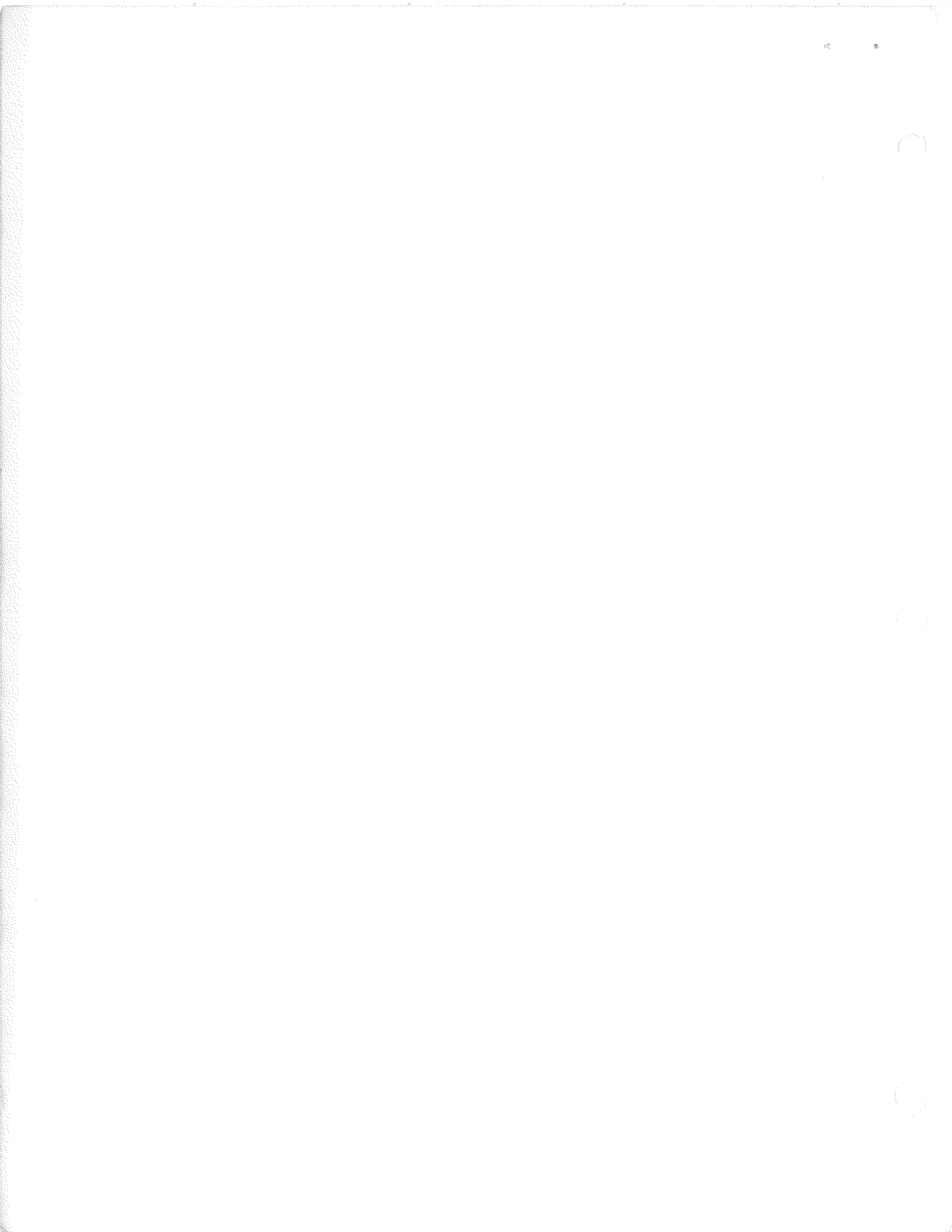


IDENTIFICATION

Product Code: MAINDEC-9A-D2CD-D  
Product Name: PDP-9 High Speed Reader Test  
Date Created: August 13, 1968  
Maintainer: Diagnostic Group  
Author: J. W. Richardson



1. ABSTRACT

The PDP-9 High Speed Reader Diagnostic tests and verifies the operational status of the reader by performing tests on the associated control logic and also testing the reader mechanics. The program is divided into two parts. Part 1 is a test tape generator which will punch the test tapes used for Part 2, if needed. Part 2 is divided into five sections. The first section is a series of tests of the reader's IOT instructions. Section 2 tests the motor delay timing and the response of the control logic with no tape in the reader. Section 3 tests the reader's ability to read data from tape correctly, using all of the control IOT's. Section 4 is a variable reader speed test, in which the operator varies the readers speed with the AC switches. Section 5 reads the tape with random block lengths and stall between frames.

2. REQUIREMENTS

Equipment

A standard PDP-9

Storage

The program occupies memory locations 000000 to 3362.

Programs

None are required. A fan-fold tape containing the necessary test patterns is provided.

3. LOADING PROCEDURE

The binary tape supplied is punched in the HRI mode and is loaded into the lower 4K of core memory.

a. Set the ADDRESS switches to 00000.

b. Press I/O RESET, and then READ-IN

At the completion of loading, the PC should equal 3340 and the MB should equal 740040.

4. STARTING PROCEDURE

4.1 Control Switch Settings

ADDRESS switches set to 000000.

## 4.2 Starting Addresses

Test Tape Generator	-	100
Section One	-	200
Section Two	-	1300
Section Three	-	2100
Section Four	-	2400
Section Five	-	2500

## 4.3 Restarting Addresses

Restarting addresses for individual tests may be found in the tables appearing after the error tables listed under section 6.1, Error Halts and Description.

Restarting addresses for the test sections are given in section 4.2.

## 4.4 Program Action

Upon completion of loading, the program immediately determines whether the PDP-9 being used is equipped with the MP09 Memory Parity option.

This is accomplished by attempting to force a parity error with IOT 702704 (FWP), and then issuing an SPE (skip on parity error, 702701). If no skip occurs, the program assumes that the PDP-9 being used is not equipped with the Memory Parity option. If a skip does occur, the program assumes the Memory Parity option is present, and adjusts the value of the constants used in timing loops to compensate for the 1.2  $\mu$ s memory cycle time.

## 5. OPERATING PROCEDURE

### 5.1 Part 1 - Test Tape Generator

Set the ADDRESS switches to 100.

Set the ACS to indicate the pattern to be punched.

ACS 0 up = Punch alternate frames of 1s and 0s.

ACS 1 up = Punch binary count.

ACS 2 up = Punch the character specified in ACS 10 through 17.

Press I/O RESET, and then START.

The pattern specified will be punched until PROGRAM STOP is pressed.

If a closed loop is desired, the pattern must be continued at the splice.

## 5.2 Part 2 - Operating Procedure

5.2.1 Section 1 - Tests 1 through 7 - The fan-fold test tape supplied contains the necessary test patterns for all sections of Part 2. The pattern used for Section 1 is an all 1s pattern. This pattern is duplicated three times on the tape even though only one portion is used for Section 1. Blank tape separates each duplicated pattern. One pass of Section 1 requires approximately 1 ft of test tape.

Any errors encountered during Section 1 will cause a program halt. The nature of the error is determined by the address of the halt. The program will not execute the next test until the error is corrected. The halts are tagged, and may be identified from the table of error halts appearing at the end of this document.

- a. Place the test tape in the reader with the punched pattern over the reader's photo cells.
- b. Set the ADDRESS switches to 200, and all ACS down.
- c. Press I/O RESET, and then START.

The program will respond with a carriage return and line feed on the KSR 33 teleprinter, and then begin Section 1.

d. Assuming no error halts, the program will halt after completing one pass of Section 1 with  $C(PC) = 1166$ .

- e. Press CONTINUE.

Section 1 tested the control logic using an RSA IOT during the first pass. The second pass tests the control logic using an RSB IOT.

- f. Assuming no errors during Pass 2 of Section 1, the program will halt with  $C(PC) = 1171$ . Test Section 2 is performed next.

### 5.2.2 Section 2 - Test 9 and 10 -

- a. Place a test tape in the reader. Any test tape may be used, as no data checks are made.
- b. Set the ADDRESS switches to 1300.
- c. Press I/O RESET, and then START.

Assuming no error halts, the program will perform test 9, and halt with  $C(CP) = 1501$ .

Test 10 is now executed.

- d. Remove the test tape from the reader.
- e. Set the ADDRESS switches to 1501.
- f. Press I/O RESET, and then START.

Assuming no error halts, the program will halt with  $C(PC) = 1523$ .

- g. Place the test tape in the reader.
- h. Press and release the TAPE FEED button.

- i. Press CONTINUE.

Assuming no error halts, the program will halt with  $C(PC) = 1530$ .

Section 3 is performed next.

5.2.3 Type-out of Reader Speeds - This routine will print (in decimal) the acceleration time, or the characters per second read by the reader. Once started, the routine will run until stopped by the operator.

Instructions:

- a. Place any tape loop in the reader.
- b. To read characters per second place ACS6 up. To read acceleration time in milliseconds, place ACS7 up.
- c. Place all other ACS down.
- d. Set the ADDRESS switches to 1600.
- e. Press I/O RESET, and then START.

When obtaining characters per second, the program will count characters received from the reader for 8 seconds, and then halt the reader to print computed speed. The procedure is repeated after printing is completed.

When obtaining the acceleration time in ms, the program will read the test tape for 8 seconds, and halt the reader to print the acceleration time. The very first computed time printed is computed as the tape is in motion. Consequently, this time will be somewhat less than the second time, and all following. All times after the first are computed from when the tape is at a dead halt, to the time the reader flag is set.

Sections 3, 4, and 5, to be executed next, all use a fan-fold test tape with a binary count pattern. When placing the test tape in the reader, place the punched pattern over the reader's photo cells. This is necessary to enable the program to synchronize properly. When starting any of the three test sections the program will read the test tape until it finds one frame of all 0s. The program then enters the test sequence.

If an all 0s character cannot be found, the message CANNOT SYNC is printed, followed by a halt with  $C(PC) = 2017$  (tagged PRHLT4). Press CONTINUE to try again. Inability to sync may be a result of the lack of an all 0s character when a specific character tape is being read, or possibly the reader buffer will not clear.

5.2.4 Section 3 - Basic Data Checks - This section requires a fan-folded test tape, or a loop with the pattern continued at the splice, with a punched binary count pattern. The user may also use a specific character or a tape with alternate frames of 1s and 0s.

- a. Place the test tape in the reader with the punched pattern over the reader's photo cells.
- b. Set the ADDRESS switches to 2100.
- c. Set the ACS to:
  - (1) ACS 9 up for an alternate 1s and 0s tape
  - (2) ACS 10 up for a binary count tape
  - (3) ACS 11 up for a specific character

(See Section 8.2.2.2 under Applications)

- d. Press I/O RESET, and then START.

The data check test is divided into four parts. A test is first made using RSA and RRB, followed by RSA and RCF. Selecting the reader in binary mode is then done by using RSB and RRB, followed by RSB and RCF. The four parts are designated as A, B, C, and D respectively.

Assuming no errors, the program will halt with the PC = 2243. If Section 3 proves error-free go on to section 5.2.5.

- c. Error Identification

If an error occurs a printout takes place giving in order, the subtest, what the data being read was expected to be, and the data read from the reader buffer.

The printout will appear as:

A	GOOD	XXX	BAD	XXX
B	GOOD	XXX	BAD	XXX
C	GOOD	XXXXXX	BAD	XXXXXX
D	GOOD	XXXXXX	BAD	XXXXXX

5.2.5 Section 4 - Variable Reader Speed Test - This test section requires a fan-fold test tape, or a loop with the pattern continued at the splice, with a punched binary count pattern. The reader is selected using the RSA IOT only.

AC switches 2 through 17 control the speed of the reader; the slowest reader speed is obtained with all ACS up, and normal speed with all ACS down. ACS 0 and 1 are used for error halt and scope mode, and have no effect on the reading speed.

- a. Place the test tape in the reader with the punched pattern over the reader's photo cells.
- b. Set the ADDRESS switches to 2400.
- c. ACS 2 through 17 may be set now, or after starting.
- d. Press I/O RESET, and then START.

If no errors are indicated, to on to e.

e. Error Identification

If an error occurs, a printout will give in order, what the data read was expected to be, and the data read from the reader buffer. The printout will appear as:

GOOD    XXX    BAD    XXX

ACS 0 will provide a halt after error print-put when in the up position. The halt will occur with the PC = 2435. Pressing CONTINUE will cause the next frame in sequence to be read.

5.2.6 Section 5 - Random Read and Stall - Section 5 requires a fan-fold test tape with a punched binary count pattern. This tape gives the most stringent test. A tape with a specific character punched or one with alternate frames of all 1s and all 0s may be used.

The Random Read and Stall routine reads a random number of frames with a fixed stall time between each frame. After reading the random number of frames the routine reads a random number of frames at full speed. The routine reads a maximum of 15 frames with a stall between each frame, and a maximum of 256 frames at full speed.

5.2.6.1 ACS Functions for Section 5 -

<u>ACS</u>	<u>Function</u>
0	Stop after error print-out (1) Don't stop (0)
1	'Scope mode (1). Ignore errors.
9	Read tape of alternate frames of all 1s and all 0s (1).
10	Read Binary Count Tape (1).
11	Read a tape of all the same character (1).

a. Place the test tape in the reader with the punched pattern over the reader's photo cells. Set the ADDRESS switches to 2500.

b. Set ACS 9, 10, or 11 to indicate the punched pattern being used. If a specific character is to be read manually deposit the character into location 3154 (tagged STOR2A).

c. Press I/O RESET, and then START.

The test will run until stopped by the operator.

d. Error Identification

A printout occurs for each detected error. The format is as shown below.

GOOD    XXX    BAD    XXX

The type of error which will occur most frequently with Section 5 will be when the test tape gets out of sync with the program. The bad data will be  $\pm 1$  count or more of the good data.

After each printout the program continues on in sequence.



5.2.7 Subroutine Abstracts - When the program is first started at location 200, tests 1 through 7 are performed on the reader using RSA. Pressing CONTINUE after the halt at location 1166, or restarting the program from location 1172, will cause the program to perform tests 2 through 7 on the reader using RSB.

a. Test 1 - Illegal Instruction

An illegal instruction of 700110 is executed. If an RRB or RCF instruction is executed, the contents of the AC will be changed and an error halt occurs with  $C(PC) = 216$ . No tape movement should be observed during this test.

b. Test 2 - Test for Reader Flag Cleared

An RSF IOT is executed. If the program was started properly by pressing I/O RESET and then START, the flag should be cleared at this point. An error halt with  $C(PC) = 225$  occurs if the flag is set. If this occurs, it may be the result of I/O power clear not clearing the flag, or the result of tape movement during test 1. Place ACS1 up, and press CONTINUE to enter 'scope mode.

c. Test 3 - Set the Reader Flag and Test for Illegal RSF

Either an RSA or RSB IOT is used to select the reader. The program then stalls for 70 ms, after which an illegal conditional skip is attempted using 700110. If the skip occurs, an error halt occurs with  $C(PC) = 330$ . If no skip occurs, the reader flag is next tested. An RSF IOT is executed, and if no skip occurs, an error halt with  $C(PC) = 324$ , or 325 depending in which mode the reader was selected. Placing ACS1 up and pressing CONTINUE after any error halt, will please the program in 'scope mode.

d. Test 4 - Clear the Reader Flag with RRB and RCF

The reader flag is first set with an RSA or RSB IOT and then immediately cleared by executing an RRB. If the test is successful, the flag is again set and then cleared by executing an RCF IOT. If RRB does not clear the flag, an error halt occurs with  $C(PC) = 423$  (RSA), or 424 (RSB). If RCF does not clear the flag, a halt occurs with  $C(PC) = 430$  (RSA), or 431 (RSB). Place ACS1 up, and press CONTINUE to enter 'scope mode.

e. Test 5 - Clear the Reader Flag with RSA or RSB

The reader flag is first set using either the RSA or RSB IOT. The reader is again selected and the flag tested for being cleared using the IOT RSF. The flag should be cleared immediately after an RSA or RSB IOT. If not, an error halt occurs with  $C(PC) = 515$  (RSA), or 516 (RSB). Place ACS1 up, and press CONTINUE to enter 'scope mode.

f. Test 6 - Read Buffer Clear Check

The reader is selected with either an RSA or RSB IOT, and the buffer is then immediately read using an RRB or RCF IOT. The data in the AC should always equal zero and anything other than zero will cause an error halt at one of eight locations with  $C(AC) = \text{data read from the buffer}$ . Enter 'scope mode after an error halt by placing ACS1 up and pressing CONTINUE.

g. Test 7 - Interrupt Test

An I/O Power Clear (CAF) is first executed, followed by a 210 ms stall. No interrupt should occur at this point. If an interrupt occurs, the I/O status word is tested to determine the device which caused the interrupt. If the reader caused the interrupt, an error halt occurs with C(PC) = 1136. A spurious interrupt will cause a halt with C(PC) = 1140. The AC will contain the I/O status word at each halt.

If the above test is successful, an attempted program interrupt using either the RSA or RSB IOT is then performed. The reader is selected, and a stall of 70 ms is done, waiting for a program interrupt. If no interrupt occurs, a halt with C(PC) = 1125 (RSA), or 1126 (RSB) occurs. Place ACS1 up and press CONTINUE to enter 'scope mode.

If both tests are successful, the program will halt with C(PC) = 1166 if the RSA IOT was being used. In this case, press CONTINUE to reexecute tests 2 through 7 using the RSB IOT.

If all tests are successful using RSB, a halt occurs with C(PC) = 1171.

h. Section 2 - Tests 9 and 10

Test 9 tests the 45 ms motor delay of the reader logic by first getting the reader up to speed, delaying for 2 ms, and then selecting the reader with an RSA IOT. The reader will not be selected again, and a test is made for the reader flag being set within a certain period of time. An error halt occurs if the flag is set sooner than 35 ms, or later than 80 ms.

Test 10 tests the response of the reader logic under no tape conditions. The test tape is first removed from the reader, and the test is started from location 1501. A test is first made to determine whether the no tape indicator has been set by the absence of tape in the reader. If true, the reader flag is then tested to make sure it has been set as a result of the no tape flag. If both tests are successful, the program halts at location 1523, at which point the tape is replaced in the reader. The TAPE FEED button is then pressed and released. Pressing CONTINUE will cause the program to check for the no tape indicator being reset by TAPE FEED. If all three of the above tests are successful a halt occurs at location 1530.

If any test is unsuccessful, an error halt will occur at a location unique to the test being performed.

The timing loops used in test 9 are adjusted by the program, immediately after loading, according to whether 1.0 or 1.2  $\mu$ s memory cycle time is being used. The accuracy of these loops is dependent on the accuracy of the clock card being used.

## 6. ERRORS

### 6.1 Error Halts and Description

Error halts and descriptions are given in the tables below for test sections 1 and 2.

'Scope mode may be entered for any single test by placing ACSI up and pressing CONTINUE after the error halt. 'Scope mode may also be entered by restarting the desired test. Restarting addresses are given in the tables immediately following each error halt table.

Table 1  
Table of Error Halts for Section 1

C(PC)	TAG	Test Number	Identification	Suggested Module	Module Location
216	E01	1	700110 changed contents of the AC.	1. S202 2. S603	E13 D10
225	E02	2	Reader flag on illegally	1. S202 2. S202	E09 E14
324	EA03	3	Flag wasn't set using RSA		
325	EB03	3	Flag wasn't set using RSB If no tape movement:	1. S202 2. S202 3. R107	E13 E14 E06
			If tape moved:	1. S202 2. S202	E09 E11
330	E04	3	Skip occurred using 700110 after an RSA or RSB	1. R111	C04
423	EA05	4	Flag wasn't cleared using RSA and RRB	1. S202	E09
424	EB05	4	Flag wasn't cleared using RSB and RRB	2. S202	D03
430	EA06	4	Flag wasn't cleared using RSA and RCF	3. S602	C09
431	EB06	4	Flag wasn't cleared using RSB and RCF		
515	EA11	5	Flag wasn't cleared using RSA	1. S202	E09
516	EB11	5	Flag wasn't cleared using RSB	2. S603 3. R111 4. S107	D10 C08 E06
743	EB12	6	Buffer didn't clear first try using RSB and RRB		
750	EA12	6	Buffer didn't clear first try using RSA and RRB		
756	EB13	6	Buffer didn't clear first try using RSB and RCF		
763	EA13	6	Buffer didn't clear first try using RSA and RCF		
777	EB14	6	Buffer didn't clear second try using RSB and RRB		
1004	EA14	6	Buffer didn't clear second try using RSA and RRB		
1012	EB15	6	Buffer didn't clear second try using RSB and RCF		
1017	EA15	6	Buffer didn't clear second try using RSA and RCF		

Table 1 (cont)  
Table of Error Halts for Section 1

The AC equals the data read from the buffer after each of the above halts.  
The reader buffer modules and locations are listed in order corresponding with ACS 10-17.

<u>Buffer Bit</u>	<u>Module</u>	<u>Location</u>
RB00	S202	D03
RB01, 02, 03	S203	D04
RB04, 05, 06	S203	D05
RB07, 08, 09	S203	D06
RB10, 11	S205	D07
RB12, 13, 14	S203	D08
RB15, 16, 17	S203	D09

C(PC)	TAG	Test Number	Identification	Suggested Module	Module Location
1125	EA16	7	No interrupt occurred using RSA - waited 70 ms	1. R111 2. S202	E15 E08
1126	EB16	7	No interrupt occurred using RSB - waited 70 ms		
1136	E16B	7	Reader caused interrupt when not selected		
1140	E16C	7	Spurious interrupt		
1152	E16D	7	Interrupt not from reader AC = I/O status word.		
1166	PRHLT1	7	End of first pass of Section 1. Press CONTINUE to test RSB using Section 1.		
1171	PRHLT2	7	End of tests 2-7. Set the ADDRESS switches to 1200, and press I/O RESET, and then START to begin Section 2.		

Table 2  
Table of Restarting Addresses to Initiate 'Scope Mode

'Scope mode should normally be initiated by placing ACS1 up, and pressing CONTINUE after an error halt. In the event that 'scope mode must be entered by restarting any one test, the starting addresses for tests 1 through 7 are listed in the table below. Tests 3 through 7 use the IOT instructions RSA, RSB, RRB, and RCF, and the starting address for any one test will vary according to which IOT is to be tested. Place ACS1 up before restarting.

Test Number	'Scope IOT	Operator Action	Restart at Address
1	Illegal IOT	Press I/O RESET, and then START.	200
2	RSF	Press I/O RESET, and then START.	221

Table 2 (cont)  
Table of Restarting Addresses to Initiate 'Scope Mode

Test Number	'Scope IOT	Operator Action	Restart at Address
3	RSA	Deposit 700104 into location 302.	300
	RSB	Deposit 700144 into location 302.	300
4	RSA and RRB RSA and RCF	Deposit 700104 into location 302.	400
		Deposit 700104 into location 302, and 700102 into location 406.	402
	RSB and RRB RSB and RCF	Deposit 700144 into location 302.	400
		Deposit 700144 into location 302, and 700102 into location 406.	402
5	RSA	Deposit 700104 into location 302.	500
	RSB	Deposit 700144 into location 302.	500
6	RSA and RRB RSA and RCF	Deposit 700104 into location 302.	700
		Deposit 700104 into location 302, and 700102 into location 705.	703
	RSB and RRB RSB and RCF	Deposit 700144 into location 302.	700
		Deposit 700144 into location 302, and 700102 into 705.	703
7		Deposit 700104 or 700144 into location 302. To test illegal interrupt; SA =	1100
7		To test no interrupt, deposit 700104 or 700144 into location 302. SA =	1112

Table 3  
Section 2 Program Halts

C(PC)	TAG	Test Number	Identification	Suggested Module	
				Module	Location
1332	ELES19	9	Reader motor delay is less than 35 ms. Adjust	R302	EO5
1343	EMOR19	9	Reader motor delay is greater than 80 ms. Adjust.	R302	EO5
1512	EA20	10	NO TAPE flag not set.	1. S202 2. R111 3. S107	EO9 CO8 EO6
1521	EA20B	10	NO TAPE did not set reader flag	1. S603 2. S202	EO8 EO9
1523	PRHLT3	10	Replace tape in reader, press and release TAPE FEED. Press CONTINUE		

Table 3 (cont)  
Section 2 Program Halts

C(PC)	TAG	Test Number	Identification	Suggested Module Module Location
1530	PJLT3A	10	End of NO TAPE test	
1531	EA20C	10	TAPE FEED did not reset NO TAPE flag	1. Switch wiring 2. R111 CO8 3. S202 EO9

Table 4  
Restarting Address for Tests 8, 9, and 10

Test Number	Scope IOT	Operator Action	Restart at Address
9	RSA	Press I/O RESET, and then START	1300
10	RSA	Press I/O RESET, and then START	1501

7. RESTRICTIONS

If the PDP-9 being used has any I/O devices other than Teletype, high speed reader and paper tape punch, the operator must insure that these devices are off and will not cause a spurious interrupt.

8. MISCELLANEOUS

8.1 Execution Time

When looping on tests 2-7 the loop time is approximately 4 seconds.

The Basic Data Check test, Section 3, will tape approximately 4 seconds.

Section 4 and 5 will run until stopped by the operator.

8.2 Applications

8.2.1 Loop on Test 2-7 of Section 1 - A loop on tests 2-7 may be performed using either the RSA or RSB or IOTs. If a test tape loop is to be used make sure the pattern is continued at the splice. Test 6 of Section 1 is the only test which requires the all 1s pattern tape.

If looping on tests 2-7 using the RSB IOT, make sure channel 8 is continuously punched, and continued at the splice.

To loop on tests 2-7 using RSA, place the test tape in the reader.

- a. Set the ADDRESS switches to 217.
- b. Place ACS 4 up.
- c. Press I/O RESET, and then START.

To loop on tests 2-7 using RSB, place the test tape in the reader.

- a. Set the ADDRESS switches to 1171.
- b. Place ACS 4 up.
- c. Press I/O RESET, and then START.

## 8.2.2 Basic Data Check Applications

8.2.2.1 'Scope Mode - 'Scope mode for part A, B, C, or D of Section 3 may be entered by following the steps below.

- a. Place ACS 1 up, and press CONTINUE if a halt on error occurred, or
- b. Press PROGRAM STOP.
- c. Place ACS 1 up.
- d. Set the ADDRESS switches to:
  - (1) 2100 for part A (RSA and RRB)
  - (2) 2133 for part B (RSA and RCF)
  - (3) 2167 for part C (RSB and RRB)
  - (4) 2215 for part D (RSB and RCF)
- e. Press I/O RESET, and then START.

8.2.2.2 Read Tape - To read a tape with a specific character punched, the test tape must have channel 8 punched for at least  $64_{10}$  consecutive frames in order to perform the data check using the RSB IOT. The character must be manually deposited into two memory locations.

Instructions:

- a. Set the ADDRESS switches to 3153. This location is storage for the compare word when using the RSB IOT.
- b. Place in ACS 0 through 5 the specific character. Do the same in ACS 6 through 11, and again in ACS 12 through 17.
- c. Press DEPOSIT (up).
- d. Place all ACS down. Place the specific character in ACS 10 through 17.

- e. Press DEPOSIT NEXT. This location is storage for the compare word when using the RSA IOT.
- f. If 'scope mode is desired, do steps c, d, and e of 8.2.2.1. If not, start at location 2100.

## 9. PROGRAM DESCRIPTION

Tests 1 through 10 are provided to find catastrophic type failures. The basic functions of the reader logic are first tested, and then as many timing tests as possible are performed. If these tests run the remaining problems will be in the individual data paths.

A provision for looping on tests 2 through 7 is provided so the user may easily make marginal power supply checks on the reader control logic.

Test Section 3 is provided to insure that the reader is capable of correctly reading data from tape. All reader IOT's are used during the test.

Test Sections 4 and 5 are designed to test the reader's mechanical adjustments by varying the motor speed, and rate of reader selection. The Binary Count portion of the test tape supplied provides the most stringent test when used with test sections 3, 4, and 5. A test tape loop will not provide a satisfactory test, and should only be used when 'scope mode is entered. The alternate 1s and 0s tape and the specific character pattern should be used only for fixed block lengths and stalls so that 'scope mode is easier to observe.



MAINDEC-9A-D2CD-D

```
          .TITLE 9-HSRD
/PDP-9 HIGH SPEED READER DIAGNOSTIC - TAPE 1
/
          .ABS
/INTERRUPT ROUTINE
          .LDC 0
          0
          IORS          /INTERRUPT ON ILLEGALLY
          HLT
          XX
          XX
          XX
          XX
          XX
          0
          0
          XX
          0
          0
          0
          .EJECT
          /INDEX 11
          /INDEX 12
```

00000	
00000	000000
00001	700314
00002	740040
00003	740040
00004	740040
00005	740040
00006	740040
00007	000000
00010	740040
00011	000000
00012	000000

		/TAPE LOOP GENERATOR		
00100			.LOC 100	
00100	750004	HGN1	LAS	/TEST SWITCH REGISTER
00101	740010		RAL	/FOR TAPE PATTERN
00102	741400		SZL	
00103	600120		JMP PALT10	/PUNCH ALTERNATE 1'S AND 0'S
00104	740010		RAL	
00105	741400		SZL	
00106	600125		JMP PBNCNT	/PUNCH BINARY COUNT
00107	740010		RAL	
00110	741400		SZL	
00111	600132		JMP PSWREG	/PUNCH SPECIFIC CHARACTER
00112	600100		JMP BGN1	
		/		
		/		
		/TAPE PUNCH ROUTINE		
		/		
00113	000000	PNCHA	0	
00114	700204		PSA	
00115	700201		PSF	
00116	600115		JMP .-1	
00117	620113		JMP* PNCHA	
		/		
		/		
		/ALTERNATE ONES AND ZEROS		
		/		
00120	750001	PALT10	CLC	
00121	100113		JMS PNCHA	
00122	750000		CLA	
00123	100113		JMS PNCHA	
00124	600120		JMP PALT10	
		/		
		/		
		/BINARY COUNT		
		/		
00125	202051	PBNCNT	LAC ONE	
00126	100113		JMS PNCHA	
00127	342051		TAD ONE	
00130	100113		JMS PNCHA	
00131	600127		JMP PBNCNT+2	
			.EJECT	

		/PUNCH SPECIFIC CHARACTER	
		/	
00132	750004	PSWREG	LAS
00133	100113		JMS PNCHA
00134	600114		JMP PNCHA+1
		/	
		/HIGH SPEED PAPER TAPE READER DIAGNOSTIC	
		/	
		/PART 1. INSTRUCTION AND CONTROL TESTING	
		/	
		/	
00200			.LOC 240
		/TEST 1. ILLEGAL INSTRUCTION	
		/	
00200	102702	TST1	JMS CRLF
00201	140013		DZM 13
00202	750001		CLA!CMA
00203	700110		700110
00204	740200		SZA
00205	600214		JMP RBERR
00206	103133		JMS SCOPE /CHECK FOR SCOPE MODE
00207	600211		JMP .+2
00210	600201		JMP TST1+1
00211	440013		ISZ 13
00212	600202		JMP TST1+2
00213	600217		JMP TST2-2
00214	103133	RBERR	JMS SCOPE
00215	740040	E01	HLT
00216	600201		JMP TST1+1
		/	
		/	
		/TEST 2. TEST FOR FLAG OFF	
		/	
			LAC CKRSA
			DAC RSAB
00217	203146	TST2	RSF
00220	040302		JMP OK
00221	700101		JMS SCOPE
00222	600226		
00223	103133		
		E02	HLT
00224	740040		JMP TST2
00225	600221		JMS SCOPE
00226	103133	OK	JMP TST3
00227	600300		JMP TST2
00230	600221		.EJECT

/NO IOT BITS. INSTRUCTION  
/BIT 14 SHOULD CLEAR AC

/ERROR, INFORMATION DELIVERED  
/ILLEGALLY

/FLAG SHHULD BE OFF  
/SUCCESSFUL TEST  
/CHECK FOR SCOPE MODE  
/FAILURE PATH  
/FLAG IS ON ILLEGALLY

/CHECK FOR SCOPE MODE  
/SUCCESS PATH

00300

.LOC 300

/  
 /TEST 3. ILLEGAL RSF TEST AND  
 /SET FLAG WITH RSA AND RSB  
 /SKIP ON RSE  
 /

00300 777763  
 00301 040013

TST3 LAR -10  
 DAC 13  
 /

00302 000000  
 00303 103120  
 00304 700110  
 00305 741000  
 00306 600326  
 00307 700101  
 00310 600316  
 00311 440013  
 00312 600302  
 00313 103133  
 00314 600400  
 00315 600302  
 00316 103133  
 00317 741000  
 00320 600302  
 00321 200302  
 00322 543146  
 00323 740040  
 00324 740040  
 00325 600300  
 00326 103133  
 00327 740040  
 00330 600302

RSAB 0  
 JMS STAL70  
 700110  
 SKP  
 JMP SKPERR  
 RSF  
 JMP ER3  
 ISZ 13  
 JMP RSAB  
 JMS SCOPE  
 JMP TST4  
 JMP TST3+2  
 ER3 JMS SCOPE  
 SKP  
 JMP TST3+2  
 LAC RSAB  
 SAG CKRSA  
 FA03 HLT  
 EB03 HLT  
 JMP TST3  
 SKPERR JMS SCOPE  
 E04 HLT  
 JMP RSAB  
 .EJECT

/FLAG SHOULD BE SET

/SUCCESS PATH

/ERROR PATH

/FLAG NOT SETTING AFTER RSA

/FLAG NOT SETTING AFTER RSB

/ILLEGAL RSA OR RSB

```

/TEST 4. RESET FLAG WITH RRB AND RCF
      .LOC 4:0
/
00400
00400 203151
00401 040406
00402 400302
00403 700101
00404 600403
00405 750000
00406 000000
00407 043152
00410 700101
00411 600432
00412 103133
00413 741000
00414 600402
00415 203160
00416 740200
00417 600425
00420 200302
00421 543146
00422 740040
00423 740040
00424 600402
00425 200302
00426 543146
00427 740040
00430 740040
00431 600402
00432 103133
00433 741000
00434 600402
00435 203160
00436 740200
00437 600500
00440 443160
00441 203150
00442 600401

TST4  LAC CKRRB
      DAC ,+5
      XCT RSAB
      RSF
      JMP , -1
      CLA
      H
      DAC STOR1
      RSF
      JMP OK4
      JMS SCOPE
      SKP
      JMP TST4+2
      LAC FLAG
      SZA
      JMP ,+6
      LAC RSAB
      SAD CKRSA
EA05  HLT
EB05  HLT
      JMP TST4+2
      LAC RSAB
      SAD CKRSA
EA06  HLT
EB06  HLT
      JMP TST4+2
      JMS SCOPE
      SKP
      JMP TST4+2
      LAC FLAG
      SZA
      JMP TST5
      ISZ FLAG
      LAC CKRCF
      JMP TST4+1
      .EJECT

/RRB OR RCF
/CHECK RESET OF FLAG
/ERROR PATH. FLAG STILL ON
/CHECK FOR RRB OR RCF
/RCF
/CHECK FOR RSA OR RSB
/ERROR. FLAG STILL SET
/AFTER RRB WITH RSA
/FLAG STILL SET AFTER
/RRB WITH RSB
/ERROR. FLAG STILL SET
/AFTER RCF WITH RSA
/FLAG STILL SET AFTER
/RCF WITH RSB
/SUCCESS PATH
/CHECK FOR RRB OR RCF
/SET FLAG

```

```

/TEST 5.  RESET FLAG WITH RSA OR RSB
/
.LOC 5'0
/
00500
00500 143160
00501 400302
00502 700101
00503 600502
00504 400302
00505 700101
00506 600517
00507 103133
00510 741000
00511 600500
00512 200302
00513 543146
00514 740040
00515 740040
00516 600500
00517 103133
00520 741000
00521 600501
00522 700101
00523 600522
00524 600700

TST5  RZM FLAG
      XCT RSAB /RESET FLAG
      RZF
      JMP .-1
      XCT RSAB /RESET FLAG
      RZF
      JMP OK5A /ERROR. FLAG STILL ON
      JMS SCOPE
      SKP
      JMP TST5
      LAC RSAB
      SAD CKRSA
EA11  HLT /DID NOT CLEAR WITH RSA
EB11  HLT /DID NOT CLEAR WITH RSH
      JMP TST5
      JMS SCOPE
      SKP
      JMP TST5+1
      RZF /WAIT FOR FLAG
      JMP .-1
      JMP TST6
      .EJECT

```

```

00700
00700 143160
00701 203151
00702 040705
00703 750000
00704 400300
00705 000000
00706 043152
00707 740200
00710 600730
00711 400705
00712 043152
00713 740200
00714 600764
00715 103133
00716 741000
00717 601020
00720 203160
00721 740200
00722 600726
00723 443160
00724 203150
00725 600700
00726 143160
00727 601100
00730 103133
00731 741000
00732 601020
00733 203160
00734 740200
00735 600751
00736 200300
00737 543146
00740 600746
00741 203152
00742 740040

00743 103133
00744 600700
00745 601020
00746 203152
00747 740040

00750 600743

/TEST 6. READ BUFFER RESET CHECK
.LOC /W
/
TST6 D&M FLAG
LAC CKRRB
DAC ,+4
CLA
XCT RSAB
R
DAC STOR1
SZA /DATA SHOULD = 0
JMP HLT6
XCT , -4 /READ AGAIN
DAC STOR1
SZA
JMP HLT61
JMS SCOPE /SUCCESS PATH
SKP
JMP STILL
LAC FLAG /CHECK FOR RCF OR RRB
SZA
JMP ,+4
ISZ FLAG
LAC CKRCF
JMP TST6+2
D&M FLAG
JMP TST7 /ONLY EXIT
JMS SCOPE
SKP
JMP STILL
LAC FLAG
SZA
JMP ERRCF
LAC RSAB
SAD CKRSA
JMP ,+6
LAC STOR1
HLT /BAD DATA
/ERROR ON 1ST CLEAR
/USING RSB AND RRB

EB12
JMS SCOPE
JMP TST6
JMP STILL
LAC STOR1
HLT /BAD DATA
/ERROR ON 1ST CLEAR
/USING RSA AND RRB

EA12
HLT
JMP , -5
.EJECT

```

00751	200302	ERRCF	LAC RSAB	
00752	543146		SAD CKRSA	
00753	600761		JMP ,+4	
00754	203152		LAC STOR1	
00755	740040	EB13	HLT	/ERROR ON 1ST CLEAR /USING RSB AND RCF
00756	103133		JMS SCOPE	
00757	600700		JMP TST6	
00760	601020		JMP STILL	
00761	203152		LAC STOR1	
00762	740040	EA13	HLT	/ERROR ON 1ST CLEAR /USING RSA AND RCF
00763	600756		JMP ,+5	
00764	103133	HLT61	JMS SCOPE	
00765	741000		SKP	
00766	601020		JMP STILL	
00767	203160		LAC FLAG	
00770	740200		SZA	
00771	601005		JMP ERRCF2	
00772	200302		LAC RSAB	
00773	543146		SAD CKRSA	
00774	601002		JMP ,+6	
00775	203152		LAC STOR1	
00776	740040	EB14	HLT	/ERROR ON 2ND CLEAR /USING RSB AND RRB
00777	103133		JMS SCOPE	
01000	600700		JMP TST6	
01001	601020		JMP STILL	
01002	203152		LAC STOR1	
01003	740040	EA14	HLT	/ERROR ON 2ND CLEAR /USING RSA AND RRB
01004	600777		JMP ,+5	
01005	200302	ERRCF2	LAC RSAB	
01006	543146		SAD CKRSA	
01007	601015		JMP ,+6	
01010	203152		LAC STOR1	
01011	740040	EB15	HLT	/ERROR ON 2ND CLEAR /USING RSB AND RCF
01012	103133		JMS SCOPE	
01013	600700		JMP TST6	
01014	601020		JMP STILL	
01015	203152		LAC STOR1	
01016	740040	EA15	HLT	/ERROR ON 2ND CLEAR /USING RSA AND RCF
01017	601012		JMP ,+5	
01020	103120	STLL	JMS STAL70	/70MS DELAY
01021	600703		JMP TST6+3	
			.EJECT	



```

01100
01100 203214
01101 040001
01102 703302
01103 700042
01104 103120
01105 103120
01106 103120
01107 103133
01110 741000
01111 601100
01112 203216
01113 040001
01114 700042
01115 400302
01116 103120
01117 103133
01120 741000
01121 601112
01122 203146
01123 540302
01124 740040
01125 740040
01126 601112

/TFST 7. INTERRUPT TEST
/
/ .LOC 1100
/
TST7 LAC JMP5
DAC 1
CAF
ION
JMS STAL70 /WAIT 210 MS FOR ILLEGAL INT
JMS STAL70
JMS STAL70
JMS SCOPE /OK, CHECK FOR SCOPE MODE
SKP /SCOPE
JMP TST7
TSRINT LAC JMP6
DAC 1
ION
XCT RSAB
JMS STAL70 /WAIT 70 MS FOR INT
JMS SCOPE /ERROR, NO INT
SKP /SCOPE
JMP TSRINT
LAC CKRSA
SAD RSAB
EA16 HLT /NO INT USING RSA
EB16 HLT /NO INT USING RSA
JMP TSRINT
.EJECT

```

		/INTERRUPT SERVICE ROUTINE	
01127	103133	ILINT	JMS SCOPE
01130	741000		SKP
01131	601100		JMP TST7
01132	700314		IURS
01133	503341		AND (2'0000)
01134	740200		SZA
01135	740040	F160	HLT
01136	700314		IURS
01137	740040	E160	HLT
01140	601100		JMP TST7
01141	103133	TSRFLG	JMS SCOPE
01142	741000		SKP
01143	601112		JMP TSRINT
01144	700314		IURS
01145	503342		AND (177777)
01146	741200		SNA
01147	601153		JMP OK7
01150	700314		IURS
01151	740040	F160	HLT
01152	601112		JMP TSRINT
01153	201150	OK7	LAC F160-1
01154	040001		DAC 1
01155	700002		IUF
01156	750004		LAS
01157	503343		AND (020000)
01160	740200		SZA
01161	601173		JMP RSRLP+2
01162	203147		LAC CKRSB
01163	540302		SAD RSAB
01164	601170		JMP .+4
01165	740040	PRHLT1	HLT
01166	703302		CAF
01167	600220		JMP TST2-1
01170	740040	PRHLT2	HLT
		RSRLP	LAC CKRSB
01171	203147		DAC RSAB
01172	040302		CAF
01173	703302		JMP TST2
01174	600221		.EJECT
			/CHECK FOR SCOPE MODE
			/SCOPE
			/READ I/O STATUS
			/SEE IF READER FLAG SET
			/HEADER FLAG SET
			/SPURIOUS INT. AC=I/O STATUS
			/RETURN FROM INT
			/SCOPE
			/I/O STATUS
			/MAKE SURE READER CAUSED INT.
			/SUCCESS PATH
			/SPURIOUS INT. AC=I/O STATUS
			/CHECK FOR LOOP ON TEST 2-7
			/LOOP
			/PRESS CONTINUE FOR RSR IOT TEST
			/SET ADDRESS SWS TO 13 W
			/FOR NEXT TEST
			/LOOP ON 2-7 WITH RSR

```

01300
01300 203164
01301 043161
01302 700104
01303 700101
01304 601303
01305 764353
01306 043163
01307 203166
01310 043162
01311 443161
01312 601302
01313 203165
01314 043161
01315 443161
01316 601315
01317 700104
01320 700101
01321 601333
01322 203162
01323 741100
01324 601330
01325 103133
01326 601500
01327 601300
01330 103133
01331 740040
01332 601300
01333 443163
01334 741000
01335 601341
01336 443162
01337 601320
01340 601320
01341 103133
01342 740040
01343 601300

/TEST 9. TIMING CHECK
.LOC 1400
/
PC01 LAC CO11
DAC WORK
RSA
RSF
JMP .-1
LAW 4353
DAC WORK2
LAC CON5
DAC WORK1
ISZ WORK
JMP PC01+2
LAC CON3
DAC WORK
ISZ WORK
JMP .-1
RSA
RSF
RETURN JMP D60MS
LAC WORK1
SPA
JMP ERPC0
JMS SCOPE
JMP NOTAPE
JMP PC01
JMS SCOPE
ELFS19 HLT
JMP PC01
D60MS ISZ WORK2
SKP
JMP ERPC01
ISZ WORK1
JMP RETURN
JMP RETURN
ERPC01 JMS SCOPE
EMOR19 HLT
JMP PC01
.EJECT

/WAIT 2 MS BEFORE SELECTING
/AGAIN
/START THE DELAY

/SUCCESS PATH
/SKIP TO NEXT
/SCOPE MODE LOOP
/ERROR DELAY < 35 MS
/

/ERROR. DELAY > 65 MS
/

```

```

/TFST 10. NO TAPE TEST
                                .LPC 1000
01500
01500 740040 /NOTAPE HLT /REMOVE TAPE FROM READER
01501 700104 RSA /SELECT READER
01502 761000 LAW 1000
01503 103120 JMS STAL70
01504 700314 IORS
01505 503344 AND (1000
01506 740200 SZA /NO TAPE SHOULD BE SET
01507 601513 JMP OKFLG
01510 103133 JMS SCOPE
01511 740040 EA20 HLT /ERROR, NO TAPE NOT SET
01512 601501 JMP NOTAPE+1
01513 700314 OKFLG IORS
01514 740010 RAL
01515 741100 SPA /READER FLAG SHOULD BE SET
01516 601522 JMP ,+4
01517 103133 JMS SCOPE
01520 740040 FA20H HLT /ERROR, NO TAPE UID NOT
01521 601501 JMP NOTAPE+1 /SET READER FLAG
01522 740040 PRHLT3 HLT /PRESS TAPE FEED HERE
01523 700104 RSA
01524 103120 JMS STAL70
01525 700101 RSF /FLAG SHOULD BE SET
01526 741000 SKP
01527 740040 PHLT3A HLT /END OF NO TAPE TEST
01530 740040 EA20C HLT /ERROR, TAPE FEED DID NOT
01531 601523 JMP PRHLT3+1 /CLEAR NO TAPE FLAG
                                .EJECT

```

```

/TEST 11.
/READER SPEED CHECK
      .LOC 1500
01600
01600      760261
01601      043220
01602      143154
01603      143170
01604      203345
01605      043161
01606      777507
01607      043162
01610      700104
01611      443170
01612      601614
01613      740040
      TST11      LAM 201
      DAC INP1+1
      DEN STOR2A
      DEN COUNTA
      LAC (-12400)
      DAC WORK
      LAM -271
      DAC WORK1
RSA1      RSA
      ISZ COUNTA
      JMP TIME
E21      HLT
/
/
/8 SEC. TIME LOOP
/
TIME      ISZ WORK
      SKP
      JMP TIMEX-2
      RSF
      JMP TIME
      RRR
      JMP RSA1
      LAC (-12400)
      DAC WORK
/
TIMEX     ISZ WORK1
      JMP TIME
      JMP TYP0UT
      .EJECT
/PRINT TOTAL CHARACTERS
/SHOULD NEVER GET HERE
/CHARACTER COUNTER
/FETCH

```

01630	750004	/	LAS	
01631	503346	TYP00T	AND (4'00	
01632	741200		SNA	/PRINT READING SPEED?
01633	601717		JMP FLTST	/NO
01634	203170		LAC COUNTA	
01635	742020		RTR; RAR	
01636	740020			
01637	503347		AND (777	
01640	043170		DAC COUNTA	
01641	141706	NXTPWR	DEM PCW	
01642	441707		ISZ TABLE	
01643	441713		ISZ PWRTEN	
01644	203170		LAC COUNTA	
01645	041705		DAC COUNTB	
01646	744000	SUBAGN	CLL	
01647	361713		TAD* PWRTEN	
01650	740400		SNL	
01651	601655		JMP DONCON	
01652	041705		DAC COUNTB	
01653	441706		ISZ PCW	
01654	601646		JMP SUBAGN	
01655	201706	DONCON	LAC PCW	
01656	342666		TAD N260	
01657	061707		DAC* TABLE	
01660	201705		LAC COUNTB	
01661	043170		DAC COUNTA	
01662	221713		LAC* PWRTEN	
01663	541715		SAD PWRTEN+2	
01664	741000		SKP	
01665	601641		JMP NXTPWR	
01666	201705		LAC COUNTB	
01667	342666		TAD N260	
01670	043301		DAC INF5+3	
01671	201711		LAC TABLE+2	
01672	043300		DAC INF5+2	
01673	201710		LAC TABLE+1	
01674	043277		DAC INF5+1	
01675	203213		LAC PRINT5	
01676	040011		DAC 11	
01677	102713		JMS MSG1	
01700	201716		LAC PWRTEN+3	
01701	041713		DAC PWRTEN	
01702	201712		LAC TABLE+3	
01703	041707		DAC TABLE	
01704	601600		JMP TST11	
			.EJECT	

01705	000000	COUNTB	0	
01706	000000	PCW	0	
01707	001707	TABLE	.	
01710	000000		0	
01711	000000		0	
01712	001707		.-3	
01713	001713	PWRFN	.	
01714	777634		777634	/-100
01715	777766		777766	/-10
01716	001713		.-3	
			.EJECT	

01717 700101  
 01720 601717  
 01721 750704  
 01722 503350  
 01723 741200  
 01724 601600  
 01725 602576

FLTST RSH  
 JMP .-1  
 LAS  
 AND (2 00  
 SVA  
 JMP TST11  
 JMP DUL

/PRINT ACCEL. TIME?  
 /NO

01726 000000  
 01727 201754  
 01730 543351  
 01731 741000  
 01732 601742  
 01733 203352  
 01734 041754  
 01735 201753  
 01736 744010  
 01737 741400  
 01740 342051  
 01741 041753  
 01742 221754  
 01743 341753  
 01744 061754  
 01745 201766  
 01746 740020  
 01747 361754  
 01750 041766  
 01751 441754  
 01752 621726

/  
 /RANDOM NUMBER GENERATOR  
 GENRAN 0  
 LAC RANDEX  
 SAD (RANTBL+10  
 SKP  
 JMP RANTAD-1  
 LAC (RANTBL  
 DAC RANDEX  
 LAC RANCON  
 CLL:RAL  
 S2L  
 TAD ONE  
 DAC RANCON  
 LAC\* RANDEX  
 TAD RANCON  
 DAC\* RANDEX  
 LAC RANSAV  
 RAR  
 TAD\* RANDEX  
 DAC RANSAV  
 ISZ RANDEX  
 JMP\* GENRAN

RANTAD

01753 123456  
 01754 001765  
 01755 654321  
 01756 361416  
 01757 055363  
 01760 546060  
 01761 243035  
 01762 762572  
 01763 453237  
 01764 150214  
 01765 000000  
 01766 000000

/  
 RANCON 123456  
 RANDEX RANTBL+10  
 RANTRL 654321  
 361416  
 055363  
 546060  
 243035  
 762572  
 453237  
 150214  
 0  
 0  
 RANSAV .EJECT



```

02000          /TAPE LOOP SYNC ROUTINE
                .LOC 2000
/
02000          SYNC          P
02001          000000          LAC (-3001
02002          203353          DAC DELAY
02003          042050          RSA
02004          700104          RSF          /CHECK FOR SYNC CHAR.
02005          700101          JMP .-1
02006          602004          RRR
02007          700112          SNA
02010          602020          JMP INSYNC
02011          442050          ISZ DELAY
02012          602003          JMP SYNC+3
02013          203212          LAC PRINT3          /TIMED OUT
02014          040011          DAC 11
02015          102713          JMS MSG1
02016          740040          PRHLT4          HLT
02017          602001          INSYNC          JMP SYNC+1
02020          750004          LAS          /CHECK ACS3
02021          742010          RTL
02022          742010          RTL
02023          741400          S&L
02024          602026          JMP .+2
02025          750004          LAS
02026          503354          AND (100
02027          740200          SZA
02030          622000          JMP* SYNC          /ALL SAME CHAR
02031          750004          LAS
02032          503355          AND (400
02033          740200          SZA
02034          602042          JMP SETONS          /ALT. 1 AND 0
02035          203356          LAC (000102
02036          043153          DAC STOR2          /BINARY COUNT RSB
02037          202051          LAC ONE
02040          043154          DAC STOR2A          /ALPHA
02041          622000          JMP* SYNC
02042          750001          SETONS          CLC
02043          502052          AND TH77
02044          043154          DAC STOR2A          /FOR ALPHA
02045          777777          LAW -1
02046          043153          DAC STOR2          /FOR RSB
02047          622000          JMP* SYNC
02050          000000          DELAY          0
02051          000001          ONE          1
02052          000377          TH77          377
                /PDP-9 HIGH SPEED READER DIAGNOSTIC - TAPE 2
/
                /DATA CHECK ROUTINE FOR RSA, RSB AND RCF
                /RSA AND RRB          .LOC 2100
/
02100          PSACK          JMS SYNC
02101          102000          LAW 301
02102          760301          DAC INF1+1
02102          043220

```

02103	202244	LAC BLOCK	
02104	043155	DAC STOR3	
02105	203172	LAC PRINT1	
02106	040011	DAC 11	
02107	700104	RSA	
02110	700101	RSE	
02111	602110	JMP .-1	
02112	700112	RRR	/READ A WORD
02113	043152	DAC STOR1	
02114	543154	SAD STOR2A	/COMPARE
02115	602125	JMP OKRSA	
02116	103133	JMS SCOPE	
02117	741000	SKP	
02120	602123	JMP .+3	
02121	102736	JMS SETUP1	/ERROR
02122	102713	JMS MSG1	
02123	103141	JMS ERHLT	
02124	740040	HLT	
02125	102246	JMS CKTAPE	
02126	443155	IS7 STOR3	/CHECK FOR END OF BLOCK
02127	602105	JMP RSACK+5	
02130	103133	JMS SCOPE	/CHECK FOR SCOPE MODE
02131	602133	JMP RSARCF	
02132	602100	JMP RSACK	/SCOPE MODE
		.EJECT	

OKRSA

		/RSA AND RCF	
02133	102000	RSARCF	JMS SYNC
02134	760302		LAK 302
02135	043220		DAC INF1+1
02136	202244		LAC BLOCK
02137	043155		DAC STOR3
02140	203172		LAC PRINT1
02141	040011		DAC 11
02142	700104		RSA
02143	700101		RSF
02144	602143		JMP , -1
02145	750000		CLA
02146	700102		RCF
02147	043152		DAC STOR1
02150	543154		SAD STOR2A
02151	602161		JMP OKRCF
02152	103133		JMS SCOPE
02153	741000		SKP
02154	602157		JMP , +3
02155	102736		JMS SETUP1
02156	102713		JMS MSG1
02157	103141		JMS ERHLT
02160	740040		HLT
02161	102246	OKRCF	JMS CKTAPE
02162	443155		ISZ STOR3
02163	602140		JMP RSARCF+5
02164	103133		JMS SCOPE
02165	602167		JMP RSHCK
02166	602133		JMP RSARCF
			.EJECT

/READ CHAR,

/COMPARE

/ERROR

/CHECK FOR END OF BLOCKS

```

/RSB AND RRB
/
RSRCK   JMS SYNC
        LAW 304
        DAC INF1+1
        LAC BLOCKA
        DAC STOR3
        RSR
        RSF
        JMP .-1
        RRR
        DAC STOR1
        SAI STOR2
        JMP .+5
        JMS SCOPE
        SKP
        JMS SETUP3
        JMS CKTAPE
        ISZ STOR3
        JMP RSRCK+5
        JMS SCOPE
        JMP RSRCKF
        JMP RSRCK
/
/
/RCF AND RSB
/
RSRRCF  JMS SYNC
        LAW 304
        DAC INF1+1
        LAC BLOCKA
        DAC STOR3
        RSR
        RSF
        JMP .-1
        CLA
        RCF
        DAC STOR1
        SAI STOR2
        JMP .+5
        JMS SCOPE
        SKP
        JMS SETUP3
        JMS CKTAPE
        ISZ STOR3
        JMP RSRRCF+5
        JMS SCOPE
        .EJECT
/SELECT
/READ
/COMPARE
/CHECK FOR SCOPE MODE
/CHECK FOR SCOPE MODE

```

```

02167 102000
02170 760303
02171 043220
02172 202245
02173 043155
02174 700144
02175 700101
02176 602175
02177 700112
02200 043152
02201 543153
02202 602207
02203 103133
02204 741000
02205 741000
02206 103005
02207 102246
02210 443155
02211 602174
02212 103133
02213 602215
02214 602167

```

```

02215 102000
02216 760304
02217 043220
02220 202245
02221 043155
02222 700144
02223 700101
02224 602223
02225 750000
02226 700102
02227 043152
02230 543153
02231 602236
02232 103133
02233 741000
02234 741000
02235 103005
02236 102246
02237 443155
02240 602222
02241 103133

```

02242	740240	PRHLT5	HLT	/END OF DATA TESTS
02243	602215		JMP RS=RCE	
02244	777401	FLOCK	777401	
02245	777753	FLOCKA	777753	
		/		
		/		
02246	000000	CKTAPE	0	
02247	750004		LAS	
02250	503354		AND (1'0	
02251	740200		SZA	
02252	622246		JMP* CKTAPE	/ALL SAME CHAR
02253	750004		LAS	
02254	503355		AND (4'0	
02255	740200		SZA	
02256	602267		JMP PATNOT	/ALT. 1 AND 0
02257	203153		LAC STOR2	/BINARY COUNT
02260	343357		TAD (030303	/BINARY MODE
02261	043153		DAC STOR2	
02262	203154		LAC STOR2A	/ALPHA MODE
02263	342051		TAD ONE	
02264	502052		AND TH77	
02265	043154		DAC STOR2A	
02266	622246		JMP* CKTAPF	
02267	203154	PATNOT	LAC STOR2A	
02270	740001		CMA	
02271	502052		AND TH77	
02272	043154		DAC STOR2A	
02273	622246		JMP* CKTAPE	
			.EJECT	

```

/
/VARIABLE READER SPEED CONTROL4 ACS 2-17 SET SPEED
/
02400          .LOC 2400
02400          102000
02401          143154
02402          202051
02403          343154
02404          502052
02405          043154
02406          750004
02407          503342
02410          740001
02411          042573
02412          442573
02413          602412
02414          700104
02415          700101
02416          602415
02417          700112
02420          543154
02421          602402
02422          043152
02423          103133
02424          741000
02425          602402
02426          102736
02427          203172
02430          342051
02431          040011
02432          102713
02433          103141
02434          740040
02435          602402
/
VARSPD        JMS SYNC
              DZM STOR2A
              LAC ONE
              TAD STOR2A
              AND TH77
              DAC STOR2A
              LAS                /LOAD ACS
              AND (177777
              CMA
              DAC STLSTR
              ISZ STLSTR        /DELAY
              JMP ,=1
              RSA                /READ
              RSF
              JMP ,=1
              RRB
              SAD STOR2A        /COMPARE
              JMP VARSPD+2
              DAC STOR1
              JMS SCOPE        /CHECK FOR SCOPE MODE
              SKP
              JMP VARSPD+2
              JMS SETUP1
              LAC PRINT1
              TAD ONE
              DAC 11
              JMS MSG1
              JMS ERHLT        /CHECK FOR HALT ON ERROR
              HLT
VAREND        JMP VARSPD+2
              .EJECT

```

02500		/RANDOM READ AND STALL	
		.LGC 2500	
		/	
02500	102000	HSKP	JMS SYNC
02501	203342		LAC (177777
02502	042573		DAC STLSTR
02503	777775	SETSPD	LAC -3
02504	042575		DAC LOOPA
02505	101726		JMS GENRAN
02506	502567		AND ENGLIM
02507	740001		CMA
02510	043174		DAC CHACNT
02511	101726		JMS GENRAN
02512	503360		AND (17
02513	740001		CMA
02514	042574		DAC LOOP
02515	202573	READ1	LAC STLSTR
02516	740001		CMA
02517	043156		DAC STOR4
02520	443156		ISZ STOR4
02521	602520		JMP .-1
02522	102540		JMS READ
02523	442574		ISZ LOOP
02524	602515		JMP READ1
02525	102540		JMS READ
02526	443174		ISZ CHACNT
02527	602525		JMP .-2
02530	703302		CAF
02531	442575		ISZ LOOPA
02532	602505		JMP SETSPD+2
02533	202573		LAC STLSTR
02534	744020		RCR
02535	543361		SAD (377
02536	602501		JMP HSKP+1
02537	602502		JMP SETSPD-1
			.EJECT

	/SET MAX. STALL
	/LOOP COUNTER
	/FRAME COUNT FOR FULL SPEED
	/MAX. OF 17 FRAMES PER BLOCK
	/STALL BEFORE READ
	/GO READ AND COMPARE
	/READ ANOTHER FRAME
	/READ FULL SPEED
	/TRY POWER DOWN WITH CAF
	/CHECK LOOPED 3 TIMES
	/LOOP
	/SET MAX. STALL

```

02540      000000      /READ AND COMPARE LOOP
02541      700104      HEAD          W
02542      700101      RSA                      /READER IN ALPHA
02543      602542      RSF
02544      700112      JMP  -1
02545      043152      RRR                      /READ A CHAR.
02546      543154      DAC STOR1
02547      602562      SAA STOR2A          /COMPARE
02550      103133      JMP TAPECK
02551      741000      JMS SCOPE
02552      602562      SKP
02553      102736      JMP TAPECK          /INHIBIT PRINT
02554      203172      JMS SETUP1         /BAD
02555      342051      LAC PRINT1
02556      040011      TAD ONE
02557      102713      DAC 11
02560      103141      JMS MSG1
02561      740040      JMS ERHLT
02562      102246      HLT
02563      622540      TAPECK           JMS CKTAPE
                                JMP* READ          /CHECK FOR END OF BLOCK

/
/CONSTANTS AND VARIABLES
02564      777736      CON7              -42
02565      000020      CON8              20
02566      000040      CON9              40
02567      000777      LNGLIM            777
02570      777657      M120             -121
02571      777776      M1                -2
02572      777747      M30              -31
02573      000000      STLSTR           0
02574      000000      LOOP             0
02575      000000      LOOPA            0
                                .EJECT

```



02576	202666	/	LAC N260
02577	042655	DUL	DAC 00
02600	042656		DAC 01
02601	042660		DAC 02
02602	700104		RSA
02603	700101		RSF
02604	602603		JMP .-1
02605	700104		RSA
02606	700101	BIN	RSF
02607	741000		SKP
02610	602672		JMP TOUT
02611	442660		ISZ 02
02612	202660		LAC 02
02613	740001		CMA
02614	342051		TAD ONE
02615	342667		TAD N272
02616	740200		SZA
02617	602635		JMP FINUP
02620	202666		LAC N260
02621	042660		DAC 02
02622	442656		ISZ 01
02623	202656		LAC 01
02624	740001		CMA
02625	342051		TAD ONE
02626	342667		TAD N272
02627	740200		SZA
02630	602644		JMP FINUP1
02631	202666		LAC N260
02632	042656		DAC 01
02633	442655		ISZ 00
02634	602647		JMP FINUP2
			,EJECT

02635	500000	FINUP	AND 0	
02636	500000		AND 0	
02637	500000		AND 0	
02640	500000		AND 0	
02641	500000		AND 0	
02642	500000		AND 0	
02643	500000		AND 0	
02644	500000	FINUP1	AND 0	
02645	500000		AND 0	
02646	500000		AND 0	
02647	202671	FINUP2	LAC TUSE	/33 US. TO HERE
02650	740000		NUP	/3US.
02651	043161		DAC WORK	/2 MORE = 38 US.
02652	443161		ISZ WORK	/00 20
02653	602652		JMP , -1	/LOOPS FOR 60 US.
02654	602606		JMP BIN	/100US TOTAL
02655	000260	D0	260	/X
02656	000260	D1	260	/X
02657	000256		256	/.
02660	000260	D2	260	/X
02661	000240		240	/SPACE
02662	000315		315	/M
02663	000323		323	/S
02664	000212		212	/LE
02665	000215		215	/CR
		/		
02666	000260	N260	260	
02667	000272	N272	272	
02670	002654	PROAD	00-1	
02671	777754	TUSE	777754	/-20
		/		
02672	202670	TOUT	LAC PROAD	
02673	040011		DAC 11	
02674	102713		JMS MSG1	
02675	750004		LAS	
02676	503350		AND (2000	
02677	740200		SZA	
02700	602576		JMP DUL	
02701	601600		JMP TST11	
02702	000000	CRLF	0	
02703	760215		LAW 215	
02704	700406		TLS	
02705	542711		SAD ,+4	
02706	622702		JMP* CRLF	
02707	700401		TSE	
02710	602707		JMP , -1	
02711	760212		LAW 212	
02712	602704		JMP CRLF+2	
			.EJECT	

/TTY PRINT ROUTINES

02713	000000	/	
02714	220011	MSG1	0
02715	700406		LAC* 11
02716	343215		TLS
02717	740200		TAB END
02720	741000		SZA
02721	602725		SKP
02722	700401		JMP CR*AIT
02723	602722		ISZ
02724	602714		JMP , -1
02725	777761	CR*AIT	JMP MSG1+1
02726	043162		LAW -17
02727	770000		DAC WORK1
02730	043161		LAW -10000
02731	443161		DAC WORK
02732	602731		ISZ WORK
02733	443162		JMP , -1
02734	602727		ISZ WORK1
02735	622713		JMP CR*AIT+2
			JMP* MSG1

02736	000000	/	
02737	203152	SETUP1	0
02740	503207		LAC STOR1
02741	102770		AND MSK3
02742	043240		JMS ROTAT6
02743	203152		DAC BAD1
02744	503206		LAC STOR1
02745	102777		AND MSK2
02746	043241		JMS ROTAT3
02747	203152		DAC BAD1+1
02750	503205		LAC STOR1
02751	342666		AND MSK1
02752	043242		TAD N260
02753	203154		DAC BAD1+2
02754	503207		LAC STOR2A
02755	102770		AND MSK3
02756	043227		JMS ROTAT6
02757	203154		DAC GOOD1
02760	503206		LAC STOR2A
02761	102777		AND MSK2
02762	043230		JMS ROTAT3
02763	203154		DAC GOOD1+1
02764	503205		LAC STOR2A
02765	342666		AND MSK1
02766	043231		TAD N260
02767	622736		DAC GOOD1+2
			JMP* SETUP1
			.EJECT

/BAD DATA

02770	000000	ROTAT6	0
02771	742020	RTR;	RTR; RTR
02772	742020		
02773	742020		
02774	342666		TAD N260
02775	744000		CLL
02776	622770		JMP* ROTAT6
/			
02777	000000	ROTAT3	0
03000	742020	RTR	
03001	740020	RAR	
03002	342666	TAD N260	
03003	744000	CLL	
03004	622777	JMP* ROTAT3	
/			
/			
03005	000000	SETUP3	0
03006	203220	LAC INF1+1	
03007	700406	TLS	
03010	700401	TSF	
03011	603010	JMP , -1	
03012	203200	LAC PRINT4	
03013	040011	DAC 11	
03014	203153	LAC STOR2	
03015	043154	DAC STOR2A	
03016	103020	JMS , +2	
03017	603032	JMP TYPE1	
03020	000000	TYPE2	0
03021	777773	LAW -5	
03022	043171	DAC CNTA	
03023	220011	LAC* 11	
03024	700406	TLS	
03025	700401	TSF	
03026	603025	JMP , -1	
03027	443171	ISZ CNTA	
03030	603023	JMP , -5	
03031	623020	JMP* TYPE2	
03032	777772	TYPE1	LAW -6
03033	043117	DAC AWAY	
03034	203362	LAC (740000)	
03035	503153	AND STOR2	
03036	744000	CLL	
03037	742010	RTL	
03040	742010	RTL	
03041	342666	TAD N260	
03042	043116	DAC TRRLES	
03043	203153	LAC STOR2	
03044	742010	RTL	
03045	740010	RAL	
03046	043153	DAC STOR2	
03047	103051	JMS TYPE3	
03050	603034	JMP TYPE1+2	
		.EJECT	

03051	000000	TYPE 3	0
03052	203116		LAC TRLES
03053	700406		TLS
03054	700401		TSF
03055	603054		JMP , -1
03056	443117		ISZ AWAY
03057	623051		JMP* TYPE3
03060	777772	TYPE 4	LAW -6
03061	043117		DAC AWAY
03062	103020		JMS TYPE2
03063	203362		LAC (700000
03064	503152		AND STOR1
03065	744000		CLL
03066	742010		RTL
03067	742010		RTL
03070	342666		TAD N260
03071	043116		DAC TRLES
03072	203152		LAC STOR1
03073	742010		RTL
03074	740010		RAL
03075	043152		DAC STOR1
03076	103100		JMS TYPE5
03077	603063		JMP TYPE4+3
03100	000000	TYPE 5	0
03101	203116		LAC TRLES
03102	700406		TLS
03103	700401		TSF
03104	603103		JMP , -1
03105	443117		ISZ AWAY
03106	623100		JMP* TYPE5
03107	102702		JMS CRLF
03110	203154		LAC STOR2A
03111	043153		DAC STOR2
03112	103120		JMS STAL70
03113	103141		JMS ERHLT
03114	740040		HLT
03115	623005		JMP* SETUP3
03116	000000	TRLES	0
03117	000000	AWAY	0
			.EJECT

```

03120 000000
03121 203132
03122 043161
03123 770000
03124 043162
03125 443162
03126 603125
03127 443161
03130 603123
03131 623120
03132 777771

03133 000000
03134 750004
03135 742010
03136 741400
03137 443133
03140 623133

03141 000000
03142 750004
03143 740100
03144 443141
03145 623141
    
```

```

STAL70 0
        LAC M6
        DAC W0RK
        LAW -10000
        DAC W0RK1
        ISZ W0RK1
        JMP , -1
        ISZ W0RK
        JMP STAL70+3
        JMP* STAL70

M6      -7
/
SCOPE  0
        LAS
        RTL
        S=L
        ISZ SCOPE
        JMP* SCOPE

/
ERHLT  0
        LAS
        SMA
        ISZ ERHLT
        JMP* ERHLT
        .EJECT
    
```

/70 MS STALL

/CHECK FOR SCOPE MODE

/YES, SCOPE MODE

/CHECK FOR HALT ON ERROR

/NO HALT

```

/CONSTANTS, VARIABLES ETC.
/
03146 700104 CKRSA 700104 /RSA IOT
03147 700144 CKRSB 700144 /RSB IOT
03150 700102 CKRCF 700102 /RCF IOT
03151 700112 CKRRF 700112 /RRF IOT
/
03152 000000 STOR1 0 /THESE NEXT 6 FOR
03153 000000 STOR2 0 /DATA WORD STORAGE
03154 000000 STOR2A 0
03155 000000 STOR3 0
03156 000000 STOR4 0
03157 000000 STOR5 0
03160 000000 FLAG 0 /RSA, RSB FLAG
03161 000000 WORK 0 /THESE 3USED
03162 000000 WORK1 0 /IN TIMING LOOPS
03163 000000 WORK2 0
/
03164 776027 CON1 -1751 /THESE FOUR USED
03165 776544 CON3 -1234 /IN TIMING LOOPS
03166 771623 CON5 -6155
03167 003777 CON6 3777
/
03170 000000 COUNTA 0
03171 000000 CNTA 0
03172 003217 PRINT1 INF1
03173 000000 BLSTOR 0 /BLOCK LENGTH
03174 000000 CHACNT 0 /CHARACTER COUNTER
03175 000000 CNTEN 0 /COUNT OF TEN
03176 000000 STORLM 0 /ERROR COUNT
03177 000000 LASTAL 0 /LAST STALL TIME
03200 003263 PRINT4 INF4
/
03201 760301 A 760301 /TTY CHAR. A
03202 760302 B 760302 /DITTO B
03203 760303 C 760303 /DITTO C
03204 760304 D 760304 /DITTO D
03205 000007 MSK1 7
03206 000070 MSK2 70
03207 000300 MSK3 300
03210 000700 MSK4 700
03211 007000 MSK5 7000
03212 003245 PRINT3 INF3
03213 003276 PRINT5 INF5
03214 601127 JMP5 JMP ILINT
03215 777563 END 777563
03216 601141 JMP6 JMP TS=FLG
.EJECT

```

/TTY PRINT ROUTINES

03217	000000	INF1	0	
03220	000000		0	/A,B,C, OR D
03221	000240		240	/SPACE
03222	000307		307	/G
03223	000317		317	/O
03224	000317		317	/O
03225	000304		304	/O
03226	000240		240	/SPACE
03227	000330	GOO01	330	/X
03230	000330		330	/X
03231	000330		330	/X
03232	000240		240	/SPACE
03233	000240		240	/SPACE
03234	000302		302	/B
03235	000301		301	/A
03236	000304		304	/O
03237	000240		240	/SPACE
03240	000330	BAD1	330	/X
03241	000330		330	/X
03242	000330		330	/X
03243	000212		212	/LF
03244	000215		215	/CR
		/		
03245	000000	INF3	0	
03246	000303		303	/C
03247	000301		301	/A
03250	000316		316	/N
03251	000316		316	/N
03252	000317		317	/O
03253	000324		324	/T
03254	000240		240	/SPACE
03255	000323		323	/S
03256	000331		331	/Y
03257	000316		316	/N
03260	000303		303	/C
03261	000212		212	/LF
03262	000215		215	/CR

.EJECT



03263	000000	INF 4	0	
03264	000307		307	/G
03265	000317		317	/O
03266	000317		317	/O
03267	000304		304	/U
03270	000240		240	/SPACE
03271	000240		240	/SPACE
03272	000302		302	/B
03273	000301		301	/A
03274	000304		304	/O
03275	000240		240	/SPACE
/				
03276	000000	INF 5	0	
03277	000000		0	/X
03300	000000		0	/X
03301	000000		0	/X
03302	000257		257	/SLASH
03303	000323		323	/S
03304	000305		305	/E
03305	000303		303	/C
03306	000240		240	/SPACE
03307	000212		212	/LF
03310	000215		215	/CR
			.EJECT	

```

/CHECK FOR 1 OR 1.2 US CYCLE TIME
/
03311 702704 PARCK FWP /FORCE PARITY ERROR
03312 204001 CRPE LAC 4001
03313 203312 LAC -1
03314 702701 SPE /SKIP IF PARITY
03315 603337 JMP PRHLT6 /NO PARITY
03316 702702 CPE /CLEAR PARITY ERROR
03317 203340 LAC LK4K /RESTORE CRPE
03320 043312 DAC CRPE /= 1.2 US CYCLE TIME
/
/TEST 9
/
03321 760261 LAW 261
03322 041305 DAC PC01+5
03323 772643 LAW -5135
03324 043166 DAC CON5
03325 776723 LAW -1055
03326 043165 DAC CON3
/
/TEST 11
/
03327 777546 LAW -232
03330 041606 DAC RSA1-2
03331 777761 LAW -17
03332 042671 DAC TUSE
/
/RANDOM STALL LOOP
/
03333 777743 LAW -35
03334 042564 DAC CON7
03335 777773 LAW -5
03336 043132 DAC M6 /70 MS STALL
03337 740040 PRHLT6 HLT /END OF CYCLE TIME CHECK
/
/
702704 FWP=702704
702701 SPE=702701
702702 CPE=702702
/
03340 204001 LK4K LAC 4001
/
003311 .END PARCK
03341 200000 *LIT
03342 177777 *LIT
03343 020000 *LIT
03344 001000 *LIT
03345 765400 *LIT
03346 004000 *LIT
03347 000777 *LIT
03350 002000 *LIT
03351 001765 *LIT
03352 001755 *LIT
03353 774777 *LIT
03354 000100 *LIT

```

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03355	000400	*LIT
03356	000102	*LIT
03357	030303	*LIT
03360	000017	*LIT
03361	000377	*LIT
03362	700000	*LIT

NO ERROR LINES

A	03201
AWAY	03117
B	03202
BA01	03240
BGN1	00100
BIN	02606
BLOCK	02244
BLOCKA	02245
BLSOR	03173
C	03203
CHACNT	03174
CKRCF	03150
CKHRB	03151
CKRSA	03146
CKRSB	03147
CKTAPE	02246
CLOF	700004
CLOX	700044
CLSF	700001
CNTA	03171
CNTEN	03175
CON1	03164
CON3	03165
CON5	03166
CON6	03167
CON7	02564
CON8	02565
CON9	02566
COUNTA	03170
COUNTB	01705
CPE	702702
CRLF	02702
CRPE	03312
CRWAIT	02725
D	03204
DELAY	02050
DONCON	01655
DUL	02576
D0	02655
D1	02656
D2	02660
D6RMS	01333
EA73	00323
EA75	00422
EA76	00427
EA11	00514
EA12	00747
EA13	00762
EA14	01003
EA15	01016
EA16	01124
EA20	01511
EA20B	01520
EA20C	01530
EA23	00324

EB25	00423
EB26	00430
EB11	00515
EB12	00742
EB13	00755
EB14	00776
EB15	01011
EB16	01125
ELFS19	01331
EMUR19	01342
ENG	03215
ERHLT	03141
ERPCO	01330
ERPCO1	01341
ERRCF	00751
ERRCF2	01005
ERS	00316
E01	00215
E02	00224
E04	00327
E16B	01135
E16C	01137
E16D	01151
E21	01613
FINUP	02635
FINUP1	02644
FINUP2	02647
FLAG	03160
FLTST	01717
FWP	702704
GENRAN	01726
GOOD1	03227
HLT6	00730
HLT61	00764
HSKP	02500
ILINT	01127
INF1	03217
INF3	03245
INF4	03263
INF5	03276
INSYNC	02020
JMP5	03214
JMP6	03216
KRM	700312
KSF	700301
LASTAL	03177
LK4K	03340
LNGLIM	02567
LOOP	02574
LOCPA	02575
MSG1	02713
MSK1	03205
MSK2	03206
MSK3	03207
MSK4	03210

MSK5	03211
41	02571
1120	02570
132	02572
16	03132
NOTAPE	01500
XTPHR	01641
V250	02666
V272	02667
UK	00226
UKFLG	01513
UKRCF	02161
UKRSA	02125
UK4	00432
UK5A	00517
UK7	01153
UNE	02051
PALT10	00120
PARCK	03311
PATNOT	02267
PBNCNT	00125
PCF	700202
PCC1	01300
PCW	01706
PHLT3A	01527
PNCHA	00113
PRHLT1	01165
PRHLT2	01170
PRHLT3	01522
PRHLT4	02016
PRHLT5	02242
PRHLT6	03337
PRINT1	03172
PRINT3	03212
PRINT4	03200
PRINT5	03213
PROAD	02670
PSA	700204
PSB	700244
PSF	700201
PSWREG	00132
PWRTE	01713
RANCON	01753
RANDEX	01754
RANSAV	01766
RANTAU	01743
RANTBL	01755
RBERR	00214
RCF	700102
READ	02540
READ1	02515
RETURN	01320
ROTAT3	02777
ROTAT6	02770
RR	700112

NSA	700104
NSAB	00302
NSACK	02100
NSARCF	02133
NSA1	01610
NSA	700144
NSACK	02167
NSALP	01171
NSARCF	02215
NSF	700101
SCOPE	03133
SETONS	02042
SETSPD	02503
SETUP1	02736
SETUP3	03005
SKPERR	00326
SPE	702701
STAL70	03120
STLL	01020
STLSTR	02573
STORLM	03176
STOR1	03152
STOR2	03153
STOR2A	03154
STOR3	03155
STOR4	03156
STOR5	03157
SUBAGN	01646
SYNC	02000
TABLE	01707
TAPECK	02562
TCF	700402
TH77	02052
TIME	01614
TIMEX	01625
TLS	700406
TOUT	02672
TR8LES	03116
TSF	700401
TSRFLG	01141
TSRINT	01112
IST1	00200
IST11	01600
IST2	00221
IST3	00300
IST4	00400
IST5	00500
IST6	00700
IST7	01100
FUSE	02671
TYPE1	03032
TYPE2	03020
TYPE3	03051
TYPE4	03060
TYPE5	03100

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TYPOUT	01630
VAHEND	02435
VAHSPU	02400
*ORK	03161
*ORK1	03162
*ORK2	03163



SGN1	00120
PNCHA	00113
HALT10	00120
PSACNT	00125
PSRFG	00132
TST1	00200
SPERR	00214
EB1	00215
TST2	00221
EB2	00224
JK	00226
TST3	00300
RSAB	00302
ER3	00316
EA03	00323
EB03	00324
SKPERR	00326
EB4	00327
TST4	00400
EA05	00422
EB05	00423
EA06	00427
EB06	00430
JK4	00432
TST5	00500
EA11	00514
EB11	00515
JK5A	00517
TST6	00700
HLT6	00730
EB12	00742
EA12	00747
ERRCF	00751
EB13	00755
EA13	00762
HLT61	00764
EB14	00776
EA14	01003
ERRCF2	01005
EB15	01011
EA15	01016
STLL	01020
TST7	01100
TSRINT	01112
EA16	01124
EB16	01125
ILINT	01127
EB18	01135
EB1C	01137
TSRFLG	01141
EB1D	01151
JK7	01153
PR-FLT1	01165
PR-FLT2	01170
RS-LP	01171

PCC1	01300
RETURN	01320
ERPC0	01330
ELFS19	01331
06VMS	01333
ERPC01	01341
EMCR19	01342
NOTAPE	01500
EA20	01511
JKFLG	01513
EA20B	01520
PRHLT3	01522
PHLT3A	01527
EA20C	01530
TST11	01600
RSA1	01610
E21	01613
TIME	01614
TIMEX	01625
TYPOUT	01630
NXTPWR	01641
SUBAGN	01646
UNCON	01655
COUNT8	01705
PCW	01706
TABLE	01707
PWRTEN	01713
FLTST	01717
GENRAN	01726
RANTAD	01743
RANCON	01753
RANDEX	01754
RANTBL	01755
RANSAV	01766
SYNC	02000
PRHLT4	02016
INSYNC	02020
SETONS	02042
DELAY	02050
ONE	02051
TH77	02052
RSACK	02100
JKRSA	02125
RSARCF	02133
JKRCF	02161
RSHCK	02167
RSBRCF	02215
PRHLT5	02242
BLGCK	02244
BLGCKA	02245
UKTAPE	02246
PATNOT	02267
VARSPD	02400
VAREND	02435
MSKP	02500

SETSPD	02503
READ1	02515
READ	02540
TA-ECK	02562
CON7	02564
CON8	02565
CON9	02566
LNGLIM	02567
M120	02570
M1	02571
M32	02572
STLSTR	02573
LOOP	02574
LOOPA	02575
DUL	02576
BIN	02606
FINUP	02635
FINUP1	02644
FINUP2	02647
D0	02655
D1	02656
D2	02660
N260	02666
N272	02667
PROAB	02670
TUSE	02671
TOUT	02672
CRLF	02702
MSG1	02713
CRWAIT	02725
SETUP1	02736
ROTAT6	02770
ROTAT3	02777
SETUP3	03005
TYPE2	03020
TYPE1	03032
TYPE3	03051
TYPE4	03060
TYPE5	03100
TRHLES	03116
AWAY	03117
STAL70	03120
M6	03132
SCOPE	03133
CRHLT	03141
CKRSA	03146
CKRSB	03147
CKRCF	03150
CKRRR	03151
STCR1	03152
STCR2	03153
STCR2A	03154
STCR3	03155
STCR4	03156
STCR5	03157

FLAG	03160
WORK	03161
WORK1	03162
WORK2	03163
CON1	03164
CON3	03165
CON5	03166
CON6	03167
COUNTA	03170
CNTA	03171
PRINT1	03172
BLSTOR	03173
CHACNT	03174
CNTEN	03175
STORLM	03176
LASTAL	03177
PRINT4	03200
A	03201
B	03202
C	03203
U	03204
MSK1	03205
MSK2	03206
MSK3	03207
MSK4	03210
MSK5	03211
PRINT3	03212
PRINT5	03213
JMP5	03214
END	03215
JMP6	03216
INF1	03217
GOOD1	03227
BAD1	03240
INF3	03245
INF4	03263
INF5	03276
PARCK	03311
CRPE	03312
PRHLT6	03337
LK4K	03340
CLSF	700001
GLOF	700004
CLON	700044
RSF	700101
RCF	700102
RSA	700104
RRB	700112
RSB	700144
PSF	700201
PCF	700202
PSA	700204
PSH	700244
ASF	700301
KRR	700312

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ISF	700401
ICF	700402
ILS	700406
SPE	702701
SPE	702702
RWP	702704

