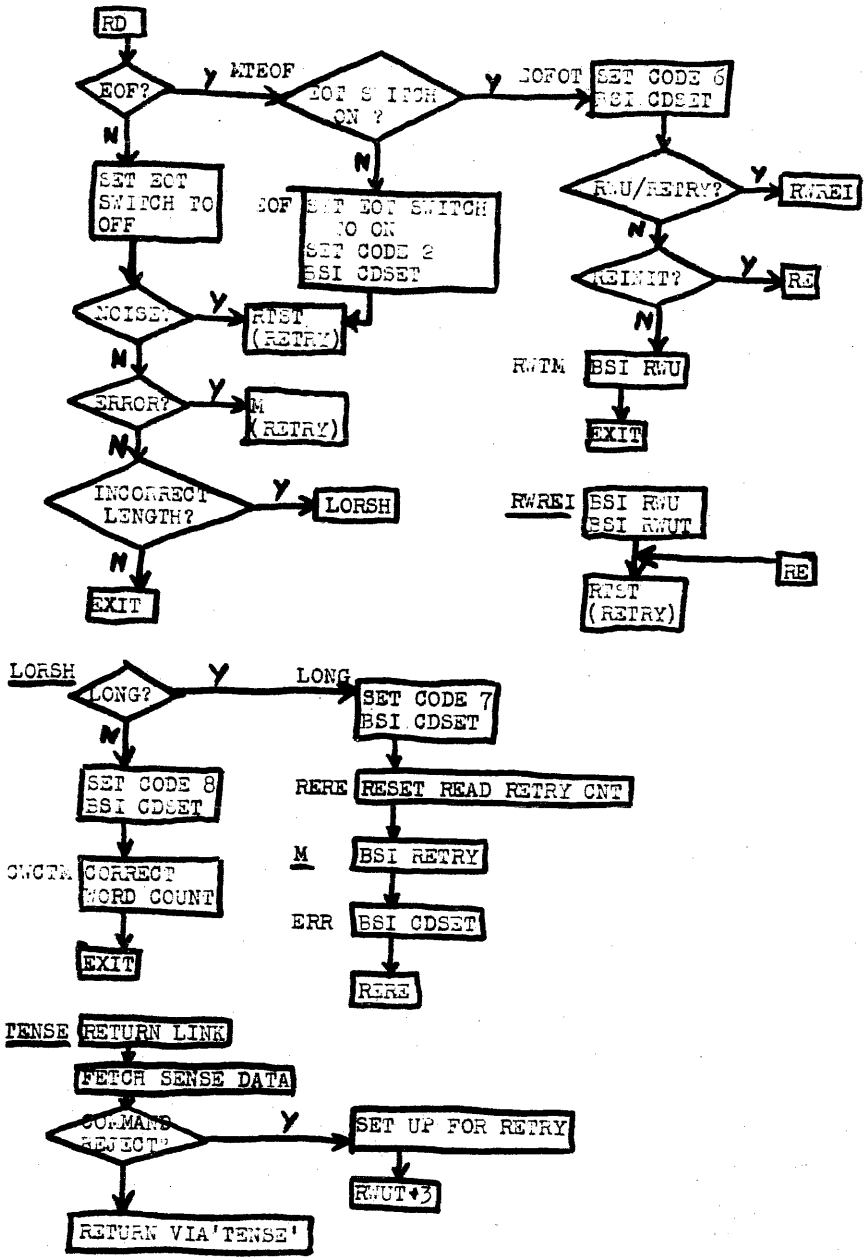
7-31. MAGT

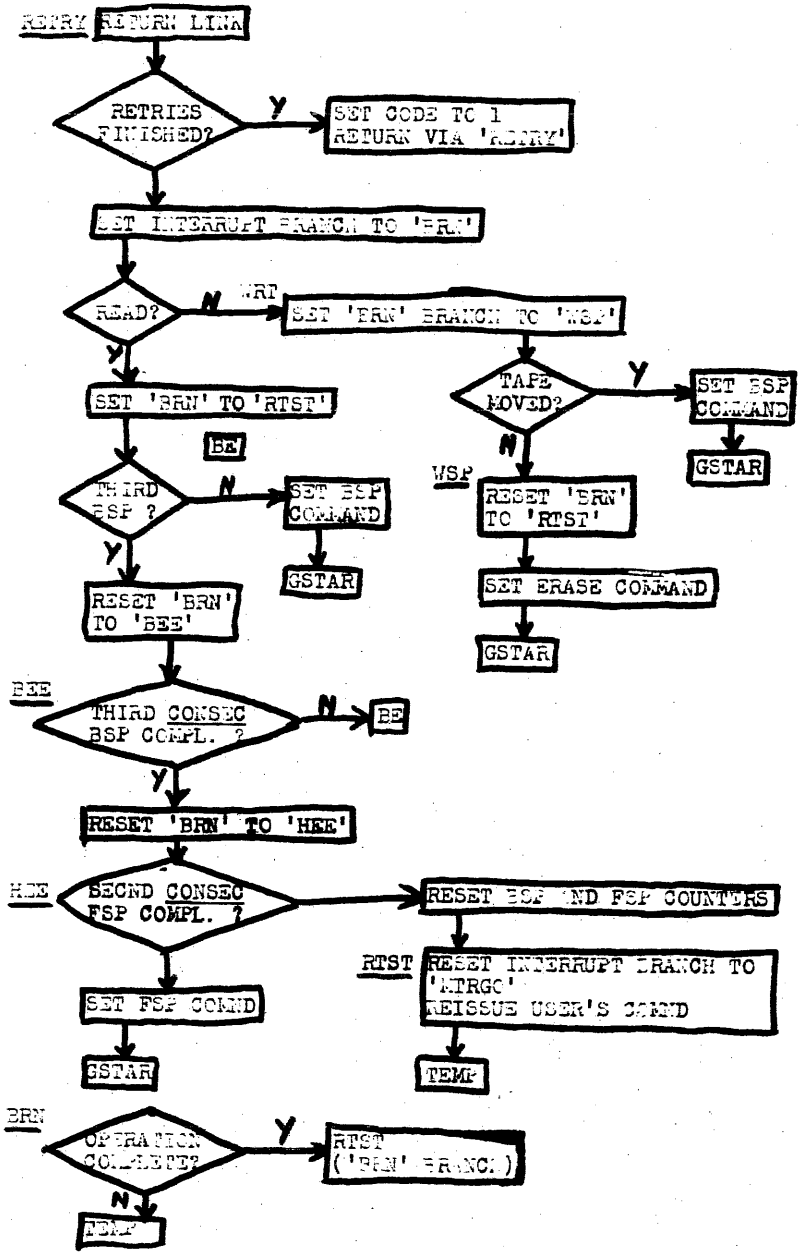

LIBF CALL
MAGT
LOAD ADDR OF PARAMETERS FROM T.V. SAVE XR2 AND XR1 AND ESTABLISH ADDRESSING IN XR1
STORE AC,EXT, AND STATUS
ROUTINE BUSY?
Y
FUNCTION 'TEST' ?
Y
SET RETURN VIA LIBF+2
N
N
FUNCTION 'TEST' ?
Y
SET RETURN VIA LIBF+3
RESTORE AC AND EXT
MTRET
RESTORE XR1, XR2, STATUS
N
SET ROUTINE BUSY
RETURN TO USER
MTNR
SET UP 'NOT READY' OR COMMAND REJECT (4X00) CODE
FUNCTION LEGAL ?
N
MTILL
SET UP ILLEGAL CODE (4001)
Y
SET UP IOCC AND SEI ROUTINE ENTRANCE ADDRESSES
SET UP TO RETRY CALL. EXIT TO LOC. 41
MTCSS
FETCH SENSE DATA
MARST
TCU BUSY?
Y
N
UNIT EXISTS ?
N
MTILL
Y
UR

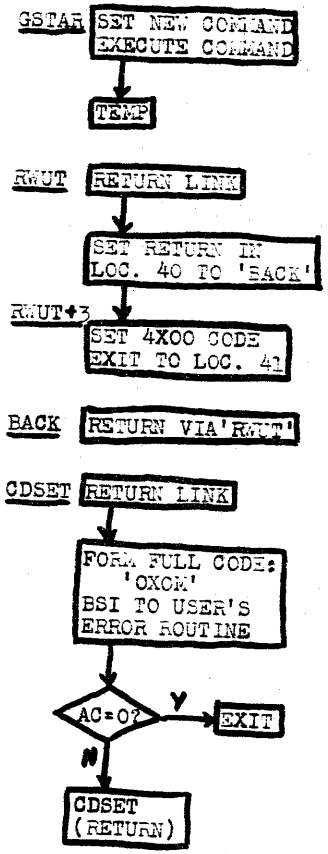

UR
UNIT READY?
N
MTNR
Y
UNIT BUSY ?
Y
MTCSS
N
BR4 ON VIA MDX TABLE TO PROPER SET UP ROUTINE (READ, WRITE/ RITE WITHOUT, WRITE TAPE MARK, MODE, SET IND/BACKSPACE, REWD-UNLD)
READ
MTRD
SET RETRY CNT TO 50 SET READ/WRITE SWITCH SET READ MINIMUM
WRITE/WRITE WITHOUT
MTWEN
SET RETRY CNT TO 3 SET WRITE MINIMUM
SAVE MINIMUM SET WORD CNT
CNT OVER MINIMUM
N
MTILL
Y
SET I/O AREA ADDR
WRITE TAPE MARK
MTSEN
SET COMND CODE INTO CCW
MTIEN+4
READY?
N
SET EOT SWITCH TO ZERO
Y
IIC
REWIND/BACKSPACE
MTLP
AT LOAD POINT ?
EXIT TO USER
MTIEN+4
MODE
POSITION MODE DIGITS
MTIEN+4
REWD-UNLD

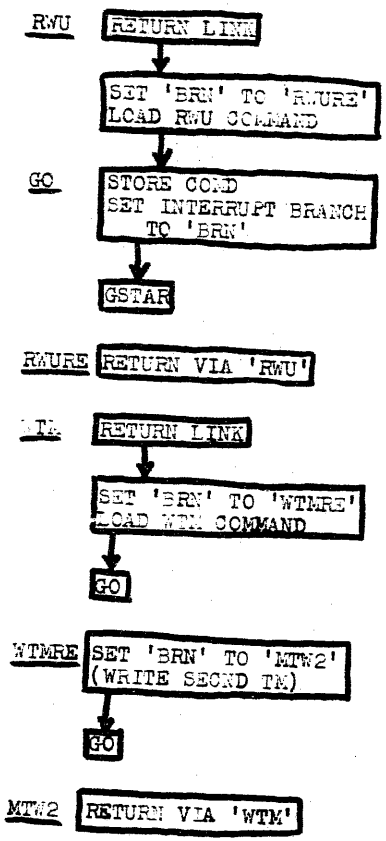

IIC
INCRM ISS COUNTER
INITIATE EXECUTION
OF COMMAND
RETURN TO USER
VIA MTRET
HARDWARE
INTERRUPT
VIA IL804
MTRRR
SAVE XR2, INITIALIZE ERROR FLAG IN XR2,
ESTABLISH ADDRESSING IN XR1
FETCH AND STORE CHANNEL STATUS
FETCH, STORE, AND SET UP UNIT STATUS
MTRGO
BRANCH TO PROPER INTERRUPT ROUTINE VIA XDX TABLE
(RD,WRITE/WRITE TAPE MARK,WRITE WITHOUT,RWU/RWD/BSP/MODE)
RWU/RWD/BSP/MODE
EXITA
OPERATION
COMPLETE?
Y
EXIT
DECRM ISS COUNTER
SET ROUTINE NOT BUSY
N
TEMP
RELOAD XR2
EXIT TO USER VIA IL804
WRITE WITHOUT
WWOR
ERROR?
N
NOER
EOT?
N
EXIT
Y
Y
BSI TENSE
MTWOT
SET CODE 15
BSI CDSET
ERRA
SET CODE 14
BSI CDSET
EXIT
NOER


RITE/ RITE TAPE MARK
ERROR?
N
EOT?
Y
SET CODE 12
BSI CDSET
Y
N
ERRB
BSI TENSE
EXIT
FUTRY
H
BSI RETRY
ERROR
Y
SET CODE 11
BSI CDSET
N
SET CODE 13
BSI CDSET
RETRY?
Y
H
N
EOF/RWU/
Y
FUTRY
BSI WTM
BSI RWU
EXIT
N
H

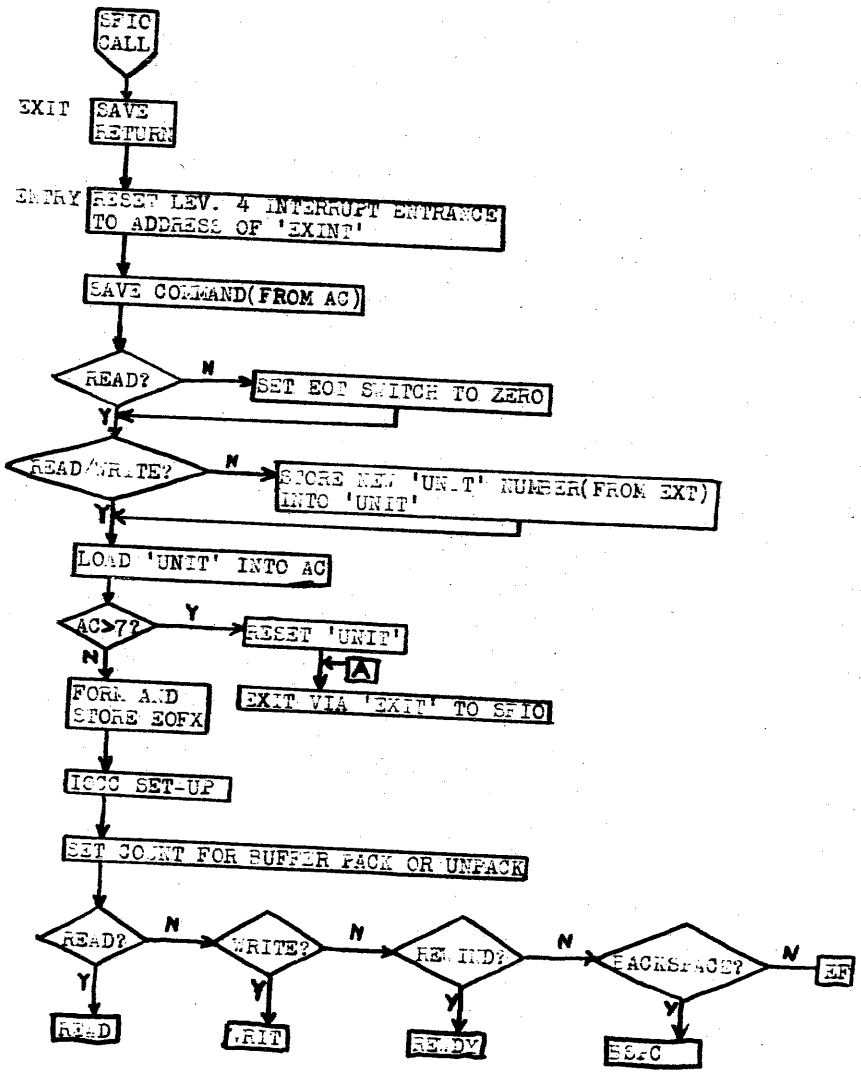

RD
EOF?
Y
MTEOF
EOF SWITCH ON ?
Y
EOFOT
SET CODE 6 BSI CDSET
N
SET EOT SWITCH TO OFF
EOF
SET EOT SWITCH TO ON SET CODE 2 BSI CDSET
RWU/RETRY?
Y
RWREI
N
RELIMIT?
Y
RE
N
RWTM
BSI RWU
EXIT
NOISE?
Y
RTST (RETRY)
N
ERROR?
Y
M (RETRY)
N
INCORRECT LENGTH?
Y
LORSH
N
EXIT
RWREI
BSI RWU
BSI RWUT
RE
RTST (RETRY)
LORSH
LONG?
Y
LONG
SET CODE 7 BSI CDSET
N
SET CODE 8 BSI CDSET
RERE
RESET READ RETRY CNT
M
BSI RETRY
CWCTR
CORRECT WORD COUNT
ERR
BSI CDSET
EXIT
RERE
TENSE
RETURN LINK
FETCH SENSE DATA
COMMAND REJECT?
Y
SET UP FOR RETRY
RWUT+3
RETURN VIA 'TENSE'

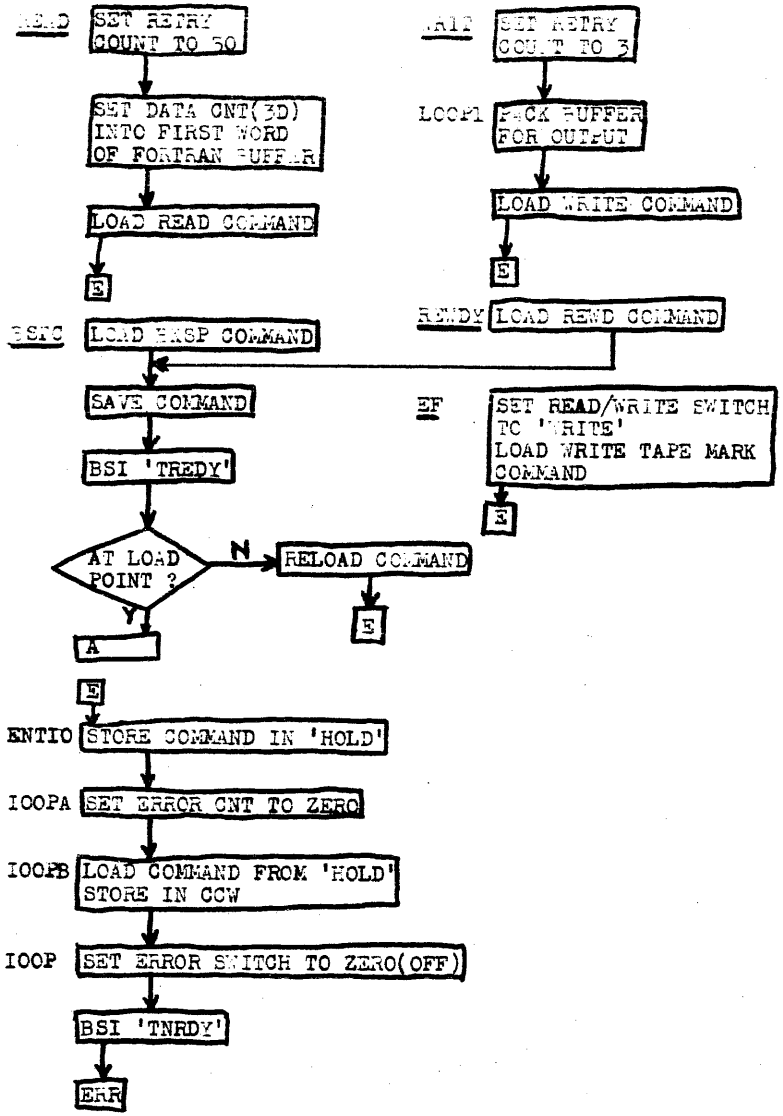

RETRY
RETURN LINK
RETRIES FINISHED?
Y
SET CODE TO 1 RETURN VIA 'RETRY'
SET INTERRUPT BRANCH TO 'ERR'
READ?
N
WRT
SET 'BRN' BRANCH TO 'WSP'
Y
SET 'BRN' TO 'RTST'
TAPE MOVED?
Y
SET BSP COMMAND
GSTAR
BE
N
WSP
THIRD BSP ?
N
SET BSP COMMAND
RESET 'BRN' TO 'RTST'
GSTAR
Y
SET ERASE COMMAND
RESET 'BRN' TO 'BEE'
GSTAR
BEE
THIRD CONSEC BSP COMPL. ?
N
BE
Y
RESET 'BRN' TO 'HEE'
HEE
SECND CONSEC FSP COMPL. ?
RESET BSP AND FSP COUNTERS
RTST
RESET INTERRUPT BRANCH TO 'ERRGO' REISSUE USER'S COMMD
SET FSP COMND
TEMP
GSTAR
BRN
OPERATION COMPLETE?
Y
RTST ('BRN' BRANCH)
N
TEMP

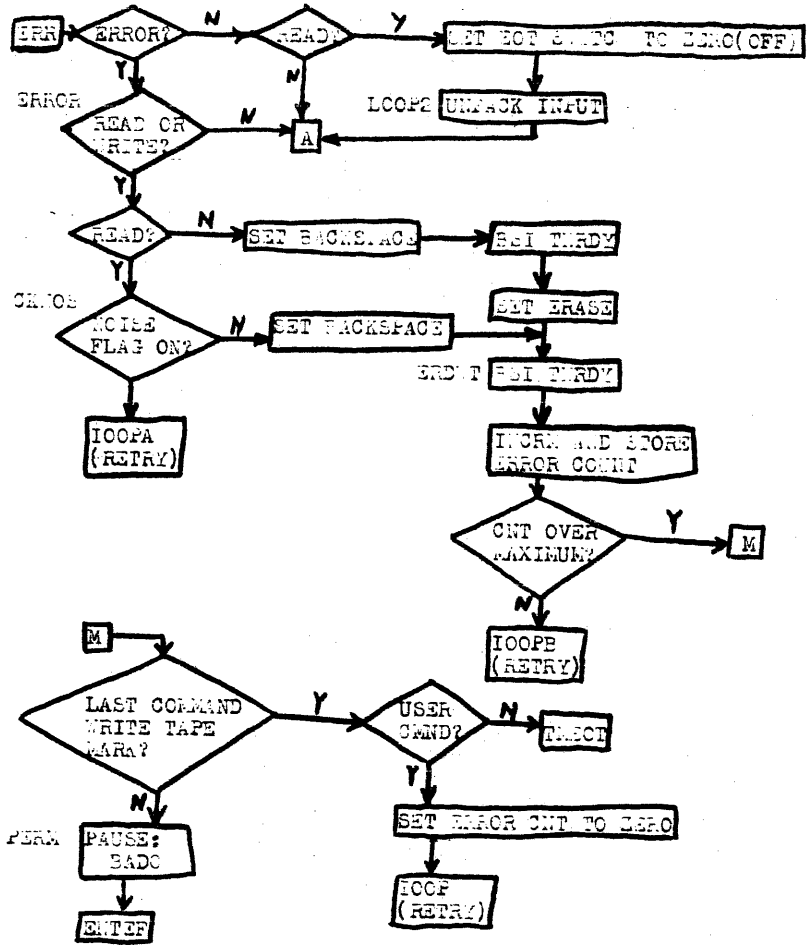

GSTAR
SET NEW COMMAND
EXECUTE COMMAND
TEMP
RWUT
RETURN LINK
SET RETURN IN
LOC. 40 TO 'BACK'
RWUT+3
SET 4X00 CODE
EXIT TO LOC. 42
BACK
RETURN VIA 'RWUT'
CDSET
RETURN LINK
FORM FULL CODE:
'OXOM'
BSI TO USER'S
ERROR ROUTINE
AC=0?
Y
EXIT
N
CDSET
(RETURN)

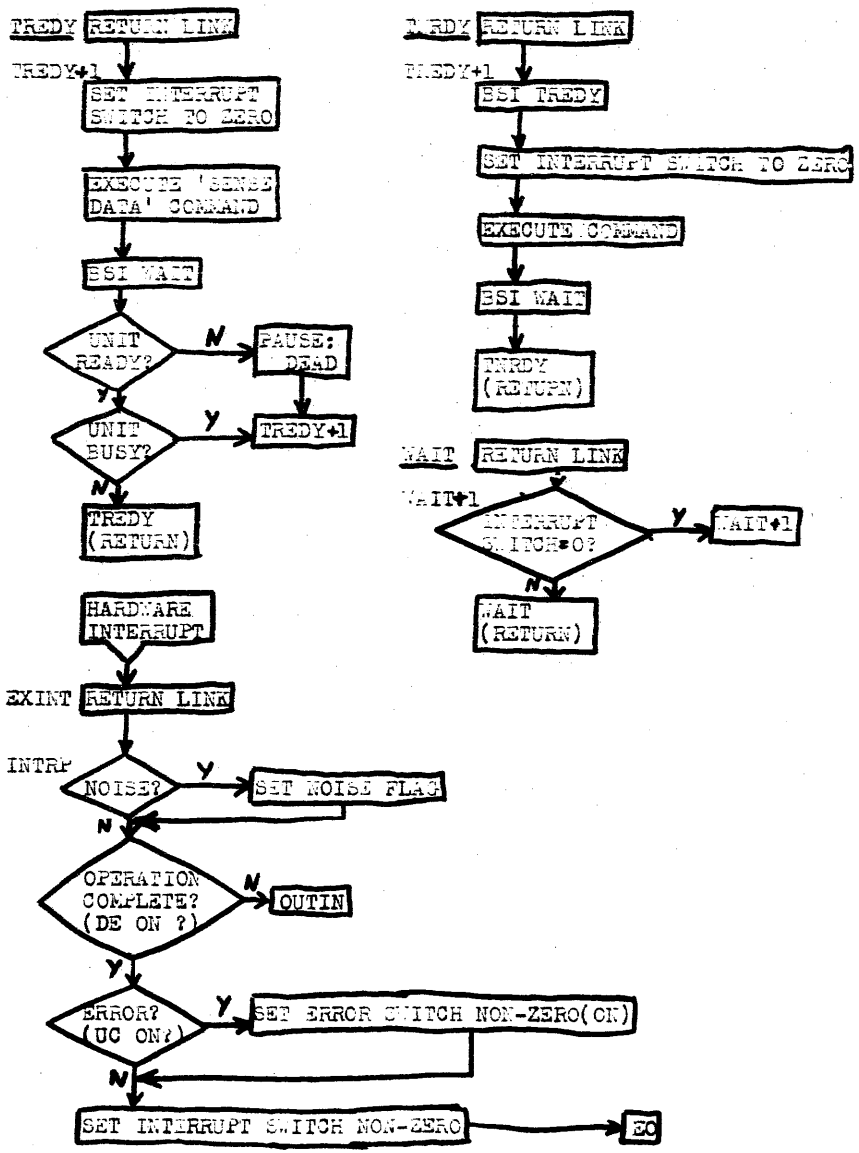

RWU
RETURN LINK
SET 'BRN' TO 'RWURE'
LOAD RWU COMMAND
GO
STORE COND
SET INTERRUPT BRANCH
TO 'BRN'
GSTAR
RWURE
RETURN VIA 'RWU'
TM
RETURN LINK
SET 'BRN' TO 'WTMRE'
LOAD WTM COMMAND
GO
WTMRE
SET 'BRN' TO 'MTW2'
(WRITE SECND TM)
GO
MTW2
RETURN VIA 'WTM'

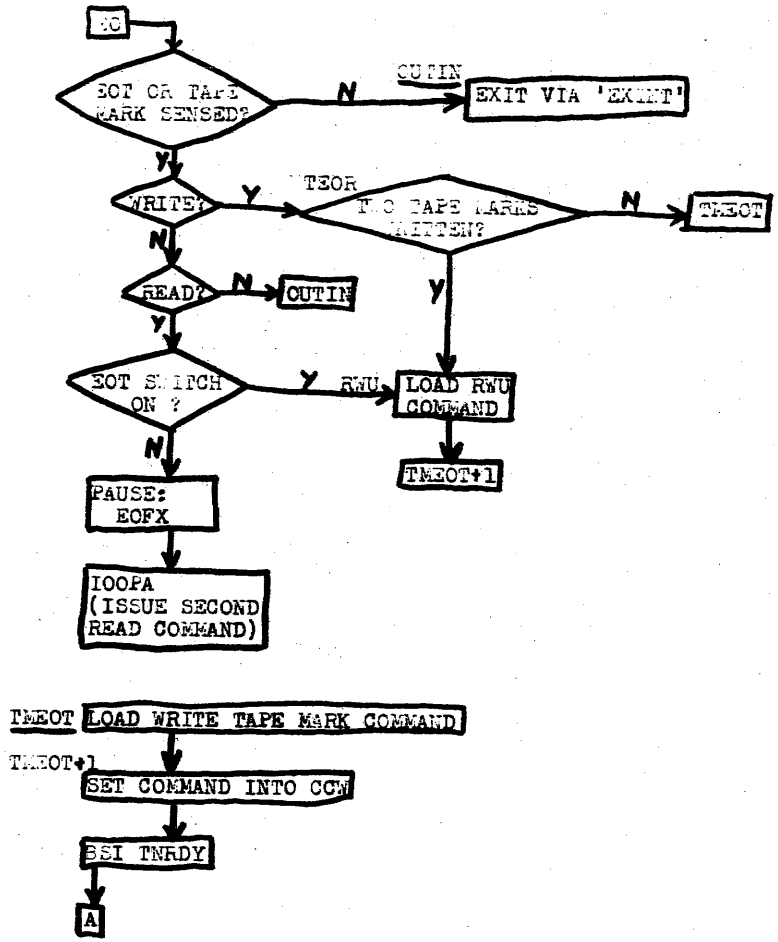
7-32. MAGTZ


SFIC
CALL
EXIT
SAVE
RETURN
ENTRY
RESET LEV. 4 INTERRUPT ENTRANCE
TO ADDRESS OF 'EXINT'
SAVE COMMAND(FROM AC)
READ?
N
SET EOF SWITCH TO ZERO
Y
READ/WRITE?
N
STORE NEW 'UNIT' NUMBER(FROM EXT)
INTO 'UNIT'
Y
LOAD 'UNIT' INTO AC
AC>7?
Y
RESET 'UNIT'
A
N
FORM AND
STORE EOFX
EXIT VIA 'EXIT' TO SFIO
IOCC SET-UP
SET COUNT FOR BUFFER PACK OR UNPACK
READ?
N
WRITE?
N
REWIND?
N
BACKSPACE?
N
ER
Y
READ
Y
WRIT
Y
REWIND
Y
BSPC

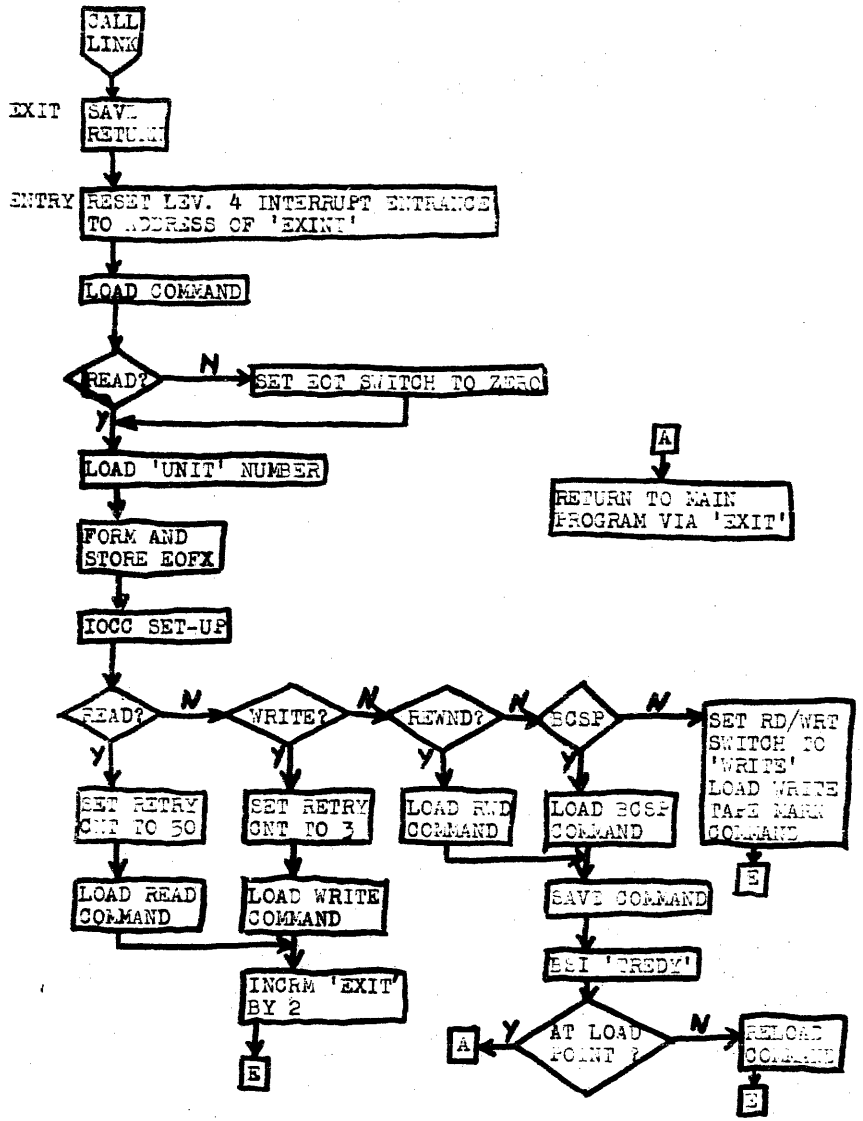

READ
SET RETRY COUNT TO 50
SET DATA CNT(3D) INTO FIRST WORD OF FORTRAN BUFFER
LOAD READ COMMAND
E
WRIT
SET RETRY COUNT TO 3
LOOP1
PACK BUFFER FOR OUTPUT
LOAD WRITE COMMAND
E
REWDY
LOAD REWD COMMAND
BSPC
LOAD BKSP COMMAND
SAVE COMMAND
BSI 'TREDY'
AT LOAD POINT ?
N
RELOAD COMMAND
E
Y
A
E
EF
SET READ/WRITE SWITCH TO 'WRITE'
LOAD WRITE TAPE MARK COMMAND
E
ENTIO
STORE COMMAND IN 'HOLD'
IOOPA
SET ERROR CNT TO ZERO
IOOPB
LOAD COMMAND FROM 'HOLD' STORE IN CCW
IOOP
SET ERROR SWITCH TO ZERO(OFF)
BSI 'TNRDY'
ERR

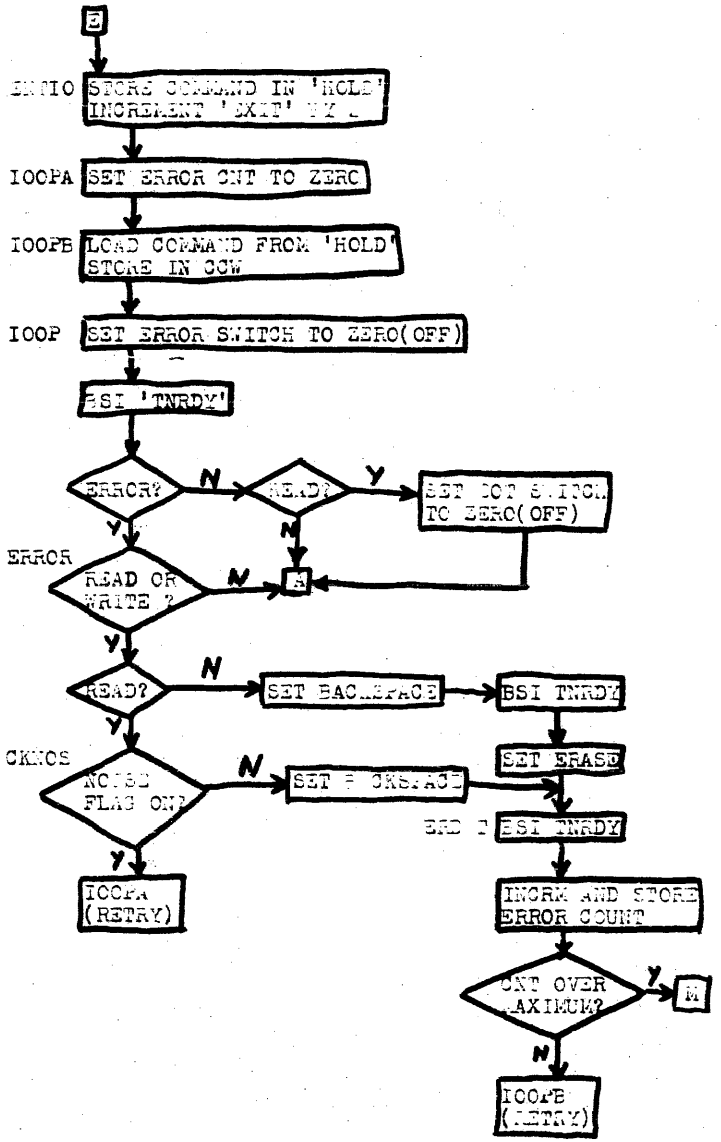

ERR
ERROR?
N
READ?
Y
SET EOT SWITCH TO ZERO(OFF)
Y
N
ERROR
READ OR WRITE?
N
A
LOOP2
UNPACK INPUT
Y
READ?
N
SET BACKSPACE
BSI TNRDY
Y
ERROR
NOISE FLAG ON?
N
SET BACKSPACE
SET ERASE
ERR T
BSI TNRDY
IOOPA (RETRY)
INCRM AND STORE ERROR COUNT
CNT OVER MAXIMUM?
Y
M
N
IOOPB (RETRY)
M
LAST COMMAND WRITE TAPE MARK?
Y
USER CMND?
N
REJCT
N
Y
PERR
PAUSE: BADC
SET ERROR CNT TO ZERO
ENTEF
IOOP (RETRY)

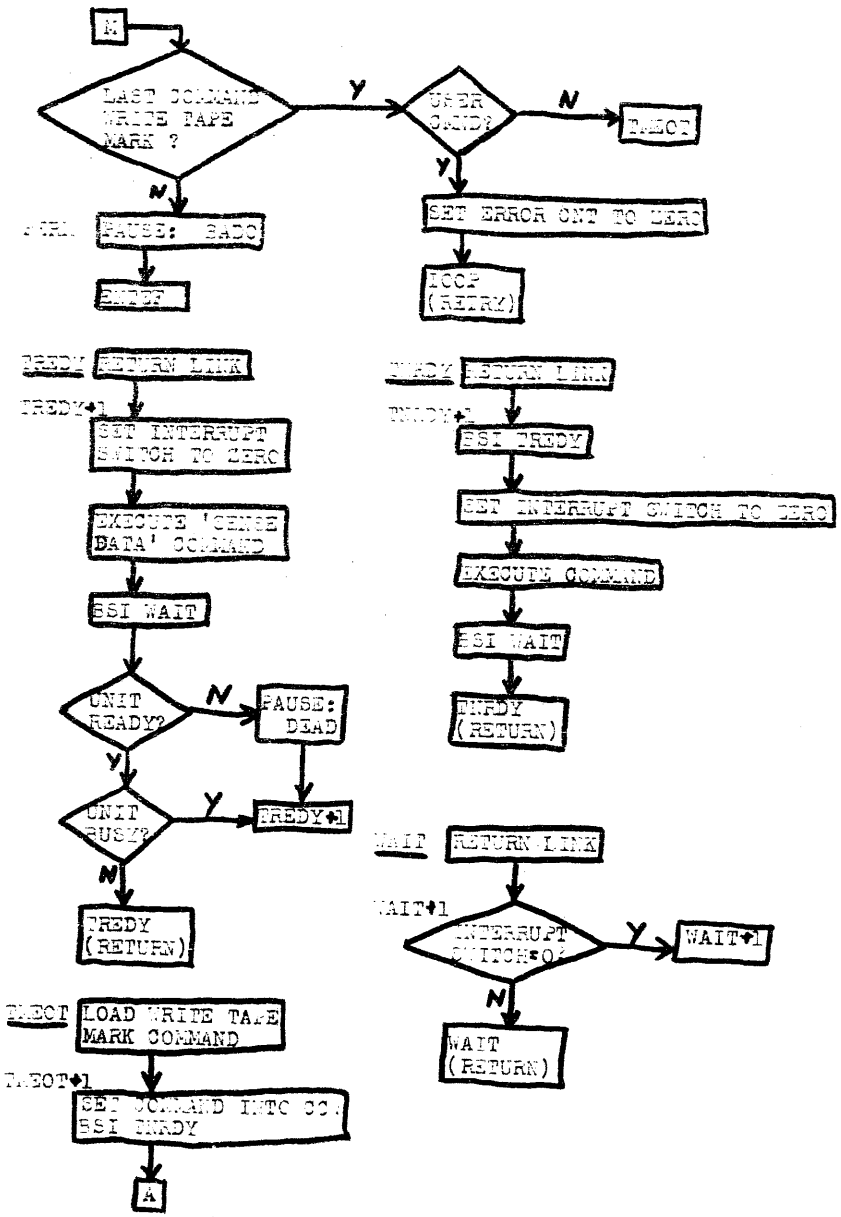

TREDY
RETURN LINK
TREDY+1
SET INTERRUPT SWITCH TO ZERO
EXECUTE 'SENSE DATA' COMMAND
BSI WAIT
UNIT READY?
N
PAUSE: DEAD
Y
UNIT BUSY?
Y
TREDY+1
N
TREDY (RETURN)
HARDWARE INTERRUPT
EXINT
RETURN LINK
INTRP
NOISE?
Y
SET NOISE FLAG
N
OPERATION COMPLETE? (DE ON ?)
N
OUTIN
Y
ERROR? (UC ON?)
Y
SET ERROR SWITCH NON-ZERO(ON)
N
SET INTERRUPT SWITCH NON-ZERO
EC
TNRDY
RETURN LINK
TNRDY+1
BSI TREDY
SET INTERRUPT SWITCH TO ZERO
EXECUTE COMMAND
BSI WAIT
TNRDY (RETURN)
WAIT
RETURN LINK
WAIT+1
INTERRUPT SWITCH=0?
Y
WAIT+1
N
WAIT (RETURN)

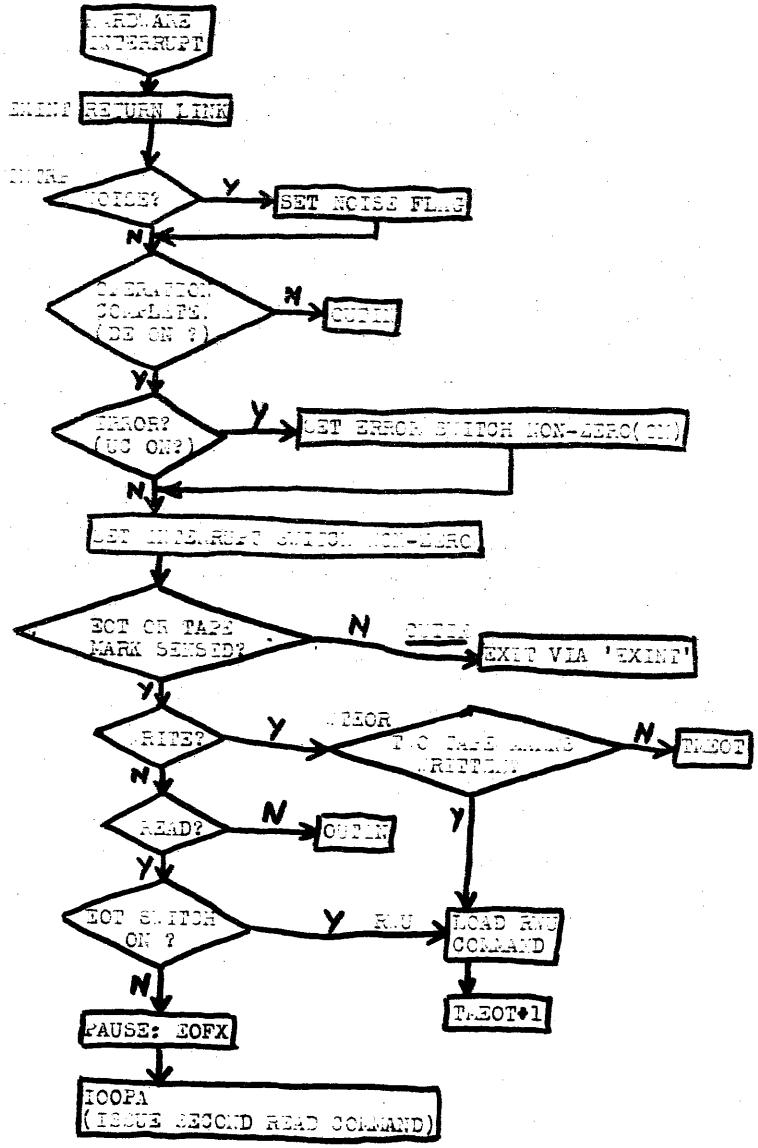

EC
EOT OR TAPE MARK SENSED?
N
OUTIN
EXIT VIA 'EXINT'
Y
WRITE?
Y
TEOR
TWO TAPE MARKS WRITTEN?
N
TREOT
N
READ?
N
OUTIN
Y
Y
EOT SWITCH ON ?
Y
RWU
LOAD RWU COMMAND
N
TMEOT+1
PAUSE: EOFX
IOOPA (ISSUE SECOND READ COMMAND)
TMEOT
LOAD WRITE TAPE MARK COMMAND
TMEOT+1
SET COMMAND INTO CCW
BSI TNRDY
A

7-33. MAGTA


CALL LINK
EXIT
SAVE RETURN
ENTRY
RESET LEV. 4 INTERRUPT ENTRANCE TO ADDRESS OF 'EXINT'
LOAD COMMAND
READ?
N
SET EOT SWITCH TO ZERO
Y
LOAD 'UNIT' NUMBER
FORM AND STORE EOFX
IOCC SET-UP
READ?
WRITE?
REWND?
BCSP
SET RD/WRT SWITCH TO 'WRITE' LOAD WRITE TAPE MARK COMMAND
SET RETRY CNT TO 50
SET RETRY CNT TO 3
LOAD REWD COMMAND
LOAD BCSP COMMAND
LOAD READ COMMAND
LOAD WRITE COMMAND
SAVE COMMAND
INCRM 'EXIT' BY 2
BSI 'TNRDY'
AT LOAD POINT ?
RELOAD COMMAND
A
RETURN TO MAIN PROGRAM VIA 'EXIT'
E


E
ENTIO
STORE COMMAND IN 'HOLD' INCREMENT 'EXIT' BY 2
IOOPA
SET ERROR CNT TO ZERO
IOOPB
LOAD COMMAND FROM 'HOLD' STORE IN CCW
IOOP
SET ERROR SWITCH TO ZERO(OFF)
BSI 'TNRDY'
ERROR?
READ?
SET EOT SWITCH TO ZERO(OFF)
ERROR
READ OR WRITE ?
A
READ?
SET BACKSPACE
BSI TNRDY
SET ERASE
CKNOS
NOISE FLAG ON?
SET FORWARD SPACE
BSI TNRDY
IOOPA (RETRY)
INCRM AND STORE ERROR COUNT
CNT OVER MAXIMUM?
M
IOOPB (RETRY)


M
LAST COMMAND WRITE TAPE MARK ?
Y
N
ERROR CNTD?
N
Y
T.EOT
PAUSE: BADC
SET ERROR CNT TO ZERO
ACCP (RETRY)
RETURN LINK
SET INTERRUPT SWITCH TO ZERO
EXECUTE 'SENSE DATA' COMMAND
SSI WAIT
UNIT READY?
N
PAUSE: DEAD
Y
UNIT BUSY?
Y
TREDY+1
N
TREDY (RETURN)
RETURN LINK
SSI TREDY
SET INTERRUPT SWITCH TO ZERO
EXECUTE COMMAND
SSI WAIT
TWRDY (RETURN)
RETURN LINK
INTERRUPT SWITCH=0?
Y
WAIT+1
N
WAIT (RETURN)
LOAD WRITE TAPE MARK COMMAND
SET COMMAND INTO CCW
SSI TWRDY
A


RETURN LINK
NOISE?
Y
SET NOISE FLAG
N
OUTIN
Y
ERROR?
Y
N
EXIT VIA 'EXINT'
Y
N
READ?
N
OUTIN
Y
Y
N
PAUSE: EOFX
LOAD RWU COMMAND
T.EOT+1

7 - 34. ILS04, REWNZ, IOU, AND SFIO

Flowcharts of these routines have NOT been included since they are basically standard system subroutines.

ILS04

Standard level 4 interrupt routine except for changes(indicated by arrows, cf. 7 - 23.) needed to test for interrupts from the 2954 R.P.Q. Selector Channel.

REWNZ

Interface routine for Fortran and MAGTZ for BACKSPACE, END FILE, and REWIND commands (cf. 7 - 27.).

IOU

Converts logical unit numbers to physical unit numbers; is called by REWNZ (cf. 7 - 26.).

SFIO

Main 1130 single device I/O Fortran routine with the test for an illegal device on a READ operation disabled. The original routine considered all odd numbered devices (e.g. console printer, printer, plotter) as illegal. However, since magnetic tape is number five, this method of testing the device number is clearly inadequate. The test should be re-written and the entire routine reassembled instead of just being disabled, but SFIO is a large routine and no source deck was readily available, so the test was dis abled by making a BSC L instruction into an unconditional branch: this required changing only one bit in the entire program and could be done easily with an object deck.

APPENDIX A. ERRORS DETECTED BY MAGT SUBROUTINE*

Error	Accumulator Contents(hex)
Write and Write Tape Mark	
*Error	0 X 0 B
*End-Of-Tape	0 X 0 C
*Error/EOT	0 X 0 D
Write Without Retries	
*Error	0 X 0 E
*End-Of-Tape	0 X 0 F
Read	
*Error	0 X 0 1
*End-Of-File	0 X 0 2
*EOT	0 X 0 6
*Long Record	0 X 0 7
*Short Record	0 X 0 8
Device not ready or command reject	4 X 0 0
Illegal unit, functin, or word count	4 0 0 1

*The errors marked with an asterisk cause a branch via the error parameter. These errors are detected during the processing of interrupts; as a consequence, the user's error routine is an interrupt routine, executed at priority level 4.

All other errors cause a branch to location 41. The address of the LIBF in error is in location 40.

X's correspond to the device identification digit in the related calling sequence.

APPENDIX B. MAGT SUBROUTINE ACTION AFTER RETURN FROM USER*

Error Code	Condition	Subr. Action
Write and Write Tape Mark		
0 X 0 B	If AC is 0	Terminate
	Otherwise	Retry
0 X 0 C	If AC is 0	Terminate
	Otherwise	EOF/EOF/RWU/Term.
0 X 0 D	If AC is 0	Terminate
	If AC is negative	Retry
	If AC is odd/pos	EOF/EOF/RWU/Term.
	If AC is even/pos	EOF/EOF/RWU/Retry
Write Without Retries		
0 X 0 E	If AC is 0	Terminate
	Otherwise	Check for EOT**
0 X 0 F	In any case	Terminate
Read		
0 X 0 1	If AC is 0	Terminate
	Otherwise	Retry
0 X 0 2	If AC is 0	Terminate
	Otherwise	Reinitiate
0 X 0 6	If AC is 0	Terminate
	If AC is negative	RWU/Reinitiate
	If AC is odd/pos	Reinitiate
	If AC is even/pos	RWU/Terminate
0 X 0 7	If AC is 0	Terminate
	Otherwise	Retry
0 X 0 8	If AC is 0	Terminate
	Otherwise	Correct Count/Term.

*For Rewind/Unload commands and RWU/Terminate recovery choices, the subroutine is set not busy, other tape commands on other units may be executed, and the unloaded unit may be reloaded at any time. For RWU/Retry and RWU/Reinitiate recovery choices, the subroutine remains busy and no other tape commands can be executed until the unloaded unit is reloaded and execution of the current recovery choice is completed. While waiting for the unit to be reloaded, the routine presents the error code for 'device not ready' (4X00) and maintains a wait state at location 41.

**If EOT, 0 X 0 F is indicated to the user's error routine; if not EOT, the operation is terminated.

APPENDIX C. MAGTA AND MAGTZ ERRORS DETECTED AND USER ACTION

Error/AC Code	User Action →	Subr. Action
Device not ready (D E A D)	Ready device, press program start	Current command retried
Non-correctable read, write, or end file error (E A D C)	Press program start	Current command terminated, but program execution continued at next command
Read		
Tape mark sensed (E O F X)	Press program start	Current read instruction tried on next record
EOT condition satisfied	(NO action needed)	Tape unit rewound/unloaded; program execution continued at next command
Write or End File		
EOT condition satisfied	(NO action needed)	Two tape marks are written on tape; tape unit rewound/unloaded; program execution continues at next command