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IDENTIFICATION

PRODUCT CODE:	MAINDEC-Ø8-DITCA-A-D REPLACES MAINDEC-Ø8-D3BD
PRODUCT NAME:	TC0~~1~~8* BASIC EXERCISER TCØ8 BE
DATE:	MAY 31, 1972
MAINTAINER:	DIAGNOSTIC GROUP
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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 Baisc 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:

Address	Function
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.

*This program can also be used on the TC08 DECtape control. All tests are applicable, merely substitue "TC08" for "TC01 in text.

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.

Switch	Drive
0	8
1	1
2	2
3	3
4	4
5	5
6	6
7	7

4.2 Starting Addresses of Routines

Address	Routine	Paragraph
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

- CAUSE AC to COUNT from 0 to 2701 (BLOCKS) BACK AND forth.

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 static register test will be run on status register A. and B. The processor should halt at address 0223 with bits 0 to 7 of the switch register displayed in the AC. For all error halts other than mentioned in 4.3 section D, consult the listing.

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:

Switch	Operation
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).

Switch	Operation
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 I should be 0, and bit I 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 0_8 and remain there for slightly more than a second, then proceed to 1_8, 2_8, 3_8 etc., up to 7_8, and return to 0_8 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

```
'F'WD   or   'B'KWD
'D'O         'D'O
```

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.

at start of tape

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

at end of Tape

'B'KWD
'W'AIT 0020
'F'WD
'W'AIT 0040

This program eventually moves the tape away from End Zone. If BKWD Wait is longer than FWD Wait it will move back to the endzone.

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.) which means if the waits are equal it will not move away from the end zone. (Wrong again)

5.3.2 Check End-Zone Detection - For the next sequenee 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 DECtape 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 ≥ 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 indicaies 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
7715 WC
```

(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 13_8 words left to be written.)

```
DRIVE 7
WRITE DATA BKWD
1000 BLOCK
0001 STAT B
7777 WC
```

(If STAT B indicates a normal block interrupt (0001) and the WC has not gone to 0, this typeout occurs.)

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 ar e 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 typeout 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:

Key	Operation
F FWD (Typeout)	Start moving tape on the currently selected drive in the forward direction.
B BKWD (Typeout)	Start moving tape on the currently selected drive in the backward direction.
S STOP (Typeout)	Stop tape on the currently selected drive.
C CHNG (Typeout)	Change drive selection and repeat from the beginning of the execute table or from the last "C."
W WAIT (Typeout)	Wait a variable number of blocks. The number of blocks to wait is typed in, immediately following the typeout "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.

Key	Operation
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 4440
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:

SW7	SW8	Operation
0	0	Write and read sequence the length of the tape.
0	1	Write and read sequence in 32 block increments.
1	0	
or		Write and read sequence one block at a time.
1	1	
SW4 = 0		Take the next pattern to be exericsed 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 typeout is generated indicating PARITY ERROR EXPECTED, the contents of the LPB can be determined by the following procedure:

a. The typeout includes the first data word of the block if read forward or the last word of the block if read backward (acutally 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 of 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 equaled 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 DECtape 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.

9.10 Static Register Test

This test is run automatically prior to all the tests listed above 9.1-9.9. The static register test verifies the ability of status register A and status register B to accept various Data Patterns, IOT 766 to load AC to status register A, IOT 774 to load AC to status register B, IOT 764 to XOR AC to status register A, IOT 761 to "OR" information from status register A to the AC, IOT 772 to "OR" information from status register B to the AC, and IOTS 774, 764, and 766 to clear the AC after their execution.

```
                /TCØ1 BASIC EXERCISER TAPE 1
                /PAGE Ø CONSTANTS AND TEMP STORAGE
      6ØØØ      IOT=6ØØØ
      6774      BUFFRS=6774

      7175      BUFFR2=BUFFRS+2Ø1
      7376      BUFFR3=BUFFR2+2Ø1

      ØØØ1      *1
ØØØ1  54Ø2              JMP I 2         /FOR INTERRUPTS

      ØØ2Ø      *2Ø

ØØ2Ø  ØØØØ      RECORD, Ø               /BLOCK OPERATED ON
ØØ21  ØØØØ      BLKFND, Ø               /BLOCK FOUND BY SEARCH
ØØ22  ØØØØ      POSITN, Ø               /TO GET TAPE POSITION
ØØ23  ØØØØ      DIRECT, Ø               /TO GET LAST DIRECTION
ØØ24  ØØØØ      LSTBLK, Ø               /TO GET LAST BLOCK WRITTEN
ØØ25  ØØ21      IDCON,  BLKFND          /FOR SRCH CA
ØØ26  ØØ2Ø      RECRDK, RECORD          /FOR TYPEOUTS

                /ADDRESSES FOR INDIRECT TAD AND DCA

ØØ27  7754      WCLOC,  7754
ØØ3Ø  7755      CALOC,  7755
ØØ31  6774      BF1WD1, BUFFRS
ØØ32  6773      BF1LOC, BUFFRS-1
ØØ33  7174      BF2LOC, BUFFR2-1
ØØ34  7375      BF3LOC, BUFFR3-1

                /SUBROUTINE ADDRESS
ØØ35  Ø6ØØ      SRCHIT, SEARCH
ØØ36  Ø4ØØ      REWIND, REPOSI
ØØ37  Ø44Ø      NEWDRV, CHNGDR
ØØ4Ø  Ø234      WAITI,  WTINT
ØØ41  Ø313      WTHALF, WT5ØØ
ØØ42  5ØØØ      DATACO, CODATA
ØØ43  41ØØ      SAVPAD, DAPSAV
ØØ44  131Ø      ERRSTP, ERSTP
ØØ45  1511      DRIVTY, TYDRV
ØØ46  1424      RDATTY, TYRDAT
ØØ47  1316      SBTYPE, TSTATB
ØØ5Ø  1442      WDATTY, TYWDAT


ØØ51  1261      TYPCON, TYCONT
ØØ52  1411      SRCHTY, TYSRCH
ØØ53  4ØØØ      ERSSTA, SSTAER
ØØ54  36ØØ      SSTFWD, SSTAFW
ØØ55  3651      SSTBKW, SSTABW
ØØ56  12ØØ      TYPTEX, TYTEXT

                /TEMP STORAGE FOR DRIVE SELECTION
```

```
        ØØ57  ØØØØ      CDRIVE, Ø               /DRIVE NUMBER AND
        ØØ6Ø  ØØØØ      UNFUNC, Ø               /POSITIONED FOR STAT A
        ØØ61  ØØØØ      MSBITS, Ø               /DRIVES SELECTED
        ØØ62  ØØØØ      COMBIT, Ø

                        /OTHER CONSTANTS

        ØØ63  776Ø      K776Ø,  776Ø
        ØØ64  7577      K7577,  7577
        ØØ65  Ø6Ø4      KØ6Ø4,  Ø6Ø4
        ØØ66  4ØØØ      K4ØØØ,  4ØØØ
        ØØ67  7767      K7767,  7767
        ØØ7Ø  77ØØ      K77ØØ,  77ØØ
        ØØ71  ØØ77      KØØ77,  77
        ØØ72  Ø24Ø      KØ24Ø,  24Ø

        ØØ73  ØØØ7      KØØØ7,  7
        ØØ74  ØØ2Ø      KØØ2Ø,  2Ø
        ØØ75  Ø2ØØ      KØ2ØØ,  2ØØ
        ØØ76  ØØØ3      KØØØ3,  3
        ØØ77  5Ø77      K5Ø77,  5Ø77
        Ø1ØØ  27Ø1      K27Ø1,  27Ø1
        Ø1Ø1  Ø614      KØ614,  614
        Ø1Ø2  Ø4ØØ      KØ4ØØ,  4ØØ

        Ø1Ø3  Ø214      KØ214,  214
        Ø1Ø4  ØØ16      SFAFK,  16
        Ø1Ø5  ØØØ6      SFABK,  6
        Ø1Ø6  7763      SBABK,  7763
        Ø1Ø7  7772      SBAFK,  7772
        Ø11Ø  1ØØØ      EZBIT,  1ØØØ

        Ø111  ØØØØ      POSSAV, Ø
        Ø112  ØØØØ      DIRSAV, Ø
        Ø113  ØØØØ      BLKINC, Ø
        Ø114  ØØØØ      DIRFLG, Ø
        Ø115  ØØ5Ø      KØØ5Ø,  5Ø
        Ø116  ØØ3Ø      KØØ3Ø,  3Ø

        Ø117  ØØ3Ø      BLKBTS, ØØ3Ø
        Ø12Ø  ØØ2Ø      BLKBIT, ØØ2Ø
        Ø121  ØØ4Ø      KØØ4Ø,  4Ø
        Ø122  Ø17Ø      KØ17Ø,  17Ø
        Ø123  Ø1ØØ      KØ1ØØ,  1ØØ
        Ø124  Ø1Ø1      KØ1Ø1,  1Ø1
        Ø125  Ø2Ø4      KØ2Ø4,  2Ø4
        Ø126  5Ø76      K5Ø76,  5Ø76
        Ø127  ØØ37      KØØ37,  37
        Ø13Ø  ØØ1Ø      KØØ1Ø,  1Ø
        Ø131  2525      K2525,  2525
        Ø132  ØØØØ      DTSAV,  Ø
        Ø133  ØØØØ      DTCNT,  Ø
        Ø134  7574      K7574,  7574
        Ø135  1Ø77      XDTCHK, DTCHK
        Ø136  2744      XCHKGO, CHKGO
        Ø137  5331     XCHKB,  CHKB
        Ø14Ø  ØØ7Ø     KØØ7Ø,  ØØ7Ø
        Ø141  76ØØ     Z76ØØ,  76ØØ
        Ø142  5ØØØ     K5ØØØ,  5ØØØ

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

              Ø2ØØ     *2ØØ
        Ø2ØØ  4211             JMS CIPHER
        Ø2Ø1  4211             JMS CIPHER
        Ø2Ø2  4211             JMS CIPHER
        Ø2Ø3  4211             JMS CIPHER
        Ø2Ø4  4211             JMS CIPHER
        Ø2Ø5  4211             JMS CIPHER
        Ø2Ø6  4211             JMS CIPHER
        Ø2Ø7  4211             JMS CIPHER
        Ø21Ø  4211             JMS CIPHER

        Ø211  ØØØØ     CIPHER, Ø
        Ø212  4535             JMS I XDTCHK    /STATIC REGISTER TEST ON STATUS A + B
        Ø213  74Ø4             OSR
        Ø214  ØØ63             AND K776Ø
        Ø215  744Ø             SZA
        Ø216  522Ø             JMP .+2
        Ø217  5311             JMP HLTNS
        Ø22Ø  3Ø61             DCA MSBITS
        Ø221  6774             IOT 774

        Ø222  1Ø61             TAD MSBITS
        Ø223  74Ø2             HLT
        Ø224  72ØØ             CLA
        Ø225  1211             TAD CIPHER
        Ø226  1Ø64             TAD K7577               /-2Ø1
        Ø227  1277             TAD TSTTBL
        Ø23Ø  3232             DCA .+2
        Ø231  4633             JMS I .+2
        Ø232  57ØØ             JMP I TSTTBL+1  /GO TO TEST SELECTED
        Ø233  Ø42Ø             RSFDRV
                       /ABOVE JMP I IS CHANGED TO JMP I TST TBL+1 + THE
                       /TEST NUMBER SELECTED
        Ø234  5234     WTINT,  JMP .
        Ø235  1272             TAD WTIJMP
        Ø236  3ØØ1             DCA 1
        Ø237  1273             TAD WTIJMP+1
        Ø24Ø  3ØØ2             DCA 2
        Ø241  3274             DCA WTIJMP+2
        Ø242  1276             TAD K4215
        Ø243  3275             DCA WTIJMP+3
        Ø244  6ØØ1             ION
        Ø245  2274             ISZ WTIJMP+2    /WAIT A MAXIMUM
        Ø246  5245             JMP .-1         /OF 35 SECONDS
        Ø247  2275             ISZ WTIJMP+3    /FOR AN INTERRUPT
        Ø25Ø  5245              JMP .-3
        Ø251  6ØØ2              IOF
        Ø252  74Ø2              HLT
        Ø253  5252              JMP .-1

        Ø254  6771      IRECD,  IOT 771         /DIF OR DTEF = 1
        Ø255  741Ø              SKP
        Ø256  5261              JMP .+3
        Ø257  74Ø2              HLT
        Ø26Ø  5254              JMP IRECD
        Ø261  6772              IOT 772
        Ø262  3274              DCA WTIJMP+2
        Ø263  1634              TAD I WTINT

        Ø264  7Ø4Ø              CMA
        Ø265  Ø274              AND WTIJMP+2
        Ø266  765Ø              SNA CLA
        Ø267  2234              ISZ WTINT
        Ø27Ø  2234              ISZ WTINT
        Ø271  5634              JMP I WTINT
        Ø272  54Ø2      WTIJMP, JMP I 2

        Ø273  Ø254              IRECD
        Ø274  ØØØØ              Ø
        Ø275  ØØØØ              Ø
        Ø276  4215      K4215,  4215

        Ø277  57ØØ      TSTTBL, JMP I .+1

                        /STARTING ADDRESSES OF TESTS
        Ø3ØØ  2ØØØ              MVTEST
        Ø3Ø1  24ØØ              SRCH1
        Ø3Ø2  26ØØ              SERCH2
        Ø3Ø3  32ØØ              SSTRNA
        Ø3Ø4  44ØØ              WRTTST
        Ø3Ø5  56ØØ              PARTST
        Ø3Ø6  16ØØ              WRSCOP
        Ø3Ø7  1667              RDSCOP
        Ø31Ø  1734              SRSCOP

        Ø311  74Ø2      HLTNS,  HLT             /TEST SELECTED
        Ø312  5212              JMP CIPHER +1   /NOT AVAILABLE
        Ø313  5313      WT5ØØ,  JMP .
        Ø314  72ØØ              CLA
        Ø315  3274              DCA WTIJMP+2            /TIME OUT
        Ø316  1325              TAD KM25
        Ø317  3275              DCA WTIJMP+3            /APPROX 5ØØ MSEC
        Ø32Ø  2274              ISZ WTIJMP+2
        Ø321  532Ø              JMP .-1
        Ø322  2275              ISZ WTIJMP+3
        Ø323  532Ø              JMP .-3
        Ø324  5713              JMP I WT5ØØ
        Ø325  7747      KM25,   7747
```

[illegible]

and Status B

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

      Ø4ØØ          *4ØØ
Ø4ØØ  52ØØ          REPOSI, JMP .
Ø4Ø1  422Ø                  JMS RSFDRV      /RESET POINTRS TO FIRST DRIVE
Ø4Ø2  1Ø65                  TAD KØ6Ø4       /MOVE BACKWARDS
Ø4Ø3  1Ø6Ø                  TAD UNFUNC      /+POSITIONED UNIT NO
Ø4Ø4  6762                  IOT 762         /CLEAR STATUS A
Ø4Ø5  6764                  IOT 764         /XOR STATUS A
Ø4Ø6  444Ø                  JMS I WAITI
Ø4Ø7  5ØØ1                  5ØØ1            /INDICATE EXPECT END
Ø41Ø  74Ø2                  HLT             /NOT STATUS EXPECTED

Ø411  724Ø                  CLA CMA
Ø412  3422                  DCA I POSITN    /INDICATE END ZONE
Ø413  724Ø                  CLA CMA
Ø414  3423                  DCA I DIRECT    /INDICATE BACKWARDS
Ø415  424Ø                  JMS CHNGDR      /SET UP NEXT DRIVE
Ø416  52Ø2                  JMP REPOSI+2    /REWIND NEXT DRIVE
Ø417  56ØØ                  JMP I REPOSI    /GOT ALL DRIVES, EXIT


                    /RESET CURRENT DRIVE POINTERS TO
                    /FIRST DRIVE SELECTED
Ø42Ø  522Ø          RSFDRV, JMP .
Ø421  72ØØ                  CLA
Ø422  3Ø57                  DCA CDRIVE      /SET INITIALLY TO Ø
Ø423  1Ø66                  TAD K4ØØØ
Ø424  3Ø62                  DCA COMBIT
Ø425  1Ø61                  TAD MSBITS

Ø426  ØØ62                  AND COMBIT
Ø427  764Ø                  SZA CLA         /THIS DRIVE SELECTED
Ø43Ø  5236                  JMP RSFDR1      /YES, SET POINTER
Ø431  1Ø62                  TAD COMBIT
Ø432  711Ø                  CLL RAR
Ø433  3Ø62                  DCA COMBIT                /MOVE COMPARE BIT
Ø434  2Ø57                  ISZ CDRIVE                /INCREMENT DRIVE NUM.
Ø435  5225                  JMP RSFDRV+5


                    /HAVE FOUND FIRST DRIVE SELECTED
Ø436  4262          RSFDR1, JMS GNPTRS      /GENERATE CONTROL POINTERS
Ø437  562Ø                  JMP I RSFDRV              /EXIT


                    /SELECT NEXT DRIVE OR
                    /RESET TO FIRST DRIVE AND SKIP
Ø44Ø  524Ø          CHNGDR, JMP .
Ø441  72ØØ                  CLA
Ø442  1Ø62                  TAD COMBIT      /GET DRIVE COMPARE BIT
Ø443  711Ø                  CLL RAR         /MOVE IT TO NEXT
```

```
        Ø444  ØØ67           AND K7767
        Ø445  744Ø           SZA               /LAST DRIVE NUM 7
        Ø446  5252           JMP .+4           /NO
        Ø447  422Ø           JMS RSFDRV        /RESET TO FIRST

        Ø45Ø  224Ø           ISZ CHNGDR        /INCR, EXIT, SKIP
        Ø451  564Ø           JMP I CHNGDR      /EXIT
        Ø452  3Ø62           DCA COMBIT
        Ø453  2Ø57           ISZ CDRIVE
        Ø454  1Ø62           TAD COMBIT
        Ø455  ØØ61           AND MSBITS
        Ø456  765Ø           SNA CLA           /THIS DRIVE SELECTED
        Ø457  5241           JMP CHNGDR+1      /NO

        Ø46Ø  4262           JMS GNPTRS        /GENERATE DRIVE POINTERS
        Ø461  564Ø           JMP I CHNGDR

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

        Ø462  5262   GNPTRS, JMP .
        Ø463  1Ø57           TAD CDRIVE        /DRIVE NUMBER
        Ø464  7112           CLL RTR
        Ø465  7Ø12           RTR               /POSITION TO BITS Ø,1,2
        Ø466  3Ø6Ø           DCA UNFUNC
        Ø467  1Ø57           TAD CDRIVE        /DRIVE NUMBER
        Ø47Ø  13Ø1           TAD PNTRS         /+ POS, PNTR ADDRS,
        Ø471  3Ø22           DCA POSITN        /FOR INDIRECTS

        Ø472  1Ø57           TAD CDRIVE
        Ø473  1312           TAD PNTRS+11      /+ DIRECTION PNTR
        Ø474  3Ø23           DCA DIRECT        /FOR INDIRECTS
        Ø475  1323           TAD PNTRS+22
        Ø476  1Ø57           TAD CDRIVE
        Ø477  3Ø24           DCA LSTBLK
        Ø5ØØ  5662           JMP I GNPTRS


        Ø5Ø1  Ø5Ø2   PNTRS,  .+1               /TO GET LAST RECORD NUMBER

        Ø5Ø2  ØØØØ           Ø                 /FOR DRIVE 8
        Ø5Ø3  ØØØØ           Ø                 /1
        Ø5Ø4  ØØØØ           Ø                 /2
        Ø5Ø5  ØØØØ           Ø                 /3
        Ø5Ø6  ØØØØ           Ø                 /4
        Ø5Ø7  ØØØØ           Ø                 /5
        Ø51Ø  ØØØØ           Ø                 /6
        Ø511  ØØØØ           Ø                 /7

        Ø512  Ø513           .+1               /TO GET LAST DIRECTION
        Ø513  ØØØØ           Ø                 /DIRECTION - UNIT 8
        Ø514  ØØØØ           Ø                 /1
        Ø515  ØØØØ           Ø                 /2
        Ø516  ØØØØ           Ø                 /3
        0517  0000            0                   /4
        0520  0000            0                   /5
        0521  0000            0                   /6
        0522  0000            0                   /7

        0523  0524            .+1                 /TO GET LAST WRITTEN
        0524  0000            0                   /8
        0525  0000            0                   /1
        0526  0000            0                   /2
        0527  0000            0                   /3
        0530  0000            0                   /4
        0531  0000            0                   /5
        0532  0000            0                   /6
        0533  0000            0                   /7

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

              0600    *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  3352            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  6762            IOT 762
        0620  6764            IOT 764

        0621  7040            CMA
        0622  3350            DCA BLKFLG
        0623  1025            TAD IDCON
        0624  3430            DCA I CALOC
        0625  4440            JMS I WAITI     /WAIT FOR NORMAL
        0626  0001            1
        0627  5322            JMP SREZTS      /COULD BE EZ
        0630  4256            JMS SRCNCK      /FOUND TURN AROUND

        0631  5235            JMP SRTAFN      /YES, TURN AROUND
        0632  5235            JMP SRTAFN      /PAST IT, TURN AROUND
        0633  6764            IOT 764         /NOT REACHED YET
        0634  5225            JMP .-7

        0635  1020    SRTAFN, TAD RECORD
        Ø636  3352            DCA TAPONT
        Ø637  6761            IOT 761
        Ø64Ø  7Ø4Ø            CMA
        Ø641  ØØ75            AND KØ2ØØ                /IN CASE MOTION=Ø
        Ø642  11Ø2            TAD KØ4ØØ
        Ø643  6764            IOT 764          /CHANGE DIRECTION
        Ø644  7Ø4Ø            CMA
        Ø645  335Ø            DCA BLKFLG
        Ø646  444Ø            JMS I WAITI

        Ø647  ØØØ1            1                /HAS TO BE NORMAL
        Ø65Ø  5747            JMP I SRCHER     /OR ERROR
        Ø651  4256            JMS SRCNCK
        Ø652  56ØØ            JMP I SEARCH     /FOUND BLOCK, EXIT
        Ø653  5747            JMP I SRCHER     /WENT PAST, ERROR
        Ø654  6764            IOT 764          /NOT THERE YET
        Ø655  5246            JMP .-7


        Ø656  5256    SRCNCK, JMP .
        Ø657  235Ø            ISZ BLKFLG       /FIRST BLOCK IN
        Ø66Ø  741Ø            SKP              /NO
        Ø661  5275            JMP SBCONS
        Ø662  6761            IOT 761
        Ø663  Ø1Ø2            AND KØ4ØØ
        Ø664  764Ø            SZA CLA          /BACKWARD IS
        Ø665  7Ø4Ø            CMA              /-1

        Ø666  745Ø            SNA              /FORWARD IS
        Ø667  7ØØ1            IAC              /+1
        Ø67Ø  1351            TAD PREBLK
        Ø671  7Ø41            CMA IAC
        Ø672  1Ø21            TAD BLKFND       /BLOCKS SEQUENTIAL
        Ø673  764Ø            SZA CLA
        Ø674  5747            JMP I SRCHER     /NO, ERROR

        Ø675  1352    SBCONS, TAD TAPONT
        Ø676  7Ø41            CMA IAC
        Ø677  1Ø21            TAD BLKFND
        Ø7ØØ  745Ø            SNA              /FIND BLOCK YET
        Ø7Ø1  5656            JMP I SRCNCK     /YES, TA OR EXIT
        Ø7Ø2  2256            ISZ SRCNCK       /STEP ADDRS
        Ø7Ø3  71ØØ            CLL
        Ø7Ø4  771Ø            SPA CLA
        Ø7Ø5  712Ø            STL              /L=1 IS BLK FND LESS
        Ø7Ø6  6761            IOT 761
        Ø7Ø7  Ø1Ø2            AND KØ4ØØ
        Ø71Ø  764Ø            SZA CLA          /FORWARD
        Ø711  5317            JMP .+6          /NO BACKWARD
        Ø712  743Ø            SZL              /FORWARD AND BLKFND
        Ø713  2256            ISZ SRCNCK       /LESS IS NOT THERE YET
        Ø714  1Ø21            TAD BLKFND
        Ø715  3351            DCA PREBLK
        Ø716  5656            JMP I SRCNCK
        Ø717  742Ø            SNL              /BACKWARD AND BLKFND
        Ø72Ø  2256           ISZ SRCNCK      /LESS IS GONE PAST
        Ø721  5314           JMP .-5


        Ø722  6772   SREZTS, IOT 772
        Ø723  Ø11Ø           AND EZBIT
        Ø724  765Ø           SNA CLA
        Ø725  5747           JMP I SRCHER    /NOT END ZONE, ERROR
        Ø726  1352           TAD TAPONT
        Ø727  751Ø           SPA

        Ø73Ø  5334           JMP .+4         /BLOCK Ø OR 1
        Ø731  1126           TAD K5Ø76
        Ø732  771Ø           SPA CLA         /BLOCK 27ØØ OR 27Ø1
        Ø733  5343           JMP .+1Ø
        Ø734  72ØØ           CLA
        Ø735  1Ø75           TAD KØ2ØØ
        Ø736  6764           IOT 764         /SET MOTION
        Ø737  444Ø           JMS I WAITI     /WAIT FOR EZ AGAIN
        Ø74Ø  5ØØØ           5ØØØ
        Ø741  5747           JMP I SRCHER
        Ø742  5235           JMP SRTAFN      /DO TURN AROUND
        Ø743  135Ø           TAD BLKFLG      /IF EZ WAS
        Ø744  77ØØ           SMA CLA         /FIRST INT WAS VALID
        Ø745  5747           JMP I SRCHER    /IF NOT FIRS IS INVALID
        Ø746  5235           JMP SRTAFN
        Ø747  1ØØØ   SRCHER, SRHERR
        Ø75Ø  ØØØØ   BLKFLG, Ø
        Ø751  ØØØØ   PREBLK, Ø
        Ø752  ØØØØ   TAPONT, Ø


                     /SEARCH ERROR TYPEOUT


              1ØØØ   *1ØØØ
        1ØØØ  4444   SRHERR, JMS I ERRSTP
        1ØØ1  4452           JMS I SRCHTY
        1ØØ2  1Ø26           TAD RECRDK
        1ØØ3  4451           JMS I TYPCON    /TYPE BLOCK SEARCHED
        1ØØ4  4456           JMS I TYPTEX
        1ØØ5  ØØ42           42
        1ØØ6  5457           5457
        1ØØ7  4353           4353
        1Ø1Ø  ØØ67           67
        1Ø11  4156           4156
        1Ø12  6445           6445
        1Ø13  44ØØ           44ØØ
        1Ø14  77ØØ           77ØØ
        1Ø15  1114           TAD DIRFLG
        1Ø16  765Ø           SNA CLA
        1Ø17  5222           JMP .+3
        1Ø2Ø  4675           JMS I BACKTY
        1Ø21  741Ø           SKP
        1Ø22  4676           JMS I FORDTY
        1Ø23  1Ø25           TAD IDCON
        1Ø24  4451          JMS I TYPCON    /TYPE BLOCK FOUND
        1Ø25  4456          JMS I TYPTEX
        1Ø26  ØØ42          42
        1Ø27  5457          5457
        1Ø3Ø  4353          4353


        1Ø31  ØØ46          46
        1Ø32  5765          5765
        1Ø33  5644          5644
        1Ø34  77ØØ          77ØØ
        1Ø35  7Ø4Ø          CMA
        1Ø36  1671          TAD I SEKONS    /BLKFLG
        1Ø37  771Ø          SPA CLA         /MORE THAN 1 BLOCK
        1Ø4Ø  5252          JMP .+12                /NO
        1Ø41  1272          TAD SEKONS+1    /PREBLK
        1Ø42  4451          JMS I TYPCON    /TYPE LAST BLOCK
        1Ø43  4456          JMS I TYPTEX    /FOUND
        1Ø44  ØØ54          54
        1Ø45  4163          4163
        1Ø46  64ØØ          64ØØ
        1Ø47  4254          4254
        1Ø5Ø  5743          5743
        1Ø51  5377          5377
        1Ø52  2671          ISZ I SEKONS
        1Ø53  7ØØØ          NOP
        1Ø54  1271          TAD SEKONS
        1Ø55  4451          JMS I TYPCON    /TYPE NUMBER OF
        1Ø56  4456          JMS I TYPTEX    /BLKS NUM READ
        1Ø57  ØØ42          42
        1Ø6Ø  5457          5457
        1Ø61  4353          4353
        1Ø62  63ØØ          63ØØ
        1Ø63  6245          6245
        1Ø64  4144          4144
        1Ø65  77ØØ          77ØØ
        1Ø66  4447          JMS I SBTYPE
        1Ø67  567Ø          JMP I .+1
        1Ø7Ø  Ø6Ø1          SEARCH+1
        1Ø71  Ø75Ø    SEKONS, BLKFLG
        1Ø72  Ø751          PREBLK
        1Ø73  1Ø74          .+1
        1Ø74  ØØØØ          Ø
        1Ø75  1545    BACKTY, TYBKW
        1Ø76  1555    FORDTY, TYFWD
                      /
                      /ROUTINE TO DO STATIC CHECK ON
                      /STATUS REGISTER A BITS 1-3 AND 5-9
                      /AND STATUS B BITS 6-8
                      /
        1Ø77  ØØØØ    DTCHK,  Ø
        11ØØ  73ØØ            CLA CLL
        11Ø1  3133            DCA DTCNT               /ZERO PASS COUNTER
        11Ø2  734Ø            CLA CLL CMA
        11Ø3  4322            JMS PATCHK              /CHECK ALL ONES PATTERN
        11Ø4  4322          JMS PATCHK          /CHECK ALL ZEROS PATTERN
        11Ø5  1131          TAD K2525
        11Ø6  4322          JMS PATCHK          /CHECK PATTERN 2525
        11Ø7  1131          TAD K2525
        111Ø  7Ø4Ø          CMA
        1111  4322          JMS PATCHK          /CHECK PATTERN 5252
        1112  2133          ISZ DTCNT           /DO 4Ø96 TIMES
        1113  53Ø2          JMP DTCHK +3        /LOOP
        1114  1133          TAD DTCNT
        1115  4322          JMS PATCHK          /DO ALL COMBINATIONS
        1116  2133          ISZ DTCNT           /FROM Ø-7777
        1117  5314          JMP .-3
        112Ø  4537          JMS I XCHKB         /CHECK STATUS B BITS
        1121  5677          JMP I DTCHK         /EXIT TO OTHER TESTS
                      /
                      /PATTERN CHECKER
                      /
        1122  ØØØØ    PATCHK, Ø
        1123  Ø134          AND K7574           /BITS 4,1Ø, AND 11 NOT USED
        1124  3132          DCA DTSAV           /STORE PATTERN
        1125  1132          TAD DTSAV
        1126  6766          IOT 766             /LOAD STATUS A
        1127  744Ø          SZA                 /IOT 766 SHOULD CLEAR AC
        113Ø  74Ø2          HLT                 /IOT 766 DID NOT CLEAR AC
        1131  6761          IOT 761             /"OR" STATIS A TO AC
        1132  7Ø41          CIA
        1133  1132          TAD DTSAV           /THIS IS THE GOOD STATUS ANSWER
        1134  744Ø          SZA                 /WAS DTSAV EQUAL TO STATUS A
        1135  74Ø2          HLT                 /STATUS A OR AC FAILED
        1136  1132          TAD DTSAV
        1137  7Ø4Ø          CMA
        114Ø  6761          IOT 761             /"OR" STATUS A TO AC
        1141  7Ø4Ø          CMA                 /AC SHOULD NOW BE ZEROS
        1142  744Ø          SZA                 /DID STATUS A "OR" TO ALL ONES
        1143  74Ø2          HLT                 /STATUS A OR AC FAILED
        1144  6764          IOT 764             /"XOR" AC TO STATUS A
        1145  6761          IOT 761             /"OR" STATUS A TO AC
        1146  7Ø41          CIA
        1147  1132          TAD DTSAV
        115Ø  744Ø          SZA                 /DID STATUS CHANGE
        1151  74Ø2          HLT                 /STATUS A OR AC FAILED
        1152  1132          TAD DTSAV
        1153  6764          IOT 764             /CLEAR STATUS A WITH XOR
        1154  744Ø          SZA                 /IOT 764 SHOULD CLEAR AC
        1155  74Ø2          HLT                 /AC OR STATUS A FAILED
        1156  724Ø          CLA CMA
        1157  6761          IOT 761             /OR STATUS A TO AC
        116Ø  7Ø4Ø          CMA
        1161  744Ø          SZA                 /WAS STATUS A ZERO
        1162  74Ø2          HLT                 /STATUS A OR AC FAILED
        1163  1132          TAD DTSAV
        1164  6766          IOT 766             /LOAD STATUS A
        1165  6762          IOT 762             /CLEAR STATUS A
        1166  6761          IOT 761             /GET STATUS A
        1167  744Ø          SZA                 /DID IO 762 CLEAR STATUS A
```

111 111 111 111
[illegible] 011
000 000 000 100

Read [illegible]
111 [illegible]
[illegible] 100

```
      1170  7402              HLT                      /STATUS A OR AC FAILED
      1171  7300              CLA CLL
      1172  5722              JMP I PATCHK             /EXIT PATTERN O.K.
                    /


                    /TYPE TEXT ROUTINE

            1200    *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 RETURN - 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
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        1252  6Ø41              TSF
        1253  5252              JMP .-1
        1254  6Ø42              TCF
        1255  72ØØ              CLA
        1256  5642              JMP I CRLFLF
        1257  Ø215     KØ215,   215
        126Ø  Ø212     KØ212,   212

                       /TYPE CONTENTS OF ADDRESS IN AC

        1261  5261     TYCONT,  JMP .
        1262  33Ø7              DCA TXSTOR         /SAVE ADDRESS
        1263  17Ø7              TAD I TXSTOR       /GET CONTENTS
        1264  33Ø7              DCA TXSTOR
        1265  4242              JMS CRLFLF         /CARRIAGE RETURN - LINE FEED
        1266  4273              JMS TYCOVR         /TYPE UPPER OCTAL
        1267  4273              JMS TYCOVR
        127Ø  4273              JMS TYCOVR
        1271  4273              JMS TYCOVR
        1272  5661              JMP I TYCONT

        1273  5273     TYCOVR,  JMP .
        1274  13Ø7              TAD TXSTOR
        1275  7ØØ6              RTL
        1276  7ØØ4              RAL
        1277  33Ø7              DCA TXSTOR
        13ØØ  13Ø7              TAD TXSTOR
        13Ø1  7ØØ4              RAL
        13Ø2  ØØ73              AND KØØØ7
        13Ø3  1Ø74              TAD KØØ2Ø
        13Ø4  7Ø4Ø              CMA                /MAKE - FOR
        13Ø5  423Ø              JMS TYCHAR         /OUTPUT
        13Ø6  5673              JMP I TYCOVR
        13Ø7  ØØØØ     TXSTOR,  Ø

                       /STOP TAPE ON ERROR, LEAVE FLAGS SET
        131Ø  531Ø     ERSTP,   JMP .
        1311  6761              IOT 761
        1312  ØØ75              AND KØ2ØØ
        1313  1Ø76              TAD KØØØ3
        1314  6764              IOT 764
        1315  571Ø              JMP I ERSTP
        1316  5316     TSTATB,  JMP .
        1317  6772              IOT 772
        132Ø  3331              DCA SBRECV
        1321  1332              TAD SBRECV+1
        1322  4451              JMS I TYPCON
        1323  4456              JMS I TYPTEX
        1324  ØØ63              63
        1325  6441              6441
        1326  64ØØ              64ØØ
        1327  4277              4277
        133Ø  5716              JMP I TSTATB
        1331  ØØØØ    SBRECV, Ø
        1332  1331            .-1

              14ØØ    *14ØØ
                      /TYPE MOVE AND DIRECTION
        14ØØ  52ØØ    TYMOVE, JMP .
        14Ø1  4311            JMS TYDRV
        14Ø2  4456            JMS I TYPTEX
        14Ø3  7777            7777
        14Ø4  5557            5557
        14Ø5  6645            6645
        14Ø6  ØØ77            ØØ77
        14Ø7  4336            JMS TYDIR
        141Ø  56ØØ            JMP I TYMOVE

                      /TYPE SEARCH DIRECTION AND MODE
        1411  5211    TYSRCH, JMP .
        1412  4311            JMS TYDRV
        1413  4456            JMS I TYPTEX
        1414  7777            7777
        1415  6345            6345
        1416  4162            4162
        1417  435Ø            435Ø
        142Ø  ØØ77            ØØ77
        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  426Ø            JMS TYREAD
        1427  4275            JMS TYDATA
        143Ø  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  426Ø            JMS TYREAD
        1436  43Ø3            JMS TYALL
        1437  4336            JMS TYDIR
        144Ø  4363            JMS TYMODE
        1441  5633            JMP I TYRALL

                      /TYPE WRITE DATA DIRECTION AND MODE
        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 MODE
        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 TYPTEX
        1462  6245              6245
        1463  4144              4144
        1464  ØØ77              ØØ77
        1465  566Ø              JMP I TYREAD

                      /TYPE WRITE
        1466  5266    TYWRIT, JMP .
        1467  4456              JMS I TYPTEX
        147Ø  6762              6762
        1471  5164              5164
        1472  45ØØ              45ØØ
        1473  77ØØ              77ØØ
        1474  5666              JMP I TYWRIT


                      /TYPE DATA
        1475  5275    TYDATA, JMP .
        1476  4456              JMS I TYPTEX
        1477  4441              4441
        15ØØ  6441              6441
        15Ø1  ØØ77              ØØ77
        15Ø2  5675              JMP I TYDATA


                      /TYPE ALL
        15Ø3  53Ø3    TYALL,  JMP .
        15Ø4  4456              JMS I TYPTEX
        15Ø5  4154              4154
        15Ø6  54ØØ              54ØØ
        15Ø7  77ØØ              77ØØ
        151Ø  57Ø3              JMP I TYALL


                      /TYPE DRIVE AND NUMBER
        1511  5311    TYDRV,  JMP .
        1512  4456              JMS I TYPTEX
        1513  7777            7777
        1514  7777            7777
        1515  4462            4462
        1516  5166            5166
        1517  45ØØ            45ØØ
        152Ø  ØØ77            ØØ77
        1521  1Ø57            TAD CDRIVE
        1522  745Ø            SNA
        1523  113Ø            TAD KØØ1Ø
        1524  1335            TAD K26Ø
        1525  6Ø46            TLS
        1526  6Ø41            TSF
        1527  5326            JMP .-1
        153Ø  72ØØ            CLA
        1531  4456            JMS I TYPTEX

        1532  7777            7777
        1533  77ØØ            77ØØ
        1534  5711            JMP I TYDRV
        1535  Ø26Ø    K26Ø,   26Ø


                      /TYPE FORWARDS OR BACKWARD
        1536  5336    TYDIR,  JMP .
        1537  6761            IOT 761
        154Ø  Ø1Ø2            AND KØ4ØØ
        1541  765Ø            SNA CLA
        1542  5353            JMP TYFWD-2
        1543  4345            JMS TYBKW
        1544  5736            JMP I TYDIR
        1545  5345    TYBKW,  JMP .
        1546  4456            JMS I TYPTEX
        1547  4253            4253
        155Ø  6744            6744
        1551  ØØ77            ØØ77
        1552  5745            JMP I TYBKW

        1553  4355            JMS TYFWD
        1554  5736            JMP I TYDIR
        1555  5355    TYFWD,  JMP .
        1556  4456            JMS I TYPTEX
        1557  4667            4667
        156Ø  44ØØ            44ØØ
        1561  77ØØ            77ØØ
        1562  5755            JMP I TYFWD


                      /TYPE CONTINUOUS IF NOT NORMAL MODE
        1563  5363    TYMODE, JMP .
        1564  6761            IOT 761
        1565  Ø123            AND KØ1ØØ
        1566  765Ø            SNA CLA
        1567  5763            JMP I TYMODE
        157Ø  4456            JMS I TYPTEX
        1571  43ØØ            43ØØ
        1572  5557              5557
        1573  4445              4445
        1574  ØØ77              ØØ77
        1575  5763              JMP I TYMODE

                        PAUSE


                        /TCØ1 EXERCISER - TAPE 2
                        /BASIC MOTION TEST, DECIPHER KEYBOARD INPUT
                        /SETUP EXECUTE TABLE, START DO LOOP
                        /ON FIRST CHARACTER IF A(D)

              2ØØØ      *2ØØØ
        2ØØØ  4456      MVTEST, JMS I TYPTEX
        2ØØ1  7777              7777            /CR LF
        2ØØ2  7777              7777            /CR LF
        2ØØ3  77ØØ              77ØØ
        2ØØ4  1Ø32              TAD BF1LOC              /SA OF EXECTUE TABLE
        2ØØ5  3Ø1Ø              DCA 1Ø          /FOR INDIRECTS
        2ØØ6  1Ø1Ø              TAD 1Ø
        2ØØ7  7ØØ1              IAC
        2Ø1Ø  3Ø11              DCA 11          /FOR RESET ON RPT LOOP
        2Ø11  7Ø4Ø              CMA
        2Ø12  3Ø13              DCA 13          /FOR 1ST D
        2Ø13  1Ø11              TAD 11
        2Ø14  3Ø12              DCA 12          /FOR RESET ON CHNG DRIVES
        2Ø15  424Ø              JMS WAITIN      /WAIT FOR INPUT
        2Ø16  4247              JMS MVEQUL
        2Ø17  Ø3Ø4              3Ø4             /1ST IN = D
        2Ø2Ø  3Ø13      MVREST, DCA 13          /Ø TO CHAR COUNTER
        2Ø21  4247              JMS MVEQUL
        2Ø22  Ø3Ø6              3Ø6             /= F FORWARD
        2Ø23  4247              JMS MVEQUL
        2Ø24  Ø3Ø2              3Ø2             /= B BACKWARD
        2Ø25  4247              JMS MVEQUL
        2Ø26  Ø323              323             /= S STOP
        2Ø27  4247              JMS MVEQUL
        2Ø3Ø  Ø3Ø3              3Ø3             /= C CHANGE
        2Ø31  4247              JMS MVEQUL
        2Ø32  Ø327              327             /= W WAIT
        2Ø33  4247              JMS MVEQUL
        2Ø34  Ø322              322             /= R REPEAT
        2Ø35  4247              JMS MVEQUL
        2Ø36  Ø3Ø4              3Ø4             /= D DO LOOP
        2Ø37  52ØØ              JMP MVTEST


                        /WAIT KEYBOARD INPUT
        2Ø4Ø  524Ø      WAITIN, JMP .
        2Ø41  6Ø31              KSF
        2Ø42  5241              JMP .-1
        2Ø43  6Ø36              KRB
        2Ø44  7Ø41              CMA IAC
        2Ø45  3Ø14              DCA 14          /14 = 2'S COMPLEMENT OF IN
        2Ø46  564Ø           JMP I WAITIN


                     /TEST FOR WHICH CHARACTER IN
        2Ø47  5247   MVEQUL, JMP .
        2Ø5Ø  1Ø14           TAD 14
        2Ø51  1647           TAD I MVEQUL
        2Ø52  2247           ISZ MVEQUL
        2Ø53  765Ø           SNA CLA         /RIGHT CHAR
        2Ø54  526Ø           JMP .+4         /FOUND WHICH CHAR
        2Ø55  2Ø13           ISZ 13          /INC POINTER
        2Ø56  7ØØØ           NOP
        2Ø57  5647           JMP I MVEQUL    /TEST NEXT CHAR
        2Ø6Ø  1Ø13           TAD 13
        2Ø61  7Ø4Ø           CMA             /FIRST IN = D
        2Ø62  765Ø           SNA CLA
        2Ø63  5712           JMP I DOTHEM    /FIRST = D DO LAST
        2Ø64  1Ø13           TAD 13
        2Ø65  71Ø4           CLL RAL         /NUMBER TIMES 2
        2Ø66  1273           TAD MVRTBL      /FORM ADDRESS
        2Ø67  3Ø14           DCA 14          /FOR INDIRECTS
        2Ø7Ø  1414           TAD I 14                /GET ROUTINE ADDRESS
        2Ø71  341Ø           DCA I 1Ø                /TO EXECUTE TABLE
        2Ø72  5414           JMP I 14                /GO TO TYPEOUT

        2Ø73  2Ø73   MVRTBL, .
        2Ø74  2216           MVFWD           /START TAPE FORWARD
        2Ø75  5313           JMP MVGFWD
        2Ø76  2223           MVBKWD          /START BACKWARD
        2Ø77  5321           JMP MVGBKW
        21ØØ  223Ø           MVSTOP          /STOP TAPE
        21Ø1  5327           JMP MVGSTP
        21Ø2  2274           MVCHNG          /CHANGE DRIVES
        21Ø3  5335           JMP MVGCHG
        21Ø4  2246           MVWAIT          /WAIT, MARK TIME
        21Ø5  5347           JMP MVGWAT
        21Ø6  2257           MVRPT           /REPEAT X TIMES
        21Ø7  5356           JMP MVGRPT
        211Ø  23Ø5           MVEND           /END OF DO LOOP
        2111  5712           JMP I .+1
        2112  22ØØ   DOTHEM, DOLOOP          /TO GET TO EXECUTE LOOP


                     /TYPE FORWARD
        2113  4456   MVGFWD, JMS I TYPTEX
        2114  7777           7777
        2115  4667           4667
        2116  4477           4477
        2117  424Ø           JMS WAITIN
        212Ø  522Ø           JMP MVREST


                     /TYPE BACKWARD
        2121  4456   MVGBKW, JMS I TYPTEX
        2122  7777           7777
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```
2123  4253              4253
2124  6744              6744
2125  77ØØ              77ØØ
2126  5317              JMP MVGFWD+4


                /TYPE STOP
2127  4456      MVGSTP, JMS I TYPTEX
213Ø  7777              7777
2131  6364              6364
2132  576Ø              576Ø
2133  77ØØ              77ØØ
2134  5317              JMP MVGFWD+4


                /TYPE CHANGE
2135  4456      MVGCHG, JMS I TYPTEX
2136  7777              7777
2137  435Ø              435Ø
214Ø  4777              4777
2141  1Ø12              TAD 12
2142  341Ø              DCA I 1Ø                 /PUT WHERE TO REPEAT
2143  1Ø1Ø              TAD 1Ø         /FROM ON CHANGING DRIVES
2144  7ØØ1              IAC
2145  3Ø12              DCA 12
2146  5317              JMP MVGFWD+4

                /TYPE WAIT
2147  4456      MVGWAT, JMS I TYPTEX
215Ø  7777              7777
2151  6741              6741
2152  5164              5164
2153  ØØ77              ØØ77
2154  4772              JMS I GET4IN   /GET WAIT CONSTANT
2155  5317              JMP MVGFWD+4


                /TYPE REPEAT
2156  4456      MVGRPT, JMS I TYPTEX
2157  7777              7777
216Ø  626Ø              626Ø
2161  64ØØ              64ØØ
2162  ØØ77              ØØ77
2163  4772              JMS I GET4IN   /GET REPEAT CONSTANT
2164  1Ø11              TAD 11         /GET REPEAT FROM ADDRESS
2165  341Ø              DCA I 1Ø              /TO EXECUTE TABLE
2166  1Ø1Ø              TAD 1Ø
2167  7ØØ1              IAC
217Ø  3Ø11              DCA 11         /FOR NEXT REPEAT
2171  5317              JMP MVGFWD+4

2172  231Ø      GET4IN, GETMIN         /TO GET 4 CHARACTERS

                /DO LOOP, EXECUTE SELECTED SEQUENCE
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        22ØØ    *22ØØ
22ØØ    4456    DOLOOP, JMS I TYPTEX    /TYPE DO
22Ø1    7777            7777
22Ø2    4457            4457
22Ø3    7777            7777
22Ø4    77ØØ            77ØØ
22Ø5    1Ø32            TAD BFILOC              /SET ROUTINE POINTER TO START
22Ø6    3Ø1Ø            DCA 1Ø
22Ø7    3Ø11            DCA 11          /TO COUNT RPTS
221Ø    141Ø            TAD I 1Ø                /GET ROUTINE ADDRESS
2211    3214            DCA .+3         /FOR JMS I
2212    4614            JMS I .+2               /EXECUTE ROUTINE
2213    521Ø            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    1Ø75            TAD KØ2ØØ               /MOVE TAPE FORWARD
222Ø    1Ø6Ø            TAD UNFUNC      /+ DRIVE NUMBER
2221    6766            IOT 766
2222    5616            JMP I MVFWD


                /START BACKWARD MOTION
2223    5223    MVBKWD, JMP .
2224    1344            TAD KØ6ØØ               /MOVE BACKWARD
2225    1Ø6Ø            TAD UNFUNC      /+ DRIVE NUMBER
2226    6766            IOT 766
2227    5623            JMP I MVBKWD


                /STOP TAPE
223Ø    523Ø    MVSTOP, JMP .
2231    6761            IOT 761         /READ STAT A
2232    Ø345            AND K7ØØØ               /CLEAR TO DRIVE NUM
2233    7Ø41            CMA IAC
2234    1Ø6Ø            TAD UNFUNC
2235    764Ø            SZA CLA         /SAME DRIVE
2236    5243            JMP .+5         /NOT SAME AS STAT A
2237    6761            IOT 761
224Ø    ØØ75            AND KØ2ØØ               /CLEAR AC TO MOTION BIT
2241    6764            IOT 764         /CLEAR MOTION IF NOT READY
2242    563Ø            JMP I MVSTOP    /EXIT
2243    1Ø6Ø            TAD UNFUNC
2244    6766            IOT 766
2245    563Ø            JMP I MVSTOP


                /WAIT AND DO NOTHING FOR A NUMBER OF BLOCKS
```

0075 = 0200
0060 = 0000
JMS MVWAIT = 4246

2344 = 0600
2345 = 7000
JMS MVWAIT = 4246

. 7402

7402

```
2246  5246     MVWAIT, JMP .
2247  3Ø16             DCA 16
225Ø  141Ø             TAD I 1Ø
2251  3Ø17             DCA 17
2252  2Ø16             ISZ 16
2253  5252             JMP .-1
2254  2Ø17             ISZ 17
2255  5252             JMP .-3
2256  5646             JMP I MVWAIT

               /REPEAT X TIMES LOOP
2257  5257     MVRPT,  JMP .
226Ø  2Ø11             ISZ 11          /RPT COUNT+1
2261  1Ø11             TAD 11
2262  141Ø             TAD I 1Ø                /+ (-RPT CONSTANT)
2263  764Ø             SZA CLA         /DONE X TIMES
2264  527Ø             JMP .+4         /NO
2265  Ø41Ø             AND I 1Ø                /INC EXECUTE ADDRES
2266  3Ø11             DCA 11
2267  5657             JMP I MVRPT     /EXIT
227Ø  7Ø4Ø             CMA             /RESET EXECUTE ADDRESS
2271  141Ø             TAD I 1Ø
2272  3Ø1Ø             DCA 1Ø
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  53Ø1             JMP .+3
2277  Ø41Ø             AND I 1Ø
23ØØ  5674             JMP I MVCHNG
23Ø1  7Ø4Ø             CMA
23Ø2  141Ø             TAD I 1Ø
23Ø3  3Ø1Ø             DCA 1Ø
23Ø4  5674             JMP I MVCHNG

               /END OF ROUTINE TYPED IN
23Ø5  53Ø5     MVEND,  JMP .
23Ø6  57Ø7             JMP I .+1
23Ø7  2ØØØ             MVTEST

               /MAKE - CONSTANT OF 4 INPUTS
231Ø  531Ø     GETMIN, JMP .
2311  72Ø1             CLA IAC         /+1 WHEN L=1 GOT 4
2312  3Ø13             DCA 13
2313  6Ø31             KSF             /WAIT KEYBOARD
2314  5313             JMP .-1
2315  6Ø36             KRB             /READ KEYBOARD
2316  6Ø46             TLS             /OUTPUT
2317  6Ø41             TSF
```

```
        2320  5317              JMP .-1
        2321  7040              CMA                     /MAKE -
        2322  ØØ73              AND KØØØ7                      /OCTAL
        2323  3014              DCA 14
        2324  1013              TAD 13                  /MOVE 1 CHARACTER
        2325  7104              CLL RAL
        2326  7006              RTL
        2327  1014              TAD 14                  /ASSEMBLE
        233Ø  3013              DCA 13
        2331  742Ø              SNL                     /SKIP - DONE 4
        2332  5313              JMP GETMIN-3            /NOT 4 YET
        2333  1013              TAD 13
        2334  7001              IAC                     /MAKE 2'S COMPLEMENT
        2335  745Ø              SNA
        2336  704Ø              CMA                     /MUST BE AT LEAST -1
        2337  341Ø              DCA I 1Ø                       /TO EXECUTE TABLE
        234Ø  4456              JMS I TYPTEX
        2341  7777              7777
        2342  77ØØ              77ØØ
        2343  571Ø              JMP I GETMIN
        2344  Ø6ØØ      KØ6ØØ,  6ØØ
        2345  7ØØØ      K7ØØØ,  7ØØØ

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

              24ØØ      *24ØØ
        24ØØ  4436      SRCH1,  JMS I REWIND
        24Ø1  4436              JMS I REWIND     /INTO EZ TWICE
        24Ø2  3114              DCA DIRFLG
        24Ø3  3Ø2Ø              DCA RECORD       /RECORD Ø
        24Ø4  4435              JMS I SRCH1T     /FIND IT
        24Ø5  5221              JMP SCH1ST       /YES
        24Ø6  4444              JMS I ERRSTP            /NO
        24Ø7  4452              JMS I SRCHTY
        241Ø  1Ø26              TAD RECRDK              /BLOCK LOOKED FOR
        2411  4451              JMS I TYPCON
        2412  1Ø25              TAD IDCON               /BLOCK FOUND
        2413  4451              JMS I TYPCON
        2414  6772              IOT 772          /RD STAT B
        2415  3Ø21              DCA BLKFND
        2416  1Ø25              TAD IDCON
        2417  4451              JMS I TYPCON     /TYPE STAT B
        242Ø  52Ø2              JMP SRCH1+2

        2421  3422      SCH1ST, DCA I POSITN     /FOUND Ø
        2422  3423              DCA I DIRECT     /FORWARD
        2423  2Ø2Ø              ISZ RECORD       /RECORD LOOKED FOR +1
        2424  7Ø4Ø              CMA
        2425  3427              DCA I WCLOC      /SET WC TO -1
        2426  6764              IOT 764          /SET WC ENABLES
        2427  444Ø              JMS I WAIT1
        2430  ØØØ1              1
        2431  741Ø              SKP
        2432  5244              JMP SCH1OK              /INTERRUPT OK
        2433  6772      SCH1ER, IOT 772
        2434  Ø11Ø              AND EZBIT
        2435  765Ø              SNA CLA         /END ZONE
        2436  52Ø6      JMP SRCH1+6     /NO TYPE ERROR
        2437  1Ø2Ø              TAD RECORD
        244Ø  1Ø77              TAD K5Ø77
        2441  77ØØ              SMA CLA         /DONE ALL BLOCKS
        2442  5262              JMP SCH1ND      /YES
        2443  52Ø6      JMP SRCH1+6     /NO, ERROR

        2444  1Ø21      SCH1OK, TAD BLKFND              /GET BLOCK NUMBER READ
        2445  7Ø41              CMA IAC         /MAKE -
        2446  1Ø2Ø              TAD RECORD
        2447  764Ø              SZA CLA         /RIGHT BLOCK
        245Ø  5254              JMP .+4         /NO
        2451  4536              JMS I XCHKGO    /CHECK GO BIT IF BLOCK 2ØØ-2ØØØ
        2452  2422              ISZ I POSITN    /NEW POSITION
        2453  5223              JMP SCH1ST+2    /TEST NEXT BLOCK
        2454  4366              JMS SIERRO


        2455  2422              ISZ I POSITN
        2456  2Ø2Ø              ISZ RECORD
        2457  4435              JMS I SRCHIT    /RESYNC ON NEXT BLOCK
        246Ø  5244              JMP SCH1OK              /FOUND OK
        2461  5233              JMP SCH1ER      /TEST FOR END ZONE
        2462  4437      SCH1ND, JMS I NEWDRV
        2463  52Ø2              JMP SRCH1+2     /RPT NEXT DRIVE
        2464  7Ø4Ø              CMA
        2465  3Ø2Ø              DCA RECORD
        2466  1125              TAD KØ2Ø4
        2467  1Ø6Ø              TAD UNFUNC
        247Ø  6766              IOT 766         /MOVE DRIVE INTO EZ
        2471  444Ø              JMS I WAITI
        2472  5ØØ1              5ØØ1
        2473  7ØØØ              NOP
        2474  4437              JMS I NEWDRV
        2475  5266              JMP SCH1ND+4
        2476  2Ø2Ø              ISZ RECORD              /DONE ALL TWICE
        2477  741Ø              SKP             /YES

        25ØØ  5266              JMP SCH1ND+4    /MAKE 2ND MOVE INTO EZ
        25Ø1  11ØØ      SRCH2,  TAD K27Ø1
        25Ø2  3Ø2Ø              DCA RECORD
        25Ø3  11Ø1              TAD KØ614               /SRCH BACKWARD
        25Ø4  1Ø6Ø              TAD UNFUNC              /+ DRIVE NUMBER
        25Ø5  6766              IOT 766
        25Ø6  7Ø4Ø              CMA
        25Ø7  3427              DCA I WCLOC
        251Ø  444Ø              JMS I WAITI
        2511  ØØØ1              1
        2512  741Ø              SKP
        2513  5326              JMP SCH2OK
        2514  4366    SCH2ER,   JMS SIERRO
        2515  724Ø              CLA CMA
        2516  1Ø2Ø              TAD RECORD
        2517  3Ø2Ø              DCA RECORD
        252Ø  1Ø2Ø              TAD RECORD
        2521  771Ø              SPA CLA
        2522  5357              JMP SIERRO-7
        2523  7Ø4Ø              CMA
        2524  3114              DCA DIRFLG
        2525  4435              JMS I SRCHIT

        2526  1Ø2Ø    SCH2OK,   TAD RECORD      /BLOCK LOOKED FOR
        2527  7Ø41              CMA IAC         /MAKE -
        253Ø  1Ø21              TAD BLKFND      /+ BLOCK FOUND
        2531  764Ø              SZA CLA         /RIGHT ONE
        2532  5314              JMP SCH2ER      /NO
        2533  6764              IOT 764         /RESET WC ENABLE
        2534  7Ø4Ø              CMA
        2535  3427              DCA I WCLOC
        2536  1Ø2Ø              TAD RECORD      /LAST BLOCK -1
        2537  3422              DCA I POSITN
        254Ø  7Ø4Ø              CMA
        2541  1Ø2Ø              TAD RECORD
        2542  3Ø2Ø              DCA RECORD
        2543  444Ø              JMS I WAITI
        2544  ØØØ1              1
        2545  741Ø              SKP
        2546  5326              JMP SCH2OK      /STATUS WAS NORMAL
        2547  6772              IOT 772         /READ STATB
        255Ø  Ø11Ø              AND EZBIT
        2551  765Ø              SNA CLA         /EZ INT
        2552  5314              JMP SCH2ER      /NO, ERROR
        2553  1Ø2Ø              TAD RECORD
        2554  7Ø4Ø              CMA
        2555  764Ø              SZA CLA         /EXPECT END ZONE
        2556  5314              JMP SCH2ER              /NO, ERROR
        2557  4437              JMS I NEWDRV    /GET NEXT DRIVE
        256Ø  53Ø1              JMP SRCH2               /REPEAT
        2561  76Ø4              CLA OSR
        2562  7Ø1Ø              RAR
        2563  762Ø              SNL CLA         /REPEAT TEST
        2564  74Ø2              HLT             /NO, HALT
        2565  52ØØ              JMP SRCH1               /START OVER
        2566  5366    SIERRO,   JMP .
        2567  4444              JMS I ERRSTP
        257Ø  4452              JMS I SRCHTY
        2571  1Ø26              TAD RECRDK
        2572  4451              JMS I TYPCON
        2573  1Ø25              TAD IDCON
        2574  4451              JMS I TYPCON
        2575  4447              JMS I SBTYPE
        2576  5766              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
     2600  4743    SERCH2, JMS I DRVTYP     /TYPE DRIVE AND NUMBER
     2601  4333            JMS TYINTX       /TYPE TYPE IN
     2602  4456            JMS I TYPTEX
     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 TYPTEX
     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
```

```
        265Ø  2Ø11           ISZ 11
        2651  741Ø           SKP
        2652  572Ø           JMP I SER2AI      /DONE 129
        2653  6764           IOT 764           /RESET WCE
        2654  5237           JMP SER2ST        /REPT

        2655  6772   SEREZ,  IOT 772           /READ B
        2656  Ø11Ø           AND EZBIT
        2657  764Ø           SZA CLA           /END ZONE
        266Ø  5274           JMP SER2NZ        /YES
        2661  6772           IOT 772
        2662  3Ø2Ø           DCA RECORD                  /TYPE STATUS B
        2663  1Ø26           TAD RECRDK
        2664  4451           JMS I TYPCON
        2665  4456           JMS I TYPTEX
        2666  ØØ63           ØØ63
        2667  6441           6441
        267Ø  64ØØ           64ØØ
        2671  4277           4277
        2672  52ØØ           JMP SERCH2        /START OVER
        2673  7472   K7472,  7472


             /TYPE END ZONE
        2674  4456   SER2NZ, JMS I TYPTEX
        2675  7777           7777
        2676  4556           4556
        2677  44ØØ           44ØØ
        27ØØ  7257           7257
        27Ø1  5645           5645
        27Ø2  77ØØ           77ØØ
        27Ø3  1Ø11           TAD 11
        27Ø4  7Ø41           CMA IAC
        27Ø5  1Ø64           TAD K7577
        27Ø6  764Ø           SZA CLA           /READ ANY AT ALL
        27Ø7  572Ø           JMP I SER2AI      /YES
        271Ø  4456           JMS I TYPTEX      /TYPE NO BLOCKS
        2711  7777           7777
        2712  5657           5657
        2713  ØØ42           ØØ42
        2714  5457           5457
        2715  4353           4353
        2716  6377           6377
        2717  52ØØ           JMP SERCH2
        272Ø  3ØØØ   SER2AI, SER2A             /TO GET TO REST OF PROGRAM

             /TYPE ALL OTHERS
        2721  5321   OTHRTX, JMP .
        2722  4456           JMS I TYPTEX
        2723  7777           7777
        2724  4154           4154
        2725  54ØØ           54ØØ
        2726  5764           5764
        2727  5Ø45           5Ø45
        273Ø  6263              6263
        2731  ØØ77              ØØ77
        2732  5721              JMP I ØTHRTX


                    /TYPE TYPE IN
        2733  5333  TYINTX, JMP .
        2734  4456              JMS I TYPTEX
        2735  7777              7777
        2736  6471              6471
        2737  6Ø45              6Ø45
        274Ø  ØØ51              ØØ51
        2741  5677              5677
        2742  5733              JMP I TYINTX

        2743  1511  DRVTYP, TYDRV
                    /
                    /ROUTINE TO CHECK GO BIT
                    /
        2744  ØØØØ  CHKGO,  Ø
        2745  73ØØ          CLA CLL
        2746  1Ø21          TAD BLKFND                 /GET BLOCK READ
        2747  1142          TAD K5ØØØ
        275Ø  763Ø          SZL CLA                    /WAS IT GREATER THAN BLOCK 2ØØØ
        2751  5744          JMP I CHKGO                /YES EXIT
        2752  1Ø21          TAD BLKFND                 /GET BLOCK READ
        2753  1141          TAD Z76ØØ
        2754  762Ø          SNL CLA                    /WAS IT LESS THAN Ø2ØØ
        2755  5744          JMP I CHKGO                /YES EXIT
        2756  6761          IOT 761                    /GET GO BIT
        2757  ØØ75          AND KØ2ØØ                  /MASK GO BIT
        276Ø  765Ø          SNA CLA                    /WAS GO BIT SET
        2761  74Ø2          HLT                        /STATUS A OR GO BIT FAILED
        2762  5744          JMP I CHKGO                /EXIT GO BIT O.K.
                    /


                    /REST OF SEARCH ROUTINE 2

              3ØØØ  *3ØØØ
        3ØØØ  6761  SER2A,  IOT 761
        3ØØ1  ØØ75          AND KØ2ØØ
        3ØØ2  6764          IOT 764         /STOP TAPE
        3ØØ3  1Ø11          TAD 11
        3ØØ4  7Ø41          CMA IAC
        3ØØ5  1Ø64          TAD K7577
        3ØØ6  3Ø11          DCA 11          /NUMBER OF BLOCKS READ
        3ØØ7  1Ø32          TAD BF1LOC
        3Ø1Ø  3Ø1Ø          DCA 1Ø          /TO GET FIRST BLOCK
        3Ø11  1Ø1Ø          TAD 1Ø
        3Ø12  7ØØ1          IAC
        3Ø13  3Ø12          DCA 12          /TO GET 2ND BLOCK
        3Ø14  1Ø12          TAD 12
        3Ø15  4451          JMS I TYPCON    /TYPE FIRST
        3Ø16  4456          JMS I TYPTEX    /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 TYPTEX    /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  7410              SKP
        3041  2721              OTHRTX
        3042  4456              JMS I TYPTEX
        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 TYPTEX
        3102  7777              7777
        3103  7700              7700
        3104  1010              TAD 10
        3105  4451              JMS I TYPCON    /TYPE 1ST
        3106  1012              TAD 12
        3107  4451              JMS I TYPCON    /TYPE 2ND
        3110  5270              JMP SERCMP      /DO NEXT


                        /TYPE OUT LAST BLOCK READ
        3111  1012      SER2LS, TAD 12
        3112  4451              JMS I TYPCON    /TYPE BLOCK NUMBER
        3113  4456              JMS I TYPTEX
        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 TYPCON    /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      K7475,  7475

                        PAUSE


                        /TC01 BASIC EXCERCISER 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

        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  7ØØØ                NOP
        3212  4453                JMS I ERSSTA
        3213  52Ø4                JMP .-7


                      /TURN AROUND FIND Ø BACKWARDS
        3214  3Ø2Ø    GBKW1,      DCA RECORD
        3215  7ØØ1                IAC
        3216  3422                DCA I POSITN
        3217  3423                DCA I DIRECT
        322Ø  4455                JMS I SSTBKW
        3221  5225                JMP .+4
        3222  521Ø                JMP SSTER1
        3223  5211                JMP SSTER1+1


                      /WAIT FOR EZ TA FIND Ø FWD
        3224  5211                JMP SSTER1+1
        3225  3422                DCA I POSITN
        3226  7Ø4Ø                CMA
        3227  3423                DCA I DIRECT
        323Ø  1Ø65                TAD KØ6Ø4
        3231  1Ø6Ø                TAD UNFUNC
        3232  6766                IOT 766
        3233  444Ø                JMS I WAITI
        3234  5ØØ1                5ØØ1
        3235  521Ø                JMP SSTER1
        3236  7Ø4Ø                CMA
        3237  3422                DCA I POSITN
        324Ø  4454                JMS I SSTFWD
        3241  5245                JMP .+4
        3242  521Ø                JMP SSTER1
        3243  7ØØØ                NOP
        3244  5211                JMP SSTER1+1


        3245  3422    DCA I POSITN
        3246  3423                DCA I DIRECT
        3247  1Ø75                TAD KØ2ØØ
        325Ø  6764                IOT 764
        3251  4437                JMS I NEWDRV
        3252  52Ø4                JMP SSTRNA+4
        3253  4441                JMS I WTHALF


                      /TEST FORWARD START AFTER FORWARD
        3254  4443    SSTAN1,     JMS I SAVPAD
        3255  1422                TAD I POSITN
        3256  11Ø4                TAD SFAFK
        3257  3Ø2Ø                DCA RECORD
        326Ø  4454                JMS I SSTFWD
        3261  5267                JMP SSTA1A
        3262  5666                JMP I .+4
        3263  7ØØØ                NOP
        3264  4453                JMS I ERSSTA
        3265  5254              JMP SSTAN1
        3266  3437              SSTAEZ

        3267  1Ø2Ø     SSTA1A,  TAD RECORD
        327Ø  3422              DCA I POSITN
        3271  3423              DCA I DIRECT
        3272  1Ø75              TAD KØ2ØØ
        3273  6764              IOT 764
        3274  4437              JMS I NEWDRV
        3275  5254              JMP SSTAN1
        3276  4441              JMS I WTHALF

                       /TEST BACKWARD START AFTER FORWARD
        3277  4443     SSTAN2,  JMS I SAVPAD
        33ØØ  1422              TAD I POSITN
        33Ø1  11Ø7              TAD SBAFK
        33Ø2  3Ø2Ø              DCA RECORD
        33Ø3  4455              JMS I SSTBKW
        33Ø4  5311              JMP SSTA2A
        33Ø5  4366              JMS EZERR
        33Ø6  7ØØØ              NOP
        33Ø7  4453              JMS I ERSSTA
        331Ø  5277              JMP SSTAN2
        3311  1Ø2Ø     SSTA2A,  TAD RECORD
        3312  3422              DCA I POSITN
        3313  7Ø4Ø              CMA
        3314  3423              DCA I DIRECT
        3315  1Ø75              TAD KØ2ØØ
        3316  6764              IOT 764
        3317  4437              JMS I NEWDRV
        332Ø  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  11Ø5              TAD SFABK
        3325  3Ø2Ø              DCA RECORD
        3326  4454              JMS I SSTFWD
        3327  5334              JMP SSTA3A
        333Ø  4366              JMS EZERR
        3331  7ØØØ              NOP

                       /THEN TEST FORWARD TO BACKWARD TURN AROUND
        3332  4453              JMS I ERSSTA
        3333  5322              JMP SSTAN3
        3334  1Ø2Ø     SSTA3A,  TAD RECORD
        3335  3422              DCA I POSITN
        3336  3423              DCA I DIRECT
        3337  7Ø4Ø              CMA
        334Ø  3427              DCA I WCLOC
        3341  6764              IOT 764
        3342  444Ø              JMS I WAIT1
        3343  5ØØ1             5ØØ1
        3344  5331             JMP SSTAN3+7
        3345  2422             ISZ I POSITN
        3346  4455             JMS I SSTBKW
        3347  5353             JMP SSTA3B
        335Ø  533Ø             JMP SSTAN3+6
        3351  7ØØØ             NOP
        3352  5331             JMP SSTAN3+7
        3353  1Ø2Ø     SSTA3B, TAD RECORD
        3354  3422             DCA I POSITN
        3355  7Ø4Ø             CMA
        3356  3423             DCA I DIRECT
        3357  1Ø75             TAD KØ2ØØ
        336Ø  6764             IOT 764
        3361  4437             JMS I NEWDRV
        3362  5322             JMP SSTAN3
        3363  4441             JMS I WTHALF
        3364  5765             JMP I .+1
        3365  34ØØ             SSTAN4
        3366  5366     EZERR,  JMP .
        3367  724Ø             CMA CLA
        337Ø  3Ø21             DCA BLKFND
        3371  5766             JMP I EZERR

              34ØØ     *34ØØ

                       /TEST BACKWARD START AFTER BACKWARDS
        34ØØ  4443     SSTAN4, JMS I SAVPAD
        34Ø1  1422             TAD I POSITN
        34Ø2  11Ø6             TAD SBABK
        34Ø3  3Ø2Ø             DCA RECORD
        34Ø4  4455             JMS I SSTBKW
        34Ø5  5212             JMP SSTA4A
        34Ø6  4636             JMS I EZERRA
        34Ø7  7ØØØ             NOP


                       /THEN TEST BACKWARD TO FORWARD TURN AROUND
        341Ø  4453             JMS I ERSSTA
        3411  52ØØ             JMP SSTAN4
        3412  1Ø2Ø     SSTA4A, TAD RECORD
        3413  3422             DCA I POSITN
        3414  7Ø4Ø             CMA
        3415  3423             DCA I DIRECT
        3416  2Ø2Ø             ISZ RECORD
        3417  4454             JMS I SSTFWD
        342Ø  5224             JMP SSTA4B

        3421  52Ø6             JMP SSTAN4+6
        3422  7ØØØ             NOP
        3423  52Ø7             JMP SSTAN4+7
        3424  1Ø2Ø     SSTA4B, TAD RECORD
        3425  3422             DCA I POSITN
        3426  3423             DCA I DIRECT
        3427  1Ø75             TAD KØ2ØØ
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```
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 27Ø1

3437  1Ø2Ø     SSTAEZ, TAD RECORD
344Ø  1Ø77             TAD K5Ø77
3441  75ØØ             SMA              /DONE TO END ZONE
3442  5245             JMP .+3          /YES
3443  5644             JMP I .+1                 /FALSE END ZONE
3444  3264             SSTAN1+1Ø
3445  4437             JMS I NEWDRV     /RESET TO FIRST DRV
3446  5245             JMP .-1

               /MOVE ALL DRIVES INTO END ZONE
3447  7Ø4Ø             CMA
345Ø  3Ø2Ø             DCA RECORD       /TO COUNT TWO EZ PASSES
3451  1125             TAD KØ2Ø4
3452  1Ø6Ø             TAD UNFUNC
3453  6766             IOT 766
3454  444Ø             JMS I WAITI
3455  5ØØ1             5ØØ1
3456  7ØØØ             NOP              /IGNORE OTHER INTERRUPTS
3457  7Ø4Ø             CMA
346Ø  3422             DCA I POSITN
3461  3423             DCA I DIRECT
3462  4437             JMS I NEWDRV
3463  5254             JMP .-7
3464  2Ø2Ø             ISZ RECORD       /2 PASSES
3465  741Ø             SKP              /YES
3466  5263             JMP .-3
3467  4441             JMS I WTHALF
347Ø  134Ø     SSTEZA, TAD K27ØØ
3471  3Ø2Ø             DCA RECORD
3472  4443     JMS I SAVPAD
3473  4455             JMS I SSTBKW     /GO BACKWARD TO 27ØØ


3474  53Ø1             JMP SSTEZ1       /REACHED 27ØØ OK
3475  7ØØØ             NOP
3476  7ØØØ             NOP
3477  4453             JMS I ERSSTA
35ØØ  527Ø             JMP SSTEZA
35Ø1  1Ø2Ø     SSTEZ1, TAD RECORD
35Ø2  3422             DCA I POSITN     /BLOCK 27ØØ
35Ø3  7Ø4Ø             CMA              /BACKWARD
35Ø4  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
        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  1Ø21          TAD BLKFND
      3622  7Ø41          CMA IAC
      3623  1Ø2Ø          TAD RECORD
      3624  745Ø          SNA             /RIGHT BLOCK
      3625  56ØØ          JMP I SSTAFW    /YES, EXIT
      3626  771Ø          SPA CLA         /BLOCK FOUND LESSER
      3627  524Ø          JMP SSTFBE      /NO, ERROR
      363Ø  6764          IOT 764         /RESET WC ENABLE
      3631  52Ø6          JMP SSTAFW+6

      3632  6772  SSTFSE, IOT 772
      3633  Ø11Ø          AND EZBIT
      3634  765Ø          SNA CLA
      3635  22ØØ          ISZ SSTAFW      /END ZONE  EXIT
      3636  22ØØ          ISZ SSTAFW      /ONLY 1 ISZ
      3637  56ØØ          JMP I SSTAFW
      364Ø  22ØØ  SSTFBE, ISZ SSTAFW
      3641  5235          JMP .-4
      3642  1371          TAD BLOCKK+1
      3643  7Ø4Ø          CMA
      3644  1Ø21          TAD BLKFND
      3645  765Ø          SNA CLA
      3646  5217          JMP SSTFR
      3647  4322          JMS BNOTCN
      365Ø  52Ø1          JMP SSTAFW+1


                  /START STOP TURN AROUND TEST
                  /SEARCH BACKWARD ROUTINE

      3651  5251  SSTABW, JMP .
      3652  724Ø          CLA CMA
      3653  337Ø          DCA BLOCKK
      3654  11Ø1          TAD KØ614
      3655  1Ø6Ø          TAD UNFUNC
      3656  6766          IOT 766
      3657  7Ø4Ø          CMA
      366Ø  3427          DCA I WCLOC
      3661  1Ø25          TAD IDCON
      3662  343Ø          DCA I CALOC
      3663  444Ø          JMS I WAITI
      3664  ØØØ1          1
      3665  53Ø3          JMP SSTBSE
      3666  237Ø          ISZ BLOCKK
      3667  5313          JMP SSTBBE+2
      367Ø  1Ø21  SSTBR,  TAD BLKFND
      3671  3371          DCA BLOCKK+1
      3672  1Ø2Ø          TAD RECORD
      3673  7Ø41          CMA IAC
      3674  1Ø21          TAD BLKFND
      3675  745Ø          SNA
      3676  5651          JMP I SSTABW    /FOUND BLOCK EXIT
      3677  771Ø          SPA CLA
      37ØØ  5311          JMP SSTBBE
      37Ø1  6764          IOT 764
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```
        3702  5257                JMP SSTABW+6
        3703  6772      SSTBSE,   IOT 772
        3704  Ø11Ø                AND EZBIT
        3705  765Ø                SNA CLA
        3706  2251                ISZ SSTABW
        3707  2251                ISZ SSTABW
        371Ø  5651                JMP I SSTABW
        3711  2251      SSTBBE,   ISZ SSTABW
        3712  53Ø6                JMP .-4
        3713  1Ø21                TAD BLKFND
        3714  7Ø4Ø                CMA
        3715  1371                TAD BLOCKK+1
        3716  765Ø                SNA CLA
        3717  527Ø                JMP SSTBR
        372Ø  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  1Ø26                TAD RECRDK
        3726  4451                JMS I TYPCON
        3727  4456                JMS I TYPTEX
        373Ø  7777                7777            /TYPE BLOCK NUMBER ERR'
        3731  4254                4254

        3732  53ØØ                53ØØ
        3733  Ø3ØØ                Ø3ØØ
        3734  4562                4562
        3735  6277                6277
        3736  1372                TAD BLOCKK+2
        3737  4451                JMS I TYPCON
        374Ø  4456                JMS I TYPTEX    /TYPE LAST
        3741  ØØ54                ØØ54

        3742  4163                4163
        3743  6477                6477
        3744  1Ø25                TAD IDCON
        3745  4451                JMS I TYPCON    /TYPE CURRENT
        3746  4456                JMS I TYPTEX    /BLOCK NUMBER
        3747  ØØ64                64
        375Ø  5Ø51                5Ø51
        3751  6377                6377

        3752  137Ø                TAD BLOCKK
        3753  7ØØ1                IAC
        3754  337Ø                DCA BLOCKK
        3755  1373                TAD BLOCKK+3
        3756  4451                JMS I TYPCON    /TYPE OUT BLOCK
        3757  4456                JMS I TYPTEX    /COUNTER
        376Ø  ØØ43                43
```

```
      3761  5664             5664
      3762  6277             6277
      3763  76Ø4             CLA OSR
      3764  7Ø12             RTR
      3765  762Ø             SNL CLA         /STOP ON ERROR
      3766  74Ø2             HLT             /YES
      3767  5722             JMP I BNOTCN
      377Ø  ØØØØ    BLOCKK,  Ø
      3771  ØØØØ             Ø
      3772  3771             .-1

      3773  377Ø             .-3


                    /START STOP TURN AROUND TEST
                    /ERROR TYPE OUT AND RESYNC ROUTINE
            4ØØØ    *4ØØØ

      4ØØØ  52ØØ    SSTAER, JMP .
      4ØØ1  4444             JMS I ERRSTP    /STOP TAPE LB STATB
      4ØØ2  4452             JMS I SRCHTY    /TYPE SEARCH
      4ØØ3  1422             TAD I POSITN
      4ØØ4  7Ø4Ø             CMA
      4ØØ5  764Ø             SZA CLA         /TAPE WAS WHERE
      4ØØ6  5211             JMP .+3         /NOT END ZONE
      4ØØ7  4267             JMS EZTYPE              /TYPE END ZONE
      4Ø1Ø  5213             JMP .+3
      4Ø11  1Ø22             TAD POSITN
      4Ø12  4451             JMS I TYPCON    /TYPE LAST BLOCK
      4Ø13  1423             TAD I DIRECT
      4Ø14  764Ø             SZA CLA         /DIRECTION WAS
      4Ø15  522Ø             JMP .+3         /BACKWARD
      4Ø16  4711             JMS I FWDTYP    /TYPE FORWARD
      4Ø17  5221             JMP .+2
      4Ø2Ø  471Ø             JMS I BKWTYP    /TYPE BACKWARD
      4Ø21  4456             JMS I TYPTEX    /TYPE (LAST POS)
      4Ø22  ØØ54             ØØ54
      4Ø23  4163             4163
      4Ø24  64ØØ             64ØØ
      4Ø25  6Ø57             6Ø57
      4Ø26  6377             6377
      4Ø27  1Ø26             TAD RECRDK
      4Ø3Ø  4451             JMS I TYPCON    /TYPE BLOCK1 LOOKED FOR
      4Ø31  4456             JMS I TYPTEX    /TYPE (SEARCHED)
      4Ø32  ØØ63             ØØ63
      4Ø33  4541             4541
      4Ø34  6243             6243
      4Ø35  5Ø45             5Ø45
      4Ø36  4477             4477
      4Ø37  1Ø21             TAD BLKFND
      4Ø4Ø  7Ø4Ø             CMA
      4Ø41  764Ø             SZA CLA         /WAS A BLOCK NUMBER
      4Ø42  5245             JMP .+3         /YES
      4Ø43  4267             JMS EZTYPE              /TYPE END ZONE
      4Ø44  5247             JMP .+3
```

```
        4Ø45  1Ø25            TAD IDCON               /TYPE BLOCK NUMBER
        4Ø46  4451            JMS I TYPCON
        4Ø47  4456            JMS I TYPTEX            /TYPE (FOUND)
        4Ø5Ø  ØØ46            ØØ46
        4Ø51  5765            5765
        4Ø52  5644            5644
        4Ø53  77ØØ            77ØØ
        4Ø54  4447            JMS I SBTYPE
        4Ø55  76Ø4            CLA OSR
        4Ø56  7ØØ6            RTL
        4Ø57  763Ø            SZL CLA         /DELETE STOP AFTER ERROR
        4Ø6Ø  5263            JMP .+3         /NO ERROR STOP


        4Ø61  12ØØ            TAD SSTAER
        4Ø62  74Ø2            HLT             /DISPLAY ADDRESS
        4Ø63  72ØØ            CLA
        4Ø64  47Ø7            JMS I SYNCRE
        4Ø65  4441            JMS I WTHALF
        4Ø66  56ØØ            JMP I SSTAER

                      /TYPE (END ZONE)
        4Ø67  5267    EZTYPE, JMP .
        4Ø7Ø  4456            JMS I TYPTEX
        4Ø71  7777            7777
        4Ø72  4556            4556
        4Ø73  44ØØ            44ØØ
        4Ø74  7257            7257
        4Ø75  5645            5645
        4Ø76  77ØØ            77ØØ
        4Ø77  5667            JMP I EZTYPE
                      /SAVE POSITION AND DIRECTION POINTERS
        41ØØ  53ØØ    DAPSAV, JMP .
        41Ø1  72ØØ            CLA
        41Ø2  1422            TAD I POSITN
        41Ø3  3111            DCA POSSAV
        41Ø4  1423            TAD I DIRECT
        41Ø5  3112            DCA DIRSAV
        41Ø6  57ØØ            JMP I DAPSAV
        41Ø7  42ØØ    SYNCRE, RESYNC
        411Ø  1545    BKWTYP, TYBKW
        4111  1555    FWDTYP, TYFWD


                      /PUT TAPE BACK TO LAST KNOWN POSITION

              42ØØ    *42ØØ

        42ØØ  52ØØ    RESYNC, JMP .
        42Ø1  1111            TAD POSSAV
        42Ø2  7Ø4Ø            CMA
        42Ø3  765Ø            SNA CLA
        42Ø4  5354            JMP RESYEZ
        42Ø5  1112            TAD DIRSAV
        42Ø6  764Ø            SZA CLA
        4207  5276              JMP RESBKW
        421Ø  1101              TAD KØ614               /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  ØØØ1              1
        4217  526Ø              JMP RESFEZ
        422Ø  1Ø21              TAD BLKFND
        4221  7Ø41              CMA IAC
        4222  1111              TAD POSSAV
        4223  1374              TAD K7772
        4224  77ØØ              SMA CLA
        4225  5231              JMP .+4
        4226  72ØØ              CLA
        4227  6764              IOT 764
        423Ø  5213              JMP RESFWD
        4231  11Ø2              TAD KØ4ØØ
        4232  6764     RESFWF,  IOT 764
        4233  7Ø4Ø              CMA
        4234  3427              DCA I WCLOC
        4235  444Ø              JMS I WAITI
        4236  ØØØ1              1
        4237  52Ø1              JMP RESYNC+1
        424Ø  1111              TAD POSSAV
        4241  7Ø41              CMA IAC
        4242  1Ø21              TAD BLKFND
        4243  745Ø              SNA
        4244  525Ø              JMP .+4
        4245  771Ø              SPA CLA
        4246  5232              JMP RESFWF
        4247  52Ø1              JMP RESYNC+1


        425Ø  1Ø75     RESXIT,  TAD KØ2ØØ               /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  56ØØ              JMP I RESYNC

        426Ø  6772     RESFEZ,  IOT 772
        4261  Ø11Ø              AND EZBIT
        4262  765Ø              SNA CLA         /END ZONE
        4263  52Ø1              JMP RESYNC+1    /NO, SOME OTHER, RESYNC
        4264  1Ø65              TAD KØ6Ø4
        4265  1Ø6Ø              TAD UNFUNC
        4266  6766              IOT 766         /MOVE FARTHER
        4267  444Ø              JMS I WAITI     /INTO EZ
        427Ø  5ØØ1              5ØØ1
        4271  5264              JMP .-5
        4272  11Ø3              TAD KØ214
        4273  1Ø6Ø             TAD UNFUNC
        4274  6766             IOT 766         /NOW START FORWARD
        4275  5233             JMP RESFWF+1

        4276  11Ø3   RESBKW,   TAD KØ214               /TO RESYNC BKWD
        4277  1Ø6Ø             TAD UNFUNC              /TAPE MUST FIRST
        43ØØ  6766             IOT 766         /GO FORWARD
        43Ø1  7Ø4Ø             CMA
        43Ø2  3427             DCA I WCLOC
        43Ø3  444Ø             JMS I WAITI
        43Ø4  ØØØ1             1
        43Ø5  5336             JMP RESBEZ      /TEST FOR END ZONE
        43Ø6  1373             TAD KØØØ6
        43Ø7  1111             TAD POSSAV
        431Ø  7Ø41             CMA IAC
        4311  1Ø21             TAD BLKFND
        4312  77ØØ             SMA CLA         /REACH POSITION +6 YET
        4313  5317             JMP .+4         /YES
        4314  72ØØ             CLA
        4315  6764             IOT 764         /GO FORWARD MORE
        4316  53Ø1             JMP RESBKW+3
        4317  11Ø2             TAD KØ4ØØ               /CHANGE TO BACKWARD
        432Ø  6764   RESBKB,   IOT 764
        4321  7Ø4Ø             CMA
        4322  3427             DCA I WCLOC
        4323  444Ø             JMS I WAITI
        4324  ØØØ1             1
        4325  52Ø1             JMP RESYNC+1    /NOT NORMAL STAT, TRY AGAIN


        4326  1Ø21             TAD BLKFND
        4327  7Ø41             CMA IAC
        433Ø  1111             TAD POSSAV
        4331  745Ø             SNA             /IN POSITION YET
        4332  525Ø             JMP RESXIT      /YES
        4333  77ØØ             CLA SMA         /GO PAST AGAIN
        4334  52Ø1             JMP RESYNC+1    /YES, TRY AGAIN
        4335  532Ø             JMP RESBKB      /NO, WAIT FOR NEXT BLOCK

        4336  6772   RESBEZ,   IOT 772
        4337  Ø11Ø             AND EZBIT
        434Ø  765Ø             SNA CLA         /END ZONE
        4341  52Ø1             JMP RESYNC+1    /NO, TRY AGAIN
        4342  1125             TAD KØ2Ø4
        4343  1Ø6Ø             TAD UNFUNC
        4344  6766             IOT 766         /MOVE INTO EZ AGAIN
        4345  444Ø             JMS I WAITI
        4346  5ØØ1             5ØØ1
        4347  52Ø1             JMP RESYNC+1
        435Ø  11Ø1             TAD KØ614
        4351  1Ø6Ø             TAD UNFUNC      /NOW START BACKWARDS
        4352  6766             IOT 766
        4353  5321             JMP RESBKB+1
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```
                  /PUT TAPE BACK INTO END ZONE
                  /LEZ OR TEZ
 4354  1112       RESYEZ, TAD DIRSAV
 4355  764Ø               SZA CLA         /BACKWARD = NO SKIP
 4356  11Ø2               TAD KØ4ØØ               /YES BACKWARD
 4357  1125               TAD KØ2Ø4
 436Ø  1Ø6Ø               TAD UNFUNC
 4361  6766               IOT 766
 4362  444Ø               JMS I WAITI
 4363  5ØØ1               5ØØ1
 4364  5354               JMP RESYEZ
 4365  1Ø75               TAD KØ2ØØ
 4366  6764               IOT 764         /MOVE INTO EZ TWICE
 4367  444Ø               JMS I WAITI
 437Ø  5ØØ1               5ØØ1
 4371  5365               JMP .-4
 4372  5251               JMP RESXIT+1
 4373  ØØØ6       KØØØ6,  6
 4374  7772       K7772,  7772

                  PAUSE


                  /TCØ1 BASIC EXERCISER - TAPE 3A
                  /WRITE BASIC DATA PATTERNS
                  /READ VERIFY WRITE FORWARD
                  /READ BACKWARD, FORWARD, WRITE BACKWARD
                  /READ FORWARD, BACKWARD

       44ØØ       *44ØØ
 44ØØ  76Ø4       WRTTST, LAS             /GET SWITCHES
 44Ø1  ØØ73               AND KØØØ7               /MASK PATTERN NUM
 44Ø2  337Ø               DCA PATNUM
 44Ø3  137Ø               TAD PATNUM
 44Ø4  1365               TAD PATTBL
 44Ø5  3363               DCA TEMP1               /ADDRESS TO GET
 44Ø6  1763               TAD I TEMP1     /ROUTINE ADDRESS
 44Ø7  3363               DCA TEMP1
 441Ø  4763               JMS I TEMP1     /GENERATE PATTERN

 4411  7Ø4Ø               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  7ØØ1               IAC
 442Ø  3113               DCA BLKINC
 4421  1113       WRTLP1, TAD BLKINC
 4422  751Ø               SPA
 4423  72ØØ               CLA
 4424  1424               TAD I LSTBLK
 4425  3Ø2Ø               DCA RECORD
 4426  4435               JMS I SRCHIT
 4427  1115               TAD KØØ5Ø
```

```
        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 27Ø1 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  76Ø4      RDCOMP, LAS
        4452  Ø121              AND KØØ4Ø
        4453  764Ø              SZA CLA
        4454  5344              JMP RDSEND+13
        4455  7Ø4Ø              CMA
        4456  3364              DCA RDCPAS
        4457  1422              TAD I POSITN
        446Ø  3Ø2Ø              DCA RECORD
        4461  4435              JMS I SRCHIT    /FIND BLOCK
        4462  1116              TAD KØØ3Ø
        4463  6764              IOT 764         /CHANGE TO READ DATA
        4464  1Ø33              TAD BF2LOC
        4465  343Ø              DCA I CALOC
        4466  1Ø64              TAD K7577
        4467  3427              DCA I WCLOC
        447Ø  4762      RDCLP1, JMS I RDSWLP    /WAIT FOR READ INTERRUPT
        4471  5315              JMP RDCEND
        4472  6764              IOT 764         /RESET ENABLES
        4473  1Ø34              TAD BF3LOC
        4474  343Ø              DCA I CALOC
        4475  1Ø64              TAD K7577
        4476  3427              DCA I WCLOC
        4477  4442              JMS I DATACO    /VERIFY DATA PATTERN
        45ØØ  7175              BUFFR2
        45Ø1  4767              JMS I RERFLG

        45Ø2  4762              JMS I RDSWLP
        45Ø3  5315              JMP RDCEND      /DONE ALL
        45Ø4  6764              IOT 764         /RESET ENABLES AGAIN
        45Ø5  1Ø33              TAD BF2LOC
        45Ø6  343Ø              DCA I CALOC
        45Ø7  1Ø64              TAD K7577
        451Ø  3427              DCA I WCLOC
        4511  4442              JMS I DATACO    /VERIFY DATA READ
        4512  7376              BUFFR3
        4513  4767              JMS I RERFLG
        4514  5270              JMP RDCLP1


        4515  6772    RDCEND, IOT 772
        4516  Ø11Ø              AND EZBIT
        4517  764Ø              SZA CLA
        452Ø  5331              JMP RDSEND      /END ZONE INTERRUPT
        4521  1427              TAD I WCLOC
        4522  764Ø              SZA CLA
        4523  5331              JMP RDSEND
        4524  143Ø              TAD I CALOC
        4525  1366              TAD K76ØØ               /FORM BUFFER ADDRESS
        4526  333Ø              DCA .+2
        4527  4442              JMS I DATACO
        453Ø  7175              BUFFR2          /OR BUFFR3
        4531  4437    RDSEND, JMS I NEWDRV
        4532  5257              JMP RDCOMP+6
        4533  1114              TAD DIRFLG
        4534  7Ø4Ø              CMA
        4535  3114              DCA DIRFLG      /GO OTHER DIRECTION

        4536  1113              TAD BLKINC      /MAKE BLOCK INCREMENTER
        4537  7Ø41              CMA IAC         /OTHER DIRECTION
        454Ø  3113              DCA BLKINC
        4541  2364              ISZ RDCPAS      /READ BOTH DIRECTIONS
        4542  741Ø              SKP             /YES
        4543  5257              JMP RDCOMP+6    /READ OTHER DIRECTION
        4544  76Ø4              CLA OSR
        4545  Ø123              AND KØ1ØØ
        4546  764Ø              SZA CLA
        4547  5255              JMP RDCOMP+4
        455Ø  1424              TAD I LSTBLK
        4551  1Ø77              TAD K5Ø77
        4552  764Ø              SZA CLA         /WRITTEN 27Ø1 YET
        4553  5221              JMP WRTLP1      /WRITE NEXT SET
        4554  1114              TAD DIRFLG
        4555  764Ø              SZA CLA
        4556  5221              JMP WRTLP1
        4557  576Ø              JMP I .+1
        456Ø  5161              WRRDND

        4561  52ØØ    WRTSLP, WRTSWS          /TO TEST SWITCHES FOR WRITE
        4562  54ØØ    RDSWLP, RDSWS           /TO TEST SWITCHES FOR READ
        4563  ØØØØ    TEMP1,  Ø               /READ PASS SWITCH
        4564  ØØØØ    RDCPAS, Ø               /-1 PASS 1 Ø PASS 2

                      /ROUTINE ADDRESS FOR PATTERNS
        4565  4724    PATTBL, PTABLE
        4566  76ØØ    K76ØØ,  76ØØ
        4567  4734    RERFLG, REFLGS
        457Ø  ØØØØ    PATNUM, Ø
        4571  5157              WRDIR
```

```
                   /PATTERN GENERATION FOR
                   /INITIAL WRITE TEST

          46ØØ     *46ØØ
    46ØØ  ØØØØ     GNPATØ, Ø
    46Ø1  73ØØ             CLA CLL
    46Ø2  4251             JMS GNSTRA
    46Ø3  56ØØ             JMP I GNPATØ

    46Ø4  ØØØØ     GNPAT1, Ø
    46Ø5  734Ø             CLA CMA CLL
    46Ø6  4251             JMS GNSTRA
    46Ø7  56Ø4             JMP I GNPAT1

    461Ø  ØØØØ     GNPAT2, Ø
    4611  732Ø             CLA STL
    4612  4251             JMS GNSTRA
    4613  561Ø             JMP I GNPAT2

    4614  ØØØØ     GNPAT3, Ø
    4615  1221             TAD .+4
    4616  71ØØ             CLL
    4617  4251             JMS GNSTRA
    462Ø  5614             JMP I GNPAT3
    4621  2525             2525

    4622  ØØØØ     GNPAT4, Ø
    4623  1227             TAD .+4
    4624  71ØØ             CLL
    4625  4251             JMS GNSTRA
    4626  5622             JMP I GNPAT4
    4627  5252             5252

    463Ø  ØØØØ     GNPAT5, Ø
    4631  1235             TAD .+4
    4632  71ØØ             CLL
    4633  4251             JMS GNSTRA
    4634  563Ø             JMP I GNPAT5
    4635  Ø7Ø7             Ø7Ø7

    4636  ØØØØ     GNPAT6, Ø
    4637  1243             TAD .+4
    464Ø  71ØØ             CLL
    4641  4251             JMS GNSTRA
    4642  5636             JMP I GNPAT6
    4643  7Ø7Ø             7Ø7Ø

    4644  ØØØØ     GNPAT7, Ø
    4645  1221             TAD GNPAT4-1
    4646  712Ø             STL
    4647  4251             JMS GNSTRA
    465Ø  5644             JMP I GNPAT7
```

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

       4651  ØØØØ      GNSTRA, Ø
       4652  3Ø1Ø              DCA 1Ø
       4653  1Ø32              TAD BF1LOC
       4654  3Ø11              DCA 11
       4655  1Ø64              TAD K7577
       4656  3Ø12              DCA 12
       4657  1Ø1Ø              TAD 1Ø
       466Ø  3411              DCA I 11

       4661  2Ø12              ISZ 12
       4662  741Ø              SKP
       4663  5651              JMP I GNSTRA
       4664  742Ø              SNL
       4665  5257              JMP GNSTRA+6
       4666  1Ø1Ø              TAD 1Ø
       4667  7Ø4Ø              CMA
       467Ø  3Ø1Ø              DCA 1Ø
       4671  5257              JMP GNSTRA+6

       4672  Ø1ØØ      PARTAB, Ø1ØØ
       4673  Ø2ØØ              Ø2ØØ
       4674  Ø4ØØ              Ø4ØØ
       4675  1ØØØ              1ØØØ
       4676  2ØØØ              2ØØØ
       4677  4ØØØ              4ØØØ
       47ØØ  Ø1Ø1              Ø1Ø1
       47Ø1  Ø2Ø2              Ø2Ø2
       47Ø2  Ø4Ø4              Ø4Ø4
       47Ø3  1Ø1Ø              1Ø1Ø
       47Ø4  2Ø2Ø              2Ø2Ø
       47Ø5  4Ø4Ø              4Ø4Ø
       47Ø6  76ØØ              76ØØ
       47Ø7  75ØØ              75ØØ
       471Ø  73ØØ              73ØØ
       4711  67ØØ              67ØØ
       4712  57ØØ              57ØØ
       4713  37ØØ              37ØØ
       4714  77ØØ              77ØØ
       4715  7676              7676
       4716  7575              7575
       4717  7373              7373
       472Ø  6767              6767
       4721  5757              5757
       4722  3737              3737
       4723  7777              7777

       4724  46ØØ      PTABLE, GNPATØ
       4725  46Ø4              GNPAT1
       4726  461Ø              GNPAT2
       4727  4614              GNPAT3
       473Ø  4622              GNPAT4
       4731  463Ø              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
        474Ø  5744              JMP I .+4
        4741  5734              JMP I REFLGS
        4742  515Ø              COFLAG
        4743  5526              NOSERR
        4744  4461              RDCOMP+1Ø


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

              5ØØØ    *5ØØØ
        5ØØØ  52ØØ    CODATA, JMP .
        5ØØ1  72ØØ              CLA
        5ØØ2  1Ø31              TAD BF1WD1            /GET KNOWN DATA
        5ØØ3  3345              DCA KNDATA      /ADDRESS
        5ØØ4  16ØØ              TAD I CODATA    /UNKNOWN DATA
        5ØØ5  3346              DCA UKDATA      /ADDRESS
        5ØØ6  22ØØ              ISZ CODATA
        5ØØ7  7Ø4Ø              CMA
        5Ø1Ø  335Ø              DCA COFLAG      /SET ERR COUNT FLAG
        5Ø11  1Ø64              TAD K7577
        5Ø12  3347              DCA NUMWRD      /NUMBER OF WORDS
                      /TST FOR DELETE COMPARE
        5Ø13  76Ø4              LAS
        5Ø14  Ø1Ø2              AND KØ4ØØ
        5Ø15  764Ø              SZA CLA
        5Ø16  56ØØ              JMP I CODATA
        5Ø17  1745    COLOOP, TAD I KNDATA
        5Ø2Ø  7Ø41              CMA IAC
        5Ø21  1746              TAD I UKDATA
        5Ø22  764Ø              SZA CLA         /WORDS =
        5Ø23  5231              JMP COCOMP      /NO TEST COMPLIMENT

        5Ø24  2345    COINCR, ISZ KNDATA
        5Ø25  2346              ISZ UKDATA
        5Ø26  2347              ISZ NUMWRD      /DONE ALL
        5Ø27  5217              JMP COLOOP
        5Ø3Ø  56ØØ              JMP I CODATA    /EXIT

        5Ø31  1745    COCOMP, TAD I KNDATA
        5Ø32  745Ø              SNA             /WORD = Ø'S
        5Ø33  5237              JMP .+4         /YES, TRY COMPLIMENT
        5Ø34  7Ø4Ø              CMA
        5Ø35  764Ø              SZA CLA         /WORD=1'S
        5Ø36  5251              JMP COERRO      /NO DATA ERROR
        5Ø37  1745             TAD I KNDATA
        5Ø4Ø  7ØØ1             IAC                /MAKE 2'S COMP

        5Ø41  1746             TAD I UKDATA
        5Ø42  764Ø             SZA CLA            /COMPLIMENTS =
        5Ø43  5251             JMP COERRO         /NO ERROR,
        5Ø44  2345             ISZ KNDATA
        5Ø45  2346             ISZ UKDATA
        5Ø46  2347             ISZ NUMWRD
        5Ø47  5237             JMP COCOMP+6       /STAY IN TEST COMP
        5Ø5Ø  56ØØ             JMP I CODATA


                   /DATA ERROR TYPEOUT

        5Ø51  235Ø   COERRO, ISZ COFLAG           /FIRST ERROR
        5Ø52  53Ø7             JMP COERR1         /NO HDR ALREADY TYPED
        5Ø53  4444             JMS I ERRSTP       /STOP TAPE
        5Ø54  4446             JMS I RDATTY
        5Ø55  4456             JMS I TYPTEX
        5Ø56  ØØ44             44
        5Ø57  4164             4164
        5Ø6Ø  41ØØ             41ØØ
        5Ø61  4562             4562
        5Ø62  6257             6257
        5Ø63  6277             6277
        5Ø64  1Ø22             TAD POSITN
        5Ø65  4451             JMS I TYPCON
        5Ø66  4456             JMS I TYPTEX       /TYPE BLOCK
        5Ø67  ØØ42             42
        5Ø7Ø  5457             5457
        5Ø71  4353             4353
        5Ø72  ØØ67             67
        5Ø73  6251             6251
        5Ø74  6464             6464
        5Ø75  4556             4556
        5Ø76  ØØ77             ØØ77
        5Ø77  1357             TAD WRDIR                   /TYPE DIRECTION
        51ØØ  765Ø             SNA CLA            /BLOCK WAS WRITTEN
        51Ø1  53Ø6             JMP .+5
        51Ø2  47Ø4             JMS I .+2
        51Ø3  53Ø7             JMP COERR1
        51Ø4  1545             TYBKW
        51Ø5  1555             TYFWD
        51Ø6  47Ø5             JMS I .-1

        51Ø7  4456   COERR1, JMS I TYPTEX         /LINE FEED TO
        511Ø  7777             7777               /SEPARATE ERRORS
        5111  77ØØ             77ØØ
        5112  1345             TAD KNDATA
        5113  4451             JMS I TYPCON       /TYPE GOOD DATA

        5114  4456             JMS I TYPTEX
        5115  ØØ53             53
        5116  5657          5657
        5117  6756          6756
        5120  77ØØ          77ØØ
        5121  1346          TAD  UKDATA     /TYPE DATA READ
        5122  4451          JMS I TYPCON
        5123  4456          JMS I TYPTEX
        5124  ØØ65          65
        5125  5653          5653
        5126  5657          5657
        5127  6756          6756
        513Ø  77ØØ          77ØØ
        5131  1344          TAD KNDATA-1
        5132  4451          JMS I TYPCON    /TYPE ADDRESS OF
        5133  4456          JMS I TYPTEX    /KNOW DATA
        5134  ØØ41          41
        5135  4444          4444
        5136  6263          6263
        5137  ØØ53          53
        514Ø  5657          5657
        5141  6756          6756
        5142  77ØØ          77ØØ
        5143  5224          JMP COINCR
        5144  5145          .+1

        5145  ØØØØ    KNDATA, Ø
        5146  ØØØØ    UKDATA, Ø
        5147  ØØØØ    NUMWRD, Ø
        515Ø  ØØØØ    COFLAG, Ø
        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  ØØØØ    WRDIR,  Ø
              ØØ44    STPERR=ERRSTP


        516Ø  457Ø          PATNUM
        5161  136Ø    WRRDND, TAD .-1
        5162  4451          JMS I TYPCON    /TYPE PATTERN NUMBER
        5163  4456          JMS I TYPTEX
        5164  ØØ45          45
        5165  5644          5644
        5166  77ØØ          77ØØ
        5167  76Ø4          CLA OSR
        517Ø  ØØ75          AND KØ2ØØ
        5171  765Ø          SNA CLA         /DO NEXT PATTERN
        5172  5777          JMP I .+5               /NO USE SWS
        5173  176Ø          TAD I WRRDND-1
        5174  7ØØ1          IAC             /PATNUM+1
        5175  5776          JMP I .+1
        5176  44Ø1          WRTTST+1
        5177  44ØØ          WRTTST
```

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

        5200    *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
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        5255  4456            JMS I TYPTEX
        5256  ØØ42            42
        5257  5457            5457
        526Ø  4353            4353
        5261  77ØØ            77ØØ
        5262  4447            JMS I $BTYPE
        5263  1Ø27            TAD WCLOC
        5264  4451            JMS I TYPCON     /TYPE WHATS LEFT OF WC
        5265  4456            JMS I TYPTEX
        5266  ØØ67            67
        5267  1643            1643
        527Ø  1677            1677
        5271  4435            JMS I SRCHIT
        5272  1115            TAD KØØ5Ø
        5273  6764            IOT 764

        5274  1Ø32            TAD BF1LOC
        5275  343Ø            DCA I CALOC
        5276  1Ø64            TAD K7577
        5277  3427            DCA I WCLOC
        53ØØ  52Ø1            JMP WRTSWS+1

        53Ø1  1Ø2Ø    WRTEZA, TAD RECORD
        53Ø2  1126            TAD K5Ø76
        53Ø3  765Ø            SNA CLA
        53Ø4  531Ø            JMP .+4
        53Ø5  1Ø2Ø            TAD RECORD
        53Ø6  77ØØ            SMA CLA
        53Ø7  5241            JMP WRTEZT+4
        531Ø  22ØØ            ISZ WRTSWS
        5311  56ØØ            JMP I WRTSWS

        5312  1Ø2Ø    WRT32,  TAD RECORD
        5313  3422            DCA I POSITN
        5314  1Ø2Ø            TAD RECORD
        5315  1113            TAD BLKINC
        5316  3Ø2Ø            DCA RECORD
        5317  1114            TAD DIRFLG
        532Ø  7Ø41            CMA IAC
        5321  1Ø2Ø            TAD RECORD
        5322  Ø127            AND KØØ37
        5323  764Ø            SZA CLA
        5324  5226            JMP WRTSWA
        5325  1Ø75            TAD KØ2ØØ
        5326  6764            IOT 764
        5327  22ØØ            ISZ WRTSWS
        533Ø  5226            JMP WRTSWA
                      /
                      /RUOTINE TO CHECK STATUS B BITS 6-8
                      /
        5331  ØØØØ    CHKB,   Ø
        5332  734Ø            CLA CLL CMA
        5333  4352            JMS GOB                /CHECK PATTERN 7777
        5334  4352            JMS GOB                /CHECK PATTERN ØØØØ
        5335  1131            TAD K2525
        5336  4352              JMS GOB                 /CHECK PATTERN 2525
        5337  1131              TAD K2525
        5340  7040              CMA
        5341  4352              JMS GOB                 /CHECK PATTERN 5252
        5342  2133              ISZ DTCNT               /DO 4096 TIMES
        5343  5332              JMP CHKB +1             .
        5344  1133              TAD DTCNT
        5345  4352              JMS GOB                 /DO ALL COMBINATIONS
        5346  2133              ISZ DTCNT
        5347  5344              JMP .-3
        5350  7300              CLA CLL
        5351  5731              JMP I CHKB              /EXIT STATUS B O.K.
                         /
        5352  ØØØØ       GOB,   Ø
        5353  Ø14Ø              AND KØØ7Ø
        5354  3132              DCA DTSAV
        5355  1132              TAD DTSAV
        5356  6774              IOT 774                 /LOAD STATUS B
        5357  7440              SZA                     /DID IOT 774 CLEAR AC
        5360  7402              HLT                     /IOT 774 DID NOT CLEAR AC
        5361  6772              IOT 772                 /GET STATUS B
        5362  Ø14Ø              AND KØØ7Ø               /MASK 6-8
        5363  7041              CIA
        5364  1132              TAD DTSAV               /THIS IS THE GOOD STATUS WORD
        5365  7440              SZA                     /WAS STATUS B O.K.
        5366  7402              HLT                     /STATUS B OR AC FAILED
        5367  7240              CLA CMA
        5370  6772              IOT 772                 /GET STATUS B
        5371  7040              CMA
        5372  7440              SZA                     /DID OR WORK
        5373  7402              HLT                     /STATUS B OR AC FAILED
        5374  5752              JMP I GOB               /EXIT PATTERN O.K.
                         /


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

              54ØØ       *54ØØ
        54ØØ  52ØØ       RDSWS, JMP .
        54Ø1  444Ø              JMS I WAITI     /WAIT NORMAL INTERRUPT
        54Ø2  ØØØ1              1
        54Ø3  5252              JMP TSRDEZ              /TEST FOR END ZONE
        54Ø4  1427              TAD I WCLOC
        54Ø5  764Ø              SZA CLA
        54Ø6  53Ø2              JMP RDSERR
        54Ø7  7Ø4Ø              CMA
        541Ø  3326              DCA NOSERR
        5411  76Ø4              CLA OSR
        5412  Ø117              AND BLKBTS
        5413  745Ø              SNA             /1 OR 32 BLOCKS
        5414  5225       JMP .+11        /NO,ALL

        5415  Ø12Ø              AND BLKBIT
        5416  765Ø              SNA CLA         /1 BLOCK
        5417  5234              JMP RDSW32      /NO, 32 BLOCKS
        542Ø  1Ø75              TAD KØ2ØØ
        5421  6764              IOT 764         /1 BLOCK, STOP TAPE
        5422  1Ø2Ø              TAD RECORD
        5423  3422              DCA I POSITN
        5424  56ØØ              JMP I RDSWS
        5425  1Ø2Ø              TAD RECORD
        5426  3422              DCA I POSITN    /NEW POSITION
        5427  1Ø2Ø              TAD RECORD
        543Ø  1113              TAD BLKINC      /NEXT BLOCK
        5431  3Ø2Ø              DCA RECORD
        5432  22ØØ              ISZ RDSWS
        5433  56ØØ              JMP I RDSWS

        5434  1Ø2Ø      RDSW32, TAD RECORD
        5435  3422              DCA I POSITN
        5436  1Ø2Ø              TAD RECORD
        5437  1113              TAD BLKINC      /+ OR - 1
        544Ø  3Ø2Ø              DCA RECORD
        5441  1114              TAD DIRFLG
        5442  7Ø41              CMA IAC
        5443  1Ø2Ø              TAD RECORD
        5444  Ø127              AND KØØ37
        5445  764Ø              SZA CLA         /DONE AN INC OF 32
        5446  5232              JMP RDSW32-2
        5447  1Ø75              TAD KØ2ØØ
        545Ø  6764              IOT 764         /32 BLOCKS, STOP TAPE
        5451  56ØØ              JMP I RDSWS


        5452  6772      TSRDEZ, IOT 772
        5453  Ø11Ø              AND EZBIT
        5454  765Ø              SNA CLA         /END ZONE INT
        5455  53Ø2              JMP RDSERR      /NO, ERROR
        5456  1Ø2Ø              TAD RECORD
        5457  1126              TAD K5Ø76               /BLOCK 27Ø2
        546Ø  765Ø              SNA CLA
        5461  5265              JMP .+4         /27Ø2 DOESN'T EXIST
        5462  1Ø2Ø              TAD RECORD
        5463  77ØØ              SMA CLA         /BLOCK-1
        5464  53Ø2              JMP RDSERR      /NO, EZ STAT IN ERROR
        5465  56ØØ              JMP I RDSWS     /EXIT

        5466  5266      PARRSE, JMP .           /STOP TAPE
        5467  4444              JMS I ERRSTP
        547Ø  4446              JMS I RDATTY    /READ AND DIRECTION
        5471  1Ø26              TAD RECRDK
        5472  4451              JMS I TYPCON    /TYPE BLOCK
        5473  4456              JMS I TYPTEX
        5474  ØØ42              42
        5475  5457              5457
        5476  4353              4353
        5477  77ØØ              77ØØ
        55ØØ  4447              JMS I SBTYPE
        55Ø1  5666              JMP I PARRSE
        5502  6761     RDSERR, IOT 761
        5503  ØØ75             AND KØ2ØØ
        5504  765Ø             SNA CLA
        5505  5312             JMP .+5
        5506  76Ø4             LAS
        55Ø7  Ø1Ø2             AND KØ4ØØ
        551Ø  764Ø             SZA CLA
        5511  52Ø7             JMP RDSWS+7
        5512  4266             JMS PARRSE
        5513  3326             DCA NOSERR

        5514  1427             TAD I WCLOC
        5515  765Ø             SNA CLA        /WC GO TO Ø
        5516  5211             JMP RDSWS+11   /YES
        5517  1Ø27             TAD WCLOC
        552Ø  4451             JMS I TYPCON
        5521  4456             JMS I TYPTEX   /TYPE WORD COUNT
        5522  ØØ67             67
        5523  1643             1643
        5524  1677             1677
        5525  5211             JMP RDSWS+11
        5526  ØØØØ     NOSERR, Ø


               /WRITE DATA SCOPE LOOP
               /NO ERROR CHECKING BOUNCES OFF EZ
               /PATTERN SELECTION BITS 9, 1Ø, 11

              16ØØ     *16ØØ
        16ØØ  76Ø4     WRSCOP, LAS
        16Ø1  ØØ73             AND KØØØ7
        16Ø2  1371             TAD PATTBA              /PAT NUM + TABLE ADRS
        16Ø3  337Ø             DCA TEMPY
        16Ø4  177Ø             TAD I TEMPY
        16Ø5  337Ø             DCA TEMPY
        16Ø6  477Ø             JMS I TEMPY    /GENERATE PATTERN
        16Ø7  11Ø3             TAD KØ214               /SEARCH +
        161Ø  1Ø6Ø             TAD UNFUNC              /DRIVE
        1611  6766             IOT 766
        1612  744Ø             SZA
        1613  74Ø2             HLT            /IOT 766 OR 764 DID NOT CLEAR AC
        1614  1Ø25             TAD IDCON
        1615  343Ø             DCA I CALOC
        1616  6773             IOT 773        /WAIT FOR FLAG
        1617  5216             JMP .-1
        162Ø  771Ø             SPA CLA                 /ERROR STATUS
        1621  5255             JMP WRTSEZ
        1622  1115             TAD KØØ5Ø
        1623  6764             IOT 764        /CHANGE TO WRITE
        1624  744Ø             SZA
        1625  74Ø2             HLT            /IOT 764 DID NOT CLEAR AC
        1626  1Ø32             TAD BF1LOC
        1627  343Ø             DCA I CALOC
        163Ø  1Ø64             TAD K7577
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         1631  3427          DCA I WCLOC
         1632  6761          IOT 761
         1633  ØØ75          AND KØ2ØØ
         1634  765Ø          SNA CLA
         1635  5243          JMP WRSCO1
         1636  1427          TAD I WCLOC
         1637  765Ø          SNA CLA
         164Ø  5243          JMP .+3
         1641  6771          IOT 771         /WAIT FOR FLAG
         1642  5232          JMP .-1Ø
         1643  1375  WRSCO1, TAD K773Ø
         1644  337Ø          DCA TEMPY
         1645  6771          IOT 771
         1646  741Ø          SKP
         1647  5252          JMP .+3
         165Ø  237Ø          ISZ TEMPY
         1651  5245          JMP .-4
         1652  1376          TAD KØØ52               /LEAVE ERROR FLAGS SET
         1653  6764          IOT 764
         1654  5212          JMP WRSCOP+12
         1655  6772  WRTSEZ, IOT 772
         1656  Ø374          AND K1ØØØ
         1657  765Ø          SNA CLA         /END ZONE
         166Ø  5265          JMP .+5         /NO START SEARCH AGAIN
         1661  6761          IOT 761         /END ZONE SET
         1662  7Ø4Ø          CMA             /CHANGE DIRECTION
         1663  Ø1Ø2          AND KØ4ØØ
         1664  52Ø7          JMP WRSCOP+7
         1665  6761          IOT 761
         1666  5263          JMP .-3

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

         1667  1372  RDSCOP, TAD KØ22Ø               /READ DATA
         167Ø  1Ø6Ø          TAD UNFUNC              /+ DRIVE
         1671  6766          IOT 766
         1672  744Ø          SZA
         1673  74Ø2          HLT             /IOT 764 DID NOT CLEAR AC
         1674  1Ø33          TAD BF2LOC
         1675  343Ø          DCA I CALOC
         1676  1Ø64          TAD K7577
         1677  3427          DCA I WCLOC
         17ØØ  6761          IOT 761         /MONITOR MOTION
         17Ø1  ØØ75          AND KØ2ØØ               /BIT IN CASE IT=Ø
         17Ø2  765Ø          SNA CLA
         17Ø3  5311          JMP .+6
         17Ø4  1427          TAD I WCLOC     /MONITOR WORD K
         17Ø5  765Ø          SNA CLA
         17Ø6  5311          JMP .+3
         17Ø7  6771          IOT 771         /AND FLAGS
         171Ø  53Ø4          JMP .-4
         1711  1375          TAD K773Ø
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        1712  337Ø             DCA TEMPY
        1713  6773             IOT 773        /MONITOR FLAG
        1714  741Ø             SKP            /FOR 22Ø MICRO SEC.
        1715  532Ø             JMP .+3
        1716  237Ø             ISZ TEMPY
        1717  5313             JMP .-4
        172Ø  Ø374             AND K1ØØØ
        1721  764Ø             SZA CLA        /END ZONE SET
        1722  533Ø             JMP .+6        /YES, REVERSE
        1723  6761    RDSCO1,  IOT 761
        1724  7Ø4Ø             CMA
        1725  ØØ75             AND KØ2ØØ              /IN CASE GO=Ø
        1726  6764             IOT 764        /RESET ENABLES
        1727  5272             JMP RDSCOP+3
        173Ø  6761             IOT 761
        1731  7Ø4Ø             CMA
        1732  Ø1Ø2             AND KØ4ØØ              /CHANGE DIRECTION
        1733  5267             JMP RDSCOP

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

        1734  11Ø3    SRSCOP,  TAD KØ214              /SEARCH
        1735  1Ø6Ø             TAD UNFUNC             /+ DRIVE
        1736  6766             IOT 766
        1737  744Ø             SZA
        174Ø  74Ø2             HLT            /IOT 764 DID NOT CLEAR AC
        1741  1377             TAD K35ØØ
        1742  3Ø1Ø             DCA 1Ø
        1743  1Ø31             TAD BF1WD1
        1744  343Ø             DCA I CALOC
        1745  1431             TAD I BF1WD1   /DISPLAY BLOCK
        1746  2Ø1Ø             ISZ 1Ø         /WAIT 1 BLOCK
        1747  5346             JMP .-1        /APPROX
        175Ø  72ØØ             CLA
        1751  6772             IOT 772
        1752  Ø374             AND K1ØØØ              /READ B
        1753  764Ø             SZA CLA        /END ZONE
        1754  5362             JMP .+6        /YES REVERSE
        1755  6761             IOT 761
        1756  7Ø4Ø             CMA            /IN CASE GO=Ø
        1757  ØØ75             AND KØ2ØØ
        176Ø  6764             IOT 764
        1761  5337             JMP SRSCOP+3
        1762  6761             IOT 761
        1763  ØØ75             AND KØ2ØØ
        1764  764Ø             SZA CLA
        1765  74Ø2             HLT            /EZ DID NOT ZERO MOTION
        1766  1373             TAD KØ6ØØA
        1767  536Ø             JMP .-7        /COMPLEMENT DIRECTION

        177Ø  ØØØØ    TEMPY,   Ø
        1771  4724    PATTBA,  PTABLE
        1772  Ø22Ø     KØ22Ø,  22Ø
        1773  Ø6ØØ     KØ6ØØA, 6ØØ
        1774  1ØØØ     K1ØØØ,  1ØØØ
        1775  773Ø     K773Ø,  773Ø
        1776  ØØ52     KØØ52,  52
        1777  35ØØ     K35ØØ,  35ØØ

                       PAUSE



                       /TAPE 4 OF TCØ1 BASIC EXERCISER
                       /PARITY GENERATION TEST
                       /IS CORRECT PARITY GENERATED
                       /BEGIN BY WRITING REV CKSUMS TO Ø
                       /BACKWARD IS 77-ØØ FWD
              56ØØ     *56ØØ
        56ØØ  11ØØ     PARTST, TAD K27Ø1
        56Ø1  3Ø2Ø             DCA RECORD      /FIND 27Ø1
        56Ø2  7Ø4Ø             CMA
        56Ø3  3114             DCA DIRFLG      /BACKWARDS
        56Ø4  4435             JMS I SRCHIT
        56Ø5  1116             TAD KØØ3Ø               /SEARCH TO READ DATA
        56Ø6  6764             IOT 764
        56Ø7  1Ø32             TAD BF1LOC

        561Ø  343Ø             DCA I CALOC
        5611  1357             TAD K76ØØB              /DUMMY INPUT
        5612  3427             DCA I WCLOC
        5613  1427             TAD I WCLOC
        5614  765Ø             SNA CLA         /WAIT FOR WCTO=-1
        5615  5221             JMP .+4
        5616  6771             IOT 771         /FLAG SET
        5617  5213             JMP .-4         /COULD BE END ZONE
        562Ø  5242             JMP PAREZ1
        5621  7ØØ1             IAC
        5622  7Ø4Ø             CMA
        5623  3427             DCA I WCLOC     /2 WORDS

        5624  1Ø32             TAD BF1LOC
        5625  343Ø             DCA I CALOC
        5626  1122             TAD KØ17Ø               /TO WRITE ALL CONTINUOUS
        5627  6764             IOT 764
        563Ø  7Ø4Ø             CMA
        5631  3431             DCA I BF1WD1
        5632  444Ø             JMS I WAITI
        5633  ØØØ1             1
        5634  5237             JMP .+3
        5635  1122             TAD KØ17Ø               /BACK TO READ DATA
        5636  52Ø6             JMP PARTST+6
        5637  4641             JMS I .+2
        564Ø  52ØØ             JMP PARTST
        5641  5151             WAETYP
        5642  6772      PAREZ1, IOT 772
        5643  Ø11Ø              AND EZBIT               /END ZONE INT.
        5644  764Ø              SZA CLA
        5645  5251              JMP .+4
        5646  465Ø              JMS I .+2
        5647  52ØØ              JMP PARTST
        565Ø  5466              PARRSE

        5651  4437              JMS I NEWDRV
        5652  52ØØ              JMP PARTST      /PREPARE NEXT DRIVE


        5653  1356      PARWL1, TAD PARLOC
        5654  3Ø1Ø              DCA 1Ø
        5655  3114              DCA DIRFLG
        5656  3Ø2Ø              DCA RECORD
        5657  3422              DCA I POSITN
        566Ø  4435              JMS I SRCHIT    /FIND BLOCK Ø FWD
        5661  1115              TAD KØØ5Ø
        5662  6764              IOT 764         /WRITE DATA
        5663  141Ø              TAD I 1Ø
        5664  3431              DCA I BF1WD1
        5665  1Ø32              TAD BF1LOC

        5666  343Ø              DCA I CALOC     /ONLY WRITE 1 WD
        5667  7Ø4Ø              CMA
        567Ø  3427              DCA I WCLOC     /REST OF BLOCK SHOULD
        5671  444Ø              JMS I WAITI     /GO TO ZERO'S
        5672  ØØØ1              1
        5673  5344              JMP PARWER
        5674  1431              TAD I BF1WD1
        5675  7Ø4Ø              CMA
        5676  765Ø              SNA CLA         /DO ALL ONES YET?
        5677  53Ø3              JMP .+4         /YES
        57ØØ  2Ø2Ø              ISZ RECORD
        57Ø1  2422              ISZ I POSITN    /COUNT BLOCKS
        57Ø2  5262              JMP PARWL1+7

                        /INCREMENTING PARITY PATTERNS
                        /Ø1ØØ TO 77ØØ AND Ø1Ø1 TO 7777
        57Ø3  3431      PARWL2, DCA I BF1WD1
        57Ø4  6764              IOT 764
        57Ø5  7Ø4Ø              CMA
        57Ø6  3427              DCA I WCLOC
        57Ø7  1Ø32              TAD BF1LOC
        571Ø  343Ø              DCA I CALOC
        5711  1431              TAD I BF1WD1    /UPPER +1
        5712  1123              TAD KØ1ØØ

        5713  3431              DCA I BF1WD1
        5714  1431              TAD I BF1WD1
        5715  745Ø              SNA             /UPPER GONE TO Ø
        5716  5323              JMP .+5         /YES, SET WORD TO Ø1Ø1
        5717  ØØ71              AND KØØ77
        572Ø  764Ø              SZA CLA         /INCREMENTING LWR
        5721  2431            ISZ I BF1WD1    /ADD 1 TO LOWER
        5722  5325            JMP .+3

        5723  1124            TAD KØ1Ø1               /DONE UPPER TO 77ØØ
        5724  3431            DCA I BF1WD1    /START BOTH EQUAL
        5725  444Ø            JMS I WAITI
        5726  ØØØ1            1
        5727  5344            JMP PARWER      /SHOULD GET NO ERROR STATUS
        573Ø  2422            ISZ I POSITN
        5731  2Ø2Ø            ISZ RECORD
        5732  1431            TAD I BF1WD1
        5733  7Ø4Ø            CMA
        5734  764Ø            SZA CLA
        5735  53Ø4            JMP PARWL2+1


        5736  1Ø75            TAD KØ2ØØ
        5737  6764            IOT 764
        574Ø  4437            JMS I NEWDRV
        5741  5253            JMP PARWL1
        5742  5743            JMP I .+1               /READ AND CHECK
        5743  62ØØ            PARTS1          /FOR CORRECT CKSUMS

        5744  4444    PARWER, JMS I ERRSTP
        5745  445Ø            JMS I WDATTY
        5746  1Ø26            TAD RECRDK
        5747  4451            JMS I TYPCON
        575Ø  ØØ42            42
        5751  5457            5457
        5752  4353            4353

        5753  77ØØ            77ØØ
        5754  4447            JMS I SBTYPE
        5755  5253            JMP PARWL1

        5756  4671    PARLOC, PARTAB-1
        5757  76ØØ    K76ØØB, 76ØØ


                      /WRITE BLOCKS TO WRONG
                      /PARITY AND VERIFY PARTITY ERRORS
                      /GENERATED (GOING BACKWARD REWRITE REV, CKSUM)
              6ØØØ    *6ØØØ

        6ØØØ  3Ø2Ø    PARTS4, DCA RECORD
        6ØØ1  3114            DCA DIRFLG
        6ØØ2  4435            JMS I SRCHIT    /FIND LAST BLOCK BKWD
        6ØØ3  1355            TAD KØ14Ø               /CHNG TO WRITE ALL
        6ØØ4  6764            IOT 764
        6ØØ5  1122            TAD KØ17Ø               /TO READ DATA

        6ØØ6  6764            IOT 764
        6ØØ7  1Ø32            TAD BF1LOC
        6Ø1Ø  343Ø            DCA I CALOC
        6Ø11  1375            TAD K76ØØA
        6Ø12  3427              DCA I WCLOC
        6Ø13  1427              TAD I WCLOC
        6Ø14  765Ø              SNA CLA         /WAIT FOR LAST
        6Ø15  5221              JMP .+4         /WORD IN

        6Ø16  6771              IOT 771
        6Ø17  5213              JMP .-4
        6Ø2Ø  5356              JMP PARRE3              /NO FLAGS FOR READ DATA
        6Ø21  1Ø32              TAD BF1LOC              /WRITE CHECKSUM TO FIRST WORD
        6Ø22  343Ø              DCA I CALOC
        6Ø23  7ØØ1              IAC
        6Ø24  7Ø4Ø              CMA
        6Ø25  3427              DCA I WCLOC
        6Ø26  1122              TAD KØ17Ø
        6Ø27  6764              IOT 764         /WRITE ALL
        6Ø3Ø  1431              TAD I BF1WD1
        6Ø31  7Ø4Ø              CMA
        6Ø32  765Ø              SNA CLA
        6Ø33  3431              DCA I BF1WD1
        6Ø34  444Ø              JMS I WAITI     /WRITE ALL CONTINUOUS
        6Ø35  ØØØ1              1
        6Ø36  5311              JMP PRWAE               /WRITE ALL STATUS ERR
        6Ø37  4361              JMS PR4INC
        6Ø4Ø  52Ø5              JMP PARTS4+5

        6Ø41  1Ø75              TAD KØ2ØØ
        6Ø42  6764              IOT 764
        6Ø43  4437              JMS I NEWDRV
        6Ø44  52ØØ              JMP PARTS4


                    /READ BLOCKS FORWARD AND
                    /EXPECT PARITY ERRORS THEN BACKWARDS
        6Ø45  3Ø2Ø  PARTS5, DCA RECORD
        6Ø46  3114              DCA DIRFLG
        6Ø47  4435              JMS I SRCHIT    /FIND Ø FWD OR LAST
        6Ø5Ø  1116              TAD KØØ3Ø
        6Ø51  6764              IOT 764         /READ DATA
        6Ø52  1Ø32              TAD BF1LOC
        6Ø53  343Ø              DCA I CALOC

        6Ø54  1Ø64              TAD K7577
        6Ø55  3427              DCA I WCLOC
        6Ø56  444Ø              JMS I WAITI     /EXPECT PARITY
        6Ø57  42Ø1              42Ø1            /ERROR
        6Ø6Ø  5277              JMP PRT5EZ
        6Ø61  6772              IOT 772
        6Ø62  ØØ75              AND KØ2ØØ
        6Ø63  765Ø              SNA CLA         /PARITY ERROR SET

        6Ø64  5314              JMP PARRE4      /NO
        6Ø65  4361              JMS PR4INC
        6Ø66  5251              JMP PARTS5+4

        6Ø67  1Ø75              TAD KØ2ØØ
        6Ø7Ø  6764            IOT 764         /STOP TAPE
        6Ø71  4437            JMS I NEWDRV    /CHANGE DRIVES
        6Ø72  5245            JMP PARTS5


                      /READ BLOCKS BACKWARDS AND EXPECT
                      /PARITY ERRORS
        6Ø73  1422    PARTS6, TAD I POSITN    /LAST BLOCK
        6Ø74  3Ø2Ø            DCA RECORD
        6Ø75  7Ø4Ø            CMA             /BACKWARDS
        6Ø76  5246            JMP PARTS5+1

        6Ø77  1114    PRT5EZ, TAD DIRFLG
        61ØØ  77ØØ            SMA CLA         /GOING BACKWARD
        61Ø1  5314            JMP PARRE4      /NO, ERROR
        61Ø2  1Ø2Ø            TAD RECORD
        61Ø3  77ØØ            SMA CLA         /DONE BLOCK Ø
        61Ø4  5314            JMP PARRE4      /NO, ERROR
        61Ø5  4437            JMS I NEWDRV
        61Ø6  5273            JMP PARTS6
        61Ø7  571Ø            JMP I .+1
        611Ø  56ØØ            PARTST

        6111  4713    PRWAE,  JMS I .+2
        6112  52Ø2            JMP PARTS4+2
        6113  5151            WAETYP

        6114  4444    PARRE4, JMS I ERRSTP
        6115  4446            JMS I RDATTY
        6116  1Ø26            TAD RECRDK
        6117  4451            JMS I TYPCON
        612Ø  4456            JMS I TYPTEX

        6121  ØØ42            42
        6122  5457            5457
        6123  4353            4353
        6124  7777            7777
        6125  6Ø41            6Ø41
        6126  6251            6251
        6127  6471            6471
        613Ø  ØØ45            45
        6131  6262            6262
        6132  5762            5762
        6133  ØØ45            45
        6134  7Ø6Ø            7Ø6Ø
        6135  4543            4543
        6136  6445            6445
        6137  4477            4477

        614Ø  4447            JMS I SBTYPE


        6141  1114            TAD DIRFLG
        6142  764Ø            SZA CLA
        6143  1Ø75            TAD KØ2ØØ
        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
        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 KØØ1Ø
        6226  6764            IOT 764         /RD DATA TO RD ALL
        6227  444Ø            JMS I WAITI
        623Ø  ØØØ1            1
        6231  5342            JMP PARRE1      /WAIT FOR CKSUM IN

        6232  1431            TAD I BF1WD1
        6233  ØØ71            AND KØØ77            /TEST FOR 2 CHAR
        6234  764Ø            SZA CLA         /IN FIRST WORD
        6235  524Ø            JMP .+3         /CKSUM SHOULD =77ØØ
        6236  1431            TAD I BF1WD1
        6237  ØØ7Ø            AND K77ØØ
        624Ø  1756            TAD I CKSLOC
        6241  1123            TAD KØ1ØØ

        6242  764Ø            SZA CLA         /CKSUM CORRECT
        6243  531Ø            JMP CKSERR      /NO
        6244  4755            JMS I PR2INC
        6245  52Ø7            JMP PARTS1+7    /NO

        6246  1Ø75            TAD KØ2ØØ
        6247  6764            IOT 764         /STOP TAPE
        625Ø  4437            JMS I NEWDRV
        6251  52ØØ            JMP PARTS1      /DO NEXT DRIVE


                      /READ BLOCKS BKWD FOR NO PARITY
                      /ERRORS
        6252  1422    PARTS2, TAD I POSITN
        6253  3Ø2Ø            DCA RECORD
        6254  7Ø4Ø            CMA
        6255  3114            DCA DIRFLG
        6256  4435            JMS I SRCHIT         /FIND LAST BLOCK BKWDS
        6257  1116            TAD KØØ3Ø
        626Ø  6764            IOT 764
        6261  1Ø32            TAD BF1LOC

        6262  343Ø            DCA I CALOC
        6263  1Ø64            TAD K7577
        6264  3427            DCA I WCLOC
        6265  444Ø            JMS I WAITI
        6266  ØØØ1            1
        6267  5273            JMP PARREZ           /TEST FOR END ZONE
        627Ø  4755            JMS I PR2INC
        6271  526Ø            JMP PARTS2+6
        6272  53Ø2            JMP PARTS3+2
        6273  1Ø2Ø    PARREZ, TAD RECORD
        6274  77ØØ            SMA CLA         /DONE BLOCK Ø
        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
        63ØØ  3Ø2Ø    PARTS3, DCA RECORD
        63Ø1  5255            JMP PARTS2+3            /BLOCK Ø FWD


        63Ø2  1Ø75            TAD KØ2ØØ
        63Ø3  6764            IOT 764 /STOP TAPE
        63Ø4  4437            JMS I NEWDRV     /ALL DRIVES
        63Ø5  53ØØ            JMP PARTS3       /NOPE
        63Ø6  57Ø7            JMP I .+1               /WRITE TO WRONG
        63Ø7  6ØØØ            PARTS4           /PARITY AND TEST ERROR

        631Ø  4444    CKSERR, JMS I ERRSTP
        6311  4445            JMS I DRIVTY
        6312  4456            JMS I TYPTEX
        6313  ØØ43            43
        6314  5363            5363
        6315  6555            6555
        6316  ØØ45            45
        6317  6262            6262
        632Ø  5762            5762
        6321  77ØØ            77ØØ

        6322  1Ø31            TAD BF1WD1
        6323  4451            JMS I TYPCON
        6324  4456            JMS I TYPTEX
        6325  ØØ44            44
        6326  4164            4164
        6327  4177            4177
        633Ø  1356            TAD CKSLOC
        6331  4451            JMS I TYPCON
        6332  4456            JMS I TYPTEX
        6333  ØØ43            43
        6334  53ØØ            53ØØ
        6335  6365            6365
        6336  5577            5577
        6337  4755            JMS I PR2INC
        634Ø  52Ø2            JMP PARTS1+2
        6341  525Ø            JMP PARTS2-2

        6342  4744    PARRE1, JMS I .+2
        6343  52Ø2            JMP PARTS1+2
        6344  5466            PARRSE

        6345  4744    PARRE2, JMS I .-1
        6346  4755            JMS I PR2INC
        6347  741Ø            SKP
        635Ø  53Ø4            JMP PARTS3+4
        6351  1Ø2Ø            TAD RECORD
        6352  771Ø            SPA CLA
        6353  5276            JMP PARTS3-2
        6354  5256            JMP PARTS2+4
        6355  6161    PR2INC, PR4INC
        6356  7175    CKSLOC, BUFFRS+2Ø1
                      $
```

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ØØØØ  Ø1ØØØØØØ  ØØØØØØØØ  11111111  11111111  11111111  11111111  11111111  11111111
Ø1ØØ  11111111  11111111  11111111  11111111  111ØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

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62ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
63ØØ  11111111  11111111  11111111  11111111  11111111  1111111Ø  ØØØØØØØØ  ØØØØØØØØ

64ØØ
65ØØ

66ØØ
67ØØ


7ØØØ
71ØØ

72ØØ
73ØØ

74ØØ
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76ØØ
77ØØ
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          BACKTY  1075          FORDTY  1076          K2701   Ø1ØØ          PARRSE  5466
          BF1LOC  ØØ32          FWDTYP  4111          K35ØØ   1777          PARTAB  4672
          BF1WD1  ØØ31          GBKW1   3214          K4ØØØ   ØØ66          PARTS1  623Ø
          BF2LOC  ØØ33          GET4IN  2172          K4215   Ø276          PARTS2  6252
          BF3LOC  ØØ34          GETMIN  231Ø          K5ØØØ   Ø142          PARTS3  63ØØ
          BKWTYP  411Ø          GNPATØ  46ØØ          K5Ø76   Ø126          PARTS4  6ØØØ
          BLKBIT  Ø12Ø          GNPAT1  46Ø4          K5Ø77   ØØ77          PARTS5  6Ø45
          BLKBTS  Ø117          GNPAT2  461Ø          K7ØØØ   2345          PARTS6  6Ø73
          BLKFLG  Ø75Ø          GNPAT3  4614          K7472   2673          PARTST  56ØØ
          BLKFND  ØØ21          GNPAT4  4622          K7475   3131          PARWER  5744
          BLKINC  Ø113          GNPAT5  463Ø          K7574   Ø134          PARWL1  5653
          BLOCKK  377Ø          GNPAT6  4636          K7577   ØØ64          PARWL2  57Ø3
          BNOTCN  3722          GNPAT7  4644          K76ØØ   4566          PATCHK  1122
          BUFFR2  7175          GNPTRS  Ø462          K76ØØA  6175          PATNUM  457Ø
          BUFFR3  7376          GNSTRA  4651          K76ØØB  5757          PATTBA  1771
          BUFFRS  6774          GOB     5352          K77ØØ   ØØ7Ø          PATTBL  4565
          CALOC   ØØ3Ø          HLTNS   Ø311          K773Ø   1775          PNTRS   Ø5Ø1
          CDRIVE  ØØ57          IDCON   ØØ25          K776Ø   ØØ63          POSITN  ØØ22
          CHKB    5331          IOT     6ØØØ          K7767   ØØ67          POSSAV  Ø111
          CHKGO   2744          IRECD   Ø254          K7772   4374          PR2INC  6355
          CHNGDR  Ø44Ø          KØØØ3   ØØ76          KM25    Ø325          PR4INC  6161
          CIPHER  Ø211          KØØØ6   4373          KNDATA  5145          PREBLK  Ø751
          CKSERR  631Ø          KØØØ7   ØØ73          LSTBLK  ØØ24          PRT5EZ  6Ø77
          CKSLOC  6356          KØØ1Ø   Ø13Ø          MSBITS  ØØ61          PRWAE   6111
          COCOMP  5Ø31          KØØ2Ø   ØØ74          MVBKWD  2223          PTABLE  4724
          CODATA  5ØØØ          KØØ3Ø   Ø116          MVCHNG  2274          RDATTY  ØØ46
          COERR1  51Ø7          KØØ37   Ø127          MVEND   23Ø5          RDCEND  4515
          COERRO  5Ø51          KØØ4Ø   Ø121          MVEQUL  2Ø47          RDCLP1  447Ø
          COFLAG  515Ø          KØØ5Ø   Ø115          MVFWD   2216          RDCOMP  4451
          COINCR  5Ø24          KØØ52   1776          MVGBKW  2121          RDCPAS  4564
          COLOOP  5Ø17          KØØ7Ø   Ø14Ø          MVGCHG  2135          RDSCO1  1723
          COMBIT  ØØ62          KØØ77   ØØ71          MVGFWD  2113          RDSCOP  1667
          CRLFLF  1242          KØ1ØØ   Ø123          MVGRPT  2156          RDSEND  4531
          DAPSAV  41ØØ          KØ1Ø1   Ø124          MVGSTP  2127          RDSERR  55Ø2
          DATACO  ØØ42          KØ14Ø   6155          MVGWAT  2147          RDSW32  5434
          DIRECT  ØØ23          KØ17Ø   Ø122          MVREST  2Ø2Ø          RDSWLP  4562
          DIRFLG  Ø114          KØ2ØØ   ØØ75          MVRPT   2257          RDSWS   54ØØ
          DIRSAV  Ø112          KØ2Ø4   Ø125          MVRTBL  2Ø73          RECORD  ØØ2Ø
          DOLOOP  22ØØ          KØ212   126Ø          MVSTOP  223Ø          RECRDK  ØØ26
          DOTHEM  2112          KØ214   Ø1Ø3          MVTEST  2ØØØ          REFLGS  4734
          DRIVTY  ØØ45          KØ215   1257          MVWAIT  2246          REPOSI  Ø4ØØ
          DRVTYP  2743          KØ22Ø   1772          NEWDRV  ØØ37          RERFLG  4567
          DTCHK   1Ø77          KØ24Ø   ØØ72          NOSERR  5526          RESBEZ  4336
          DTCNT   Ø133          KØ4ØØ   Ø1Ø2          NUMWRD  5147          RESBKB  432Ø
          DTSAV   Ø132          KØ6ØØ   2344          OTHRTX  2721          RESBKW  4276
          ERRSTP  ØØ44          KØ6ØØA  1773          PAREZ1  5642          RESFEZ  426Ø
          ERSSTA  ØØ53          KØ6Ø4   ØØ65          PARLOC  5756          RESFWD  4213
          ERSTP   131Ø          KØ614   Ø1Ø1          PARRE1  6342          RESFWF  4232
          EZBIT   Ø11Ø          K1ØØØ   1774          PARRE2  6345          RESXIT  425Ø
          EZERR   3366          K2525   Ø131          PARRE3  6156          RESYEZ  4354
          EZERRA  3436          K26Ø    1535          PARRE4  6114          RESYNC  427Ø
          EZTYPE  4Ø67          K27ØØ   354Ø          PARREZ  6273          REWIND  ØØ36
```

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        RSFDR1  3436            SSTBBE  3711            WRSCO1  1643
        RSFDRV  Ø42Ø            SSTBKW  ØØ55            WRSCOP  16ØØ
        SAVPAD  ØØ43            SSTBR   367Ø            WRT32   5312
        SBABK   Ø1Ø6            SSTBSE  37Ø3            WRTEZA  53Ø1
        SBAFK   Ø1Ø7            SSTER1  321Ø            WRTEZT  5235
        SBCONS  Ø675            SSTEZ1  35Ø1            WRTLP1  44Ø1
        SBRECV  1331            SSTEZA  347Ø            WRTSEZ  1655
        SBTYPE  ØØ47            SSTFBE  364Ø            WRTSLP  4561
        SCH1ER  2433            SSTFR   3617            WRTSWA  5226
        SCH1ND  2462            SSTFSE  3632            WRTSWS  52ØØ
        SCH1OK  2444            SSTFWD  ØØ54            WRTTST  44ØØ
        SCH1ST  2421            SSTRNA  32ØØ            WT5ØØ   Ø313
        SCH2ER  2514            STPERR  ØØ44            WTHALF  ØØ41
        SCH2OK  2526            SYNCRE  41Ø7            WTIJMP  Ø272
        SEARCH  Ø6ØØ            TAPONT  Ø752            WTINT   Ø234
        SEKONS  1Ø71            TEMP1   4563            XCHKB   Ø137
        SER2A   3ØØØ            TEMPY   177Ø            XCHKGO  Ø136
        SER2AI  272Ø            TSRDEZ  5452            XDTCHK  Ø135
        SER2LS  3111            TSTATB  1316            Z76ØØ   Ø141
        SER2NZ  2674            TSTTBL  Ø277
        SER2ST  2637            TXSTOR  13Ø7
        SER2TY  3123            TYALL   15Ø3
        SERCH2  26ØØ            TYBKW   1545
        SERCMP  3Ø7Ø            TYCHAR  123Ø
        SEREZ   2655            TYCONT  1261
        SFABK   Ø1Ø5            TYCOVR  1273
        SFAFK   Ø1Ø4            TYDATA  1475
        SIERRO  2566            TYDIR   1536
        SRCH1   24ØØ            TYDRV   1511
        SRCH2   25Ø1            TYFWD   1555
        SRCHER  Ø747            TYINTX  2733
        SRCHIT  ØØ35            TYMODE  1563
        SRCHTY  ØØ52            TYMOVE  14ØØ
        SRCNCK  Ø656            TYPCON  ØØ51
        SREZTS  Ø722            TYPTEX  ØØ56
        SRHERR  1ØØØ            TYRALL  1433
        SRSCOP  1734            TYRDAT  1424
        SRTAFN  Ø635            TYREAD  146Ø
        SSTA1A  3267            TYSRCH  1411
        SSTA2A  3311            TYTEXT  12ØØ
        SSTA3A  3334            TYWALL  1451
        SSTA3B  3353            TYWDAT  1442
        SSTA4A  3412            TYWRIT  1466
        SSTA4B  3424            UKDATA  5146
        SSTABW  3651            UNFUNC  ØØ6Ø
        SSTAER  4ØØØ            WAETYP  5151
        SSTAEZ  3437            WAITI   ØØ4Ø
        SSTAFW  36ØØ            WAITIN  2Ø4Ø
        SSTAN1  3254            WCLOC   ØØ27
        SSTAN2  3277            WDATTY  ØØ5Ø
        SSTAN3  3322            WRDIR   5157
        SSTAN4  34ØØ            WRRDND  5161
```

```
ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME:  23 SECONDS

3K CORE USED
```