

IDENTIFICATION

Product Code: Maindec-08-D3BB-D
Product Name: TC01 Basic Exerciser (Maindec 850)
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1. ABSTRACT

The TC01 Basic Exerciser is a series of test programs that may be used to gain a high degree of confidence in the data handling ability of a TC01 DECTape Control and one to eight TU55 DECTape Transports. The Basic Exerciser consists of several basic routines that may be individually selected; each routine will operate on any configuration of one to eight drives. These routines include a Basic Motion Routine, Search Find All Blocks Test, Basic Search Routine, Start/Stop/Turnaround Test, Basic Write/Read Data Test with eight selectable patterns, and a Parity Generation and Checking Test. The operation of the Basic Motion Routine and the Basic Search Routine are controlled by keyboard input. Also, a Write Data Scope Loop, Read Data Scope Loop, and a Search Scope Loop are provided to keep the tape moving from end zone to end zone.

2. REQUIREMENTS

2.1 Equipment

PDP-8 (standard)

TC01 DECTape Control

One to eight TU55 DECTape Transports

2.2 Storage

The program occupies most of memory from address 0000 to 6377 and utilizes three buffer areas as follows:

<u>Address</u>	<u>Function</u>
6774-7174	Output buffer Program storage for Motion Test (0200) Block Number storage for Basic Search (0202)
7175-7375	INPUT buffer 1
7376-7576	INPUT buffer 2

2.3 Preliminary Programs (None)

3. LOADING PROCEDURE

3.1 Method

Use normal binary loading procedures from paper tape.

4. STARTING PROCEDURE

4.1 Control Switch Settings

Any configuration of one to eight drives may be selected in SWITCH REGISTER bits 0 to 7. Each bit is a master bit for selection of a drive. When the switch is a 1 the drive is selected; when a 0 the drive is not selected.

<u>Switch</u>	<u>Drive</u>
0	8
1	1
2	2
3	3
4	4
5	5
6	6
7	7

4.2 Starting Addresses of Routines

<u>Address</u>	<u>Routine</u>	<u>Paragraph</u>
0200	Basic Motion Routine	9.1
0201	Search Find All Blocks	9.2
0202	Basic Search Routine	9.3
0203	Start/Stop/Turnaround	9.4
0204	Write/Read Data Test	9.5
0205	Parity Generation Test	9.6
0206	Write Data Scope Loop	9.7
0207	Read Data Scope Loop	9.8
0210	Search Scope Loop	9.9

4.3 Program and/or Operator Action

- a. Place the select address for the routine desired in the SWITCH REGISTER and press LOAD ADDRESS.
- b. Set SWITCH REGISTER bits 0 to 7 to select drives. (Any configuration except all 0s is valid.)
- c. Press START. The processor halts at address 0223 with bits 0 to 7 of the SWITCH REGISTER displayed in the AC.

- d. A halt at address 0311 indicates bits 0 to 7 were all 0s. Select drives and press CONTINUE to recover.
- e. Set all SWITCH REGISTER bits to 0, or as desired according to paragraph 5.1, and press CONTINUE.

A detailed description of how the routines can be used to initially check out the control and drives can be found in paragraph 5.3.

5. OPERATING PROCEDURE

5.1 Operational Switch Settings

5.1.1 Routines with no Switch Settings - Four of the routines require different switch settings to control program flow. The routines that have no switch settings are:

0200	Basic Motion Routine
0202	Basic Search Routine
0205	Parity Generation
0207	Read Scope Loop
0210	Search Scope Loop

5.1.2 Search Find All Blocks - The Search Find All Blocks Routine (0201) has one switch setting. Setting SW11 to 1 deletes the halt at the end of test.

5.1.3 Write/Read Data Test - The Write/Read Data Test (0204) utilizes switches 3 to 11 to control pattern selection and program flow as follows:

<u>Switch</u>	<u>Operation</u>
3	Delete all error detection where the motion bit in status A remains 1 (parity, data compare errors, and WC (word count register) not equal to 0).
4	Run patterns sequentially; i.e., After making one complete pass the length of tape with pattern 5, the next pass is made with pattern 6.
5	Read data only (after the first write pass).
6	Write data only (SW5 overrides SW6).
7	Write and read sequence, one block at a time.
8	Write and read sequence, 32 blocks at a time. (SW7 overrides SW8, when both switches = 0, the write and read sequence occurs for the length of the tape).

<u>Switch</u>	<u>Operation</u>
9, 10, and 11	Indicate pattern selection as follows:
000	All 0s
001	All 1s
010	Alternate words of 0s and 1s
011	Words of 2525
100	Words of 5252
101	Words of 0707
110	Words of 7070
111	Alternate words of 2525 and 5252

5.1.4 Write Scope Loop - The Write Scope Loop (0206) utilizes switches 9, 10, and 11 for pattern selection in the same manner as the Write Data/Read Data Test.

5.1.5 Start/Stop/Turnaround - The Start/Stop/Turnaround Test (0203) uses switch 1 to delete stop after error, and halt at end of test.

5.2 Subroutine Aspects (None)

5.3 Program and/or Operator Action

This series of routines is designed for initial check-out of a TC01 DECTape Control and its associated drives, or maintenance and repair of the control and drives after installation.

The following procedure is used for initial check-out of the control and drives and can be followed to repair malfunctions once the control and drives have been operating:

5.3.1 Operation Check - The first routine utilized is the Basic Motion Routine (0200). It is used to visually verify the following operations with the use of an oscilloscope, the indicators on the TC01 indicator panel, and by watching the motion of the tape on the DECTape drive.

5.3.1.1 Initial Control State - When power is initially applied to the TC01 Control, status A, the error and DECTape flags, and the data flag can come up in any state. A short manual procedure will prevent erasing DECTapes and having to reload programs.

Set the SWITCH REGISTER to 0.

Press LOAD ADDRESS.

Select SINGLE STEP.

Press DEPOSIT.

Press LOAD ADDRESS.

Press START (to generate a POWER CLEAR).

Now examine the TC01 indicator panel, the following indicators should all be off, indicating a 0.

- DTF (DECtape flag)
- DF (data flag)
- All ERROR flags
- W (WREN write enable)
- Status A bit 4 (motion)
- US (up to speed)
- C0 to C3 can be in any stable state (not counting)
- All state register bits except 1 should be 0, and bit 1 should be a 1 (state idle)

5.3.1.2 Clear and Load Status A (IOT 762, 764, and 766) - The basic operation and existence of these DECTape IOTs can be verified as follows:

Start the Basic Motion Routine with all drives SWITCH REGISTER selected and off line. Type the following program:

```
"F" WD
"W" AIT 0100
"C" HNG
"R" PT 0002
"D" O
```

Now, watch the status A indicators 0, 1, and 2. They should go to 0₈ and remain there for slightly more than a second, then proceed to 1₈, 2₈, 3₈ etc., up to 7₈, and return to 0₈ and repeat the process. In addition, a select error should be generated for each drive selection and the MOTION bit should be set to 0. By increasing the "W"AIT count or restarting the program with each drive individually selected, the decoding of the drive number to a single select line can be monitored with an oscilloscope; or the selection indicators over the rotary select switch on the TU55s may be used by placing the drives on line and including a "S"TOP command after the "F"WD.

5.3.1.3 Tape Motion and Timing Pulse Generation - Put one drive on line and start the Basic Motion Routine with that drive SWITCH REGISTER selected. To verify basic operations of the control and drive motion controls: type the following series of short programs:

```
"F"WD
"D"O
```

The tape on the selected drive should start moving forward (off the left-hand reel and onto the right-hand reel). A select error should not be generated and bit 4 of status A should remain 1 unless end zone is reached and detected. C0 to C3 should appear to be counting, indicating timing pulse generation; US (up to speed) should set to 1 within a short period after tape starts moving. The DTF should not set. Now type:

```
"S"TOP
"D"O
```

Forward tape motion on the selected drive should stop. (Bit 4 of status A should go to 0). The left-hand brake on the drive should be set and the right-hand reel should be free with a small amount of torque holding the tape tight. Again, no select error occurs. Now type:

```
"B"KWD
"D"O
```

The tape on the selected drive should start moving backwards (off the right-hand reel and onto the left). Status A bit 3 should be 1 (BKWD). All other indicator observations for forward should be true. Again type:

```
"S"TOP
"D"O
```

Backward tape motion should stop. Bit 3 of status A should remain 1 and bit 4 should go to 0. The right-hand drive brake should be set and the left-hand reel should be free with only enough torque to hold the tape tight.

5.3.1.4 New U + M Delay - The new unit and motion delay can be generated by any of several short programs, but its operation must be monitored with an oscilloscope. Since the delay time could change at a later date (for some currently unknown reason), the time will not be mentioned here; but it can be determined from the TC01 logic diagrams. An example of a program that could be used is:

Manually move the tape until approximately an even amount of tape is on both reels and type:

```
"F"WD
"W"AIT 0020
"B"KWD
"W"AIT 0020
"R"PT 0040 (or a shorter or longer count as desired)
"D"O
```

5.3.1.5 End Zone Detection - The program can be used to determine if the end zone is being detected by starting the tape in either direction and watching whether or not the tape runs off the reel. Also

watch the end bit in the error status. If the END indicator lights and the tape does not stop, error stop in the control is not being generated. In either case, return the tape to the reel a short distance from the start of the reel (less than 10 feet of tape on right hand reel) and use following program to scope the end-zone detection.

```
"F"WD
"W"AIT 0020
"B"KWD
"W"AIT 0016
"R"PT 0040 (or may be made longer or shorter as desired)
"S"TOP
"D"O
```

The forward wait count can be decreased if the tape rocks forward or increased if the end zone approaches too quickly or if the tape runs off the reel. (At that end of the reel, the tape will move backward faster than forward.)

5.3.2 Check End-Zone Detection - For the next sequence of operations, any of the three search routines (0201, 0202, or 0210) could be used; but the Search Scope Loop (0210) is the most practical and least complicated. When the routine is initiated, the tape starts forward until the end zone is detected and then runs backward until end zone is again detected and then forward again.

If the tape runs off the reel, either the end zone was not detected or bit 2 of status B (END) did not read to the processor accumulator during a Read Status B IOT. As the tape is moving forward, make the following observations:

C0 to C3 should appear to be incrementing, indicating timing pulses are being generated.

US (up to speed) should indicate a 1 shortly after the tape starts moving and should stay on.

The STATE REGISTER should circulate and appear to remain mainly in state data.

The DECTape flag indicator should glow visibly, dim, and glow again as the tape moves forward (The program does not monitor DTF but simply waits in an ISZ loop and periodically monitors END and MOTION).

No error statuses should be generated except end zone.

The processor accumulator should appear to be incrementing by 1 as each successive block number is read from tape and displayed.

The timing in the control should be monitored with an oscilloscope with reference to the DEC-tape TC01 timing diagrams.

With the DECTape searching backward, the same observations may be made as forward except the processor accumulator should appear to decrement.

5.3.3 Correct Block Number - At this point it is suggested that the Search Find All Blocks Routine starting at 0201 be used to prove that the control will correctly read block numbers. The Basic Search Routine starting at 0202 may be used to gain more information if 0201 does not run without error typeouts.

5.3.4 Check Read Data Timing - The next step should be to verify the Read Data Timing with an oscilloscope utilizing the Read Scope Loop (0207) and the TC01 timing diagrams.

5.3.5 Check Write Data Timing - Next, the Write Scope Loop (0206) may be run and the Write Data timing verified. This routine changes to Search Between Blocks as an effort to keep from writing over block numbers. (Recheck the tape with 0201 or 0202 to verify this).

The different data patterns may be utilized visually as follows, (W (WREN) should indicate 1 for all patterns).

Pattern 0 (all 0s)	DATA BUFFER bit indicators 6, 7, and 8 should glow dimly and the rest of the DATA BUFFER should appear to be 0s. RWB bits 3, 4, and 5 should appear to remain 0s. RWB bits 0, 1, and 2 should be complementing and should glow fairly brightly but not solidly. The LPB should complement every six bits and will glow dimly.
Pattern 1 (all 1s)	DATA BUFFER bits 6, 7, and 8 should glow dimly and the rest of the DATA BUFFER should appear to be steady 1s. RWB bits 3, 4, and 5 should appear to remain steady 1s; bits 0, 1, and 2 should complement and glow fairly brightly but not solidly. The LPB contents are not predictable but the rate of change should be fairly slow and discernable. (The LPB only complements on 0s and will contain the complement of the reverse checksum of the block it is passing over).
Pattern 2 (alternate words of 0s and 1s)	All bits in the DATA BUFFER, RWB, and LPB should glow dimly.
Pattern 3 (2525)	The even numbered bits of the buffers should act as pattern 0 and the odd numbered bits as pattern 1.
Pattern 4 (5252)	The even numbered bits of the buffers should act as pattern 1 and the odd numbered bits as pattern 0.
Pattern 5 (0707)	The rightmost three bits (of each six bits) should appear as pattern 1 and the leftmost as pattern 0.

Pattern 6 (7070)	The leftmost three bits (of each six bits) should appear as pattern 1 and the rightmost as pattern 0.
Pattern 7 (2525 alternate with 5252)	Should appear as pattern 2. No steady states discernible in the buffers.

5.3.6 Prepare Tape for Read - The Write Scope Loop may now be used to prepare a tape for the Read Scope Loop and for a further visual verification. Patterns 3, 4, 5, and 6 appearing in the BUFFER(s) indicators should read the same in either direction.

Note that the DATA BUFFER bits 6, 7, and 8 appear to be in a steady state and not to complement. Patterns 0 and 1 should be complemented when read in the direction opposite that in which they were written. No steady states should be discernible with patterns 2 and 7.

5.3.7 Check Correct Data - Run the Write/Read Data Test to verify that data is correctly read and written. Utilize the different switch configurations (see paragraph 5.1) for a complete test or to scope loop the reads or writes. This routine does not change to search between blocks, thus the possibility that block numbers may be written over is greater than that of the Write Data Scope Loop.

5.3.8 Check Checksum Generation - The Parity Generation Test verifies that checksums are being generated properly and that parity errors will be detected if they occur.

5.3.9 Check Turnaround Function - Run the Start/Stop/Turnaround Test (0203). All of the other routines are designed to eliminate the possibility of a turnaround error, but this routine tests this function to a much tighter limit.

6. ERRORS

Almost all hardware malfunctions detected by the program result in an error message typed on the Teletype. Each error message includes drive number, operation, direction, mode, error status, block being operated on, and correct and incorrect data, if applicable.

6.1 Error Typeout Descriptions

6.1.1 Search Error Typeouts - The Search Error Typeouts are in several formats. The Search Routine used by the Parity Test and Write/Read Data Test uses the following format:

DRIVE X	(A)
SEARCH FWD (or BKWD)	(B)
XXXX BLOCK WANTED FWD (or BKWD)	(C)
XXXX BLOCK FOUND	(D)
XXXX LAST BLOCK (if BLOCKS READ $\geq$ 002)	(E)
XXXX BLOCKS READ	(F)
XXXX STAT B	(G)

A. This will be the first line of every typeout. Drive X is the drive that was being operated at the time of the error.

B. The second line of every typeout indicates the DECTape function, direction and mode. (Typeout will be C MODE for continuous mode).

C. This is the block number that the search routine should find as an end result and the direction that the block should be found in. If the direction in line B is the same as the direction in line C, the turnaround for finding the block has already been made. If the two directions are different, the error occurred before turnaround.

D. This is the contents of symbolic register BLKFND and could indicate one of the following:

1. Should be ignored if BLOCKS READ = 0000 and the directions in line B and C disagree. It could indicate the turnaround block, if the directions are the same and BLOCKS READ = 0000.

2. That the DECTape did not turn around in two PDP-8 block lengths, if BLOCKS READ = 0001, STAT B = 0001, and the directions indicated are the same.

3. The BLOCK in error, if BLOCKS READ does not = 0000 and STAT B is an error status (i.e., 6000 MARK TRACK ERROR) other than END ZONE (5000).

E. This line of the typeout is included only if two or more block numbers have been received since the search operation was started, or since the direction bit in status A was complemented for turnaround. Examine STAT B and if it does not equal 0001 ignore this line. If STAT B does = 0001, LAST BLOCK compared against BLOCK FOUND will indicate that the last two block numbers read were not sequential.

F. The number of block numbers received since the search operation was initiated or since turnaround.

G. This is the DECTape status B register; if STAT B does not = 0001, this is the error condition that caused the typeout. If STAT B equals 5000 (end-zone interrupt), and the directions in lines B and C are the same, it means that the drive made one turnaround and went the length of the tape without finding the block that the search routine was looking for. An end-zone error before turnaround indicates that at least one block number had been read, and that the block wanted was two or more blocks from end zone in the direction opposite the search. (i.e., BLOCK 3 WANTED FWD or BLOCK 2677 WANTED BKWD.)

The Start/Stop Turnaround Test has two formats for search error typeouts:

```

DRIVE 1
SEARCH BKWD
0005 BLOCK (Tape should have been up to speed by this block)
0006 FWD LAST POS (Last known tape position)
0004 FOUND (Block number in error)
0001 STAT B (If not 0001 indicates error was a status error)
    
```

In this case, notice that the difference between BLOCK and LAST POSITION is 1 and that the operations were in opposite directions. This indicates a turnaround error. If these lines differ by more than 1, the error would have been on a start-up.

The other error typeout format occurs if block numbers are not sequential.

```
DRIVE 1
SEARCH FWD
BLK # ERROR
0010 BLOCK
0006 LAST (Block 6 should have been followed by block 7)
0010 THIS (Not by block 10)
0001 STAT B
```

6.1.2 Read Data Status Error Typeouts - The first three lines of the read-data typeouts are in the same format as the search typeouts. The first two lines contain drive number, operation and direction, and the third line is the block being operated on. Again, depending upon which test routine is being run, one of several typeouts could occur.

```
DRIVE 1
READ DATA FWD
0046 BLOCK
4301 STAT B
```

(Combination parity error and timing error)

```
DRIVE 2
READ DATA BKWD
0100 BLOCK
4201 STAT B
7757
```

(This typeout is used by the Parity Generation Test. The last line of this typeout indicates the data pattern written to test parity. In this case, the reverse checksum is 20; CHECKSUM going forward was 75. The LPB at the end of a block in read data should always be 77 for normal operation).

```
DRIVE 2
READ DATA FWD
0100 BLOCK
PARITY ERROR EXPECTED
0001 STAT B
0200
```

(This typeout is also used by the Parity Generation Test and could follow the one above. The typeout indicates that a parity error should have been generated, but was not received. Again, the last line of the typeout indicates the data pattern written to test the parity circuitry. Notice the complement obverse relationship between the two data typeouts. In this case, the CHECKSUM has been rewritten to 02 in WRITE ALL, it was 75 after WRITE DATA, and the LPB should have been 00 after reading the block. READ DATA and STATE CHECK going to 0 and LPB not equal to 77 is 1 to PARITY ERROR. See paragraph 9.6 for a complete description of the parity test.)

```
DRIVE 4
READ DATA FWD
0077 BLOCK
0001 STAT B
7777 WC
```

In the read data typeouts, the contents of the word count register (address 7754) are included only if the WC did not go to 0. Or if the DECTape status B was normal (0001) and the WC did not go to 0, the above typeout would occur.

6.1.3 Checksum Error Typeouts - The Parity Generation Test writes various data patterns in the first and second characters of each block. Since the reverse checksum is written to 00, the checksum generated by the TC01 should either be the complement of the first character in the block or if the first two characters are written should equal 77. The following typeouts could occur if the parity generation is failing.

DRIVE 1	
CKSUM ERROR	
2000 DATA	(First word of block, as read from tape)
7700 CK SUM	(As read from tape in READ ALL, in this case should equal 5700).
DRIVE 1	
CKSUM ERROR	
5757 DATA	(As read from tape)
5700 CK SUM	(As read from tape in READ ALL, in this case should be 7700)

6.1.4 Write Data Status Error Typeouts - Write data error typeouts also include drive, operation and direction, block being operated on, and the error status.

DRIVE 6	
WRITE DATA FWD	
0765 BLOCK	
6000 STAT B	(This typeout indicates a mark-track error while doing a Write Data Forward on block 0765. The WC typeout indicates that the error occurred with 138 words left to be written.)
7715 WC	
DRIVE 7	
WRITE DATA BKWD	
1000 BLOCK	
0001 STAT B	(If STAT B indicates a normal block interrupt (0001) and the WC has not gone to 0, this typeout occurs.)
7777 WC	

6.1.5 Data Error Typeouts - A data error may or may not follow a parity error typeout; it could also occur without a parity error. Again, the first three lines of the typeout are the same as for search errors: drive, operation and direction, and block number.

DRIVE 4	
READ DATA BKWD DATA ERROR	
0325 BLOCK	
0000 KNOWN	(Data written)
7773 UNKNOWN	(Data read)
7000 ADDRS KNOWN	(Buffer Address of data written)

6.1.6 Error Halts - The cause of any error halt not accompanying a typeout can be found by examining the program listing at the address of the halt. These may be caused by:

- a. A status other than EZ while in MOVE TAPE.
- b. The AC not being cleared after an IOT766 or 764.
- c. AC bits 0 to 7 equal to all 0s when initially starting.
- d. Program interrupt and no DECTape skip.
- e. No program interrupt for 45 seconds.

6.2 Error Recovery

There are no manual error-recovery procedures. In the cases of read data and read errors in the Parity Test, the programs proceed to the next sequential block in an effort to gain more information about the failure. For search (except 0201) or write errors, the same operation is attempted again.

In Search Test 0201, the program attempts to pick up the next block in sequence.

Any error halt that occurs without a timeout may indicate a completely non-logical type of failure. Examine the program listing to determine the meaning of the halt.

9. PROGRAM DESCRIPTION

9.1 Basic Motion Routine (0200)

This routine is a visual verification of the operation of the DECTape drives and some sections of the TC01 Control. The sequence of operations is selected by keyboard input from the Teletype. The keys that may be typed to select operations are "F," "B," "S," "C," "W," "R," and "D." All other keys will cause the execute table to be reset and previous selections to be lost. The operations selected by the individual keys are as follows:

<u>Key</u>	<u>Operation</u>
F FWD (Timeout)	Start moving tape on the currently selected drive in the forward direction.
B BKWD (Timeout)	Start moving tape on the currently selected drive in the backward direction.
S STOP (Timeout)	Stop tape on the currently selected drive.
C CHNG (Timeout)	Change drive selection and repeat from the beginning of the execute table or from the last "C."
W WAIT (Timeout)	Wait a variable number of blocks. The number of blocks to wait is typed in, immediately following the timeout "WAIT," and is a 4-digit number from 0000 to 7777. NOTE: The program does not actually count blocks but sits in an ISZ loop 18 msec for every increment typed in.

<u>Key</u>	<u>Operation</u>
R RPT (Typeout)	Repeat the sequence of operations from the start of the execute table or from the last "R." Again, the number of times to repeat is typed in immediately following the typeout "RPT" and is a 4-digit octal number from 0000 to 7777.
D DO (Typeout)	Causes the sequence of operations previously typed in to be executed NOTE: "D" can only be typed in as the first character after a sequence of operations has once been executed. This is true each time that the routine is restarted from address 0200. Typing a "D" as the first character causes the last sequence of operations to be executed.

9.2 Search Find All Blocks (0201)

Before a program can verify that the DECTape system can write correctly, it must prove that the system can read correctly. Since a DECTape with a, so-called, virgin tape pattern is not always readily available and DECTape with correctly written block numbers is usually available, the first verification of read operations must be a Search Test. Search Find All Blocks moves the DECTape backward into the end zone, reads the tape forward and verifies that blocks are numbered 0000 to 2701; then moves the tape into forward end zone, reverses the tape and tests that blocks are numbered 2701 to 0000. If SW11 is 0, the processor halts; press CONTINUE, and the program will repeat. If SW11 is 1, the processor will not halt and the program will repeat.

9.3 Basic Search Routine (0202)

In this routine, the tape is searched in either direction until a series of 129 block numbers is read and stored. (Or until end zone is reached or some error status is generated). The decision is made to either type out all of the block numbers or to have the program verify that the block numbers read are sequential. When started the program types:

DRIVE 8 (or whichever drive is selected)
TYPE IN F FOR FORWARD
ALL OTHERS BACKWARD

At this point, type in an "F" to search forward or any other key to search backwards. The program will search in the direction selected until an error status or end zone occurs, or until 129 block numbers have been read and stored in memory. It then types:

XXXX STAT B	(If an error status and then repeat the initial typeout)
END ZONE	(If the tape went into end zone before 129 blocks were read)
NO BLOCKS	(If no block numbers were read)
XXXX FIRST BLOCK	(First block number read)
TYPE C FOR COMPARE	
ALL OTHERS PRINT	

To have the program verify that the block numbers are sequential, type in a "C." Any other character typed in causes the program to type out the complete series of block numbers. If a "C" is typed, the program types out block numbers that are not sequential. The program always types the last block number read as follows:

XXXX LAST

9.4 Start/Stop/Turnaround Test (0203)

When the ability to correctly read block numbers has been established, a more thorough test of the DECTape motion controls can be given. The Start/Stop/Turnaround Test verifies the following operations:

TURN AROUND Both directions on BLOCK 0
 Start FORWARD/STOP
 Start BACKWARD/STOP
 Start FORWARD/Wait UP TO SPEED/Turnaround
 Start BACKWARD/Wait UP TO SPEED/Turnaround

The sequence is repeated for the length of tape. Turnaround occurs in both directions on block 2701.

Since the tape is up to full speed before turnaround, the tape must be up to speed again by the time it returns to that same point on the tape.

9.5 Write/Read Data Test (0204)

The search routines establish a minimum capability to read known data from tape. This routine establishes the ability to write data and further establishes the ability to read data. The test includes eight selectable data patterns and three selectable modes of operation. The basic sequence of operation is write forward, read backward, read forward, write backward, read forward, read backward. The sequence may be selected for 1 block at a time, 32 blocks at a time, or the length of tape. The program recycles and runs until STOP is depressed. At the end of each complete sequence (the length of tape), the program types out the pattern number and END. The eight write patterns are as follows:

0	0000
1	7777
2	0000, 7777, 0000
3	2525
4	5252
5	0707
6	7070
7	2525, 5252, 2525

The pattern to be written is selected in SWITCH REGISTER bits 9, 10, and 11. Place the number of the pattern desired in these switches.

Switches 7 and 8 are used to select the sequence of operation as follows:

<u>SW7</u>	<u>SW8</u>	<u>Operation</u>
0	0	Write and read sequence the length of the tape.
0	1	Write and read sequence in 32 block increments.
1	0	Write and read sequence one block at a time.
or 1	1	
SW4 = 0		Take the next pattern to be exercised from SWs 9, 10, and 11.
SW4 = 1		Exercise sequentially through the patterns; i.e., after one complete sequence the length of tape with pattern number 3, exercise pattern number 4, after exercising 4 go to 5. Patterns are not changed until block 2701 has been written backwards.
SW3 = 0		Type out parity error information and data errors.
SW3 = 1		Ignore parity and data errors. Mark track, timing, and select errors are not ignored.
SW6 = 0		Sequence from write to read data.
SW6 = 1		Write data only.
SW5 = 0		Sequence from read data to write data.
SW5 = 1		Read data only (SW5 overrides SW6).

9.6 Parity Generation and Checking Test (0205)

The complete test of parity generation and checking requires several passes over a series of blocks. The steps that the program takes for a complete test of the parity circuitry are as follows:

- | | |
|--------|--|
| STEP 1 | Write reverse checksums to 0 (Actually written to 77 going backward and should equal 00 going forward). |
| STEP 2 | Write data patterns
Various data patterns are written in the first and second characters of each block and the rest of the block is written to zeros (Note: the checksums generated are either the complement of the first character or 77 ₈ , if the first two characters are written). |
| STEP 3 | Read/Verify checksums
The checksums are read back and verified to be the complement of the first character in the block or 77, if the first two characters of block are non-zero. |
| STEP 4 | Test no parity errors
The blocks are read in both directions and no parity errors should be generated. |

- STEP 5 Write blocks to wrong parity
The checksums are written to be the same as the first character in the block so that the LPB will not equal 77 when the block is read.
- STEP 6 Test for parity errors
The blocks are read in both directions and parity errors should be generated.

The program then repeats from step 1 and will run until STOP is depressed.

If an error timeout is generated indicating PARITY ERROR EXPECTED, the contents of the LPB can be determined by the following procedure:

- a. The timeout includes the first data word of the block if read forward or the last word of the block if read backward (actually same word but complement obverse if read backward).
- b. This word will contain either one or two non-zero 6-bit characters, (FWD); or one or two characters that do not equal 77 (BKWD).
- c. If there is only one 6-bit character, the LPB should be all 0s at the time it is strobed for parity error. This is true whether read occurred in a forward or a backward direction.
- d. If the read direction is forward and there are two non-zero characters in the first word, the LPB should be equal to one of the characters at the time it is strobed for parity error; i.e., WORD = 0202, LPB = 02.
- e. If the read direction is backward and there are two characters not equal to 77, the LPB should be equal to the complement of one of the characters when it was strobed for parity error; i.e., WORD = 5757, LPB = 20.

9.7 Write Data Scope Loop (0206)

This routine starts forward in search. When a block number is found, the program changes to write data for one block, then back to search and then to write data again. The program continues in that mode until end zone. Upon reaching end zone the tape is started backwards in search and is again changed to write data when a block is found. Each time an end zone interrupt is received, the tape direction is reversed. For any other error status, the function is reset to search and tape direction is not reversed. Any of the eight data patterns in the Write/Read Data Test may be selected by placing the pattern number in switches 9, 10, 11. (See paragraph (5.1.3)). The routine has to be restarted from 0207 to change pattern selection. This routine contains error halts if the AC is not cleared after an IOT764 or 766.

9.8 Read Scope Loop (0207)

This routine starts forward in read data and reads in 129-word blocks. When end zone is reached the tape is run backwards in read data. For any other error, the tape continues in read data in the same direction. Each time an end zone is reached, tape direction is reversed. This routine also contains error halts that indicate the accumulator was not cleared after an IOT766 or 764.

9.9 Search Scope Loop (0210)

This routine starts forward in search function and reverses direction at end zones. The DEC-tape flag and all error statuses except end zone are ignored. The program starts forward in search and displays the last block number received in the AC while doing an ISZ/JMP .-1 loop for approximately 13 msec. At completion of the ISZ loop, the program tests for end-zone status and complements the direction bit if end zone was reached. If end zone was not reached, search enables are reset and the motion bit in status A is set to a 1 if it was cleared. This routine contains error halts if the AC is not cleared after an IOT766 or 764 and if the motion bit is not cleared by EZ.

10. LISTING

```

/TC01 BASIC EXERCISER TAPE 1
/PAGE 0 CONSTANTS AND TEMP STORAGE
IOT=6000
BUFFRS=6774

```

```

BUFFER2=BUFFRS+201
BUFFER3=BUFFER2+201

```

```

*1
0001 5402 JMP I 2 /FOR INTERRUPTS

```

```

*20

```

```

0020 0000 RECORD, 0 /BLOCK OPERATED ON
0021 0000 BLKFND, 0 /BLOCK FOUND BY SEARCH
0022 0000 POSITN, 0 /TO GET TAPE POSITION
0023 0000 DIRECT, 0 /TO GET LAST DIRECTION
0024 0000 LSTBLK, 0 /TO GET LAST BLOCK WRITTEN
0025 0021 IDCON, BLKFND /FOR SRCH CA
0026 0020 RECRDK, RECORD /FOR TYPEOUTS

```

```

/ADDRESSES FOR INDIRECT TAD AND DCA

```

```

0027 7754 WCLOC, 7754
0030 7755 CALOC, 7755
0031 6774 BF1WD1, BUFFRS
0032 6773 BF1LOC, BUFFRS-1
0033 7174 BF2LOC, BUFFER2-1
0034 7375 BF3LOC, BUFFER3-1

```

```

/SUBROUTINE ADDRESS
0035 0600 SRCHIT, SEARCH
0036 0400 REWIND, REPOSI
0037 0437 NEWDRV, CHNGDR
0040 0234 WAITI, WTINT
0041 0313 WTHALF, WT500
0042 5000 DATACO, CODATA
0043 4100 SAVPAD, DAPSAV
0044 1310 ERRSTP, ERSTP
0045 1511 DRIVTY, TYDRV
0046 1424 RDATTY, TYRDAT
0047 1316 SBTYPE, TSTATB
0050 1442 WDATTY, TYWDAT

```

0051	1261	TYPCON,	TYCONT
0052	1411	SRCHTY,	TYSRCH
0053	4000	ERSSTA,	SSTAER
0054	3600	SSTFWD,	SSTAFW
0055	3651	SSTBKW,	SSTABW
0056	1200	TYPTX,	TYTEXT

/TEMP STORAGE FOR DRIVE SELECTION

0057	0000	CDRIVE,	0	/DRIVE NUMBER AND
0060	0000	UNFUNC,	0	/POSITIONED FOR STAT
0061	0000	MSBITS,	0	/DRIVES SELECTED
0062	0000	COMBIT,	0	

/OTHER CONSTANTS

0063	7760	K7760,	7760
0064	7577	K7577,	7577
0065	0604	K0604,	0604
0066	4000	K4000,	4000
0067	7767	K7767,	7767
0070	7700	K7700,	7700
0071	0077	K0077,	77
0072	0240	K0240,	240
0073	0007	K0007,	7
0074	0020	K0020,	20
0075	0200	K0200,	200
0076	0003	K0003,	3
0077	5077	K5077,	5077
0100	2701	K2701,	2701
0101	0614	K0614,	614
0102	0400	K0400,	400
0103	0214	K0214,	214
0104	0016	SFAFK,	16
0105	0006	SFABK,	6
0106	7763	SBABK,	7763
0107	7772	SBAFK,	7772
0110	1000	EZBIT,	1000
0111	0000	POSSAV,	0
0112	0000	DIRSAV,	0
0113	0000	BLKINC,	0
0114	0000	DIRFLG,	0
0115	0050	K0050,	50
0116	0030	K0030,	30
0117	0030	BLKBTS,	0030
0120	0020	BLKBIT,	0020
0121	0040	K0040,	40
0122	0170	K0170,	170
0123	0100	K0100,	100
0124	0101	K0101,	101
0125	0204	K0204,	204
0126	5076	K5076,	5076
0127	0037	K0037,	37
0130	0010	K0010,	10

/SELECT AND START TESTS
 /SWITCHES * MASTER BIT SELECTION
 /FOR TAPES

*200

0200	4211	JMS CIPHER
0201	4211	JMS CIPHER
0202	4211	JMS CIPHER
0203	4211	JMS CIPHER
0204	4211	JMS CIPHER
0205	4211	JMS CIPHER
0206	4211	JMS CIPHER
0207	4211	JMS CIPHER
0210	4211	JMS CIPHER

0211	0000	CIPHER,	0
0212	7404	OSR	
0213	0063	AND	K7760
0214	7440	SZA	
0215	5220	JMP	,+3
0216	7402	HLT	
0217	5212	JMP	CIPHER+1
0220	3061	DCA	MSBITS
0221	6774	IOT	774

/CLR STATUS B MEM FIELD

0222	1061	TAD	MSBITS
0223	7402	HLT	
0224	7200	CLA	
0225	1211	TAD	CIPHER
0226	1064	TAD	K7577
0227	1277	TAD	TSTTBL
0230	3232	DCA	,+2
0231	4633	JMS	I ,+2
0232	5700	JMP	I TSTTBL+1
0233	0417	RSFDRV	

/GO TO TEST SELECTED

/-201

/ABOVE JMP I IS CHANGED TO JMP I TST TBL+1 + THE
 /TEST NUMBER SELECTED
 WTINT, JMP ,

0234	5234	TAD	WTIJMP
0235	1272	DCA	1
0236	3001	TAD	WTIJMP+1
0237	1273	DCA	2
0240	3002	DCA	WTIJMP+2
0241	3274	TAD	K4215
0242	1276	DCA	WTIJMP+3
0243	3275	ION	
0244	6001	ISZ	WTIJMP+2
0245	2274	JMP	, -1
0246	5245	ISZ	WTIJMP+3
0247	2275	JMP	, -3
0250	5245	IOF	
0251	6002	HLT	
0252	7402	JMP	, -1
0253	5252		

/WAIT A MAXIMUM
 /OF 35 SECONDS
 /FOR AN INTERRUPT

```

0254 6771 IRECD,      IOT 771      /DIF OR DTEF = 1
0255 7410      SKP
0256 5261      JMP ,+3
0257 7402      HLT
0260 5254      JMP IRECD
0261 6772      IOT 772
0262 3274      DCA WTIJMP+2
0263 1634      TAD I WTINT

0264 7040      CMA
0265 0274      AND WTIJMP+2
0266 7650      SNA CLA
0267 2234      ISZ WTINT
0270 2234      ISZ WTINT
0271 5634      JMP I WTINT
0272 5402      WTIJMP,      JMP I 2

0273 0254      IRECD
0274 0000      0
0275 0000      0
0276 4215      K4215,      4215

0277 5700      TSTTBL,      JMP I ,+1

```

/STARTING ADDRESSES OF TESTS

```

0300 2000      MVTEST
0301 2400      SRCH1
0302 2600      SERCH2
0303 3200      SSTRNA
0304 4400      WRTTST
0305 5600      PARTST
0306 1600      WRSCOP
0307 1667      RDSCOP
0310 1734      SRSCOP

```

```

0311 7402      HLTNS,      HLT      /TEST SELECTED
0312 5311      JMP , -1      /NOT AVAILABLE
0313 5313      WT500,      JMP ,
0314 7200      CLA
0315 3274      DCA WTIJMP+2      /TIME OUT
0316 1325      TAD KM25
0317 3275      DCA WTIJMP+3      /APPROX 500 MSEC
0320 2274      ISZ WTIJMP+2
0321 5320      JMP , -1
0322 2275      ISZ WTIJMP+3
0323 5320      JMP , -3
0324 5713      JMP I WT500
0325 7747      KM25,      7747

```

/REWIND ALL DRIVES SELECTED
/TO END ZONE AT START OF TAPE

```

*400
0400 5200 REPOS1,      JMP ,
0401 4217      JMS RSFDRV      /RESET POINTRS TO FIRST DRIVE
0402 1065      TAD K0604      /MOVE BACKWARDS
0403 1060      TAD UNFUNC      /*POSITIONED JNIT NO
0404 6766      IOT 766        /SET STATUS A
0405 4440      JMS I WAITI
0406 5001      5001          /INDICATE EXPECT END
0407 7402      HLT            /NOT STATUS EXPECTED

0410 7240      CLA CMA
0411 3422      DCA I POSITN    /INDICATE END ZONE
0412 7240      CLA CMA
0413 3423      DCA I DIRECT    /INDICATE BACKWARDS
0414 4237      JMS CHNGDR      /SET UP NEXT DRIVE
0415 5202      JMP REPOS1+2    /REWIND NEXT DRIVE
0416 5600      JMP I REPOS1    /GOT ALL DRIVES, EXIT

```

/RESET CURRENT DRIVE POINTERS TO
/FIRST DRIVE SELECTED

```

0417 5217 RSFDRV,      JMP ,
0420 7200      CLA
0421 3057      DCA CDRIVE      /SET INITIALLY TO 0
0422 1066      TAD K4000
0423 3062      DCA COMBIT
0424 1061      TAD MSBITS

0425 0062      AND COMBIT
0426 7640      SZA CLA          /THIS DRIVE SELECTED
0427 5235      JMP RSFDR1      /YES, SET POINTER
0430 1062      TAD COMBIT
0431 7110      CLL RAR
0432 3062      DCA COMBIT
0433 2057      ISZ CDRIVE      /MOVE COMPARE BIT
0434 5224      JMP RSFDRV+5    /INCREMENT DRIVE NUM.

```

/HAVE FOUND FIRST DRIVE SELECTED

```

0435 4261 RSFDR1,      JMS GNPTRS      /GENERATE CONTROL POINTERS
0436 5617      JMP I RSFDRV          /EXIT

```

```

/SELECT NEXT DRIVE OR
/RESET TO FIRST DRIVE AND SKIP
CHNGDR,      JMP .
0437  5237
0440  7200      CLA
0441  1062      TAD COMBIT      /GET DRIVE COMPARE BIT
0442  7110      CLL RAR        /MOVE IT TO NEXT
0443  0067      AND K7767
0444  7440      SZA            /LAST DRIVE NJM 7
0445  5251      JMP ,+4        /NO
0446  4217      JMS RSFDRV     /RESET TO FIRST

0447  2237      ISZ CHNGDR     /INCR. EXIT, SKIP
0450  5637      JMP I CHNGDR   /EXIT
0451  3062      DCA COMBIT
0452  2057      ISZ CDRIVE
0453  1062      TAD COMBIT
0454  0061      AND MSBITS
0455  7650      SNA CLA        /THIS DRIVE SELECTED
0456  5240      JMP CHNGDR+1   /NO

0457  4261      JMS GNPTRS     /GENERATE DRIVE POINTERS
0460  5637      JMP I CHNGDR

```

```

/GENERATE LAST RECORD,
/DIRECTION AND UNIT NUMBER POINTERS
/FOR DECTAPE FUNCTIONS

```

```

0461  5261      GNPTRS,      JMP .
0462  1057      TAD CDRIVE     /DRIVE NUMBER
0463  7112      CLL RTR
0464  7012      RTR           /POSITION TO BITS 0,1,2
0465  3060      DCA UNFUNC
0466  1057      TAD CDRIVE     /DRIVE NUMBER
0467  1300      TAD PNTRS      /* POS, PNTR ADDRS,
0470  3022      DCA POSITN     /FOR INDIRECTS:

0471  1057      TAD CDRIVE
0472  1311      TAD PNTRS+11   /* DIRECTION PNTR
0473  3023      DCA DIRECT     /FOR INDIRECTS.
0474  1322      TAD PNTRS+22
0475  1057      TAD CDRIVE
0476  3024      DCA LSTBLK
0477  5661      JMP I GNPTRS

```

0500	0501	PNTRS.	.*1	/TO GET LAST RECORD NUMBER
0501	0000	0		/FOR DRIVE 8
0502	0000	0		/1
0503	0000	0		/2
0504	0000	0		/3
0505	0000	0		/4
0506	0000	0		/5
0507	0000	0		/6
0510	0000	0		/7
0511	0512	.*1		/TO GET LAST DIRECTION
0512	0000	0		/DIRECTION - UNIT 8
0513	0000	0		/1
0514	0000	0		/2
0515	0000	0		/3
0516	0000	0		/4
0517	0000	0		/5
0520	0000	0		/6
0521	0000	0		/7
0522	0523	.*1		/TO GET LAST WRITTEN
0523	0000	0		/8
0524	0000	0		/1
0525	0000	0		/2
0526	0000	0		/3
0527	0000	0		/4
0530	0000	0		/5
0531	0000	0		/6
0532	0000	0		/7

/SEARCH ROUTINE
/FIND BLOCK IN (RECORD) IN
/DIRFLG=7777 BKWD #0 FWD

*600

0600	5200	SEARCH,	JMP .	
0601	1114	TAD	DIRFLG	
0602	7100	CLL		
0603	7640	SZA	CLA	
0604	7120	STL		
0605	1076	TAD	K0003	/MAKE=3 IF FWD
0606	7420	SNL		
0607	7041	CMA	IAC	/MAKE 3 IF BKWD
0610	1020	TAD	RECORD	/BLOCK + OR - 2 FOR TA
0611	3351	DCA	TAPONT	
0612	1114	TAD	DIRFLG	
0613	7650	SNA	CLA	/FORWARD IS
0614	1102	TAD	K0400	/START BACKWARD
0615	1103	TAD	K0214	
0616	1060	TAD	UNFUNC	/+DRIVE NUMBER
0617	6766	IOT	766	
0620	7040	CMA		
0621	3347	DCA	BLKFLG	
0622	1025	TAD	IDCON	
0623	3430	DCA	I CALOC	
0624	4440	JMS	I WAITI	/WAIT FOR NORMAL
0625	0001	1		
0626	5321	JMP	SREZTS	/COULD BE EZ
0627	4255	JMS	SRCNCK	/FOUND TURN AROUND
0630	5234	JMP	SRTAFN	/YES, TURN AROUND
0631	5234	JMP	SRTAFN	/PAST IT, TURN AROUND
0632	6764	IOT	764	/NOT REACHED YET
0633	5224	JMP	,-7	
0634	1020	SRTAFN,	TAD RECORD	
0635	3351	DCA	TAPONT	
0636	6761	IOT	761	
0637	7040	CMA		
0640	0075	AND	K0200	/IN CASE MOTION=0
0641	1102	TAD	K0400	
0642	6764	IOT	764	/CHANGE DIRECTION
0643	7040	CMA		
0644	3347	DCA	BLKFLG	
0645	4440	JMS	I WAITI	
0646	0001	1		/HAS TO BE NORMAL
0647	5746	JMP	I SRCHER	/OR ERROR
0650	4255	JMS	SRCNCK	
0651	5600	JMP	I SEARCH	/FOUND BLOCK, EXIT
0652	5746	JMP	I SRCHER	/WENT PAST, ERROR
0653	6764	IOT	764	/NOT THERE YET
0654	5245	JMP	,-7	

0655	5255	SRCNCK,	JMP ,	
0656	2347	ISZ	BLKFLG	/FIRST BLOCK IN
0657	7410	SKP		/NO
0660	5274	JMP	SBCONS	
0661	6761	IOT	761	
0662	0102	AND	K0400	
0663	7640	SZA	CLA	/BACKWARD IS
0664	7040	CMA		/-1
0665	7450	SNA		/FORWARD IS
0666	7001	IAC		/+1
0667	1350	TAD	PREBLK	
0670	7041	CMA	IAC	
0671	1021	TAD	BLKFND	/BLOCKS SEQUENTIAL
0672	7640	SZA	CLA	
0673	5746	JMP	I SRCHER	/NO, ERROR
0674	1351	SBCONS,	TAD TAPONT	
0675	7041	CMA	IAC	
0676	1021	TAD	BLKFND	
0677	7450	SNA		/FIND BLOCK YET
0700	5655	JMP	I SRCNCK	/YES, TA OR EXIT
0701	2255	ISZ	SRCNCK	/STEP ADDRS
0702	7100	CLL		
0703	7710	SPA	CLA	
0704	7120	STL		/L=1 IS BLK FND LESS
0705	6761	IOT	761	
0706	0102	AND	K0400	
0707	7640	SZA	CLA	/FORWARD
0710	5316	JMP	,+6	/NO BACKWARD
0711	7430	SZL		/FORWARD AND BLKFND
0712	2255	ISZ	SRCNCK	/LESS IS NOT THERE YET
0713	1021	TAD	BLKFND	
0714	3350	DCA	PREBLK	
0715	5655	JMP	I SRCNCK	
0716	7420	SNL		/BACKWARD AND BLKFND
0717	2255	ISZ	SRCNCK	/LESS IS GONE PAST
0720	5313	JMP	, -5	

```

0721 6772 SREZTS, IOT 772
0722 0110 AND EZBIT
0723 7650 SNA CLA
0724 5746 JMP I SRCHER /NOT END ZONE, ERROR
0725 1351 TAD TAPONT
0726 7510 SPA

0727 5333 JMP ,+4 /BLOCK 0 OR 1
0730 1126 TAD K5076
0731 7710 SPA CLA /BLOCK 2700 OR 2701
0732 5342 JMP ,+10
0733 7200 CLA
0734 1075 TAD K0200
0735 6764 IOT 764 /SET MOTION
0736 4440 JMS I WAITI /WAIT FOR EZ AGAIN
0737 5000 5000
0740 5746 JMP I SRCHER
0741 5234 JMP SRTAFN /DO TURN AROUND
0742 1347 TAD BLKFLG /IF EZ WAS
0743 7700 SNA CLA /FIRST INT WAS VALID
0744 5746 JMP I SRCHER /IF NOT FIRS IS INVALID
0745 5234 JMP SRTAFN
0746 1000 SRCHER, SRHERR
0747 0000 BLKFLG, 0
0750 0000 PREBLK, 0
0751 0000 TAPONT, 0

```

/SEARCH ERROR TYPEOUT

```

*1000
1000 4444 SRHERR, JMS I ERRSTP
1001 4452 JMS I SRCHTY
1002 1026 TAD RECRDK
1003 4451 JMS I TYPCON /TYPE BLOCK SEARCHED
1004 4456 JMS I TYPTX
1005 0042 42
1006 5457 5457
1007 4353 4353
1010 0067 67
1011 4156 4156
1012 6445 6445
1013 4400 4400
1014 7700 7700
1015 1114 TAD DIRFLG
1016 7650 SNA CLA
1017 5222 JMP ,+3
1020 4675 JMS I BACKTY
1021 7410 SKP
1022 4676 JMS I FORDTY
1023 1025 TAD IDCON
1024 4451 JMS I TYPCON /TYPE BLOCK FOUND
1025 4456 JMS I TYPTX
1026 0042 42
1027 5457 5457
1030 4353 4353

```

1031	0046	46	
1032	5765	5765	
1033	5644	5644	
1034	7700	7700	
1035	7040	CMA	
1036	1671	TAD I SEKONS	/BLKFLG
1037	7710	SPA CLA	/MORE THAN 1 BLOCK
1040	5252	JMP ,+12	/NO
1041	1272	TAD SEKONS+1	/PREBLK
1042	4451	JMS I TYP CON	/TYPE LAST BLOCK
1043	4456	JMS I TYPTX	/FOUND
1044	0054	54	
1045	4163	4163	
1046	6400	6400	
1047	4254	4254	
1050	5743	5743	
1051	5377	5377	
1052	2671	ISZ I SEKONS	
1053	7000	NOP	
1054	1271	TAD SEKONS	
1055	4451	JMS I TYP CON	/TYPE NUMBER OF
1056	4456	JMS I TYPTX	/BLKS NUM READ
1057	0042	42	
1060	5457	5457	
1061	4353	4353	
1062	6300	6300	
1063	6245	6245	
1064	4144	4144	
1065	7700	7700	
1066	4447	JMS I SBTYPE	
1067	5670	JMP I ,+1	
1070	0601	SEARCH+1	
1071	0747	SEKONS,	BLKFLG
1072	0750	PREBLK	
1073	1074	,+1	
1074	0000	0	
1075	1545	BACKTY,	TYBKW
1076	1555	FORDTY,	TYFWD

/TYPE TEXT ROUTINE

```

*1200
1200 5200 TYTEXT,      JMP .
1201 7200      CLA
1202 1600      TAD I TYTEXT      /GET NEXT 2 CHARACTERS
1203 7040      CMA                /MAKE -
1204 3307      DCA TXSTOR
1205 2200      ISZ TYTEXT
1206 1307      TAD TXSTOR
1207 7440      SZA                /CARRIAGE RETJRN - LINE FEED
1210 5213      JMP ,+3            /NO

1211 4242      JMS CRLFLF        /CR LF
1212 5201      JMP TYTEXT+1      /GET NEXT
1213 0070      AND K7700          /CLEAR TO UPR CHAR
1214 7450      SNA                /END OF MESSAGE
1215 5600      JMP I TYTEXT      /YES
1216 7012      RTR                /MOVE
1217 7012      RTR                /OVER
1220 7012      RTR                /6 PLACES
1221 4230      JMS TYCHAR        /OUTPUT
1222 1307      TAD TXSTOR
1223 0071      AND K0077
1224 7450      SNA                /END OF MESSAGE
1225 5600      JMP I TYTEXT      /YES EXIT

1226 4230      JMS TYCHAR        /OUTPUT
1227 5201      JMP TYTEXT+1      /GET NEXT 2

1230 5230 TYCHAR,      JMP .
1231 7040      CMA                /MAKE * AGAIN
1232 0071      AND K0077          /CLEAR TO LOWER 6
1233 1072      TAD K0240          /MAKE ASCII
1234 6046      TLS                /OUTPUT
1235 6041      TSF                /WAIT FLAG
1236 5235      JMP , -1
1237 7200      CLA
1240 6042      TCF                /CLEAR FLAG
1241 5630      JMP I TYCHAR      /DO NEXT

1242 5242 CRLFLF,      JMP .
1243 1257      TAD K0215          /CARRIAGE RETURN
1244 6046      TLS
1245 6041      TSF
1246 5245      JMP , -1
1247 7200      CLA
1250 1260      TAD K0212          /LINE FEED
1251 6046      TLS
1252 6041      TSF
1253 5252      JMP , -1
1254 6042      TCF
1255 7200      CLA
1256 5642      JMP I CRLFLF
1257 0215      <0215,           215
1260 0212      <0212,           212

```

/TYPE CONTENTS OF ADDRESS IN AC

1261	5261	TYCONT,	JMP ,	
1262	3307	DCA TXSTOR		/SAVE ADDRESS
1263	1707	TAD I TXSTOR		/GET CONTENTS
1264	3307	DCA TXSTOR		
1265	4242	JMS CRLFLF		/CARRIAGE RETURN - LINE FEED
1266	4273	JMS TYCOVR		/TYPE UPPER OCTAL
1267	4273	JMS TYCOVR		
1270	4273	JMS TYCOVR		
1271	4273	JMS TYCOVR		
1272	5661	JMP I TYCONT		

1273	5273	TYCOVR,	JMP ,	
1274	1307	TAD TXSTOR		
1275	7006	RTL		
1276	7004	RAL		
1277	3307	DCA TXSTOR		
1300	1307	TAD TXSTOR		
1301	7004	RAL		
1302	0073	AND K0007		
1303	1074	TAD K0020		
1304	7040	CMA		/MAKE - FOR
1305	4230	JMS TYCHAR		/OUTPUT
1306	5673	JMP I TYCOVR		
1307	0000	TXSTOR,	0	

/STOP TAPE ON ERROR, LEAVE FLAGS SET

1310	5310	ERSTP,	JMP ,	
1311	6761	IOT 761		
1312	0075	AND K0200		
1313	1076	TAD K0003		
1314	6764	IOT 764		
1315	5710	JMP I ERSTP		
1316	5316	TSTATB,	JMP ,	
1317	6772	IOT 772		
1320	3331	DCA SBRECV		
1321	1332	TAD SBRECV+1		
1322	4451	JMS I TYPCON		
1323	4456	JMS I TYPTX		
1324	0063	63		
1325	6441	6441		
1326	6400	6400		
1327	4277	4277		
1330	5716	JMP I TSTATB		
1331	0000	SBRECV,	0	
1332	1331	.+1		

```
*1400
/TYPE MOVE AND DIRECTION
1400 5200 TYMOVE,      JMP ,
1401 4311      JMS TYDRV
1402 4456      JMS I TYPTX
1403 7777      7777
1404 5557      5557
1405 6645      6645
1406 0077      0077
1407 4336      JMS TYDIR
1410 5600      JMP I TYMOVE

/TYPE SEARCH DIRECTION AND MODE
1411 5211 TYSRCH,      JMP ,
1412 4311      JMS TYDRV
1413 4456      JMS I TYPTX
1414 7777      7777
1415 6345      6345
1416 4162      4162
1417 4350      4350
1420 0077      0077
1421 4336      JMS TYDIR
1422 4363      JMS TYMODE
1423 5611      JMP I TYSRCH

/TYPE READ DATA DIRECTION AND MODE
1424 5224 TYRDAT,      JMP ,
1425 4311      JMS TYDRV
1426 4260      JMS TYREAD
1427 4275      JMS TYDATA
1430 4336      JMS TYDIR
1431 4363      JMS TYMODE
1432 5624      JMP I TYRDAT

/TYPE READ ALL DIRECTION AND MODE
1433 5233 TYRALL,      JMP ,
1434 4311      JMS TYDRV
1435 4260      JMS TYREAD
1436 4303      JMS TYALL
1437 4336      JMS TYDIR
1440 4363      JMS TYMODE
1441 5633      JMP I TYRALL
```

```
      /TYPE WRITE DATA DIRECTION AND MOJE
1442 5242 TYWDAT,      JMP ,
1443 4311      JMS TYDRV
1444 4266      JMS TYWRIT
1445 4275      JMS TYDATA
1446 4336      JMS TYDIR
1447 4363      JMS TYMODE
1450 5642      JMP I TYWDAT
```

```
      /TYPE WRITE ALL DIRECTION AND MODEL
1451 5251 TYWALL,      JMP ,
1452 4311      JMS TYDRV
1453 4266      JMS TYWRIT
1454 4303      JMS TYALL
1455 4336      JMS TYDIR
1456 4363      JMS TYMODE
1457 5651      JMP I TYWALL
```

```
      /TYPE READ
1460 5260 TYREAD,      JMP ,
1461 4456      JMS I TYPTX
1462 6245      6245
1463 4144      4144
1464 0077      0077
1465 5660      JMP I TYREAD
```

```
      /TYPE WRITE
1466 5266 TYWRIT,      JMP ,
1467 4456      JMS I TYPTX
1470 6762      6762
1471 5164      5164
1472 4500      4500
1473 7700      7700
1474 5666      JMP I TYWRIT
```

```
      /TYPE DATA
1475 5275 TYDATA,      JMP ,
1476 4456      JMS I TYPTX
1477 4441      4441
1500 6441      6441
1501 0077      0077
1502 5675      JMP I TYDATA
```

```

/TYPE ALL
1503 5303 TYALL,      JMP .
1504 4456      JMS I TYPTX
1505 4154      4154
1506 5400      5400
1507 7700      7700
1510 5703      JMP I TYALL

```

```

/TYPE DRIVE AND NUMBER
1511 5311 TYDRV,      JMP .
1512 4456      JMS I TYPTX
1513 7777      7777
1514 7777      7777
1515 4462      4462
1516 5166      5166
1517 4500      4500
1520 0077      0077
1521 1057      TAD CDRIVE
1522 7450      SNA
1523 1130      TAD K0010
1524 1335      TAD K260
1525 6046      TLS
1526 6041      TSF
1527 5326      JMP , -1
1530 7200      CLA
1531 4456      JMS I TYPTX

```

```

1532 7777      7777
1533 7700      7700
1534 5711      JMP I TYDRV
1535 0260      K260,      260

```

```

/TYPE FORWARDS OR BACKWARD
1536 5336 TYDIR,      JMP .
1537 6761      IOT 761
1540 0102      AND K0400
1541 7650      SNA CLA
1542 5353      JMP TYFWD-2
1543 4345      JMS TYBKW
1544 5736      JMP I TYDIR
1545 5345 TYBKW,      JMP .
1546 4456      JMS I TYPTX
1547 4253      4253
1550 6744      6744
1551 0077      0077
1552 5745      JMP I TYBKW

1553 4355      JMS TYFWD
1554 5736      JMP I TYDIR
1555 5355 TYFWD,      JMP .
1556 4456      JMS I TYPTX
1557 4667      4667
1560 4400      4400
1561 7700      7700
1562 5755      JMP I TYFWD

```

```

/TYPE CONTINUOUS IF NOT NORMAL MODE
1563 5363 TYMODE, JMP ,
1564 6761 IOT 761
1565 0123 AND K0100
1566 7650 SNA CLA
1567 5763 JMP I TYMODE
1570 4456 JMS I TYPTX
1571 4300 4300
1572 5557 5557
1573 4445 4445
1574 0077 0077
1575 5763 JMP I TYMODE

```

PAUSE

```

/TC01 EXERCISER - TAPE 2
/BASIC MOTION TEST, DECIPHER KEYBOARD INPUT
/SETUP EXECUTE TABLE, START DO LOOP
/ON FIRST CHARACTER IF A(D)

```

```

*2000
2000 4456 MVTEST, JMS I TYPTX
2001 7777 7777 /CR LF
2002 7777 7777 /CR LF
2003 7700 7700
2004 1032 TAD BF1LOC /SA OF EXECUTE TABLE
2005 3010 DCA 10 /FOR INDIRECTS:
2006 1010 TAD 10
2007 7001 IAC
2010 3011 DCA 11 /FOR RESET ON RPT LOOP
2011 7040 CMA
2012 3013 DCA 13 /FOR 1ST D
2013 1011 TAD 11
2014 3012 DCA 12 /FOR RESET ON CHNG DRIVES
2015 4240 JMS WAITIN /WAIT FOR INPJ
2016 4247 JMS MVEQUL
2017 0304 304 /1ST IN = D
2020 3013 MVREST, DCA 13 /0 TO CHAR COUNTER
2021 4247 JMS MVEQUL
2022 0306 306 /* F FORWARD
2023 4247 JMS MVEQUL
2024 0302 302 /* B BACKWARD
2025 4247 JMS MVEQUL
2026 0323 323 /* S STOP
2027 4247 JMS MVEQUL
2030 0303 303 /* C CHANGE
2031 4247 JMS MVEQUL
2032 0327 327 /* W WAIT
2033 4247 JMS MVEQUL
2034 0322 322 /* R REPEAT
2035 4247 JMS MVEQUL
2036 0304 304 /* D DO LOOP
2037 5200 JMP MVTEST

```

```

/WAIT KEYBOARD INPUT
2040 5240 WAITIN, JMP ,
2041 6031 KSF
2042 5241 JMP ,-1

```

2043 6036
 2044 7041
 2045 3014
 2046 5640

KRB
 CMA IAC
 DCA 14
 JMP I WAITIN

/14 = 2'S COMPLEMENT OF IN

```

/TEST FOR WHICH CHARACTER IN
2047 5247 MVEQUL, JMP ,
2050 1014 TAD 14
2051 1647 TAD I MVEQUL
2052 2247 ISZ MVEQUL
2053 7650 SNA CLA /RIGHT CHAR
2054 5260 JMP ,+4 /FOUND WHICH CHAR
2055 2013 ISZ 13 /INC POINTER
2056 7000 NOP
2057 5647 JMP I MVEQUL /TEST NEXT CHAR
2060 1013 TAD 13
2061 7040 CMA /FIRST IN = 0
2062 7650 SNA CLA
2063 5712 JMP I DOTHEM /FIRST = 0 DO LAST
2064 1013 TAD 13
2065 7104 CLL RAL /NUMBER TIMES 2
2066 1273 TAD MVRTBL /FORM ADDRESS
2067 3014 DCA 14 /FOR INDIRECTS:
2070 1414 TAD I 14 /GET ROUTINE ADDRESS
2071 3410 DCA I 10 /TO EXECUTE TABLE
2072 5414 JMP I 14 /GO TO TYPEOUT

2073 2073 MVRTBL,
2074 2216 MVFWD /START TAPE FORWARD
2075 5313 JMP MVGFWD
2076 2223 MVBKWD /START BACKWARD
2077 5321 JMP MVGBKW
2100 2230 MVSTOP /STOP TAPE
2101 5327 JMP MVGSTP
2102 2274 MVCHNG /CHANGE DRIVES:
2103 5335 JMP MVGCHG
2104 2246 MVWAIT /WAIT, MARK TIME
2105 5347 JMP MVGWAT
2106 2257 MVRPT /REPEAT X TIMES
2107 5356 JMP MVGRPT
2110 2305 MVEND /END OF DO LOOP
2111 5712 JMP I ,+1
2112 2200 DOTHEM, DOLOOP /TO GET TO EXECUTE LOOP

/TYPE FORWARD
2113 4456 MVGFWD, JMS I TYPTX
2114 7777 7777
2115 4667 4667
2116 4477 4477
2117 4240 JMS WAITIN
2120 5220 JMP MVREST

```

```

/TYPE BACKWARD
2121 4456 MVGBKW,      JMS I TYPTX
2122 7777          7777
2123 4253          4253
2124 6744          6744
2125 7700          7700
2126 5317          JMP MVGFWD+4

```

```

/TYPE STOP
2127 4456 MVGSTP,      JMS I TYPTX
2130 7777          7777
2131 6364          6364
2132 5760          5760
2133 7700          7700
2134 5317          JMP MVGFWD+4

```

```

/TYPE CHANGE
2135 4456 MVGCHG,      JMS I TYPTX
2136 7777          7777
2137 4350          4350
2140 4777          4777
2141 1012          TAD 12
2142 3410          DCA I 10          /PUT WHERE TO REPEAT
2143 1010          TAD 10          /FROM ON CHANGING DRIVES
2144 7001          IAC
2145 3012          DCA 12
2146 5317          JMP MVGFWD+4

```

```

/TYPE WAIT
2147 4456 MVGWAT,      JMS I TYPTX
2150 7777          7777
2151 6741          6741
2152 5164          5164
2153 0077          0077
2154 4772          JMS I GET4IN      /GET WAIT CONSTANT
2155 5317          JMP MVGFWD+4

```

```

/TYPE REPEAT
2156 4456 MVGRPT,      JMS I TYPTX
2157 7777          7777
2160 6260          6260
2161 6400          6400
2162 0077          0077
2163 4772          JMS I GET4IN      /GET REPEAT CONSTANT
2164 1011          TAD 11          /GET REPEAT FROM ADDRESS
2165 3410          DCA I 10          /TO EXECUTE TABLE
2166 1010          TAD 10
2167 7001          IAC
2170 3011          DCA 11          /FOR NEXT REPEAT
2171 5317          JMP MVGFWD+4

2172 2310 GET4IN,      GETMIN          /TO GET 4 CHARACTERS

```

/DO LOOP, EXECUTE SELECTED SEQUENCE

*2200

```

2200 4456 DOLOOP,      JMS I TYPTEx    /TYPE DO
2201 7777          7777
2202 4457          4457
2203 7777          7777
2204 7700          7700
2205 1032          TAD BF1LOC          /SET ROUTINE POINTER TO START
2206 3010          DCA 10
2207 3011          DCA 11          /TO COUNT RPTS
2210 1410          TAD I 10          /GET ROUTINE ADDRESS
2211 3214          DCA ,+3          /FOR JMS I
2212 4614          JMS I ,+2          /EXECUTE ROUTINE
2213 5210          JMP , -3          /DO NEXT
2214 2214          .
2215 5215          JMP ,

```

/BASIC MOTION TEST

/FORWARD, BACKWARD, STOP, WAIT

/REPEAT AND CHANGE DRIVE ROUTINES

/START FORWARD MOTION

```

2216 5216 MVFWD,      JMP ,
2217 1075          TAD K0200          /MOVE TAPE FORWARD
2220 1060          TAD UNFUNC          /+ DRIVE NUMBER
2221 6766          IOT 766
2222 5616          JMP I MVFWD

```

/START BACKWARD MOTION

```

2223 5223 MVBKWD,     JMP ,
2224 1344          TAD K0600          /MOVE BACKWARD
2225 1060          TAD UNFUNC          /+ DRIVE NUMBER
2226 6766          IOT 766
2227 5623          JMP I MVBKWD

```

/STOP TAPE

```

2230 5230 MVSTOP,     JMP ,
2231 6761          IOT 761          /READ STAT A
2232 0345          AND K7000          /CLEAR TO DRIVE NUM
2233 7041          CMA IAC
2234 1060          TAD UNFUNC
2235 7640          SZA CLA          /SAME DRIVE
2236 5243          JMP ,+5          /NOT SAME AS STAT A
2237 6761          IOT 761
2240 0075          AND K0200          /CLEAR AC TO MOTION BIT
2241 6764          IOT 764          /CLEAR MOTION IF NOT READY
2242 5630          JMP I MVSTOP      /EXIT
2243 1060          TAD UNFUNC
2244 6766          IOT 766
2245 5630          JMP I MVSTOP

```

```

/ WAIT AND DO NOTHING FOR A NUMBER OF BLOCKS
2246 5246 MVWAIT,      JMP ,
2247 3016      DCA 16
2250 1410      TAD I 10
2251 3017      DCA 17
2252 2016      ISZ 16
2253 5252      JMP , -1
2254 2017      ISZ 17
2255 5252      JMP , -3
2256 5646      JMP I MVWAIT

```

```

/ REPEAT X TIMES LOOP
2257 5257 MVRPT,      JMP ,
2260 2011      ISZ 11      / RPT COUNT+1
2261 1011      TAD 11
2262 1410      TAD I 10      /* (-RPT CONSTANT)
2263 7640      SZA CLA      / DONE X TIMES
2264 5270      JMP , +4      / NO
2265 0410      AND I 10      / INC EXECUTE ADDRESS
2266 3011      DCA 11
2267 5657      JMP I MVRPT   / EXIT
2270 7040      CMA          / RESET EXECUTE ADDRESS
2271 1410      TAD I 10
2272 3010      DCA 10
2273 5657      JMP I MVRPT

```

```

/ CHANGE DRIVES AND REPEAT OR
/ IF BACK TO FIRST DRIVE CONTINUE
2274 5274 MVCHNG,      JMP ,
2275 4437      JMS I NEWDRV
2276 5301      JMP , +3
2277 0410      AND I 10
2300 5674      JMP I MVCHNG
2301 7040      CMA
2302 1410      TAD I 10
2303 3010      DCA 10
2304 5674      JMP I MVCHNG

```

```

/ END OF ROUTINE TYPED IN
2305 5305 MVEND,      JMP ,
2306 5707      JMP I , +1
2307 2000      MVTEST

```

```

/MAKE - CONSTANT OF 4 INPUTS
2310 5310 GETMIN, JMP ,
2311 7201 CLA IAC /+1 WHEN L=1 GOT 4
2312 3013 DCA 13
2313 6031 KSF /WAIT KEYBOARD
2314 5313 JMP , -1
2315 6036 KRB /READ KEYBOARD
2316 6046 TLS /OUTPUT
2317 6041 TSF
2320 5317 JMP , -1
2321 7040 CMA /MAKE -
2322 0073 AND K0007 /OCTAL
2323 3014 DCA 14
2324 1013 TAD 13 /MOVE 1 CHARACTER
2325 7104 CLL RAL
2326 7006 RTL
2327 1014 TAD 14 /ASSEMBLE
2330 3013 DCA 13
2331 7420 SNL /SKIP = DONE 4
2332 5313 JMP GETMIN+3 /NOT 4 YET
2333 1013 TAD 13
2334 7001 IAC /MAKE 2'S COMPLEMENT
2335 7450 SNA
2336 7040 CMA /MUST BE AT LEAST -1
2337 3410 DCA I 10 /TO EXECUTE TABLE
2340 4456 JMS I TYPTEX
2341 7777 7777
2342 7700 7700
2343 5710 JMP I GETMIN
2344 0600 K0600, 600
2345 7000 K7000, 7000

```

/BASIC SEARCH ROUTINE 1
 /FORCE TAPE INTO END ZONE
 /FAR ENOUGH TO GUARANTEE BLOCK 0 FORWARD
 /VERIFY BLOCKS 0000 TO 2701 THEN REVERSE

*2400

```

2400 4436 SRCH1,      JMS I REWIND
2401 4436      JMS I REWIND      /INTO EZ TWICE
2402 3114      DCA DIRFLG
2403 3020      DCA RECORD      /RECORD 0
2404 4435      JMS I SRCHIT      /FIND IT
2405 5221      JMP SCH1ST      /YES
2406 4444      JMS I ERRSTP      /NO
2407 4452      JMS I SRCHTY
2410 1026      TAD RECRDK      /BLOCK LOOKED FOR
2411 4451      JMS I TYPCON
2412 1025      TAD IDCON      /BLOCK FOUND
2413 4451      JMS I TYPCON
2414 6772      IOT 772      /RD STAT B
2415 3021      DCA BLKFND
2416 1025      TAD IDCON
2417 4451      JMS I TYPCON      /TYPE STAT B
2420 5202      JMP SRCH1+2

2421 3422      SCH1ST,      DCA I POSITN      FOUND 0
2422 3423      DCA I DIRECT      /FORWARD
2423 2020      ISZ RECORD      /RECORD LOOKED FOR +1
2424 7040      CMA
2425 3427      DCA I WCLOC      /SET WC TO -1
2426 6764      IOT 764      /SET WC ENABLES
2427 4440      JMS I WAITI
2430 0001      1
2431 7410      SKP
2432 5244      JMP SCH1OK      /INTERRUPT OK
2433 6772      SCH1ER,      IOT 772
2434 0110      AND EZBIT
2435 7650      SNA CLA      /END ZONE
2436 5206      JMP SRCH1+6 /NO TYPE ERROR
2437 1020      TAD RECORD
2440 1077      TAD K5077
2441 7700      SMA CLA      /DONE ALL BLOCKS
2442 5261      JMP SCH1ND      /YES
2443 5206      JMP SRCH1+6 /NO, ERROR

2444 1021      SCH1OK,      TAD BLKFND      /GET BLOCK NUMBER READ
2445 7041      CMA IAC      /MAKE -
2446 1020      TAD RECORD
2447 7640      SZA CLA      /RIGHT BLOCK
2450 5253      JMP ,+3      /NO
2451 2422      ISZ I POSITN      /NEW POSITION
2452 5223      JMP SCH1ST+2      /TEST NEXT BLOCK
2453 4365      JMS SIERR0

```

2454	2422	ISZ	I POSITN	
2455	2020	ISZ	RECORD	
2456	4435	JMS	I SRCHIT	/RESYNC ON NEXT BLOCK
2457	5244	JMP	SCH10K	/FOUND OK
2460	5233	JMP	SCH1ER	/TEST FOR END ZONE
2461	4437	SCH1ND,	JMS I NEWDRV	
2462	5202	JMP	SRCH1+2	/RPT NEXT DRIVE
2463	7040	CMA		
2464	3020	DCA	RECORD	
2465	1125	TAD	K0204	
2466	1060	TAD	UNFUNC	
2467	6766	IOT	766	/MOVE DRIVE INTO EZ
2470	4440	JMS	I WAITI	
2471	5001		5001	
2472	7000	NOP		
2473	4437	JMS	I NEWDRV	
2474	5265	JMP	SCH1ND+4	
2475	2020	ISZ	RECORD	/DONE ALL TWICE
2476	7410	SKP		/YES
2477	5265	JMP	SCH1ND+4	/MAKE 2ND MOVE INTO EZ
2500	1100	SRCH2,	TAD K2701	
2501	3020	DCA	RECORD	
2502	1101	TAD	K0614	/SRCH BACKWARD
2503	1060	TAD	UNFUNC	/+ DRIVE NUMBER
2504	6766	IOT	766	
2505	7040	CMA		
2506	3427	DCA	I WCLOC	
2507	4440	JMS	I WAITI	
2510	0001		1	
2511	7410	SKP		
2512	5325	JMP	SCH20K	
2513	4365	SCH2ER,	JMS SIERRO	
2514	7240	CLA	CMA	
2515	1020	TAD	RECORD	
2516	3020	DCA	RECORD	
2517	1020	TAD	RECORD	
2520	7710	SPA	CLA	
2521	5356	JMP	SIERRO-7	
2522	7040	CMA		
2523	3114	DCA	DIRFLG	
2524	4435	JMS	I SRCHIT	

2525	1020	SCH20K,	TAD RECORD	/BLOCK LOOKED FOR
2526	7041	CMA	IAC	/MAKE -
2527	1021	TAD	BLKFND	/+ BLOCK FOJND
2530	7640	SZA	CLA	/RIGHT ONE
2531	5313	JMP	SCH2ER	/NO
2532	6764	IOT	764	/RESET WC ENAB3LE
2533	7040	CMA		
2534	3427	DCA	I WCLOC	
2535	1020	TAD	RECORD	/LAST BLOCK -1
2536	3422	DCA	I POSITN	
2537	7040	CMA		
2540	1020	TAD	RECORD	
2541	3020	DCA	RECORD	
2542	4440	JMS	I WAITI	
2543	0001	1		
2544	7410	SKP		
2545	5325	JMP	SCH20K	/STATUS WAS NORMAL
2546	6772	IOT	772	/READ STATB
2547	0110	AND	EZBIT	
2550	7650	SNA	CLA	/EZ INT
2551	5313	JMP	SCH2ER	/NO, ERROR
2552	1020	TAD	RECORD	
2553	7040	CMA		
2554	7640	SZA	CLA	/EXPECT END ZONE
2555	5313	JMP	SCH2ER	/NO, ERROR
2556	4437	JMS	I NEWDRV	/GET NEXT DRIVE
2557	5300	JMP	SRCH2	/REPEAT
2560	7604	CLA	OSR	
2561	7010	RAR		
2562	7620	SNL	CLA	/REPEAT TEST
2563	7402	HLT		/NO, HALT
2564	5200	JMP	SRCH1	/START OVER
2565	5365	SIERRO,	JMP ,	
2566	4444	JMS	I ERRSTP	
2567	4452	JMS	I SRCHTY	
2570	1026	TAD	RECRDK	
2571	4451	JMS	I TYPCON	
2572	1025	TAD	IDCON	
2573	4451	JMS	I TYPCON	
2574	4447	JMS	I SBTYPE	
2575	5765	JMP	I SIERRO	

/SEARCH ROUTINE 2
 /READ A SERIES OF 129 BLOCKS OR UNTIL END ZONE
 /COMPARE FOR INCREMENTING OR DEC.

/1ST KEY (F) SEARCH FORWARD
 /ALL OTHERS BACKWARD
 /2ND KEY (C) COMPARE BLOCKS
 /ALL OTHERS DUMP TO 129 ON PRINTER

```

*2600
2600 4743  SERCH2,      JMS I DRVTP      /TYPE DRIVE AND NUMBER
2601 4333      JMS TYINTX      /TYPE TYPE IN
2602 4456      JMS I TYPTX
2603 0046      0046      /F FOR FWD
2604 0046      0046
2605 5762      5762
2606 0046      0046
2607 6744      6744
2610 7700      7700
2611 4321      JMS OTHRTX      /TYPE ALL OTHERS
2612 4456      JMS I TYPTX
2613 4253      4253      /BACKWARD
2614 6744      6744
2615 0077      0077
2616 6031      KSF      /WAIT K
2617 5216      JMP , -1
2620 6036      KRB
2621 6046      TLS
2622 6041      TSF
2623 5222      JMP , -1
2624 6042      TCF
2625 1273      TAD K7472
2626 7640      SZA CLA      /#F
2627 1102      TAD K0400      /NO PREP BACKWARD
2630 1103      TAD K0214

2631 1060      TAD UNFUNC
2632 6766      IOT 766      /START SEARCH
2633 1032      TAD BF1LOC
2634 3010      DCA 10
2635 1064      TAD K7577
2636 3011      DCA 11
2637 7040  SER2ST,      CMA      /WC = -1
2640 3427      DCA I WCLOC
2641 1025      TAD IDCON      /TO BLKFND
2642 3430      DCA I CALOC
2643 4440      JMS I WAITI
2644 0001      1
2645 5255      JMP SEREZ      /NO NORMAL INT

```

2646	1021	TAD BLKFND	
2647	3410	DCA I 10	/STORE BLOCK NUMBER
2650	2011	ISZ 11	
2651	7410	SKP	
2652	5720	JMP I SER2AI	/DONE 129
2653	6764	IOT 764	/RESET WCE
2654	5237	JMP SER2ST	/REPT
2655	6772	SEREZ, IOT 772	/READ B
2656	0110	AND EZBIT	
2657	7640	SZA CLA	/END ZONE
2660	5274	JMP SER2NZ	/YES
2661	6772	IOT 772	
2662	3020	DCA RECORD	/TYPE STATUS B
2663	1026	TAD RECRDK	
2664	4451	JMS I TYPCON	
2665	4456	JMS I TYPTX	
2666	0063	0063	
2667	6441	6441	
2670	6400	6400	
2671	4277	4277	
2672	5200	JMP SERCH2	/START OVER
2673	7472	K7472, 7472	

```

/TYPE END ZONE
2674 4456 SER2NZ,      JMS I TYPTX
2675 7777          7777
2676 4556          4556
2677 4400          4400
2700 7257          7257
2701 5645          5645
2702 7700          7700
2703 1011          TAD 11
2704 7041          CMA IAC
2705 1064          TAD K7577
2706 7640          SZA CLA      /READ ANY AT ALL
2707 5720          JMP I SER2AI  /YES
2710 4456          JMS I TYPTX  /TYPE NO BLOCKS
2711 7777          7777
2712 5657          5657
2713 0042          0042
2714 5457          5457
2715 4353          4353
2716 6377          6377
2717 5200          JMP SERCH2
2720 3000 SER2AI,   SER2A      /TO GET TO REST OF PROGRAM

```

```

/TYPE ALL OTHERS
2721 5321 OTHRTX,    JMP .
2722 4456      JMS I TYPTX
2723 7777      7777
2724 4154      4154
2725 5400      5400
2726 5764      5764
2727 5045      5045
2730 6263      6263
2731 0077      0077
2732 5721      JMP I OTHRTX

```

```

/TYPE TYPE IN
2733 5333 TYINTX,    JMP .
2734 4456      JMS I TYPTX
2735 7777      7777
2736 6471      6471
2737 6045      6045
2740 0051      0051
2741 5677      5677
2742 5733      JMP I TYINTX
2743 1511 DRV TYP,   TYDRV

```

/REST OF SEARCH ROUTINE 2

```

*3000
SER2A,      IOT 761
3000  6761
3001  0075      AND K0200
3002  6764      IOT 764      /STOP TAPE
3003  1011      TAD 11
3004  7041      CMA IAC
3005  1064      TAD K7577
3006  3011      DCA 11      /NUMBER OF BLOCKS READ
3007  1032      TAD BF1LOC
3010  3010      DCA 10      /TO GET FIRST BLOCK
3011  1010      TAD 10
3012  7001      IAC
3013  3012      DCA 12      /TO GET 2ND BLOCK
3014  1012      TAD 12
3015  4451      JMS I TYPCON /TYPE FIRST
3016  4456      JMS I TYPTX  /BLOCK NO READ
3017  0046      0046
3020  5162      5162
3021  6364      6364
3022  7700      7700
3023  4625      JMS I ,+2      /TYPE TYPE IN
3024  7410      SKP
3025  2733      TYINTX
3026  4456      JMS I TYPTX  /C FOR COMPARE
3027  0043      0043
3030  0046      0046
3031  5762      5762
3032  0043      0043
3033  5755      5755
3034  6041      6041
3035  6245      6245
3036  7700      7700
3037  4641      JMS I ,+2      /ALL OTHERS
3040  74410     SKP
3041  2721      OTHRTX
3042  4456      JMS I TYPTX
3043  6062      6062      /PRINT
3044  5156      5156
3045  6400      6400
3046  7700      7700
3047  6031      KSF      /WAIT KEY
3050  5247      JMP , -1
3051  6036      KRB
3052  6046      TLS
3053  6041      TSF
3054  5253      JMP , -1
3055  6042      TCF
3056  1331      TAD K7475
3057  7640      SZA CLA      /C
3060  5323      JMP SER2TY  /NO, PRINT ALL

```

```

3061 6761      IOT 761
3062 0102      AND K0400
3063 7640      SZA CLA          /FORWARDS
3064 7040      CMA              /NO MAKE -1
3065 7450      SNA              /BACKWARDS
3066 7001      IAC              /NO MAKE +1
3067 3014      DCA 14

/COMPARE BLOCKS FOR INCREMENTING OR DEC
3070 2011      SERCMP,      ISZ 11      /COMPARED ALL
3071 7410      SKP          /NO
3072 5311      JMP SER2LS      /TYPE LAST BLOCK
3073 1014      TAD 14          /* OR -
3074 1410      TAD I 10          /* FIRST BLOCK
3075 7041      CMA IAC          /MAKE -
3076 1412      TAD I 12          /* NEXT BLOCK
3077 7650      SNA CLA          /SHOULD BE 0
3100 5270      JMP SERCMP      /DO NEXT
3101 4456      JMS I TYPTX
3102 7777      7777
3103 7700      7700
3104 1010      TAD 10
3105 4451      JMS I TYP CON      /TYPE 1ST
3106 1012      TAD 12
3107 4451      JMS I TYP CON      /TYPE 2ND
3110 5270      JMP SERCMP      /DO NEXT

/TYPE OUT LAST BLOCK READ
3111 1012      SER2LS,      TAD 12
3112 4451      JMS I TYP CON      /TYPE BLOCK NUMBER
3113 4456      JMS I TYPTX
3114 0054      0054          /LAST
3115 4163      4163
3116 6477      6477
3117 4437      JMS I NEWDRV
3120 7000      NOP
3121 5722      JMP I ,+1
3122 2600      SERCH2          /REPEAT FOR NEXT DRIVE

/PRINT ALL BLOCKS READ
3123 1012      SER2TY,      TAD 12          /ADDRESS
3124 4451      JMS I TYP CON      /TYPE BLOCK NUMBER
3125 2012      ISZ 12
3126 2011      ISZ 11          /DONE ALL
3127 5323      JMP SER2TY      /NO
3130 5313      JMP SER2LS+2      /YES, DO NEXT DRV
3131 7475      7475

```

PAUSE

/TC01 BASIC EXERCISER TAPE 3
 /START STOP TURN AROUND TEST
 /1 TO 8 DRIVES IN ANY COMBINATION
 /TESTS TA ON BLOCK 0 BOTH DIRECTIONS
 /S/S/TA LENGTH OF TAPE AND TA ON BLOCK 2701
 /MOVE ALL DRIVES INTO REVERSE END ZONE

*3200

3200	4436	SSTRNA,	JMS I REWIND
3201	4436	JMS I REWIND	/MOVE INTO EZ 2
3202	4441	JMS I WTHALF	/WAIT HALF SECOND
3203	4443	JMS I SAVPAD	

/TEST TURN AROUND ON BLOCK 0 FIND 1 FWD

3204	7201	CLA	IAC
3205	3020	DCA	RECORD
3206	4454	JMS I SSTFWD	/FIND BLOCK 1 FWD
3207	5214	JMP	GBKW1
3210	4366	SSTER1,	JMS EZERR
3211	7000	NOP	
3212	4453	JMS I ERSSTA	
3213	5204	JMP	,-7

/TURN AROUND FIND 0 BACKWARDS

3214	3020	GBKW1,	DCA RECORD
3215	7001	IAC	
3216	3422	DCA I POSITN	
3217	3423	DCA I DIRECT	
3220	4455	JMS I SSTBKW	
3221	5225	JMP	,+4
3222	5210	JMP	SSTER1
3223	5211	JMP	SSTER1+1

/WAIT FOR EZ TA FIND 0 FWD

3224	5211	JMP	SSTER1+1
3225	3422	DCA I POSITN	
3226	7040	CMA	
3227	3423	DCA I DIRECT	
3230	1065	TAD	K0604
3231	1060	TAD	UNFUNC
3232	6766	IOT	766
3233	4440	JMS I WAITI	
3234	5001	5001	
3235	5210	JMP	SSTER1
3236	7040	CMA	
3237	3422	DCA I POSITN	
3240	4454	JMS I SSTFWD	
3241	5245	JMP	,+4
3242	5210	JMP	SSTER1
3243	7000	NOP	
3244	5211	JMP	SSTER1+1

```

3245 3422 DCA I POSITN
3246 3423 DCA I DIRECT
3247 1075 TAD K0200
3250 6764 IOT 764
3251 4437 JMS I NEWDRV
3252 5204 JMP SSTRNA+4
3253 4441 JMS I WTHALF

```

```

/TEST FORWARD START AFTER FORWARD
SSTAN1, JMS I SAVPAD

```

```

3254 4443
3255 1422 TAD I POSITN
3256 1104 TAD SFAFK
3257 3020 DCA RECORD
3260 4454 JMS I SSTFWD
3261 5267 JMP SSTA1A
3262 5666 JMP I .+4
3263 7000 NOP
3264 4453 JMS I ERSSTA
3265 5254 JMP SSTAN1
3266 3437 SSTAEZ

```

```

SSTA1A, TAD RECORD

```

```

3267 1020
3270 3422 DCA I POSITN
3271 3423 DCA I DIRECT
3272 1075 TAD K0200
3273 6764 IOT 764
3274 4437 JMS I NEWDRV
3275 5254 JMP SSTAN1
3276 4441 JMS I WTHALF

```

```

/TEST BACKWARD START AFTER FORWARD
SSTAN2, JMS I SAVPAD

```

```

3277 4443
3300 1422 TAD I POSITN
3301 1107 TAD SBAFK
3302 3020 DCA RECORD
3303 4455 JMS I SSTBKW
3304 5311 JMP SSTA2A
3305 4366 JMS EZERR
3306 7000 NOP
3307 4453 JMS I ERSSTA
3310 5277 JMP SSTAN2
3311 1020 SSTA2A, TAD RECORD
3312 3422 DCA I POSITN
3313 7040 CMA
3314 3423 DCA I DIRECT
3315 1075 TAD K0200
3316 6764 IOT 764
3317 4437 JMS I NEWDRV
3320 5277 JMP SSTAN2
3321 4441 JMS I WTHALF

```

```

/TEST START FORWARD AFTER BACKWARD
3322 4443 SSTAN3, JMS I SAVPAD
3323 1422 TAD I POSITN
3324 1105 TAD SFABK
3325 3020 DCA RECORD
3326 4454 JMS I SSTFWD
3327 5334 JMP SSTA3A
3330 4366 JMS EZERR
3331 7000 NOP

```

```

/THEN TEST FORWARD TO BACKWARD TURN AROUND
3332 4453 JMS I ERSSTA
3333 5322 JMP SSTAN3
3334 1020 SSTA3A, TAD RECORD
3335 3422 DCA I POSITN
3336 3423 DCA I DIRECT
3337 7040 CMA
3340 3427 DCA I WCLOC
3341 6764 IOT 764
3342 4440 JMS I WAITI
3343 5001 5001
3344 5331 JMP SSTAN3+7
3345 2422 ISZ I POSITN
3346 4455 JMS I SSTBKW
3347 5353 JMP SSTA3B
3350 5330 JMP SSTAN3+6
3351 7000 NOP
3352 5331 JMP SSTAN3+7
3353 1020 SSTA3B, TAD RECORD
3354 3422 DCA I POSITN
3355 7040 CMA
3356 3423 DCA I DIRECT
3357 1075 TAD K0200
3360 6764 IOT 764
3361 4437 JMS I NEWDRV
3362 5322 JMP SSTAN3
3363 4441 JMS I WTHALF
3364 5765 JMP I ,+1
3365 3400 SSTAN4
3366 5366 EZERR, JMP
3367 7240 CMA CLA
3370 3021 DCA BLKFND
3371 5766 JMP I EZERR

```

*3400

```

/TEST BACKWARD START AFTER BACKWARDS
3400 4443 SSTAN4, JMS I SAVPAD
3401 1422 TAD I POSITN
3402 1106 TAD SBABK
3403 3020 DCA RECORD
3404 4455 JMS I SSTBKW
3405 5212 JMP SSTA4A
3406 4636 JMS I EZERRA
3407 7000 NOP

```

```
      /THEN TEST BACKWARD TO FORWARD TURN AROUND
3410  4453      JMS I ERSSTA
3411  5200      JMP SSTAN4
3412  1020      SSTA4A,      TAD RECORD
3413  3422      DCA I POSITN
3414  7040      CMA
3415  3423      DCA I DIRECT
3416  2020      ISZ RECORD
3417  4454      JMS I SSTFWD
3420  5224      JMP SSTA4B

3421  5206      JMP SSTAN4+6
3422  7000      NOP
3423  5207      JMP SSTAN4+7
3424  1020      SSTA4B,      TAD RECORD
3425  3422      DCA I POSITN
3426  3423      DCA I DIRECT
3427  1075      TAD K0200
3430  6764      IOT 764
3431  4437      JMS I NEWDRV
3432  5200      JMP SSTAN4
3433  4441      JMS I WTHALF
3434  5635      JMP I ,+1
3435  3254      SSTAN1

3436  3366      EZERRA,      EZERR
```

/END ZONE HAS BEEN REACHED FWD
/TEST TURN AROUND ON 2701

```

3437 1020 SSTAEZ,      TAD RECORD
3440 1077      TAD K5077
3441 7500      SMA          /DONE TO END ZONE
3442 5245      JMP ,+3      /YES
3443 5644      JMP I ,+1          /FALSE END ZONE
3444 3264      SSTAN1+10
3445 4437      JMS I NEWDRV      /RESET TO FIRST DRV
3446 5245      JMP , -1

```

/MOVE ALL DRIVES INTO END ZONE

```

3447 7040      CMA
3450 3020      DCA RECORD      /TO COUNT TWO EZ PASSES
3451 1125      TAD K0204
3452 1060      TAD UNFUNC
3453 6766      IOT 766
3454 4440      JMS I WAITI
3455 5001      5001
3456 7000      NOP          /IGNORE OTHER INTERRUPTS
3457 7040      CMA
3460 3422      DCA I POSITN
3461 3423      DCA I DIRECT
3462 4437      JMS I NEWDRV
3463 5254      JMP , -7
3464 2020      ISZ RECORD      /2 PASSES
3465 7410      SKP          /YES
3466 5263      JMP , -3
3467 4441      JMS I WTHALF
3470 1340      SSTEZA,      TAD K2700
3471 3020      DCA RECORD
3472 4443      JMS I SAVPAD
3473 4455      JMS I SSTBKW      /GO BACKWARD TO 2700

```

```

3474 5301      JMP SSTEZ1      /REACHED 2700 OK
3475 7000      NOP
3476 7000      NOP
3477 4453      JMS I ERSSTA
3500 5270      JMP SSTEZA
3501 1020      SSTEZ1,      TAD RECORD
3502 3422      DCA I POSITN      /BLOCK 2700
3503 7040      CMA          /BACKWARD
3504 3423      DCA I DIRECT
3505 2020      ISZ RECORD      /2700 TO 2701
3506 4454      JMS I SSTFWD      /FIND 2701 FORWARD
3507 5313      JMP , +4      /OK

```

3510	4636	JMS I EZERRA	/EZ INT. ERROR
3511	7000	NOP	
3512	5274	JMP SSTEZA+4	
3513	1125	TAD K0204	
3514	1060	TAD UNFUNC	
3515	6766	IOT 766	
3516	4440	JMS I WAITI	/WAIT FOR EZ
3517	5001	5001	
3520	7000	NOP	
3521	4455	JMS I SSTBKW	/FIND 2701 BACKWARD
3522	5326	JMP ,+4	/OK
3523	7000	NOP	
3524	7000	NOP	
3525	5274	JMP SSTEZA+4	
3526	1075	TAD K0200	
3527	6764	IOT 764	
3530	4437	JMS I NEWDRV	/TESTED ALL DRIVES
3531	5335	JMP ,+4	/NO
3532	7604	CLA OSR	
3533	7006	RTL	
3534	7420	SNL	/DELETE END OF TEST HALT
3535	7402	HLT	/HLT END OF TEST
3536	5737	JMP I ,+1	/REPEAT TEST
3537	3201	SSTRNA+1	
3540	2700	K2700, 2700	

/START STOP TURN AROUND TEST
/SEARCH FORWARD ROUTINE

```

*3600
3600 5200 SSTAFW,      JMP .
3601 7240      CLA CMA
3602 3370      DCA BLOCKK
3603 1103      TAD K0214
3604 1060      TAD UNFUNC
3605 6766      IOT 766      /START TAPE FORWARD
3606 7040      CMA
3607 3427      DCA I WCLOC      /SET WC = -1
3610 1025      TAD IDCON
3611 3430      DCA I CALOC
3612 4440      JMS I WAITI
3613 0001      1
3614 5232      JMP SSTFSE      /STATUS B ERROR
3615 2370      ISZ BLOCKK
3616 5242      JMP SSTFBE+2
3617 1021      SSTFR,      TAD BLKFND
3620 3371      DCA BLOCKK+1
3621 1021      TAD BLKFND
3622 7041      CMA IAC
3623 1020      TAD RECORD
3624 7650      SNA CLA      /RIGHT BLOCK
3625 5600      JMP I SSTAFW      /YES, EXIT
3626 7710      SPA CLA      /BLOCK FOUND LESSER
3627 5240      JMP SSTFBE      /NO, ERROR
3630 6764      IOT 764      /RESET WC ENABLE
3631 5206      JMP SSTAFW+6

3632 6772      SSTFSE,      IOT 772
3633 0110      AND EZBIT
3634 7650      SNA CLA
3635 2200      ISZ SSTAFW      /END ZONE EXIT
3636 2200      ISZ SSTAFW      /ONLY 1 ISZ
3637 5600      JMP I SSTAFW
3640 2200      SSTFBE,      ISZ SSTAFW
3641 5235      JMP , -4
3642 1371      TAD BLOCKK+1
3643 7040      CMA
3644 1021      TAD BLKFND
3645 7650      SNA CLA
3646 5217      JMP SSTFR
3647 4322      JMS BNOTCN
3650 5201      JMP SSTAFW+1

```

/START STOP TURN AROUND TEST
/SEARCH BACKWARD ROUTINE

3651	5251	SSTABW,	JMP .	
3652	7240	CLA	CMA	
3653	3370	DCA	BLOCKK	
3654	1101	TAD	K0614	
3655	1060	TAD	UNFUNC	
3656	6766	IOT	766	
3657	7040	CMA		
3660	3427	DCA	I WCLOC	
3661	1025	TAD	IDCON	
3662	3430	DCA	I CALOC	
3663	4440	JMS	I WAITI	
3664	0001	1		
3665	5303	JMP	SSTBSE	
3666	2370	ISZ	BLOCKK	
3667	5313	JMP	SSTBBE+2	
3670	1021	SSTBR,	TAD BLKFND	
3671	3371	DCA	BLOCKK+1	
3672	1020	TAD	RECORD	
3673	7041	CMA	IAC	
3674	1021	TAD	BLKFND	
3675	7450	SNA		
3676	5651	JMP	I SSTABW	/FOUND BLOCK EXIT
3677	7710	SPA	CLA	
3700	5311	JMP	SSTBBE	
3701	6764	IOT	764	
3702	5257	JMP	SSTABW+6	
3703	6772	SSTBSE,	IOT 772	
3704	0110	AND	EZBIT	
3705	7650	SNA	CLA	
3706	2251	ISZ	SSTABW	
3707	2251	ISZ	SSTABW	
3710	5651	JMP	I SSTABW	
3711	2251	SSTBBE,	ISZ SSTABW	
3712	5306	JMP	, -4	
3713	1021	TAD	BLKFND	
3714	7040	CMA		
3715	1371	TAD	BLOCKK+1	
3716	7650	SNA	CLA	
3717	5270	JMP	SSTBR	
3720	4322	JMS	BNOTCN	
3721	5252	JMP	SSTABW+1	

/BLOCK NUMBERS ARE NOT
/CONSECUTIVE ON START UP OR TURN AROUND

3722	5322	BNOTCN, JMP ,	
3723	4444	JMS I ERRSTP	
3724	4452	JMS I SRCHTY	
3725	1026	TAD RECRDK	
3726	4451	JMS I TYPCON	
3727	4456	JMS I TYPTX	
3730	7777	7777	/TYPE BLOCK NUMBER ERR.
3731	4254	4254	
3732	5300	5300	
3733	0300	0300	
3734	4562	4562	
3735	6277	6277	
3736	1372	TAD BLOCKK+2	
3737	4451	JMS I TYPCON	
3740	4456	JMS I TYPTX	/TYPE LAST
3741	0054	0054	
3742	4163	4163	
3743	6477	6477	
3744	1025	TAD IDCON	
3745	4451	JMS I TYPCON	/TYPE CURRENT
3746	4456	JMS I TYPTX	/BLOCK NUMBER
3747	0064	64	
3750	5051	5051	
3751	6377	6377	
3752	1370	TAD BLOCKK	
3753	7001	IAC	
3754	3370	DCA BLOCKK	
3755	1373	TAD BLOCKK+3	
3756	4451	JMS I TYPCON	/TYPE OUT BLOCK
3757	4456	JMS I TYPTX	/COUNTER
3760	0043	43	
3761	5664	5664	
3762	6277	6277	
3763	7604	CLA OSR	
3764	7012	RTR	
3765	7620	SNL CLA	/STOP ON ERROR
3766	7402	HLT	/YES
3767	5722	JMP I BNOTCN	
3770	0000	BLOCKK, 0	
3771	0000	0	
3772	3771	.-1	
3773	3770	.-3	

/START STOP TURN AROUND TEST
 /ERROR TYPE OUT AND RESYNC ROUTINE
 *4000

4000	5200	SSTAER,	JMP	
4001	4444	JMS I	ERRSTP	/STOP TAPE LB STATB
4002	4452	JMS I	SRCHTY	/TYPE SEARCH
4003	1422	TAD I	POSITN	
4004	7040	CMA		
4005	7640	SZA CLA		/TAPE WAS WHERE
4006	5211	JMP ,+3		/NOT END ZONE
4007	4267	JMS EZTYPE		/TYPE END ZONE
4010	5213	JMP ,+3		
4011	1022	TAD POSITN		
4012	4451	JMS I TYPCON		/TYPE LAST BLOCK
4013	1423	TAD I DIRECT		
4014	7640	SZA CLA		/DIRECTION WAS:
4015	5220	JMP ,+3		/BACKWARD
4016	4711	JMS I FWDTP		/TYPE FORWARD
4017	5221	JMP ,+2		
4020	4710	JMS I BKWTYP		/TYPE BACKWARD
4021	4456	JMS I TYPTX		/TYPE (LAST PGS)
4022	0054	0054		
4023	4163	4163		
4024	6400	6400		
4025	6057	6057		
4026	6377	6377		
4027	1026	TAD RECRD		
4030	4451	JMS I TYPCON		/TYPE BLOCK1 LOOKED FOR
4031	4456	JMS I TYPTX		/TYPE (SEARCHED)
4032	0063	0063		
4033	4541	4541		
4034	6243	6243		
4035	5045	5045		
4036	4477	4477		
4037	1021	TAD BLKFND		
4040	7040	CMA		
4041	7640	SZA CLA		/WAS A BLOCK NUMBER
4042	5245	JMP ,+3		/YES
4043	4267	JMS EZTYPE		/TYPE END ZONE
4044	5247	JMP ,+3		
4045	1025	TAD IDCON		/TYPE BLOCK NUMBER
4046	4451	JMS I TYPCON		
4047	4456	JMS I TYPTX		/TYPE (FOUND)
4050	0046	0046		
4051	5765	5765		
4052	5644	5644		
4053	7700	7700		
4054	4447	JMS I SBTYPE		
4055	7604	CLA OSR		
4056	7006	RTL		
4057	7630	SZL CLA		/DELETE STOP AFTER ERROR
4060	5263	JMP ,+3		/NO ERROR STOP

4061	1200	TAD SSTAER	
4062	7402	HLT	/DISPLAY ADDRESS
4063	7200	CLA	
4064	4707	JMS I SYNCRE	
4065	4441	JMS I WTHALF	
4066	5600	JMP I SSTAER	
/TYPE (END ZONE)			
4067	5267	EZTYPE,	JMP ,
4070	4456	JMS I TYPTX	
4071	7777	7777	
4072	4556	4556	
4073	4400	4400	
4074	7257	7257	
4075	5645	5645	
4076	7700	7700	
4077	5667	JMP I EZTYPE	
/SAVE POSITION AND DIRECTION POINTERS			
4100	5300	DAPSAV,	JMP ,
4101	7200	CLA	
4102	1422	TAD I POSITN	
4103	3111	DCA POSSAV	
4104	1423	TAD I DIRECT	
4105	3112	DCA DIRSAV	
4106	5700	JMP I DAPSAV	
4107	4200	SYNCRE,	RESYNC
4110	1545	BKWTYP,	TYBKW
4111	1555	FWDTP,	TYFWD

/PUT TAPE BACK TO LAST KNOWN POSITION

*4200

4200	5200	RESYNC,	JMP ,	
4201	1111	TAD	POSSAV	
4202	7040	CMA		
4203	7650	SNA	CLA	
4204	5354	JMP	RESYEZ	
4205	1112	TAD	DIRSAV	
4206	7640	SZA	CLA	
4207	5276	JMP	RESBKW	
4210	1101	TAD	K0614	/TAPE GOES BACKWARD
4211	1060	TAD	UNFUNC	/FIRST TO RESYNC
4212	6766	IOT	766	/FORWARD
4213	7040	RESFWD,	CMA	
4214	3427	DCA	I WCLOC	/-1 TO WC
4215	4440	JMS	I WAITI	
4216	0001	1		
4217	5260	JMP	RESFEZ	
4220	1021	TAD	BLKFND	
4221	7041	CMA	IAC	
4222	1111	TAD	POSSAV	
4223	1374	TAD	K7772	
4224	7700	SMA	CLA	
4225	5231	JMP	,+4	
4226	7200	CLA		
4227	6764	IOT	764	
4230	5213	JMP	RESFWD	
4231	1102	TAD	K0400	
4232	6764	RESFWF,	IOT 764	
4233	7040	CMA		
4234	3427	DCA	I WCLOC	
4235	4440	JMS	I WAITI	
4236	0001	1		
4237	5201	JMP	RESYNC+1	
4240	1111	TAD	POSSAV	
4241	7041	CMA	IAC	
4242	1021	TAD	BLKFND	
4243	7450	SNA		
4244	5250	JMP	,+4	
4245	7710	SPA	CLA	
4246	5232	JMP	RESFWF	
4247	5201	JMP	RESYNC+1	

```

4250 1075 RESXIT,      TAD K0200          /STOP TAPE
4251 6764      IOT 764
4252 1111      TAD POSSAV      /RESET POSITION
4253 3422      DCA I POSITN    /AND DIRECTION
4254 1112      TAD DIRSAV      /POINTERS
4255 3423      DCA I DIRECT
4256 4441      JMS I WTHALF
4257 5600      JMP I RESYNC

4260 6772 RESFEZ,      IOT 772
4261 0110      AND EZBIT
4262 7650      SNA CLA          /END ZONE
4263 5201      JMP RESYNC+1    /NO, SOME OTHER, RESYNC
4264 1065      TAD K0604
4265 1060      TAD UNFUNC
4266 6766      IOT 766          /MOVE FARTHER
4267 4440      JMS I WAITI     /INTO EZ
4270 5001
4271 5264      JMP ,+5
4272 1103      TAD K0214
4273 1060      TAD UNFUNC
4274 6766      IOT 766          /NOW START FORWARD
4275 5233      JMP RESFWF+1

4276 1103 RESBKW,      TAD K0214          /TO RESYNC BKWD
4277 1060      TAD UNFUNC          /TAPE MUST FIRST
4300 6766      IOT 766            /GO FORWARD
4301 7040      CMA
4302 3427      DCA I WCLOC
4303 4440      JMS I WAITI
4304 0001      1
4305 5336      JMP RESBEZ        /TEST FOR END ZONE
4306 1373      TAD K0006
4307 1111      TAD POSSAV
4310 7041      CMA IAC
4311 1021      TAD BLKFND
4312 7700      SNA CLA          /REACH POSITION +6 YET
4313 5317      JMP ,+4          /YES
4314 7200      CLA
4315 6764      IOT 764          /GO FORWARD MORE
4316 5301      JMP RESBKW+3
4317 1102      TAD K0400          /CHANGE TO BACKWARD
4320 6764 RESBKB,      IOT 764
4321 7040      CMA
4322 3427      DCA I WCLOC
4323 4440      JMS I WAITI
4324 0001      1
4325 5201      JMP RESYNC+1      /NOT NORMAL STAT, TRY AGAIN

```

```

4326 1021 TAD BLKFND
4327 7041 CMA IAC
4330 1111 TAD POSSAV
4331 7450 SNA /IN POSITION YET
4332 5250 JMP RESXIT /YES
4333 7700 CLA SMA /GO PAST AGAIN
4334 5201 JMP RESYNC+1 /YES, TRY AGAIN
4335 5320 JMP RESBKB /NO, WAIT FOR NEXT BLOCK

```

```

4336 6772 RESBEZ, IOT 772
4337 0110 AND EZBIT
4340 7650 SNA CLA /END ZONE
4341 5201 JMP RESYNC+1 /NO, TRY AGAIN
4342 1125 TAD K0204
4343 1060 TAD UNFUNC
4344 6766 IOT 766 /MOVE INTO EZ AGAIN
4345 4440 JMS I WAITI
4346 5001 5001
4347 5201 JMP RESYNC+1
4350 1101 TAD K0614
4351 1060 TAD UNFUNC /NOW START BACKWARDS
4352 6766 IOT 766
4353 5321 JMP RESBKB+1

```

/PUT TAPE BACK INTO END ZONE

/LEZ OR TEZ

```

4354 1112 RESYEZ, TAD DIRSAV
4355 7640 SZA CLA /BACKWARD = NO SKIP
4356 1102 TAD K0400 /YES BACKWARD
4357 1125 TAD K0204
4360 1060 TAD UNFUNC
4361 6766 IOT 766
4362 4440 JMS I WAITI
4363 5001 5001
4364 5354 JMP RESYEZ
4365 1075 TAD K0200
4366 6764 IOT 764 /MOVE INTO EZ TWICE
4367 4440 JMS I WAITI
4370 5001 5001
4371 5365 JMP , -4
4372 5251 JMP RESXIT+1
4373 0006 K0006, 6
4374 7772 K7772, 7772

```

PAUSE

/TC01 BASIC EXERCISER - TAPE 3A

/WRITE BASIC DATA PATTERNS

/READ VERIFY WRITE FORWARD

/READ BACKWARD, FORWARD, WRITE BACKWARD

/READ FORWARD, BACKWARD

*4400

```

4400 7604 WRTTST, LAS /GET SWITCHES
4401 0073 AND K0007 /MASK PATTERN NUM
4402 3370 DCA PATNUM
4403 1370 TAD PATNUM
4404 1365 TAD PATTBL

```

4405	3363	DCA TEMP1	/ADDRESS TO GET
4406	1763	TAD I TEMP1	/ROUTINE ADDRESS
4407	3363	DCA TEMP1	
4410	4763	JMS I TEMP1	/GENERATE PATTERN
4411	7040	CMA	
4412	3424	DCA I LSTBLK	
4413	3422	DCA I POSITN	
4414	4437	JMS I NEWDRV	
4415	5211	JMP , -4	
4416	3114	DCA DIRFLG	
4417	7001	IAC	
4420	3113	DCA BLKINC	
4421	1113	WRTLP1, TAD BLKINC	
4422	7510	SPA	
4423	7200	CLA	
4424	1424	TAD I LSTBLK	
4425	3020	DCA RECORD	
4426	4435	JMS I SRCHIT	
4427	1115	TAD K0050	
4430	6764	IOT 764	
4431	1032	TAD BF1LOC	
4432	3430	DCA I CALOC	
4433	1064	TAD K7577	
4434	3427	DCA I WCLOC	
4435	4761	JMS I WRTSLP	/CHECK 1,32 OR 2701 OPTIONS
4436	5230	JMP WRTLP1+7	/RETURN, NOT DONE ALL
4437	4437	JMS I NEWDRV	/RETURN, DONE ALL
4440	5221	JMP WRTLP1	
4441	1114	TAD DIRFLG	/SAVE WRITE DIR
4442	3771	DCA I PATNUM+1	/FOR ERROR TYPEOUTS
4443	1114	TAD DIRFLG	/MAKE 1ST RD PASS
4444	7040	CMA	/GO OTHER DIRECTION
4445	3114	DCA DIRFLG	
4446	1113	TAD BLKINC	/MAKE BLOCK
4447	7041	CMA IAC	/INCREMENTER
4450	3113	DCA BLKINC	/COMPLIMENT

```

/TEST READ COMPARE OPTION
/EXAMINE SWITCHES
4451 7604 RDCOMP, LAS
4452 0121 AND K0040
4453 7640 SZA CLA
4454 5344 JMP RDCEND+13
4455 7040 CMA
4456 3364 DCA RDCPAS
4457 1422 TAD I POSITN
4460 3020 DCA RECORD
4461 4435 JMS I SRCHIT /FIND BLOCK
4462 1116 TAD K0030
4463 6764 IOT 764 /CHANGE TO READ DATA
4464 1033 TAD BF2LOC
4465 3430 DCA I CALOC
4466 1064 TAD K7577
4467 3427 DCA I WCLOC
4470 4762 RDCLP1, JMS I RDSWLP /WAIT FOR READ INTERRUPT
4471 5315 JMP RDCEND
4472 6764 IOT 764 /RESET ENABLES:
4473 1034 TAD BF3LOC
4474 3430 DCA I CALOC
4475 1064 TAD K7577
4476 3427 DCA I WCLOC
4477 4442 JMS I DATACO /VERIFY DATA PATTERN
4500 7175 BUFFER2
4501 4767 JMS I RERFLG

4502 4762 JMS I RDSWLP
4503 5315 JMP RDCEND /DONE ALL
4504 6764 IOT 764 /RESET ENABLES: AGAIN
4505 1033 TAD BF2LOC
4506 3430 DCA I CALOC
4507 1064 TAD K7577
4510 3427 DCA I WCLOC
4511 4442 JMS I DATACO /VERIFY DATA READ
4512 7376 BUFFER3
4513 4767 JMS I RERFLG
4514 5270 JMP RDCLP1

```

```

4515 6772 RDCEND,      IOT 772
4516 0110      AND EZBIT
4517 7640      SZA CLA
4520 5331      JMP RSEND      /END ZONE INTERRUPT
4521 1427      TAD I WCLOC
4522 7640      SZA CLA
4523 5331      JMP RSEND
4524 1430      TAD I CALOC
4525 1366      TAD K7600      /FORM BUFFER ADDRESS
4526 3330      DCA .+2
4527 4442      JMS I DATACO
4530 7175      BUFFER2      /OR BUFFER3
4531 4437 RSEND,      JMS I NEWDRV
4532 5257      JMP RDCOMP+6
4533 1114      TAD DIRFLG
4534 7040      CMA
4535 3114      DCA DIRFLG      /GO OTHER DIRECTION

4536 1113      TAD BLKINC      /MAKE BLOCK INCREMENTER
4537 7041      CMA IAC      /OTHER DIRECTION
4540 3113      DCA BLKINC
4541 2364      ISZ RDCPAS      /READ BOTH DIRECTIONS
4542 7410      SKP      /YES
4543 5257      JMP RDCOMP+6      /READ OTHER DIRECTION
4544 7604      CLA OSR
4545 0123      AND K0100
4546 7640      SZA CLA
4547 5255      JMP RDCOMP+4
4550 1424      TAD I LSTBLK
4551 1077      TAD K5077
4552 7640      SZA CLA      /WRITTEN 2701 YET
4553 5221      JMP WRTLP1      /WRITE NEXT SET
4554 1114      TAD DIRFLG
4555 7640      SZA CLA
4556 5221      JMP WRTLP1
4557 5760      JMP I .+1
4560 5161      WRROND

4561 5200 WRTSLP,      WRTSWS      /TO TEST SWITCHES FOR WRITE
4562 5400 RDSWLP,      RDSWS      /TO TEST SWITCHES FOR READ
4563 0000 TEMP1,      0      /READ PASS SWITCH
4564 0000 RDCPAS,      0      /-1 PASS 1 0 PASS 2

/ROUTINE ADDRESS FOR PATTERNS
4565 4724 PATTBL,      PTABLE
4566 7600 K7600,      7600
4567 4734 RERFLG,      REFLGS
4570 0000 PATNUM,      0
4571 5157 WRDIR

```

/PATTERN GENERATION FOR
/INITIAL WRITE TEST

```
*4600
4600 0000 GNPAT0,      0
4601 7300      CLA CLL
4602 4251      JMS GNSTRA
4603 5600      JMP I GNPAT0

4604 0000 GNPAT1,      0
4605 7340      CLA CMA CLL
4606 4251      JMS GNSTRA
4607 5604      JMP I GNPAT1

4610 0000 GNPAT2,      0
4611 7320      CLA STL
4612 4251      JMS GNSTRA
4613 5610      JMP I GNPAT2

4614 0000 GNPAT3,      0
4615 1221      TAD ,+4
4616 7100      CLL
4617 4251      JMS GNSTRA
4620 5614      JMP I GNPAT3
4621 2525      2525

4622 0000 GNPAT4,      0
4623 1227      TAD ,+4
4624 7100      CLL
4625 4251      JMS GNSTRA
4626 5622      JMP I GNPAT4
4627 5252      5252

4630 0000 GNPAT5,      0
4631 1235      TAD ,+4
4632 7100      CLL
4633 4251      JMS GNSTRA
4634 5630      JMP I GNPAT5
4635 0707      0707

4636 0000 GNPAT6,      0
4637 1243      TAD ,+4
4640 7100      CLL
4641 4251      JMS GNSTRA
4642 5630      JMP I GNPAT5
4643 7070      7070

4644 0000 GNPAT7,      0
4645 1221      TAD GNPAT4-1
4646 7120      STL
4647 4251      JMS GNSTRA
4650 5644      JMP I GNPAT7
```

/STORE AC CONTENTS IN BF1LOC
/OR IF L=1 COMPLIMENT EVERY OTHER

4651	0000	GNSTRA,	0
4652	3010	DCA	10
4653	1032	TAD	BF1LOC
4654	3011	DCA	11
4655	1064	TAD	K7577
4656	3012	DCA	12
4657	1010	TAD	10
4660	3411	DCA	I 11
4661	2012	ISZ	12
4662	7410	SKP	
4663	5651	JMP	I GNSTRA
4664	7420	SNL	
4665	5257	JMP	GNSTRA+6
4666	1010	TAD	10
4667	7040	CMA	
4670	3010	DCA	10
4671	5257	JMP	GNSTRA+6

4672	0100	PARTAB,	0100
4673	0200	0200	
4674	0400	0400	
4675	1000	1000	
4676	2000	2000	
4677	4000	4000	
4700	0101	0101	
4701	0202	0202	
4702	0404	0404	
4703	1010	1010	
4704	2020	2020	
4705	4040	4040	
4706	7600	7600	
4707	7500	7500	
4710	7300	7300	
4711	6700	6700	
4712	5700	5700	
4713	3700	3700	
4714	7700	7700	
4715	7676	7676	
4716	7575	7575	
4717	7373	7373	
4720	6767	6767	
4721	5757	5757	
4722	3737	3737	
4723	7777	7777	

4724	4600	PTABLE,	GNPAT0
4725	4604	GNPAT1	
4726	4610	GNPAT2	
4727	4614	GNPAT3	
4730	4622	GNPAT4	
4731	4630	GNPAT5	
4732	4636	GNPAT6	
4733	4644	GNPAT7	

/TEST READ ERRORS

/AND RESYNC NEXT BLOCK

4734	5334	REFLGS,	JMP .
4735	2742	ISZ I	,+5
4736	5744	JMP I	,+6
4737	2743	ISZ I	,+4
4740	5744	JMP I	,+4
4741	5734	JMP I	REFLGS
4742	5150	COFLAG	
4743	5526	NOSERR	
4744	4461	RDCOMP	*10

/COMPARE DATA SUBROUTINE FOR
/WRITE / READ BASIC DATA PATTERNS

```

*5000
5000 5200 CODATA,      JMP .
5001 7200      CLA
5002 1031      TAD BF1WD1      /GET KNOWN DATA
5003 3345      DCA KNDATA      /ADDRESS
5004 1600      TAD I CODATA    /UNKNOWN DATA
5005 3346      DCA UKDATA      /ADDRESS
5006 2200      ISZ CODATA
5007 7040      CMA
5010 3350      DCA COFLAG      /SET ERR COJNT FLAG
5011 1064      TAD K7577
5012 3347      DCA NUMWRD      /NUMBER OF WORDS
      /TST FOR DELETE COMPARE
5013 7604      LAS
5014 0102      AND K0400
5015 7640      SZA CLA
5016 5600      JMP I CODATA
5017 1745      COLOOP,      TAD I KNDATA
5020 7041      CMA IAC
5021 1746      TAD I UKDATA
5022 7640      SZA CLA      /WORDS =
5023 5231      JMP COCOMP      /NO TEST COMPLIMENT

5024 2345      COINCR,      ISZ KNDATA
5025 2346      ISZ UKDATA
5026 2347      ISZ NUMWRD      /DONE ALL
5027 5217      JMP COLOOP
5030 5600      JMP I CODATA      /EXIT

5031 1745      COCOMP,      TAD I KNDATA
5032 7450      SNA      /WORD = 0'S
5033 5237      JMP ,+4      /YES, TRY COMPLIMENT
5034 7040      CMA
5035 7640      SZA CLA      /WORD=1'S
5036 5251      JMP COERRO      /NO DATA ERROR
5037 1745      TAD I KNDATA
5040 7001      IAC      /MAKE 2'S COMPI

5041 1746      TAD I UKDATA
5042 7640      SZA CLA      /COMPLIMENTS =
5043 5251      JMP COERRO      /NO ERROR
5044 2345      ISZ KNDATA
5045 2346      ISZ UKDATA
5046 2347      ISZ NUMWRD
5047 5237      JMP COCOMP+6      /STAY IN TEST COMP
5050 5600      JMP I CODATA

```

/DATA ERROR TYPEOUT

5051	2350	COERRO,	ISZ COFLAG	/FIRST ERROR
5052	5307	JMP COERR1		/NO HDR ALREADY TYPED
5053	4444	JMS I ERRSTP		/STOP TAPE
5054	4446	JMS I RDATTY		
5055	4456	JMS I TYPTX		
5056	0044	44		
5057	4164	4164		
5060	4100	4100		
5061	4562	4562		
5062	6257	6257		
5063	6277	6277		
5064	1022	TAD POSITN		
5065	4451	JMS I TYPCON		
5066	4456	JMS I TYPTX	/TYPE BLOCK	
5067	0042	42		
5070	5457	5457		
5071	4353	4353		
5072	0067	67		
5073	6251	6251		
5074	6464	6464		
5075	4556	4556		
5076	0077	0077		
5077	1357	TAD WRDIR	/TYPE DIRECTION	
5100	7650	SNA CLA	/BLOCK WAS WRITTEN	
5101	5306	JMP ,+5		
5102	4704	JMS I ,+2		
5103	5307	JMP COERR1		
5104	1545	TYBKW		
5105	1555	TYFWD		
5106	4705	JMS I , -1		

```

5107 4456 COERR1,      JMS I TYPTX  /LINE FEED TO
5110 7777      7777      /SEPARATE ERRORS
5111 7700      7700
5112 1345      TAD KNDATA
5113 4451      JMS I TYPCON  /TYPE GOOD DATA

5114 4456      JMS I TYPTX
5115 0053      53
5116 5657      5657
5117 6756      6756
5120 7700      7700
5121 1346      TAD UKDATA  /TYPE DATA READ
5122 4451      JMS I TYPCON
5123 4456      JMS I TYPTX
5124 0065      65
5125 5653      5653
5126 5657      5657
5127 6756      6756
5130 7700      7700
5131 1344      TAD KNDATA-1
5132 4451      JMS I TYPCON  /TYPE ADDRESS OF
5133 4456      JMS I TYPTX  /KNOW DATA
5134 0041      41
5135 4444      4444
5136 6263      6263
5137 0053      53
5140 5657      5657
5141 6756      6756
5142 7700      7700
5143 5224      JMP COINCR
5144 5145      ,+1

5145 0000      KNDATA,      0
5146 0000      UKDATA,      0
5147 0000      NUMWRD,      0
5150 0000      COFLAG,      0
5151 5351      WAETYP,      JMP ,
5152 4444      JMS I ERRSTP
5153 4756      JMS I ,+3
5154 4447      JMS I SBTYPE
5155 5751      JMP I WAETYP
5156 1451      TYWALL

5157 0000      WDIR,      0
          STPERR=ERRSTP

```

5160	4570	PATNUM	
5161	1360	WRRDND,	TAD , -1
5162	4451	JMS I TYPCON	/TYPE PATTERN NUMBER
5163	4456	JMS I TYPTEX	
5164	0045	45	
5165	5644	5644	
5166	7700	7700	
5167	7604	CLA OSR	
5170	0075	AND K0200	
5171	7650	SNA CLA	/DO NEXT PATTERN
5172	5777	JMP I , +5	/NO USE SWS
5173	1760	TAD I WRRDND=1	
5174	7001	IAC	/PATNUM+1
5175	5776	JMP I , +1	
5176	4401	WRTTST+1	
5177	4400	WRTTST	

/WAIT FOR WRITE INTERRUPT
/AND TEST SWITCHES FOR NUM BLOCKS

*5200

5200	5200	WRTSWS,	JMP ,	
5201	4440	JMS I WAITI		/WAIT NORMAL INT
5202	0001	1		
5203	5235	JMP WRTEZT		/TEST FOR END ZONE
5204	1427	TAD I WCLOC		
5205	7640	SZA CLA		/WC GO TO 0
5206	5241	JMP WRTEZT+4		/NO ERROR
5207	7604	CLA OSR		
5210	0117	AND BLKBTs		
5211	7450	SNA		/INDICATE 1 OR 32 BLOCKS
5212	5221	JMP ,+7		/NO DO ALL
5213	0120	AND BLKBIT		
5214	7650	SNA CLA		/BLOCK
5215	5312	JMP WRT32		/NO TEST 32 BLOCKS
5216	2200	ISZ WRTSWS		/INC EXIT ADDRESS
5217	1075	TAD K0200		
5220	6764	IOT 764		/STOP TAPE
5221	1020	TAD RECORD		
5222	3422	DCA I POSITN		
5223	1020	TAD RECORD		
5224	1113	TAD BLKINC		
5225	3020	DCA RECORD		
5226	1114	WRTSWA,	TAD DIRFLG	
5227	7640	SZA CLA		/GOING FORWARD
5230	5600	JMP I WRTSWS		/BACKWARD EXIT
5231	1424	TAD I LSTBLK		
5232	7001	IAC		/INCREMENT LAST
5233	3424	DCA I LSTBLK		/BLOCK WRITTEN
5234	5600	JMP I WRTSWS		
5235	6772	WRTEZT,	IOT 772	
5236	0110	AND EZBIT		
5237	7640	SZA CLA		
5240	5301	JMP WRTEZA		
5241	6761	IOT 761		
5242	0075	AND K0200		/IF TAPE NOT STOPPED
5243	7650	SNA CLA		
5244	5251	JMP ,+5		/IF SW3=1
5245	7604	LAS		
5246	0102	AND K0400		
5247	7640	SZA CLA		
5250	5207	JMP WRTSWS+7		
5251	4444	JMS I ERRSTP		
5252	4450	JMS I WDATTY		
5253	1026	TAD RECRDK		
5254	4451	JMS I TYPCON		

5255	4456	JMS I TYPTEX	
5256	0042	42	
5257	5457	5457	
5260	4353	4353	
5261	7700	7700	
5262	4447	JMS I SBTYPE	
5263	1027	TAD WCLOC	
5264	4451	JMS I TYPCON	/TYPE WHATS LEFT OF WC
5265	4456	JMS I TYPTEX	
5266	0067	67	
5267	1643	1643	
5270	1677	1677	
5271	4435	JMS I SRCHIT	
5272	1115	TAD K0050	
5273	6764	IOT 764	
5274	1032	TAD BF1LOC	
5275	3430	DCA I CALOC	
5276	1064	TAD K7577	
5277	3427	DCA I WCLOC	
5300	5201	JMP WRTSWS+1	
5301	1020	WRTEZA,	TAD RECORD
5302	1126	TAD K5076	
5303	7650	SNA CLA	
5304	5310	JMP ,+4	
5305	1020	TAD RECORD	
5306	7700	SMA CLA	
5307	5241	JMP WRTEZT+4	
5310	2200	ISZ WRTSWS	
5311	5600	JMP I WRTSWS	
5312	1020	WRT32,	TAD RECORD
5313	3422	DCA I POSITN	
5314	1020	TAD RECORD	
5315	1113	TAD BLKINC	
5316	3020	DCA RECORD	
5317	1114	TAD DIRFLG	
5320	7041	CMA IAC	
5321	1020	TAD RECORD	
5322	0127	AND K0037	
5323	7640	SZA CLA	
5324	5226	JMP WRTSWA	
5325	1075	TAD K0200	
5326	6764	IOT 764	
5327	2200	ISZ WRTSWS	
5330	5226	JMP WRTSWA	

/WAIT FOR READ INTERRUPT AND
/TEST SWITCHES FOR NUMBER OF BLOCKS

```

*5400
5400 5200 RDSWS,      JMP .
5401 4440      JMS I WAITI      /WAIT NORMAL INTERRUPT
5402 0001      1
5403 5252      JMP TSRDEZ      /TEST FOR END ZONE
5404 1427      TAD I WCLOC
5405 7640      SZA CLA
5406 5302      JMP RDSERR
5407 7040      CMA
5410 3326      DCA NOSERR
5411 7604      CLA OSR
5412 0117      AND BLKBTS
5413 7450      SNA      /1 OR 32 BLOCKS
5414 5225      JMP .+11      /NO, ALL

5415 0120      AND BLKBIT
5416 7650      SNA CLA      /1 BLOCK
5417 5234      JMP RDSW32      /NO, 32 BLOCKS:
5420 1075      TAD K0200
5421 6764      IOT 764      /1 BLOCK, STOP TAPE
5422 1020      TAD RECORD
5423 3422      DCA I POSITN
5424 5600      JMP I RDSWS
5425 1020      TAD RECORD
5426 3422      DCA I POSITN      /NEW POSITION
5427 1020      TAD RECORD
5430 1113      TAD BLKINC      /NEXT BLOCK
5431 3020      DCA RECORD
5432 2200      ISZ RDSWS
5433 5600      JMP I RDSWS

5434 1020      RDSW32,      TAD RECORD
5435 3422      DCA I POSITN
5436 1020      TAD RECORD
5437 1113      TAD BLKINC      /+ OR - 1
5440 3020      DCA RECORD
5441 1114      TAD DIRFLG
5442 7041      CMA IAC
5443 1020      TAD RECORD
5444 0127      AND K0037
5445 7640      SZA CLA      /DONE AN INC OF 32
5446 5232      JMP RDSW32-2
5447 1075      TAD K0200
5450 6764      IOT 764      /32 BLOCKS, STOP TAPE
5451 5600      JMP I RDSWS

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```

5452 6772  TSRDEZ,      IOT 772
5453 0110      AND EZBIT
5454 7650      SNA CLA      /END ZONE INT
5455 5302      JMP RDSERR    /NO, ERROR
5456 1020      TAD RECORD
5457 1126      TAD K5076      /BLOCK 2702
5460 7650      SNA CLA
5461 5265      JMP ,+4      /2702 DOESN'T EXIST
5462 1020      TAD RECORD
5463 7700      SMA CLA      /BLOCK-1
5464 5302      JMP RDSERR    /NO, EZ STAT IN ERROR
5465 5600      JMP I RDSWS   /EXIT

```

```

5466 5266  PARRSE,      JMP ,      /STOP TAPE
5467 4444      JMS I ERRSTP
5470 4446      JMS I RDATTY    /READ AND DIRECTION
5471 1026      TAD RECRDK
5472 4451      JMS I TYPCON    /TYPE BLOCK
5473 4456      JMS I TYPTX
5474 0042      42
5475 5457      5457
5476 4353      4353
5477 7700      7700
5500 4447      JMS I SBTYPE
5501 5666      JMP I PARRSE
5502 6761  RDSERR,      IOT 761
5503 0075      AND K0200
5504 7650      SNA CLA
5505 5312      JMP ,+5
5506 7604      LAS
5507 0102      AND K0400
5510 7640      SZA CLA
5511 5207      JMP RDSWS+7
5512 4266      JMS PARRSE
5513 3326      DCA NOSERR

```

```

5514 1427      TAD I WCLOC
5515 7650      SNA CLA      /WC GO TO 0
5516 5211      JMP RDSWS+11   /YES
5517 1027      TAD WCLOC
5520 4451      JMS I TYPCON
5521 4456      JMS I TYPTX    /TYPE WORD COUNT
5522 0067      67
5523 1643      1643
5524 1677      1677
5525 5211      JMP RDSWS+11
5526 0000  NOSERR,      0

```

/WRITE DATA SCOPE LOOP
 /NO ERROR CHECKING BOUNCES OFF EZ
 /PATTERN SELECTION BITS 9, 10, 11

```

*1600
1600 7604  *RSCOP,      LAS
1601 0073      AND K0007
1602 1371      TAD PATTBA      /PAT NUM + TABLE AORS
1603 3370      DCA TEMPY
1604 1770      TAD I TEMPY
1605 3370      DCA TEMPY
1606 4770      JMS I TEMPY      /GENERATE PATTERN
1607 1103      TAD K0214      /SEARCH +
1610 1060      TAD UNFUNC      /DRIVE
1611 6766      IOT 766
1612 7440      SZA
1613 7402      HLT      /IOT 766 OR 754 DID NOT CLEAR AC
1614 1025      TAD IDCON
1615 3430      DCA I CALOC
1616 6773      IOT 773      /WAIT FOR FLAG
1617 5216      JMP .-1
1620 7710      SPA CLA
1621 5255      JMP WRTSEZ      /ERROR STATUS
1622 1115      TAD K0050
1623 6764      IOT 764      /CHANGE TO WRITE
1624 7440      SZA
1625 7402      HLT      /IOT 764 DID NOT CLEAR AC
1626 1032      TAD BF1LOC
1627 3430      DCA I CALOC
1630 1064      TAD K7577
1631 3427      DCA I WCLOC
1632 6761      IOT 761
1633 0075      AND K0200
1634 7650      SNA CLA
1635 5243      JMP WRSC01
1636 1427      TAD I WCLOC
1637 7650      SNA CLA
1640 5243      JMP .+3
1641 6771      IOT 771      /WAIT FOR FLAG
1642 5232      JMP .-10
1643 1375      *RSC01,      TAD K7730
1644 3370      DCA TEMPY
1645 6771      IOT 771
1646 7410      SKP
1647 5252      JMP .+3
1650 2370      ISZ TEMPY
1651 5245      JMP .-4
1652 1376      TAD K0052      /LEAVE ERROR FLAGS SET
1653 6764      IOT 764
1654 5212      JMP WRSCOP+12
1655 6772      *WRTSEZ,      IOT 772
1656 0374      AND K1000
1657 7650      SNA CLA      /END ZONE
1660 5265      JMP .+5      /NO START SEARCH AGAIN
1661 6761      IOT 761      /END ZONE SET
1662 7040      CMA      /CHANGE DIRECTION
1663 0102      AND K0400
1664 5207      JMP WRSCOP+7
1665 6761      IOT 761

```

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1666 5263

JMP .-3

/READ DATA SCOPE LOOP
 /IGNORES ALL ERRORS
 /BOUNCES OFF END ZONE

1667	1372	RDSCOP,	TAD K0220	/READ DATA
1670	1060	TAD UNFUNC		/+ DRIVE
1671	6766	IOT 766		
1672	7440	SZA		
1673	7402	HLT		/IOT 764 DID NOT CLEAR AC
1674	1033	TAD BF2LOC		
1675	3430	DCA I CALOC		
1676	1064	TAD K7577		
1677	3427	DCA I WCLOC		
1700	6761	IOT 761		/MONITOR MOTION
1701	0075	AND K0200		/BIT IN CASE IT=0
1702	7650	SNA CLA		
1703	5311	JMP .+6		
1704	1427	TAD I WCLOC		/MONITOR WORD K
1705	7650	SNA CLA		
1706	5311	JMP .+3		
1707	6771	IOT 771		/AND FLAGS
1710	5304	JMP .-4		
1711	1375	TAD K7730		
1712	3370	DCA TEMPY		
1713	6773	IOT 773		/MONITOR FLAG
1714	7410	SKP		/FOR 200 MICRO SEC.
1715	5320	JMP .+3		
1716	2370	ISZ TEMPY		
1717	5313	JMP .-4		
1720	0374	AND K1000		
1721	7640	SZA CLA		/END ZONE SET
1722	5330	JMP .+6		/YES, REVERSE
1723	6761	RDSC01,	IOT 761	
1724	7040	CMA		
1725	0075	AND K0200		/IN CASE GO=0
1726	6764	IOT 764		/RESET ENABLES
1727	5272	JMP RDSCOP+3		
1730	6761	IOT 761		
1731	7040	CMA		
1732	0102	AND K0400		/CHANGE DIRECTION
1733	5267	JMP RDSCOP		

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/SEARCH SCOPE LOOP IGNORES ERRORS
/BOUNCES OFF END ZONES
/DISPLAYS LAST BLOCK IN AC

1734	1103	SRSCOP,	TAD K0214	/SEARCH
1735	1060	TAD UNFUNC		/+ DRIVE
1736	6766	IOT 766		
1737	7440	SZA		
1740	7402	HLT	/IOT 764 DID NOT CLEAR AC	
1741	1377	TAD K3500		
1742	3010	DCA 10		
1743	1031	TAD BF1WD1		
1744	3430	DCA I CALOC		
1745	1431	TAD I BF1WD1	/DISPLAY BLOCK	
1746	2010	ISZ 10	/WAIT 1 BLOCK	
1747	5346	JMP .-1	/APPROX	
1750	7200	CLA		
1751	6772	IOT 772		
1752	0374	AND K1000	/READ B	
1753	7640	SZA CLA	/END ZONE	
1754	5362	JMP .+6	/YES REVERSE	
1755	6761	IOT 761		
1756	7040	CMA	/IN CASE GO=0	
1757	0075	AND K0200		
1760	6764	IOT 764		
1761	5337	JMP SRSCOP+3		
1762	6761	IOT 761		
1763	0075	AND K0200		
1764	7640	SZA CLA		
1765	7402	HLT	/EZ DID NOT ZERO MOTION	
1766	1373	TAD K0600A		
1767	5360	JMP .-7	/COMPLEMENT DIRECTION	
1770	0000	TEMPY,	0	
1771	4724	PATTRA,	PTABLE	
1772	0220	<0220,	220	
1773	0600	<0600A,	600	
1774	1000	<1000,	1000	
1775	7730	<7730,	7730	
1776	0052	<0052,	52	
1777	3500	<3500,	3500	

PAUSE

/TAPE 4 OF TC01 BASIC EXERCISER
 /PARITY GENERATION TEST
 /IS CORRECT PARITY GENERATED
 /BEGIN BY WRITING REV CKSUMS TO 0
 /BACKWARD IS 77*00 FWD
 *5600

5600	1100	PARTST,	TAD K2701	
5601	3020	DCA RECORD	/FIND 2701	
5602	7040	CMA		
5603	3114	DCA DIRFLG	/BACKWARDS	
5604	4435	JMS I SRCHIT		
5605	1116	TAD K0030	/SEARCH TO READ DATA	
5606	6764	IOT 764		
5607	1032	TAD BF1LOC		
5610	3430	DCA I CALOC		
5611	1357	TAD K7600B	/DUMMY INPUT	
5612	3427	DCA I WCLOC		
5613	1427	TAD I WCLOC		
5614	7650	SNA CLA	/WAIT FOR WCTD=-1	
5615	5221	JMP ,+4		
5616	6771	IOT 771	/FLAG SET	
5617	5213	JMP , -4	/COULD BE END ZONE	
5620	5242	JMP PAREZ1		
5621	7001	IAC		
5622	7040	CMA		
5623	3427	DCA I WCLOC	/2 WORDS	
5624	1032	TAD BF1LOC		
5625	3430	DCA I CALOC		
5626	1122	TAD K0170	/TO WRITE ALL CONTINUOUS	
5627	6764	IOT 764		
5630	7040	CMA		
5631	3431	DCA I BF1WD1		
5632	4440	JMS I WAITI		
5633	0001	1		
5634	5237	JMP ,+3		
5635	1122	TAD K0170	/BACK TO READ DATA	
5636	5206	JMP PARTST+6		
5637	4641	JMS I ,+2		
5640	5200	JMP PARTST		
5641	5151	WAETYP		
5642	6772	PAREZ1, IOT 772		
5643	0110	AND EZBIT	/END ZONE INT.	
5644	7640	SZA CLA		
5645	5251	JMP ,+4		
5646	4650	JMS I ,+2		
5647	5200	JMP PARTST		
5650	5466	PARRSE		
5651	4437	JMS I NEWDRV		
5652	5200	JMP PARTST	/PREPARE NEXT DRIVE	

5653	1356	PARWL1,	TAD PARLOC	
5654	3010	DCA	10	
5655	3114	DCA	DIRFLG	
5656	3020	DCA	RECORD	
5657	3422	DCA	I POSITN	
5660	4435	JMS	I SRCHIT	/FIND BLOCK 0 FWD
5661	1115	TAD	K0050	
5662	6764	IOT	764	/WRITE DATA
5663	1410	TAD	I 10	
5664	3431	DCA	I BF1WD1	
5665	1032	TAD	BF1LOC	
5666	3430	DCA	I CALOC	/ONLY WRITE 1 WD
5667	7040	CMA		
5670	3427	DCA	I WCLOC	/REST OF BLOCK SHOULD
5671	4440	JMS	I WAITI	/GO TO ZERO'S
5672	0001	1		
5673	5344	JMP	PARWER	
5674	1431	TAD	I BF1WD1	
5675	7040	CMA		
5676	7650	SNA	CLA	/DO ALL ONES YET?
5677	5303	JMP	,+4	/YES
5700	2020	ISZ	RECORD	
5701	2422	ISZ	I POSITN	/COUNT BLOCKS
5702	5262	JMP	PARWL1+7	

/INCREMENTING PARITY PATTERNS
/0100 TO 7700 AND 0101 TO 7777

5703	3431	PARWL2,	DCA I BF1WD1	
5704	6764	IOT	764	
5705	7040	CMA		
5706	3427	DCA	I WCLOC	
5707	1032	TAD	BF1LOC	
5710	3430	DCA	I CALOC	
5711	1431	TAD	I BF1WD1	/UPPER +1
5712	1123	TAD	K0100	
5713	3431	DCA	I BF1WD1	
5714	1431	TAD	I BF1WD1	
5715	7450	SNA		/UPPER GONE TO 0
5716	5323	JMP	,+5	/YES, SET WORD TO 0101
5717	0071	AND	K0077	
5720	7640	SZA	CLA	/INCREMENTING LWR
5721	2431	ISZ	I BF1WD1	/ADD 1 TO LOWER
5722	5325	JMP	,+3	
5723	1124	TAD	K0101	/DONE UPPER TO 7700
5724	3431	DCA	I BF1WD1	/START BOTH EQUAL
5725	4440	JMS	I WAITI	
5726	0001	1		
5727	5344	JMP	PARWER	/SHOULD GET NO ERROR STATUS
5730	2422	ISZ	I POSITN	
5731	2020	ISZ	RECORD	
5732	1431	TAD	I BF1WD1	
5733	7040	CMA		
5734	7640	SZA	CLA	
5735	5304	JMP	PARWL2+1	

5736	1075	TAD K0200	
5737	6764	IOT 764	
5740	4437	JMS I NEWDRV	
5741	5253	JMP PARWL1	
5742	5743	JMP I .+1	/READ AND CHECK
5743	6200	PARTS1	/FOR CORRECT CKSUMS
5744	4444	PARWER,	JMS I ERRSTP
5745	4450	JMS I WDATTY	
5746	1026	TAD RECRDK	
5747	4451	JMS I TYPCON	
5750	0042	42	
5751	5457	5457	
5752	4353	4353	
5753	7700	7700	
5754	4447	JMS I SBTYPE	
5755	5253	JMP PARWL1	
5756	4671	PARLOC,	PARTAB-1
5757	7600	K7600B,	7600

/WRITE BLOCKS TO WRONG
 /PARITY AND VERIFY PARTITY ERRORS
 /GENERATED (GOING BACKWARD REWRITE|REV, CKSUM)
 *6000

6000	3020	PARTS4,	DCA RECORD	
6001	3114	DCA	DIRFLG	
6002	4435	JMS	I SRCHIT	/FIND LAST BLOCK BKWD
6003	1355	TAD	K0140	/CHNG TO WRITE ALL
6004	6764	IOT	764	
6005	1122	TAD	K0170	/TO READ DATA
6006	6764	IOT	764	
6007	1032	TAD	BF1LOC	
6010	3430	DCA	I CALOC	
6011	1375	TAD	K7600A	
6012	3427	DCA	I WCLOC	
6013	1427	TAD	I WCLOC	
6014	7650	SNA	CLA	/WAIT FOR LAST
6015	5221	JMP	,+4	/WORD IN
6016	6771	IOT	771	
6017	5213	JMP	,+4	
6020	5356	JMP	PARRE3	/NO FLAGS FOR READ DATA
6021	1032	TAD	BF1LOC	/WRITE CHECKSUM TO FIRST WORD
6022	3430	DCA	I CALOC	
6023	7001	IAC		
6024	7040	CMA		
6025	3427	DCA	I WCLOC	
6026	1122	TAD	K0170	
6027	6764	IOT	764	/WRITE ALL
6030	1431	TAD	I BF1WD1	
6031	7040	CMA		
6032	7650	SNA	CLA	
6033	3431	DCA	I BF1WD1	
6034	4440	JMS	I WAITI	/WRITE ALL CONTINUOUS
6035	0001	1		
6036	5311	JMP	PRWAE	/WRITE ALL STATUS ERR
6037	4361	JMS	PR4INC	
6040	5205	JMP	PARTS4+5	
6041	1075	TAD	K0200	
6042	6764	IOT	764	
6043	4437	JMS	I NEWDRV	
6044	5200	JMP	PARTS4	

```

/READ BLOCKS FORWARD AND
/EXPECT PARITY ERRORS THEN BACKWARDS
PARTS5,      DCA RECORD
6045  3020
6046  3114      DCA DIRFLG
6047  4435      JMS I SRCHIT      /FIND 0 FWD OR LAST
6050  1116      TAD K0030
6051  6764      IOT 764          /READ DATA
6052  1032      TAD BF1LOC
6053  3430      DCA I CALOC

6054  1064      TAD K7577
6055  3427      DCA I WCLOC
6056  4440      JMS I WAITI      /EXPECT PARITY
6057  4201      4201            /ERROR
6060  5277      JMP PRT5EZ
6061  6772      IOT 772
6062  0075      AND K0200
6063  7650      SNA CLA          /PARITY ERROR SET

6064  5314      JMP PARRE4      /NO
6065  4361      JMS PR4INC
6066  5251      JMP PARTS5+4

6067  1075      TAD K0200
6070  6764      IOT 764          /STOP TAPE
6071  4437      JMS I NEWDRV    /CHANGE DRIVES
6072  5245      JMP PARTS5
```

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/READ BLOCKS BACKWARDS AND EXPECT
/PARITY ERRORS
6073 1422 PARTS6, TAD I POSITN /LAST BLOCK
6074 3020 DCA RECORD
6075 7040 CMA /BACKWARDS
6076 5246 JMP PARTS5+1

6077 1114 PRTSEZ, TAD DIRFLG
6100 7700 SMA CLA /GOING BACKWARD
6101 5314 JMP PARRE4 /NO, ERROR
6102 1020 TAD RECORD
6103 7700 SMA CLA /DONE BLOCK 0
6104 5314 JMP PARRE4 /NO, ERROR
6105 4437 JMS I NEWDRV
6106 5273 JMP PARTS6
6107 5710 JMP I ,+1
6110 5600 PARTST

6111 4713 PRWAE, JMS I ,+2
6112 5202 JMP PARTS4+2
6113 5151 WAETYP

6114 4444 PARRE4, JMS I ERRSTP
6115 4446 JMS I RDATTY
6116 1026 TAD RECRDK
6117 4451 JMS I TYPCON
6120 4456 JMS I TYPTX

6121 0042 42
6122 5457 5457
6123 4353 4353
6124 7777 7777
6125 6041 6041
6126 6251 6251
6127 6471 6471
6130 0045 45
6131 6262 6262
6132 5762 5762
6133 0045 45
6134 7060 7060
6135 4543 4543
6136 6445 6445
6137 4477 4477

6140 4447 JMS I SBTYPE

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6141	1114	TAD	DIRFLG	
6142	7640	SZA	CLA	
6143	1075	TAD	K0200	
6144	1031	TAD	BF1WD1	
6145	4451	JMS	I TYPCON	
6146	4361	JMS	PR4INC	
6147	7410	SKP		
6150	5271	JMP	PARTS6-2	
6151	1020	TAD	RECORD	
6152	7710	SPA	CLA	
6153	5305	JMP	PRWAE-4	
6154	5247	JMP	PARTS5+2	
6155	0140	K0140,	140	
6156	4760	PARRE3,	JMS I ,+2	
6157	5202	JMP	PARTS4+2	
6160	5466	PARRSE		
6161	5361	PR4INC,	JMP ,	
6162	1114	TAD	DIRFLG	
6163	7450	SNA		
6164	2020	ISZ	RECORD	
6165	1020	TAD	RECORD	
6166	3020	DCA	RECORD	
6167	1422	TAD	I POSITN	
6170	7040	CMA		
6171	1020	TAD	RECORD	
6172	7650	SNA	CLA	
6173	2361	ISZ	PR4INC	
6174	5761	JMP	I PR4INC	
6175	7600	K7600A,	7600	

/READ THE GENERATED CKSUMS BACK
/AND VERIFY THAT THEY ARE CORRECT
*6200

6200	3020	PARTS1,	DCA RECORD	
6201	3114	DCA	DIRFLG	
6202	4435	JMS	I SRCHIT	/FIND BLOCK 0
6203	7040	CMA		/CA = 7777 IN CASE
6204	3430	DCA	I CALOC	/R ALL BREAKS BEFORE DATA
6205	1074	TAD	K0020	
6206	6764	IOT	764	
6207	1130	TAD	K0010	
6210	6764	IOT	764	/READ ALL TO RD DATA
6211	1032	TAD	BF1LOC	
6212	3430	DCA	I CALOC	
6213	1064	TAD	K7577	
6214	3427	DCA	I WCLOC	
6215	1427	TAD	I WCLOC	
6216	7650	SNA	CLA	/WAIT FOR WC TO =0
6217	5223	JMP	,+4	
6220	6771	IOT	771	/IN CASE READ ERROR
6221	5215	JMP	,+4	
6222	5342	JMP	PARRE1	
6223	7040	CMA		
6224	3427	DCA	I WCLOC	
6225	1130	TAD	K0010	
6226	6764	IOT	764	/RD DATA TO RD ALL
6227	4440	JMS	I WAITI	
6230	0001	1		
6231	5342	JMP	PARRE1	/WAIT FOR CKSUM IN
6232	1431	TAD	I BF1WD1	
6233	0071	AND	K0077	/TEST FOR 2 CHAR
6234	7640	SZA	CLA	/IN FIRST WORD
6235	5240	JMP	,+3	/CKSUM SHOULD =7700
6236	1431	TAD	I BF1WD1	
6237	0070	AND	K7700	
6240	1756	TAD	I CKSLOC	
6241	1123	TAD	K0100	
6242	7640	SZA	CLA	/CKSUM CORRECT
6243	5310	JMP	CKSERR	/NO
6244	4755	JMS	I PR2INC	
6245	5207	JMP	PARTS1+7	/NO
6246	1075	TAD	K0200	
6247	6764	IOT	764	/STOP TAPE
6250	4437	JMS	I NEWDRV	
6251	5200	JMP	PARTS1	/DO NEXT DRIVE

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/READ BLOCKS BKWD FOR NO PARITY
/ERRORS
6252 1422 PARTS2,      TAD I POSITN
6253 3020      DCA RECORD
6254 7040      CMA
6255 3114      DCA DIRFLG
6256 4435      JMS I SRCHIT      /FIND LAST BLOCK BKWDS
6257 1116      TAD K0030
6260 6764      IOT 764
6261 1032      TAD BF1LOC

6262 3430      DCA I CALOC
6263 1064      TAD K7577
6264 3427      DCA I WCLOC
6265 4440      JMS I WAITI
6266 0001      1
6267 5273      JMP PARREZ      /TEST FOR END ZONE
6270 4755      JMS I PR2INC
6271 5260      JMP PARTS2+6
6272 5302      JMP PARTS3+2
6273 1020      PARREZ,      TAD RECORD
6274 7700      SMA CLA      /DONE BLOCK 0
6275 5345      JMP PARRE2      /NO, ERROR STATUS
6276 4437      JMS I NEWDRV      /DONE ALL DRIVES
6277 5252      JMP PARTS2      /DO NEXT

/READ BLOCKS FORWARD FOR NO
/PARITY ERRORS
6300 3020 PARTS3,      DCA RECORD
6301 5255      JMP PARTS2+3      /BLOCK 0 FWD

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6302	1075	TAD K0200	
6303	6764	IOT 764 /STOP TAPE	
6304	4437	JMS I NEWDRV	/ALL DRIVES
6305	5300	JMP PARTS3	/NOPE
6306	5707	JMP I ,+1	/WRITE TO WRONG
6307	6000	PARTS4	/PARITY AND TEST ERROR
6310	4444	CKSERR,	JMS I ERRSTP
6311	4445		JMS I DRIVTY
6312	4456		JMS I TYPTX
6313	0043		43
6314	5363		5363
6315	6555		6555
6316	0045		45
6317	6262		6262
6320	5762		5762
6321	7700		7700
6322	1031	TAD BF1WD1	
6323	4451	JMS I TYPCON	
6324	4456	JMS I TYPTX	
6325	0044		44
6326	4164		4164
6327	4177		4177
6330	1356	TAD CKSLOC	
6331	4451	JMS I TYPCON	
6332	4456	JMS I TYPTX	
6333	0043		43
6334	5300		5300
6335	6365		6365
6336	5577		5577
6337	4755	JMS I PR2INC	
6340	5202	JMP PARTS1+2	
6341	5250	JMP PARTS2+2	
6342	4744	PARRE1,	JMS I ,+2
6343	5202		JMP PARTS1+2
6344	5466		PARRSE
6345	4744	PARRE2,	JMS I , -1
6346	4755		JMS I PR2INC
6347	7410		SKP
6350	5304		JMP PARTS3+4
6351	1020		TAD RECORD
6352	7710		SPA CLA
6353	5276		JMP PARTS3-2
6354	5256		JMP PARTS2+4
6355	6161	PR2INC,	PR4INC
6356	7175	CKSLOC,	BUFFRS+201

BACKTY	1375	BNP13	2461	WVND	2325
BEILOC	2332	GNSTPA	4651	WVNDL	2347
BEIYDI	2331	MLINS	2311	MVFWD	2216
BE2LOC	2333	IDCON	2025	MVBRKW	2121
BE3LOC	2334	LOT	6320	MVCHG	2135
BKWTYP	4113	IRECD	2254	MVCFWD	2113
BLKBIT	0120	KM25	2325	MVCRPT	2156
BLKBIT5	0117	KNDATA	5145	MVCRSTP	2127
BLKFLG	2747	K0003	2076	MVCMAT	2147
BLKFND	0021	K0006	4373	MVCRST	2020
BLKINC	0113	K0007	2073	MVRPT	2257
BLOCKK	3770	K0010	2130	MVRTBL	2073
BNOTCN	3722	K0020	2074	MVSTOP	2230
BUFFERS	6774	K0030	2116	MVTEST	2300
BUFFR2	7175	K0037	2127	MVWAIT	2246
BUFFR3	7376	K0040	2121	NEWDRV	2037
CALOC	2030	K0050	2115	NOSTEP	5526
CDRIVE	0057	K0052	1776	NUMWRD	5147
CHNGDR	0437	K0077	2071	OTHRIX	2721
CIPHER	0211	K0100	2123	PARZ1	5642
CKSERR	6310	K0101	2124	PARLOC	5756
CKSLC	6356	K0140	6155	PARREZ	6273
COCOMP	5031	K0170	2122	PARRE1	6342
CODATA	5000	K0200	2075	PARRE2	6345
COERRO	5051	K0204	2125	PARRE3	6156
COERR1	5107	K0212	1260	PARRE4	6114
COFLAG	5150	K0214	2103	PARRE5	5466
COINCR	5024	K0215	1257	PARTAB	4672
COLOOP	5017	K0220	1772	PARTST	5600
COMBIT	0062	K0240	2072	PARTS1	6200
CRLFLE	1242	K0400	2102	PARTS2	6252
DAPSAV	4100	K0600	2344	PARTS3	6300
DATA00	0042	K0600A	1773	PARTS4	6000
DIRECT	0023	K0604	2065	PARTS5	6045
DIRFLG	2114	K0614	2101	PARTS6	6073
DIRSAV	0112	K1000	1774	PARWER	5744
DOLOOP	2200	K260	1535	PARWL1	5653
DOTHEM	2112	K2700	3540	PARWL2	5703
DRIVTY	0045	K2701	2100	PATNUM	4570
DRVITY	2743	K3500	1777	PATTBA	1771
ERRSTP	0044	K4000	2066	PATTBL	4565
ERSSTA	0053	K4215	2076	PNTPS	2500
ERSTP	1310	K5076	2126	POSITN	2022
EZBIT	0110	K5077	2077	POSSAV	2111
EZERR	3366	K7000	2345	PREBLK	2750
EZERRA	3436	K7472	2673	PRT5EZ	6077
EZTYPE	4067	K7475	3131	PRWAF	6111
FORDTY	1076	K7577	2064	PR2INC	6355
FWDITY	4111	K7600	4566	PR4INC	6161
GBKWI	3214	K7600A	6175	PTABLE	4724
GETMIN	2310	K7600B	5757	RDATTY	2046
GET4IN	2172	K7700	2070	RDCEND	4515
GNPAT0	4600	K7730	1775	RDCPL1	4470
GNPAT1	4604	K7760	2063	RDCOMP	4451
GNPAT2	4610	K7767	2067	RDCPAS	4564
GNPAT3	4614	K7772	4374	RDSOOP	1667
GNPAT4	4622	LSTBLK	2024	RDSO01	1723
GNPAT5	4630	MSBITS	2061	RDSEND	4531
GNPAT6	4636	MVBKWD	2223	RDSERR	5502
GNPAT7	4644	MVCHNG	2274	RDSWLP	4562

RDSWS 5400
 RDSW32 5434
 RECORD 0020
 RECRDK 0026
 REFLGS 4734
 REPOSI 0400
 RERFLG 4567
 RESBEZ 4336
 RESBK3 4320
 RESBKW 4276
 RESFEZ 4260
 RESFWD 4213
 RESFWF 4232
 RESXIT 4250
 RESYEZ 4354
 RESYNC 4200
 REWIND 0036
 RSFDRV 0417
 RSFDR1 0435
 SAVPAD 0043
 SBABK 0106
 SBAFK 0107
 SBCONS 0674
 SBRECV 1331
 SBTYPE 0047
 SCHIER 2433
 SCHIND 2461
 SCH1OK 2444
 SCH1ST 2421
 SCH2ER 2513
 SH2OK 2525
 SEARCH 0600
 SEKONS 1071
 SERCH2 2600
 SERCMP 3070
 SEREZ 2655
 SER2A 3000
 SER2AI 2720
 SER2LS 3111
 SER2NZ 2674
 SER2ST 2637
 SER2TY 3123
 SFABK 0105
 SFAFK 0104
 SIERR0 2565

SRCHER 0746
 SRCHIT 0035
 SRCHTY 0052
 SRCH1 2400
 SRCH2 2500
 SRCNCK 0655
 SREZTS 0721
 SRHERR 1000
 SRSCOP 1734
 SRTAFN 0634
 SSTA3W 3651
 SSTAER 4000
 SSTAER 3437
 SSTAFW 3600
 SSTANI 3254
 SSTAN2 3277
 SSTAN3 3322
 SSTAN4 3400
 SSTA1A 3267
 SSTA2A 3311
 SSTA3A 3334
 SSTA3B 3353
 SSTA4A 3412
 SSTA4B 3424
 SSTBBE 3711
 SSTBKW 0055
 SSTBR 3670
 SSTBSE 3703
 SSTER1 3210
 SSTEZA 3470
 SSTEZ1 3501
 SSTFBE 3640
 SSTFR 3617
 SSTFSE 3632
 SSTFWD 0054
 SSTRNA 3200
 STPERR 0044
 SYNCRE 4107
 TAPONT 0751
 TEMPY 1770
 TEMPI 4563
 TSRDEZ 5452
 TSTATB 1316
 TSTTBL 0277
 TXSTOR 1307
 TYALL 1503

TY3KW 1545
 TYCHAR 1230
 TYCONT 1261
 TYCOVR 1273
 TYDATA 1475
 TYDIR 1536
 TYDRV 1511
 TYFWD 1555
 TYINTX 2733
 TYMODE 1563
 TYMOVE 1400
 TYPCON 0051
 TYPTX 0056
 TYRALL 1433
 TYRDAT 1424
 TYREAD 1460
 TYSRCH 1411
 TYTEXT 1200
 TYWALL 1451
 TYWDAT 1442
 TYWRIT 1466
 UKDATA 5146
 UNFUNC 0063
 WAETYP 5151
 WAITI 0040
 WAITIN 2040
 WCLOC 0057
 WDATTY 0050
 WRDIR 5157
 WRRDND 5161
 WRSCOP 1600
 WRSCOI 1643
 WRTEZA 5301
 WRTEZT 5235
 WRTLPI 4421
 WRTEZ 1655
 WRTSLP 4561
 WRTSWA 5226
 WRTSWS 5200
 WRTTST 4400
 WRT32 5312
 WTHALF 0041
 WTJMP 0272
 WTINT 0234
 WT500 0313