

#### IDENTIFICATION

Product Code: MAINDEC-08-D2PE-D  
Product Name: Family-of-8 ASR 33/35  
Teletype Tests Part 1  
Date Created: February 21, 1969  
Maintainer: Diagnostic Group



## 1. ABSTRACT

The Family-of-8 ASR33/35 Teletype Tests Part 1 is the first part of a two part package used to test the ASR33, ASR33TY, or ASR35 Teletype when attached to a Family-of-8 system.

Part 1 contains nine selectable programs numbered from 0 to 10 (octal). The programs are selected by means of the switch register (SR).

The programs available are:

PRG0	Basic Input Logic Tests
PRG1	Basic Output Logic Tests
PRG2	Reader Test
PRG3	Test Tape Generator. Punches tape with characters stored in locations 0021 and 0022.
PRG4	Test Tape Generator. Punches Binary Count Pattern test tape.
PRG5	Reader Exerciser. Reads Binary Count pattern tape in random length blocks, and with fixed stalls between characters. The stall is determined at random.
PRG6	Reader Exerciser. Reads Binary Count pattern tape. Fixed stall between characters. Stall count is taken from LOC 0023.
PRG7	Reader Exerciser. Reads tape punched with any 2 test characters. Random length blocks and fixed stall between characters. The stall is determined at random.
PRG10	Reader Exerciser. Reads tape punched with any 2 test characters. Fixed stall between characters. Stall count taken from LOC 0023.
PRG11	ASR33TY Automatic Reader option test. Checks for correct response to READER ON, and READER OFF commands.
PRG12	ASR33TY Automatic Punch option test. Checks for correct response to PUNCH ON and PUNCH OFF commands

## 2. REQUIREMENTS

### 2.1 Equipment

Standard PDP-8/S, PDP-8 or PDP-8/I with ASR33, ASR33TY, or ASR35 Teletype.

#### NOTE

Programs PRG0 through PRG10 are not written specifically for the ASR33TY Teletype. Whenever these programs are run, be sure to lock the punch and reader in their ON position. In the case of the reader, use a heavy rubber band to keep the reader switch in the ON position.

## 2.2 Storage

Locations 0000 through 2341 are used.

## 3. LOADING PROCEDURE

### 3.1 Method

The Binary Loader is used to load the program.

## 4. STARTING PROCEDURE (PRG0)

### 4.1 Control Switch Settings (PRG0)

SR0	Halt at end of routine. Routine number in AC.
SR1	Select routine whose number is set in SR6 through SR11.
SR2	Loop program.
SR6 through SR11	Routine number to be selected.

### 4.2 Starting Addresses (PRG0)

This program starts at LOC 0200.

### 4.3 Program and/or Operator Action (PRG0)

- a. Insure Teletype is on-line.
- b. Load binary count pattern test tape in reader.
- c. Turn on reader.
- d. Load address 0200.
- e. Set SR to 0000.
- f. Press START.
- g. Program halts at LOC 0232 to permit setting of options.
- h. Select desired options, if any, in SR. For normal run SR should be 0000. Press CONTINUE.
- i. Program is executed and halts at LOC 0274, program end halt, if no loop options are selected and if no errors occur.

## 5. OPERATING PROCEDURE (PRG0)

## 5.1 Program and/or Operator Action (PRG0)

### 5.1.1 Normal Halts (PRG0)

LOC 0232	SR SET halt. Occurs to permit setting of desired options.
LOC 0274	Program end halt. Occurs if no "loop program" option is set. Set desired options and press CONTINUE. If no options are set, this halt reoccurs.
LOC 0320	Routine end halt. Occurs at end of routine if SR0 = 1. To proceed, press CONTINUE.

## 6. ERRORS (PRG0)

### 6.1 Error Halts and Description (PRG0)

LOC 0177	Incorrect program number selected. Set SR to 0000 and press CONTINUE.
LOC 0255	Nonexistent routine selected. Set correct routine number in SR6 through SR11 and press CONTINUE.
LOC 1221	PRG0, routine 0 error halt. KCC instruction failed to clear the AC. Pressing CONTINUE enters scope loop that sets AC to all 1s, issues KCC to clear AC, and repeats. Manual restart.
LOC 1244	PRG0, routine 1 error halt. 200 ms after KRB instruction the flag is not set, or KSF instruction failed to skip on flag = 1. Pressing CONTINUE repeats the test.
LOC 1267	PRG0, routine 2 error halt A. Same as PRG0, routine 1 error halt.
LOC 1271	PRG0, routine 2 error halt B. KSF instruction failed to skip with flag = 1. Pressing CONTINUE enters scope loop that skips on flag continuously. Manual Restart.
LOC 1320	PRG0, routine 3 error halt A. Same as PRG0, routine 1 error halt.
LOC 1322	PRG0, routine 3 error halt B. KCC failed to reset, or KSF instruction skipped with flag = 0. Pressing CONTINUE enters scope loop that clears the flag and skips on flag continuously. Manual restart.
LOC 1345	PRG0, routine 4, error halt A. Unexpected interrupt. Turn off any device that may be causing an interrupt (other than the Teletype). Pressing CONTINUE repeats the test.
LOC 1362	PRG0, routine 4, error halt B. With reader flag =1 and interrupt enabled, no interrupt occurred. Pressing CONTINUE enters scope loop that turns on interrupt continuously. Manual restart.
LOC 1417	PRG0, routine 5, error halt. Timing error. Flag not -1 110 ms after KRB command. Pressing CONTINUE enters scope loop that reads tape continuously to aid in timing adjustment. Manual restart.

- LOC 1457                    PRG0, routine 6, error halt A. Reread error. A reread of the Teletype buffer did not match with the original read. New character is displayed in AC. Press CONTINUE.
- LOC 1462                    PRG0, routine 6, error halt B. Follow up halt to PRG0, routine 6, error halt A. The "old" character is displayed in AC. Pressing CONTINUE enters scope loop that reads the teletype buffer continuously. Manual restart.

4A.     STARTING PROCEDURES (PRG1)

4.1A   Control Switch Settings (PRG1)

- SR0                         Halt at end of routine. Routine number in AC.
- SR1                         Select routine whose number is set in SR6 through SR11.
- SR2                         Loop program.
- SR6 through SR11         Routine number to be selected.

4.2A   Starting Addresses (PRG1)

This program starts at LOC 0200.

4.3A   Program and/or Operator Action (PRG1)

- a. Insure Teletype is on-line.
- b. Insure reader is off.
- c. Insure that there is paper in teleprinter.
- d. Load address 0200.
- e. Set SR to 0001.
- f. Press START.
- g. Program halts at LOC 0232 to permit setting of options.
- h. Select desired options, if any, in SR. For normal run SR should be 0000. Press CONTINUE.
- i. Program is executed and halts at LOC 0274, program end halt, if no loop options are selected and if no errors occur.

5.A     OPERATING PROCEDURE (PRG1)

5.1A   Program and/or Operator Action (PRG1)

### 5.1.1A Normal Halts (PRG1)

- LOC 0232 SR SET halt. Occurs to permit setting of desired options. Press CONTINUE.
- LOC 0274 Program end halt. Occurs if no "loop program" option is set. Set desired options and press CONTINUE. If no options are set, the halt reoccurs.
- LOC 0320 Routine end halt. Occurs at end of routine if SR0 = 1. To proceed, press CONTINUE.

### 6.A ERRORS (PRG1)

#### 6.1A Error Halts and Description (PRG1)

- LOC 0177 Incorrect program number selected. Set SR to 0001 and press CONTINUE.
- LOC 0255 Nonexistent routine selected. Set correct routine number in SR6 through SR11 and press CONTINUE.
- LOC 1627 PRG1, routine 0, error halt A. 200 ms after TLS command the flag is not 1, or TSF command failed to skip. Pressing CONTINUE repeats the test.
- LOC 1631 PRG1, routine 0, error halt B. With flag = 1, TSF command failed to skip. Pressing CONTINUE enters scope loop that skips on flag continuously. Manual restart.
- LOC 1651 PRG1, routine 1 error halt. TCF command failed to clear flag, or TSF command skipped with flag = 0. Pressing CONTINUE enters scope loop that clears the flag and then skips on flag continuously. Manual restart.
- LOC 1676 PRG1, routine 2 error halt. TCF command failed to clear flag. Pressing CONTINUE enters scope loop that issues TCF command continuously. Manual restart.
- LOC 1717 PRG1, routine 3, error halt A. Unexpected interrupt. Turn off any device that may be causing an interrupt. (The teletype reader must be off). Press CONTINUE to repeat test.
- LOC 1734 PRG1, routine 3, error halt B. With flag = 1, and interrupt enabled, no interrupt occurred. Pressing CONTINUE enters scope loop that turns on interrupt continuously. Manual restart.
- LOC 1765 PRG1, routine 4 error halt. Timing error. Flag not 1 110 ms after TLS command. Pressing CONTINUE enters scope loop that runs the printer/punch continuously, to aid in timing adjustment. Manual restart.

### 4.B STARTING PROCEDURES (PRG2)

4.1B Control Switch Settings (PRG2)

- SR0 Halt at end of routine. Routine number in AC.  
SR1 Select routine whose number is set in SR6 through SR11.  
SR2 Loop program.  
SR6 through SR11 Routine number to be selected.

4.2B Starting Addresses (PRG2)

This program starts at LOC 0200.

4.3B Program and/or Operator Action (PRG2)

- a. Insure Teletype is on-line.
- b. Load binary count pattern test tape in reader.
- c. Turn on reader.
- d. Load address 0200.
- e. Set SR to 0002.
- f. Press START
- g. Program halts at LOC 0232 to permit setting of options.
- h. Set desired options, if any, in SR. For normal run, SR should be 0000. Press CONTINUE.
- i. Program is executed and halts at LOC 0274, program end halt, if no loop options are set, and if no errors occur.

5.B OPERATING PROCEDURE (PRG2)

5.1B Program and/or Operator Action (PRG2)

5.1.1B Normal Halts (PRG2)

- LOC 0232 SR SET halt. Occurs to permit setting of desired options. Press CONTINUE.
- LOC 0274 Program end halt. Occurs if no "loop program" option is set, set options and press CONTINUE. If no options are set, this halt reoccurs.
- LOC 0320 Routine end halt. Occurs at end of routine if SR0 = 1. To proceed press CONTINUE.

6.B ERRORS (PRG2)



## 6.1B Error Halts and Description (PRG2)

LOC 0177	Incorrect program number selected. Set SR to 0002 and press CONTINUE.
LOC 0255	Nonexistent routine selected. Set correct routine number in SR6 through SR11 and press CONTINUE.
LOC 0564	Unable to sync. Sync subroutine has not found an all 1's character within 256 characters. Press CONTINUE to retry.
LOC 2030	PRG2, routine 0, error halt A. Read error. Bad character in AC. Press CONTINUE.
LOC 2033	PRG2, routine 0, error halt B. Follow up halt. Expected character in AC. Pressing CONTINUE resumes test.
LOC 2062	PRG2, routine 1, error halt A. Read error. Bad character in AC. Press CONTINUE.
LOC 2065	PRG2, routine 1, error halt B. Follow up halt. Expected character in AC. Pressing CONTINUE resumes test.
LOC 2120	PRG2, routine 2, error halt A. Read error. Bad character in AC. Press CONTINUE.
LOC 2123	PRG2, routine 2, error halt B. Follow up halt. Expected character AC. Pressing CONTINUE resumes test.

## 4.C STARTING PROCEDURES (PRG3)

### 4.1.C Control Switch Settings (PRG3)

None

### 4.2C Starting Addresses (PRG3)

This program starts at LOC 0200.

### 4.3C Program and/or Operator Action (PRG3)

- a. Insure Teletype is on-line.
- b. Turn off teletype reader.
- c. Load blank tape in punch.
- d. Turn on punch.
- e. Deposit in LOC 0021 and 0022 (8), the 8-bit code for characters to be punched.
- f. Load address 0200.
- g. Set SR to 0003.

- h. Press START.
- i. Program punches tape until stopped by user.

5.C OPERATING PROCEDURE (PRG3)

5.1C Program and/or Operator Action (PRG3)

5.1.1C Normal Halts (PRG3)

None

6.C ERRORS (PRG3)

6.1C Error Halts and Description (PRG3)

LOC 0177                      Incorrect program number selected. Set SR to 0003 and press  
CONTINUE.

4.D STARTING PROCEDURES (PRG4)

4.1D Control Switch Settings (PRG4)

None

4.2D Starting Addresses (PRG4)

This program starts at LOC 0200.

4.3D Program and/or Operator Action (PRG4)

- a. Insure Teletype is on-line.
- b. Turn off teletype reader.
- c. Load blank tape in punch.
- d. Turn on punch.
- e. Load address 0200.
- f. Set SR to 0004.
- g. Press START.
- h. Program punches binary count pattern test tape until stopped user.

5.D OPERATING PROCEDURE (PRG4)

5.1D Program and/or Operator Action (PRG4)

5.1.1D Normal Halts (PRG4)

None.

6.D ERRORS (PRG4)

6.1D Error Halts and Description (PRG4)

LOC 0177                      Incorrect program number selected. Set SR to 0004 and press CONTINUE.

4.E STARTING PROCEDURES (PRG5)

4.1E Control Switch Settings (PRG5)

SR0                              Halt. Program halts with accumulated error count in AC.  
SR5                              Halt on error. Program halts if read-error occurs.

4.2E Starting Addresses (PRG5)

This program starts at LOC 0200.

4.3E Program and/or Operator Action (PRG5)

- a. Insure Teletype is on-line.
- b. Load binary count pattern test tape in reader.
- c. Turn on reader.
- d. Load address 0200.
- e. Set SR to 0005.
- f. Press START.
- g. Program runs continuously until stopped, unless a read error occurs with SR5 = 1, or SR0 is set to 1.

5.E OPERATING PROCEDURE (PRG5)

5.1E Program and/or Operator Action (PRG5)

5.1.1E Normal Halts

LOC 1115                    Halt. Accumulated errors in AC. Occurs if SR0 = 1. Press CONTINUE to proceed.

6.E ERRORS (PRG5)

6.1E Error Halts and Description (PRG5)

LOC 0177                    Incorrect program number selected. Set SR to 0005 and press CONTINUE.

LOC 1110                    Read error halt. Occurs if SR5 = 1. Press CONTINUE to proceed.

4.F STARTING PROCEDURES (PRG6)

4.1F Control Switch Settings (PRG6)

SR0                         Halt. Program halts with accumulated error count in AC.

SR5                         Halt on error. Program halts if read error occurs.

4.2F Starting Addresses (PRG6)

This program starts at LOC 0200.

4.3F Program and/or Operator Action (PRG6)

- a. Insure Teletype is on-line.
- b. Load binary count pattern test tape in reader.
- c. Turn on reader.
- d. Deposit in LOC 0023 the desired stall count in 2's complement form. A count of -1 gives a 1ms stall, etc.
- e. Load address 0200.
- f. Set SR to 0006.
- g. Press START.
- h. Program runs continuously until stopped, unless a read error occurs with SR5 = 1, or SR0 is set to 1.

5.F OPERATING PROCEDURE (PRG6)

5.1F Program and/or Operator Action (PRG6)

5.1.1F Normal Halts (PRG6)

LOC 1115                    Halt. Accumulated errors in AC. Occurs if SR0 = 1. Press CONTINUE to proceed.

6.F ERRORS (PRG6)

6.1F Error Halts and Description (PRG6)

LOC 0177                    Incorrect program number selected. Set SR to 0006 and press CONTINUE.

LOC 1110                    Read error halt. Occurs if SR5 = 1. Press CONTINUE to proceed.

4.G STARTING PROCEDURES (PRG7)

4.1G Control Switch Settings (PRG7)

SR0                         Halt. Program halts with accumulated error count in AC.

SR5                         Halt on error. Program halts if read error occurs.

4.2G Starting Addresses (PRG7)

This program starts at LOC 0200.

4.3G Program and/or Operator Action (PRG7)

- a. Insure Teletype is on-line.
- b. Load reader with 2-character test tape.
- c. Turn on reader.
- d. Deposit in location 0021 and 0022 the 8-bit codes for the character punched in the test tape.
- e. Load address 0200.
- f. Set SR to 0007.
- g. Press START
- h. Program runs continuously until stopped, unless a read error occurs with SR5 = 1, or SR0 is set to 1.

5.G OPERATING PROCEDURE (PRG7)

5.1G Program and/or Operator Action (PRG7)

5.1.1G Normal Halts (PRG7)

LOC 1115                      Halt. Accumulated errors in AC. Occurs if SR0 = 1. Press CONTINUE to proceed.

6.G ERRORS (PRG7)

6.1G Error Halts and Description (PRG7)

LOC 0177                      Incorrect program number selected. Set SR to 0007 and press CONTINUE.

LOC 1110                      Read error halt. Occurs if SR5=1. Press CONTINUE to proceed.

LOC 1137                      Align error halt. Insure that correct tape is used, and check Step 4.3Gd.

4.H STARTING PROCEDURES (PRG 10)

4.1H Control Switch Settings (PRG 10)

SR0                              Halt. Program halts with accumulated error count in AC.

SR5                              Halt on error. Program halts if read error occurs.

4.2H Starting Addresses (PRG 10)

This program starts at LOC 0200.

4.3H Program and/or Operator Action (PRG 10)

- a. Insure Teletype is on-line.
- b. Load reader with 2-character test tape.
- c. Turn on reader
- d. Deposit in LOC 0023 the desired stall count in 2's complement form. A count of -1 gives a 1 ms stall, etc.
- e. Load address 0200.
- f. Set SR to 0010.

- g. Press START.
- h. Program runs continuously until stopped, unless a read error occurs with SR5 = 1, or SR0 is set to 1.

## 5.H OPERATING PROCEDURE (PRG10)

### 5.1H Normal Halts (PRG 10)

LOC 1115                    Halt. Accumulated errors in AC. Occurs is SR0 = 1. Press CONTINUE to proceed.

## 6.H ERRORS (PRG 10)

### 6.1H Error Halts and Description (PRG 10)

LOC 0177                    Incorrect program number selected. Set SR to 0007 and press CONTINUE.

LOC 1110                    Read error halt. Occurs if SR5 = 1. Press CONTINUE to proceed.

LOC 1137                    Align error halt. Insure that correct tape is used, and check Step 4.3Hd.

4.I STARTING PROCEDURES (PRG 11)

4.II Control Switch Settings (PRG 11)

None

4.2I Starting Addresses (PRG 11)

This program starts at LOC 0200.

4.3I Program and/or Operator Action (PRG 11)

- a. Insure that Teletype is on-line.
- b. Load reader with any test tape loop .
- c. Turn on reader by pushing the momentary contact switch to the START position.
- d. Make sure that teletype punch is not locked on.
- e. Load Address 0200.
- f. Set SR to 0011.
- g. Press START
- h. Program runs continuously until stopped, unless an error halt occurs.

5.I OPERATING PROCEDURE (PRG 11)

5.II Normal Halts (PRG 11)

None

6.I ERRORS (PRG 11)

6.II Error halts and Description (PRG 11)

LOC 2212

Reader flag not set after approximately 110 ms after KCC command issued after READER ON command. Probably the READER ON command failed to turn on the reader. Press CONTINUE to proceed.

LOC 2227

Reader flag was set after approximately 110 ms after KCC command issued after READER OFF command. Probably the READER OFF command failed to turn off the reader. Press CONTINUE to proceed.

*mean  
add*



4.J STARTING PROCEDURES (PRG 12)

4.1J Control Switch Settings (PRG 12)

None

4.2J Starting Addresses (PRG 12)

This program starts at LOC 0200.

4.3J Program and/or Operator Action (PRG 12)

a. With Teletype off-line, punch a section of blank leader about 6 inches long. Return Teletype to on-line position.

b. Load leader on reader, leaving very little slack between punch and reader.

c. Turn on reader by pushing the momentary contact switch to the START position.

d. Make sure that teletype punch is not locked on.

e. Load address 0200.

f. Set SR to 0012.

g. Press START

h. Program runs continuously until stopped, unless an error halt occurs.

5.J OPERATING PROCEDURE (PRG 12)

5.1J Normal Halts (PRG 12)

None

6.J ERRORS (PRG 12)

6.1J Error halts and Description (PRG 12)

LOC 2337	Reader failed to read a rubout. Reader failed to read correctly if character on tape is a rubout. If tape character is a rubout, the PUNCH FEED OFF command failed to stop the punch from feeding. Check for other similar failures. To be correct, the punched tape should contain all rubouts. Press CONTINUE to proceed.
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6.2J Other Errors (PRG 12)

Failure of the PUNCH FEED ON command will eventually be detected by the tightening of the slack between the reader and punch. The longer the program is run the better the chances are of detecting the problem, if present.

## 7. RESTRICTIONS

### 7.1 Starting Restrictions

All programs must be started at LOC 0200.

### 7.2 Operating Restrictions

PRG0 and PRG1 must be run prior to executing any other programs. Problems detected during execution of PRG0 and PRG1 should be corrected as they occur.

PRG11 must precede PRG12 execution.

## 8. MISCELLANEOUS

### 8.1 Execution Time

PRG0 execution time: 1 minute

PRG1 execution time: 20 seconds

PRG2 execution time: 18 minutes

PRG3 through PRG12 are continuous run programs.

### 8.2 Test Tapes

MAINDEC-08-D2G3-PT Binary Count Pattern test tape is provided with this program. For convenience in use, the tape should be spliced into a loop, making sure that the pattern is matched at the splice point.

## 9. PROGRAM DESCRIPTION

The Family-of-8 ASR33/35 Teletype Tests, Part 1, consists of 11 programs numbered from 0 to 12 (octal).

### 9.1 PRG0 - Basic Input Logic Tests

This program contains 7 routines numbered from 0 to 6 (octal).

RTN0 Checks that KCC command is able to clear the AC. Test is done 1000 times.

RTN1 Issues KCC, waits 200 ms and checks for flag = 1. A failure to skip on flag indicates that flag is not 1, or KSF command failure to skip.

- RTN2 Checks ability of KSF command to skip with flag = 1. Done 1000 times.
- RTN3 Checks that KSF command does not skip with flag = 0. Done 500 times.
- RTN4 Checks that no other device can cause an interrupt, and then checks that the reader is capable of interrupting.
- RTN5 Timing Test.
- RTN6 Reads a character from tape and saves it. It then rereads the TTI statically 1000 times to check for consistent reading from TTI. 256 characters are read in this manner.

## 9.2 PRG1 - Basic Output Logic Tests

This program contains five routines numbered from 0 to 4.

- RTN0 Issues TLS, waits 200 ms, and checks for flag = 1. A failure to skip indicates that flag is not 1, or KSF command failed. If this part is satisfied the routine skips on flag = 1, 1000 times. Failure to skip indicates TSF failure.
- RTN1 Checks that TSF command does not skip with flag = 0. Done 1000 times.
- RTN2 Checks that TCF command clears flag. Done 100 times.
- RTN3 Checks that no other device can cause an interrupt, and then checks that the printer/punch is able to interrupt.
- RTN4 Timing Test.

## 9.3 PRG2 - Reader Test

This program contains three routines numbered from 0 to 2.

- RTN0 Reads 4095 characters of binary count pattern, at full speed.
- RTN1 Reads 2000 characters of binary count patterns with random stalls between characters.
- RTN2 Reads 100 random-length character blocks. Fixed stall between characters in a block. Stall is changed for each block and is determined at random.

## 9.4 PRG3 - Test Tape Generator

This program punches test tape with characters whose code is stored in LOC 0021 and 0022.

## 9.5 PRG4 - Test Tape Generator

Punches binary count pattern test tape.

9.6 PRG5 - Reader Exerciser

This program reads binary count pattern test tape, in random length blocks, and with fixed stalls between characters. Stall is determined at random.

9.7 PRG6 - Reader Exerciser

Reads binary count pattern test tape. Fixed stall between characters. Stall count is taken from LOC 0023.

9.8 PRG7 - Reader Exerciser

Reads test tape punched with any two test characters, random length blocks, and fixed stall between characters. Stall is determined at random.

9.9 PRG10 - Reader Exerciser

Reads test tape punched with any two test characters. Fixed stall between characters. Stall count taken from LOC 0023.

9.10 PRG11 - ASR33TY Automatic Reader Option Test

Checks for correct response to READER ON, and READER OFF commands by checking for correct state of reader flag 110 ms after issuing KCC command which is preceded by one of the reader control commands.

The coder control commands used are:

READER ON - 221

READER OFF - 223

9.11 PRG12 - ASR33TY Automatic Punch Option Test

Checks for correct operation of PUNCH FEED ON and PUNCH FEED OFF commands by punching rubouts with the punch feed on, and all 0's characters with the punch feed off. The resulting tape should contain all rubouts. The tape is verified by running it through the reader at the same time.

The punch control commands used are:

PUNCH FEED ON - 222

PUNCH FEED OFF - 224

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/FAMILY OF ASR33/35 TELETYPE TESTS - PART 1
/
/COPYRIGHT 1969, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS.
/
/PRG0-BASIC INPUT CONTROL LOGIC TEST - (USES READER)
/PRG1-BASIC OUTPUT CONTROL LOGIC TEST - (USES PRINTER)
/PRG2-READER TEST
/PRG3-TEST TAPE GENERATOR, PUNCHES CONTENTS OF LOC 0021 AND 0022
/PRG4-TEST TAPE GENERATOR, PUNCHES BINARY COUNT PATTERN TEST TAPE
/PRG5-READER EXERCISER, READS BINARY COUNT PATTERN TEST TAPE IN RANDOM
/   LENGTH BLOCKS, STALLS WITH FIXED DELAY BETWEEN CHARACTERS. STALL
/   IS DIFFERENT FOR EACH BLOCK,
/PRG6-READER EXERCISER READS BINARY COUNT PATTERN, FIXED STALL BETWEEN CHARACTERS.
/PRG7-READER EXERCISER, READS TAPE PUNCHED BY PRG3, TEST DATA MUST BE STORED
/   IN LOC 0021 AND 0022, RANDOM LENGTH BLOCKS, FIXED STALL BETWEEN
/   CHARACTERS, STALL DIFFERENT FOR EACH BLOCK
/PRG10-SAME AS PRG7, BUT FIXED STALL BETWEEN CHARACTERS (NO RANDOM LENGTH BLOCKS)
/PRG11-ASR33TY AUTOMATIC READER OPTION TEST
/PRG12-ASR33TY AUTOMATIC PUNCH OPTION TEST
/
/SR OPTIONS
/
/SR0-HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC
/SR1-SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 TO SR11
/SR2-LOOP PROGRAM
/SR5-HALT ON ERROR
/SR6-SR11-ROUTINE NUMBER TO BE SELECTED,
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/FAMILY-OF-8 ASR33/35 TELETYPE TESTS-PART 1

0000	0000	*0	
0000	0000	0000	
0001	5001	JMP 1	
0002	0002	2	
0003	0003	3	
	0005	*5	
0005	5402	JMP I 2	
0006	0000	0	
	0020	*20	
0020	0000	KSTART, 0	/USER PROGRAM START,
0021	0000	PTEMP, 0	
0022	0000	PTEMP1, 0	
0023	0000	DELAYM, 0	
0024	0257	CHAIN, CHAINN	/CHAIN RTN ENTRY,
0025	0313	SHLT, SHALT	/HALT TEST ENTRY
0026	0322	SETCTR, STCTR	/SET COUNTER ENTRY
0027	0333	DLY1SC, DLYSC	/DELAY SECONDS ENTRY
0030	0345	DLY1MS, DLYMS	/DELAY MILLISECS ENTRY
0031	0232	SRST, SRSET	
0032	0400	RANDNO, RANGEN	
0033	0017	PRGMSK, 17	
0034	7766	PRGLIM, -12	
0035	0000	PRGNUM, 0	
0036	0037	PSW, PRGTAB	
0037	1200	PRGTAB, PRG0	
0040	1600	PRG1	
0041	2000	PRG2	
0042	1000	PRG3	
0043	1006	PRG4	
0044	1013	PRG5	
0045	1031	PRG6	
0046	1042	PRG7	
0047	1060	PRG10	
0050	2200	PRG11	
0051	2244	PRG12	

0052	0000	TEMP, 0	/WORK
0053	0000	TEMP1, 0	/LOCATIONS
0054	0077	TSMASK, 77	/SR 6-11 ENABLE MASK
0055	0100	SRDMASK, 100	/SR5 MASK
0056	0000	CPID, 0	/IDENTIFIES CPU
0057	0000	CURTST, 0	/FOR CURRENT TEST ADDRESS
0060	0000	RTNNO, 0	/FOR CURRENT TEST NUMBER
0061	0000	NXTST, 0	/FOR NEXT TEST ADDRESS
0062	0000	SCCTR, 0	/SECONDS COUNTER
0063	0000	MSCCTR, 0	/MILLISECONDS COUNTER
0064	0000	MILCTR, 0	
0065	0000	MIL1, 0	/FOR 1 MSEC CONSTANT
0066	7444	KPB, -334	/PDP8 1 MSEC CONSTANT
0067	7764	KPBS, -14	/PDP8S 1 MSEC CONSTANT
0070	0000	TEMPQ, 0	/CONSTANTS
0071	0000	TEMPR, 0	/FOR
0072	0000	FLAG, 0	/TYPE
0073	0077	K77, 77	/CHARACTER
0074	7740	M40, -40	/STRING
0075	0100	C100, 100	/SUBROUTINE
0076	0240	C240, 240	
0077	7500	SKIPMA, SMA	
0100	7510	SKIPPA, SPA	
0101	0000	CTRA, 0	/COUNTER A,
0102	0000	CTRB, 0	/COUNTER B,
0103	0000	SCNT, 0	
0104	7634	K100, -144	
0105	2000	K2000, 2000	
		/	
0106	0546	SYNC, SYNK	/ENTRY TO SYNC TAPE RTN,
0107	0444	INPATT, INITPT	/ENTRY TO INITIATE PATTERN
0110	0453	GETPT, GETPTT	/ENTRY TO GET PATTERN CHAR,
0111	0531	CHECK, CHCK	
0112	0502	CRCNT, CHRCNT	
0113	0520	DLYCNT, DLCNT	
0114	0000	PFLAG, 0	
0115	0465	UPUNCH, PUNCH	
0116	0600	UMOVE, MOVE	
0117	7401	MRBOUT, -377	

```

/CONTROL ROUTINE
* 177
0177 0177
0200 7402
0201 7604
0202 0033
0203 1034
0204 7540
0205 5177
0206 7604
0207 0033
0210 3035
0210 1035
0211 1036
0212 3052
0213 1452
0214 3231
0215 7350
0216 7710
0217 5222
0220 1066
0221 7410
0222 1067
0223 3065
0224 4516
0225 0005
0226 0001
0227 7776
0230 5631
0231 0000
0232 7602

START, HLT /INCORRECT PROGRAM NUMBER
      LAS
      AND PRGMSK
      TAD PRGLIM
      SMA SZA
      JMP 177
      LAS
      AND PRGMSK
      DCA PRGNUM
      TAD PRGNUM
      TAD PSW
      DCA TEMP
      TAD I TEMP
      DCA PRGADR
ID,   CLA CLL CMA RAR
      SPA CLA
      JMP ,+3
      TAD KP8
      SKP
      TAD KP8S
      DCA MIL1
      JMS I UMOVE /INITIALIZE
      5 /INTERRUPT,
      1 /AREA,
      -2
      JMP I ,+1
PRGADR, 0
SRSET, HLT CLA

GETROY, CLA
      TAD KSTART /SET ADDRESS OF 1ST ROUTINE
      DCA NXTST /STORE AT NXTST
      JMS FORWD
      LAS /READ SR
      RAL
      SMA /ROUTINE SELECT?
      JMP I CURTST /NO, START WITH 1ST RTN
      LAS /YES
      AND TSTMSK
      CIA
      TAD RTNNO
      SNA CLA /IS IT THIS RTN?
      JMP I CURTST /YES, GO DO IT
      TAD NXTST /NO
      IAC /IS THIS LAST TRN?
      SZA CLA /NO
      JMP GETROY+3
INCRTN, HLT /YES, INCORRECT ROUTINE NO,
      JMP GETROY
0233 7200
0234 1020
0235 3061
0236 4276
0237 7604
0240 7004
0241 7500
0242 5457
0243 7604
0244 0054
0245 7041
0246 1060
0247 7650
0250 5457
0251 1061
0252 7001
0253 7640
0254 5236
0255 7402
0256 5233

```



0257	4313	CHAINN, JMS	SHALT	/HALT? (SR0)
0258	7644		LAS	/READ SR
0259	7246		RIL	
0260	7630		SZL CLA	/SELECT ROUTINE? (SR1)
0261	5233		JMP GETRUY	/YES
0264	1061		TAD NXTST	
0265	7001		IAC	
0266	7640		SZA CLA	/LAST ROUTINE?
0267	5236		JMP GETRUY+3	/NO,
0270	7644		LAS	
0271	7006		RTL	
0272	7710		SPA CLA	/LOOP PROGRAM? (SR2)
0273	5233		JMP GETRUY	/YES
0274	7402	PRGEND,	HLT	/END OF PROGRAM HALT
0275	5257		JMP CHAINN	
0276	0000	FORWD,	0	
0277	7300		CLA CLL	
0300	1461		TAD I NXTST	/GET NEXT RTN NO
0301	3060		DCA RTNNO	/STORE AT RTNNO
0302	2061		ISZ NXTST	
0303	1061		TAD NXTST	/SET CURRENT
0304	3052		DCA TEMP	/RTN NUMBER
0305	2061		ISZ NXTST	
0306	1061		TAD NXTST	/SET CURRENT
0307	3057		DCA CURTST	/RTN ADDR,
0310	1452		TAD I TEMP	/SET NEXT
0311	3061		DCA NXTST	/RTN ADDR,
0312	5676		JMP I FORWD	/EXIT

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0313 0000 SHALT, 0
0314 7604 LAS /READ SR
0315 7700 SMA CLA /HALT? (SR0)
0316 5713 JMP I SHALT
0317 1060 TAD RTNNO
0320 7402 HLT /UNCONDITIONAL HALT (SR0 = 1)
0321 5713 JMP I SHALT /EXIT,S/-10L

0322 0000 STCTR, 0
0323 7200 CLA
0324 1722 TAD I STCTR /GET CTR ADDR
0325 3052 DCA TEMP /AND SAVE AT TEMP
0326 2322 ISZ STCTR
0327 1722 TAD I STCTR /GET COUNT AND
0330 3452 DCA I TEMP /STORE PER C(TEMP)
0331 2322 ISZ STCTR
0332 5722 JMP I STCTR /EXIT
0333 0000 DLYSC, 0
0334 7300 CLA CLL
0335 1733 TAD I DLYSC /GET SECONDS COUNT
0336 3062 DCA SCCTR /STORE AT SCCTR
0337 4345 JMS DLYMS /GO DELAY
0340 6030 =1750 /1 SECOND (1000 MSEC),
0341 2062 ISZ SCCTR /DONE DELAYING?
0342 5337 JMP ,=3

0343 2333 ISZ DLYSC /YES
0344 5733 JMP I DLYSC /EXIT
0345 0000 DLYMS, 0
0346 7300 CLA CLL
0347 1023 TAD DELAYM /GET MS COUNT
0350 3063 DCA MSCTR /STORE IN MSCTR
0351 1065 TAD MIL1 /GET 1 MS CONSTANT
0352 3064 DCA MILCTR /STORE IN MILCTR
0353 2064 ISZ MILCTR /DELAYED 1 MSEC?
0354 5353 JMP ,=1
0355 2063 ISZ MSCTR /DONE DELAYING?
0356 5351 JMP ,=5
0357 5745 JMP I DLYMS /EXIT

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0400      * . 177+1
          /RANDOM NUMBER GENERATOR SUBROUTINE
          RANGEN, 0
0400 0000          CLA
0401 7200          TAD RANTND
0402 1242          TAD RANDEX
0403 1227          SZA CLA
0404 7640          JMP RANTAD
0405 5215          TAD RANTBL
0406 1231          DCA RANDEX
0407 3227          TAD RANCON
0410 1230          CLL RAL
0411 7104          SZL
0412 7430          IAC
0413 7001          DCA RANCON
0414 3230          RANTAD, TAD RANCON
0415 1230          TAD I RANDEX
0416 1627          DCA I RANDEX
0417 3627          TAD RANSAV
0420 1243          RAR
0421 7010          TAD I RANDEX
0422 1627          ISZ RANDEX
0423 2227          DCA RANSAV
0424 3243          TAD RANSAV
0425 1243          JMP I RANGEN
0426 5600          RANDEX, RANTND
0427 0442          RANCON, 6543
0430 6543          RANTBL, ,+1
0431 0432          6543
0432 6543          3210
0433 3210          0765
0434 0765          5432
0435 5432          2107
0436 2107          7654
0437 7654          4321
0440 4321          1076
0441 1076          RANTND, -,
0442 7336          RANSAV, 0
0443 0000

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/SUBROUTINE TO INITIALIZE BINARY COUNT PATTERN
0444 0000 INITPT, 0
0445 7200          CLA          /SET PT0 = 0
0446 3250          DCA PT0
0447 5644          JMP I INITPT /EXIT
0450 0000 PT0, 0
0451 0000 PT1, 0
0452 0377 PTMSK, 377

/SUBROUTINE TO PROVIDE NEXT BINARY COUNT PATTERN CHARACTER (IN AC)
0453 0000 GEIPTT, 0
0454 7200          CLA
0455 1250          TAD PT0          /GET PT0
0456 3251          DCA PT1          /STORE AT PT1
0457 1251          TAD PT1          /GET PT1
0460 7001          IAC          /INCREMENT ACCUMULATOR
0461 0252          AND PTMSK       /LIMIT TO 8 BITS
0462 3250          DCA PT0          /STORE AT PT0
0463 1251          TAD PT1          /GET PT1
0464 5653          JMP I GETPTT    /EXIT

/PUNCH/PRINT ONE CHARACTER SUBROUTINE (CHAR IN AC).
0465 0000 PUNCH, 0
0466 2114          ISZ PFLAG       /SET PFLAG
0467 6046          TLS          /PUNCH PRINT
0470 7200          CLA
0471 1114          TAD PFLAG
0472 7640          SZA CLA          /FLAG RESET?
0473 7410          SKP          /NO
0474 5277          JMP ,+3         /YES,
0475 6041          TSF          /DONE PRINTING
0476 5271          JMP ,=5         /NO,
0477 6042          TCF          /YES, RESET PUNCH/PRINTER FLAG
0500 3114          DCA PFLAG       /RESET PFLAG,
0501 5665          JMP I PUNCH     /EXIT,

/SUBROUTINE TO GENERATE RANDOM CHARACTER COUNT, (NOT MORE THAN 77(8))
0502 0000 CHR CNT, 0
0503 4432          JMS I RANDNO    /GO GENERATE RANDOM NUMBER
0504 0317          AND CRMSK       /REMOVE HIGH ORDER 6 BITS
0505 7450          SVA
0506 5303          JMP CHR CNT+1
0507 7041          CIA          /2'S COMPLEMENT IT
0510 3103          DCA SCNT
0511 1702          TAD I CHR CNT
0512 3052          DCA TEMP
0513 1103          TAD SCNT
0514 3452          DCA I TEMP       /STORE AT SPECIFIED ADDRESS
0515 2302          ISZ CHR CNT     /SET UP EXIT
0516 5702          JMP I CHR CNT   /EXIT
0517 0077          CRMSK, 77

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/SUBROUTINE TO GENERATE RANDOM DELAY COUNT (NOT MORE THAN 3777(8)),
/
0520 0000   DLCNT,
0521 4432   JMS I RANDNO   /GO GENERATE RANDOM NUMBER
0522 0330   AND DLYMSK   /MASK OUT UNDESIRED BITS,
0523 7450   SNA         /ZERO?
0524 5321   JMP DLCNT+1   /YES, GET ANOTHER NUMBER
0525 7041   CIA         /2'S COMPLEMENT IT
0526 3023   DCA DELAYM
0527 5720   JMP I DLCNT   /EXIT
0530 0277   DLYMSK, 277

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/SUBROUTINE TO COMPARE C(AC) TO CONTENTS STORED AT CALL+1
/
0531 0000   CHCK, 0
0532 3345   DCA WCHK     /STORE AC AT WCHK
0533 1731   TAD I CHCK   /GET COMPARE DATA
0534 7041   CIA         /2'S COMPLEMENT IT
0535 1345   TAD WCHK     /ADD C(WCHK)
0536 2331   ISZ CHCK     /SET UP FOR UNEQUAL EXIT
0537 7640   SZA CLA     /EQUAL (AC = 0)
0540 5343   JMP ,+3      /NO
0541 2331   ISZ CHCK     /YES, SET UP FOR EQUAL EXIT
0542 5731   JMP I CHCK   /EQUAL EXIT
0543 1345   TAD WCHK     /RESTORE AC
0544 5731   JMP I CHCK   /UNEQUAL EXIT
0545 0000   WCHK, 0

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/SYNC ON TAPE SUBROUTINE
/
0546 0000   SYNK, 0
0547 4426   JMS I SETCTR /SET COUNT OF
0550 0566   CTSK        /-256 (DEC) IN
0551 7400   =400        /CTSK
0552 6032   SYNKA, KCC  /CLEAR AC AND FLAG
0553 6031   KSF         /READY?
0554 5353   JMP ,=1     /NO, TEST AGAIN
0555 6034   KRS         /YES, READ
0556 1117   TAD MRBOUT
0557 7640   SZA CLA     /377?
0560 7410   SKP
0561 5746   JMP I SYNK  /YES, EXIT

0562 2366   ISZ CTSK    /BUMP CHAR CTR +1
0563 5352   JMP SYNKA  /GO READ AGAIN
0564 7402   HLT        /256 CHARS READ, CAN'T SYNC
0565 5347   JMP SYNK+1 /GO TO SRST
0566 0000   CTSK, 0   /CHAR COUNTER

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0600      0600      * .177*1
           /SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
0600      0000      MOVE, 0
0601      7200      CLA
0602      1600      TAD I MOVE      /GET "FROM ADDR" AND
0603      3223      DCA FADDR      /STORE AT FADDR
0604      2200      ISZ MOVE
0605      1600      TAD I MOVE      /GET "TO ADDR" AND
0606      3224      DCA TADDR      /STORE AT TADDR,
0607      2200      ISZ MOVE
0610      1600      TAD I MOVE      /GET "MOVE COUNT" AND
0611      3225      DCA MCTR      /STORE AT MCTR,
0612      2200      ISZ MOVE      /SET UP FOR EXIT.
0613      7200      MOVEA, CLA
0614      1623      TAD I FADDR      /GET "FROM" WORD
0615      3624      DCA I TADDR      /STORE AT "TO" LOCATION
0616      2223      ISZ FADDR      /*1 TO "FROM" ADDR
0617      2224      ISZ TADDR      /*1 TO "TO" ADDR
0620      2225      ISZ MCTR      /ALL WORDS MOVED
0621      5213      JMP MOVEA      /NO, GO MOVE AGAIN
0622      5600      JMP I MOVE      /YES, EXIT
0623      0000      FADDR, 0
0624      0000      TADDR, 0
0625      0000      MCTR, 0

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1000      * 177+1
          /PROGRAM NUMBER 3, PUNCHES TEST TAPE WITH 2 CHARACTERS
          /SPECIFIED IN SYMBOLIC LOCATIONS PTEMP, AND PTEMP1.
1000 7200 PRG3,  CLA
1001 1021      TAD PTEMP      /GET C(PTEMP)
1002 4515      JMS I UPUNCH   /PUNCH C(PTEMP)
1003 1022      TAD PTEMP1    /GET C(PTEMP1)
1004 4515      JMS I UPUNCH   /PUNCH C(PTEMP1)
1005 5200      JMP PRG3      /REPEAT,

/PROGRAM NUMBER 4, PUNCHES TEST TAPE WITH BINARY COUNT PATTERN.
1006 7200 PRG4,  CLA
1007 4507      JMS I INPATT   /INITIALIZE BINARY COUNT PATTERN
1010 4510      JMS I GETPT   /GET BINARY COUNT CHARACTER.
1011 4515      JMS I UPUNCH   /PUNCH CHARACTER
1012 5210      JMP ,=2      /REPEAT,

/PROGRAM 5-READS COUNT PATTERN-RANDOM NUMBERED GROUPS,
/ FIXED RANDOM DELAY BETWEEN CHARACTERS IN A GROUP.
1013 4506 PRG5,  JMS I SYNC    /SYNC TAPE
1014 3317      DCA ERRCTR    /CLEAR ERROR COUNTER
1015 4507      JMS I INPATT   /INITIALIZE PATTERN,
1016 6032      KCC          /START READER
1017 4513      SRT0A, JMS I DLYCNT /GENERATE DELAY COUNT
1020 4512      JMS I CRCNT   /GO GENERATE AND STORE
1021 0101      CTRA        /RANDOM CHAR, COUNT
1022 4510      SRT0B, JMS I GETPT /GET PATTERN CHAR,
1023 3276      DCA SBSP     /STORE AT SBSP.
1024 4430      JMS I DLY1MS  /GO DELAY
1025 4271      JMS READCK   /GO READ AND CHECK CHAR,
1026 2101      ISZ CTRA     /GROUP DONE?
1027 5222      JMP SRT0B    /NO,
1030 5217      JMP SRT0A    /YES, START AGAIN

/PROGRAM 6-READS COUNT PATTERN=FIXED DELAY BETWEEN CHARACTERS
1031 4506 PRG6,  JMS I SYNC    /SYNC TAPE
1032 3317      DCA ERRCTR    /CLEAR ERROR COUNTER
1033 4507      JMS I INPATT   /INITIALIZE PATTERN
1034 6032      KCC          /START READER
1035 4510      SRT1A, JMS I GETPT /GET PATTERN CHAR,
1036 3276      DCA SBSP     /STORE AT SBSP
1037 4430      JMS I DLY1MS  /GO DELAY
1040 4271      JMS READCK   /GO READ AND CHECK CHAR,
1041 5235      JMP SRT1A    /REPEAT

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/PROGRAM 7 - READS CHARS FROM TAPE AND MATCHES AGAINST CHARS
/ IN TEMP AND TEMP1, RANDOM DELAY BETWEEN CHARS,
1042 7200 PRG7, CLA
1043 3317 DCA ERRCTR /CLEAR ERROR COUNTER
1044 4320 JMS ALIGN /
1045 6032 KCC /START READER
1046 4513 SRT2A, JMS I DLYCNT /GENERATE DELAY COUNT
1047 4512 JMS I CRCNT /GO GENERATE AND STORE
1050 0101 CTRA /RANDOM CHAR COUNT
1051 4350 SRT2B, JMS GIVE /GET CHARACTER
1052 3276 DCA SBSP /STORE AT SBSP
1053 4430 JMS I DLY1MS /GO DELAY
1054 4271 JMS READCK /GO READ AND CHECK CHAR
1055 2101 ISZ CTRA /GROUP DONE?
1056 5251 JMP SRT2B /NO,
1057 5246 JMP SRT2A /YES START AGAIN

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/PROGRAM 10 - SAME AS SRT2, BUT FIXED DELAY BETWEEN
/ CHARS, DELAY IS SPECIFIED IN LOC - DELAYM,
1060 7200 PRG10, CLA
1061 3317 DCA ERRCTR /CLEAR ERROR COUNTER,
1062 4320 JMS ALIGN /
1063 6032 KCC /START READER
1064 4350 SRT3A, JMS GIVE /SET CHARACTER,
1065 3276 DCA SBSP /STORE AT SBSP
1066 4430 JMS I DLY1MS /GO DELAY
1067 4271 JMS READCK /GO READ AND CHECK CHAR,
1070 5264 JMP SRT3A /REPEAT,

1071 0000 READCK, 0
1072 6031 KSF /READY?
1073 5272 JMP ,*-1 /TEST AGAIN,
1074 6036 KRB /READ CLEAR AC AND FLAG,
1075 4511 JMS I CHECK /GO CHECK CHARACTER WORD,
1076 0000 SBSP, 0 /
1077 5301 JMP ERRCNT /ERROR, NO MATCH, GO INC, ERRCNT
1100 5311 JMP HLTST
1101 2317 ERRCNT, ISZ ERRCTR /INCREMENT ERROR COUNTER
1102 5305 JMP ,*3
1103 7240 CLA CMA /OFLOW, RESET TO 7777,
1104 3317 DCA ERRCTR
1105 7604 LAS /READ SR,
1106 0055 AND SR5MSK
1107 7640 SZA CLA /HALT ON ERROR?
1110 7402 HLT /YES,
1111 7604 HLTST, LAS /READ SR
1112 7700 SMA CLA /HALT?
1113 5671 JMP I READCK /NO EXIT
1114 1317 TAD ERRCTR /GET ERROR COUNT
1115 7402 HLT /HALT, ERROR COUNT IN AC
1116 5671 JMP I READCK /EXIT,
1117 0000 ERRCTR, 0 /ERROR COUNTER

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/
1120 3000 ALIGN, 0
1121 7200 CLA
1122 6031 KSF /READY?
1123 5322 JMP ,-1 /TEST AGAIN,
1124 6034 KHS /READ CHARACTER,
1125 7041 CIA /2'S COMPLEMENT IT,
1126 3347 DCA ATEMP /STORE AT A TEMP.
1127 1347 TAD ATEMP
1130 1021 TAD PTEMP
1131 7650 SNA CLA /IS IT CHAR IN PTEMP?
1132 5341 JMP AL1 /YES.
1133 1347 TAD ATEMP /NO.
1134 1022 TAD PTEMP1
1135 7650 SNA CLA /IS IT CHAR IN PTEMP1?
1136 5344 JMP AL2 /YES.
1137 7402 HLT /NO, ERROR,
1140 5321 JMP ALIGN+1 /REPEAT,
1141 7040 AL1, CMA
1142 3346 DCA IND /SET IND TO -1
1143 5720 JMP I ALIGN
1144 3346 AL2, DCA IND /SET IND TO 0,
1145 5720 JMP I ALIGN
1146 0000 INU, 0
1147 0000 ATEMP, 0
1150 0000 GIVE, 0
1151 7200 CLA
1152 2346 ISZ IND /IS IND = -1?
1153 5357 JMP ,+4 /NO.
1154 3346 DCA IND /YES.
1155 1022 TAD PTEMP1 /GET CHAR FROM TEMP1
1156 5750 JMP I GIVE /EXIT,
1157 7040 CMA
1160 3346 DCA IND /SET IND TO -1.
1161 1021 TAD PTEMP /GET CHAR FROM TEMP,
1162 5750 JMP I GIVE /EXIT,
/

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1200      * , 1/7+1
          /PROGRAM 0, ASR 33/35 TELETYPE BASIC INPUT TESTS,
          /PROGRAM CHECKS INPUT IOT'S, INTERRUPT, AND READER TIMING
1200 4426 PRG0,   JMS I SETCTR  /SET KSTART TO INITIAL
1201 0020      KSTART      /ROUTINE ADDRESS,
1202 1205      P0TS0
1203 5604      JMP I ,+1     /GO START TEST
1204 0232      SRSET
          /
1205 0000      P0TS0, 0
1206 1225      P0TS1
          /ISSUE KCC WITH AC=7777, AC SHOULD GO TO 0,
          /AC NOT 0 INDICATES KCC FAILURE, TEST IS DONE 1000 TIMES,
1207 4426      JMS I SETCTR  /SET COUNT OF
1210 0101      CTRA         /-1000 (DEC) IN
1211 6030      -1750        /CTRA
1212 7240      CLA CMA      /SET AC TO 7777
1213 6032      KCC          /CLEAR AC AND FLAG
1214 7440      SZA         /IS AC = 0?
1215 5221      JMP P0E0     /NO ERROR, GO TO P0E0
1216 2101      ISZ CTRA     /DONE?
1217 5212      JMP ,=5      /NO, REPEAT
1220 5424      JMP I CHAIN  /CHAIN
1221 7402      P0E0, HLT    /TST0 ERR HALT, KCC DID
          /NOT RESULT IN AC = 0
1222 7240      CLA CMA      /SET A TO 7777
1223 6032      KCC          /CLEAR AC AND FLAG
1224 5222      JMP ,=2      /REPEAT
1225 0001      P0TS1, 1
1226 1246      P0TS2
          /ISSUE KCC, WAIT 200 MSEC FOR FLAG TO SET,
          /SKIP ON FLAG, FAILURE TO SKIP INDICATES
          /THAT FLAG IS NOT SET, OR KSF FAILURE,
          /TEST IS DONE 100 TIMES,
1227 4426      JMS I SETCTR  /SET DELAYM
1230 0023      DELAYM      /TO -200
1231 7470      -310
1232 4426      P0TS1A, JMS I SETCTR /GO SET COUNT OF
1233 0101      CTRA         /-100 (DEC) IN
1234 7634      -144        /CTRA
1235 6032      P0TS1B, KCC   /CLEAR AC AND FLAG
1236 4430      JMS I DLY1MS /GO DELAY
1237 6031      KSF          /SKIP ON FLAG = 1
1240 5244      JMP P0E1     /ERROR, GO TO E1
1241 2101      ISZ CTRA     /ALL DONE?
1242 5235      JMP P0TS1B  /NO, REPEAT
1243 5424      JMP I CHAIN  /CHAIN
1244 7402      P0E1, HLT    /TST1 ERROR HALT, FLAG IS NOT
          /SET, OR KSF FAILED
1245 5232      JMP P0TS1A  /RESTARTING TEST,

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1246 0002 P0IS2, 2
1247 1275 P0TS3
/ISSUE KCC, WAIT 200 MSEC FOR FLAG TO BE SET,
/SKIP ON FLAG 1000 TIMES TO VERIFY CONSISTENT SKIPPING,
/
1250 4426 JMS I SETCTR /SET DELAYM
1251 0023 DELAYM /TO =200
1252 7470 =310
1253 4426 JMS I SETCTR /GO SET COUNT OF 1000
1254 0101 CTRA /((DEC) IN
1255 6030 =1750 /CTRA
1256 6032 P0TS2A, KCC /CLEAR AC AND FLAG
1257 4430 JMS I DLY1MS /GO DELAY
1260 6031 KSF /SKIP ON FLAG = 1
1261 5267 JMP P0E2A /DID NOT SKIP, GO TO E2A
1262 6031 KSF /SKIP ON FLAG = 1
1263 5271 JMP P0E2B /DID NOT SKIP, GO TO E2B
1264 2101 ISZ CTRA /ALL DONE?
1265 5262 JMP ,=3 /NO, REPEAT
1266 5424 JMP I CHAIN /CHAIN
1267 7402 P0E2A, HLT /TST2 ERROR HALT, FLAG
/NOT SET OR KSF FAILURE,
1270 5256 JM B P0TS2A
1271 7402 P0E2B, HLT /TST2 ERR HALT B,
/KSF FAILURE
1272 6031 KSF /SKIP ON FLAG = 1
1273 5272 JMP ,=1 /REPEAT
1274 5272 JMP ,=2 /REPEAT

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1275 0003 P0TS3, 3
1276 1327 P0TS4
/
/ISSUE KCC, WAIT 200 MSECs FOR FLAG TO SET,
/VERIFY THAT FLAG IS SET, RESET FLAG (KCC) AND
/SKIP ON FLAG 500 TIMES TO VERIFY THAT NO
/SKIP OCCURS WITH FLAG = 0,
/
1277 4426 JMS I SETCTR /SET DELATM
1300 0023 DELAYM /TO -200,
1301 7470 =310
1302 4426 JMS I SETCTR /SET COUNT OF
1303 0101 CTRA /-500 (DEC) IN
1304 7014 =764 /CTRA
1305 6032 P0TS3A, KCC /CLEAR FLAG
1306 4430 JMS I DLY1MS /GO DELAY
1307 6031 KSF /READY?
1310 5320 JMP P0E3A /NO, ERROR
1311 6032 KCC /YES, RESET FLAG
1312 6031 KSF /READY?
1313 5315 JMP ,+2 /NO, OK
1314 5322 JMP P0E3B /YES, ERROR
1315 2101 ISZ CTRA /ALL DONE TESTING?
1316 5312 JMP ,=4 /NO, REPEAT
1317 5424 JMP I CHAIN /YES, CHAIN
1320 7402 P0E3A, HLT /TST3 ERR HALT A, FLAG
/NOT SET OR KSF FAILURE
1321 5305 JMP P0TS3A /TRY AGAIN
1322 7402 P0E3B, HLT /TST3 ERR HALT B, FLAG
/FAILED TO RESET, OR KSF
/SKIPPED ERRONEOUSLY.

/TURN OFF READER BEFORE ENTERING
/SCOPE LOOP,
1323 6032 KCC /CLEAR FLAG AND AC
1324 6031 KSF /SKIP ON FLAG = 1
1325 5323 JMP ,=2 /REPEAT
1326 5323 JMP ,=3 /REPEAT

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1327 0004 P0TS4, 4
1330 1400 P0TS5
/THIS ROUTINE CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT,
/AND THEN CHECKS THAT THE READER FLAG IS CAPABLE OF INTERRUPTING.
1331 4426 JMS I SETCTR /SET INTERRUPT RETURN
1332 0002 2 /TO P0E4A,
1333 1345 P0E4A
1334 6042 P0TS4A, TCF /CLEAR PUNCH/PRINTER FLAG
1335 6032 KCC /CLEAR READER FLAG AFTER
1336 6031 KSF /IT COMES UP
1337 5336 JMP , -1
1340 6032 KCC /CLEAR READER FLAG
1341 6001 ION /ENABLE INTERRUPT
1342 7000 NOP
1343 6002 IOF /TURN OFF INTERRUPT
1344 5347 JMP , +3
1345 7402 P0E4A, HLT /UNEXPECTED INTERRUPT
1346 5334 JMP P0TS4A /TRY AGAIN
1347 4426 JMS I SETCTR /SET CTRA TO
1350 0101 CTRA /-1000
1351 6030 =1750
1352 4426 JMS I SETCTR /SET INTERRUPT RETURN
1353 0002 2 /TO P0TS4C,
1354 1371 P0TS4C
1355 6032 KCC
1356 6031 KSF /WAIT FOR READER FLAG
1357 5356 JMP , -1 /TO SET
1360 6001 P0TS4B, ION /ENABLE INTERRUPT
1361 7000 NOP
1362 7402 P0E4B, HLT /READER FLAG FAILED TO INTERRUPT,
/OR INTERRUPT SYSTEM MALFUNCTION
1363 4426 JMS I SETCTR /SET INTERRUPT RETURN
1364 0002 2 /TO P0TS4C-1,
1365 1370 P0TS4C-1
/SCOPE LOOP
1366 6001 ION
1367 7000 NOP
1370 5366 JMP , -2
/
1371 2101 P0TS4C, ISZ CTRA /DONE?
1372 5360 JMP P0TS4B /NO, REPEAT
1373 5424 JMP I CHAIN

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1400 1400      *, 177+1
1400 0005      PØTS5, 5
1401 1424      PØTS6
                /READER TIMING TEST, CHECKS THAT READER FLAG IS =1 NO
                /LATER THAN 110 MILLISECONDS AFTER KCC INSTRUCTION IS ISSUED.
                /
1402 4426      JMS I SETCTR /SET DELAYM
1403 0023      DELAYM /TO=110
1404 7622      =156
1405 4426      JMS I SETCTR /SET COUNT OF
1406 0101      CTRA /-100 (DEC) IN
1407 7634      =144 /CTRA
1410 6032      PØTS5A, KCC /START READER, CLEAR PC FLAG
1411 4430      JMS I DLY1MS /GO DELAY 110 MILLISECS
1412 6031      KSF
1413 5217      JMP PØE5
1414 2101      ISZ CTRA
1415 5210      JMP PØTS5A
1416 5424      JMP I CHAIN
1417 7402      PØE5, HLT /TST5 ERR HALT, FLAG NOT=1
                /110 MSECS AFTER KCC INSTRUCTION.
                /START READER, CLEAR FLAG, AC,
1420 6032      KCC /FLAG=1?
1421 6031      KSF /NO, TEST AGAIN
1422 5221      JMP ,=1 /YES, REPEAT.
1423 5220      JMP ,=3

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1424 0006 POTS6, 6
1425 7777      7777
/READ 256 DIFFERENT CHARACTERS, EACH CHARACTER IS READ 1000 TIMES
/TO VERIFY CONSISTENCY OF READING FROM TTI,
/
1426 4426      JMS I SETCTR /SET COUNT OF
1427 0101      CTRA /-256(DEC)
1430 7400      =400 /IN CTRA
1431 6032 POTS6A, KCC /CLEAR AC, FLAG, START RDR;
1432 6031      KSF /READY?
1433 5232      JMP ,=-1 /NO, TEST AGAIN,
1434 6034      KRS /READ CHARACTER,
1435 3266      DCA WTS6A /SAVE AT WTS6A,
1436 4426      JMS I SETCTR /SET COUNT OF
1437 0102      CTRB /CTRB
1440 6030      =1750 /-1000 (DEC) IN
1441 7200 POTS6B, CLA
1442 6034      KRS /READ CHARACTER,
1443 3267      DCA WTS6B /SAVE AT WTS6B
1444 1267      TAD WTS6B /GET IT BACK,
1445 7041      CIA /2'S COMPLEMENT IT
1446 1266      TAD WTS6A /ADD EXPECTED CHAR,
1447 7640      SZA CLA /RESULT 0?
1450 5256      JMP P0E6A /NO, ERROR, GO TO E6A;
1451 2102      ISZ CTRB /READ CHAR 1000 TIMES?
1452 5241      JMP POTS6B /NO, GO READ IT AGAIN,
1453 2101      ISZ CTRA /YES, READ 256 DIFF, CHARS?
1454 5231      JMP POTS6A /NO,
1455 5424      JMP I CHAIN /YES, CHAIN
1456 1267 P0E6A, TAD WTS6B
1457 7402      HLT /TST6 ERR HALT A, AC DISPLAYS
/ /INCORRECTLY READ CHAR, DEPRESS
/ /KEY CONTINUE
1460 7200      CLA
1461 1266      TAD WTS6A
1462 7402 P0E6B, HLT /TST6 ERR HALT B, AC DISPLAYS
/ /WHAT THE CORRECT CHAR SHOULD
/ /BE,
1463 7200      CLA
1464 6034      KRS /READ CHARACTER
1465 5263      JMP ,=-2 /L
1466 0000 WTS6A, 0
1467 0000 WTS6B, 0

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1600      * : 177*1
          /PROGRAM 1, ASR33/35 TELETYPE BASIC OUTPUT TESTS,
          /PROGRAM CHECKS OUTPUT IOT,S, INTERRUPT, AND TIMING,
1600 4426 PRG1,  JMS I SETCTR /SET KSTART TO INITIAL
1601 0020      KSTART /ROUTINE ADDRESS.
1602 1605      P1TS0
1603 5604      JMP I ,+1 /GO START TEST
1604 0232      SRSET

/
1605 0000 P1TS0, 0
1606 1635 P1TS1
          /1. TLS AND WAIT 200 MSEC'S FOR FLAG TO SET, SKIP ON FLAG=1 (TSF),
          /TSF SHOULD SKIP, OR ERROR HALT P1E0A OCCURS, FLAG NOT SET, OR TSF FAILURE,
          /2. WITH FLAG=1, SKIP ON FLAG 1000 TIMES TO TEST FOR CONSISTENT SKIPPING,
          /FAILURE TO SKIP CAUSES ERROR HALT P1E0B.
1607 4426      JMS I SETCTR /-200 TO DELAYM
1610 0023      DELAYM
1611 7470      =310
1612 4426      JMS I SETCTR /-1000 TO CTRA
1613 0101      CTRA
1614 6030      =1750
P1TS0A, CLA /CLEAR AC
1615 7200      TLS /START PRINTER/PUNCH
1616 6046      JMS I DLY1MS /DELAY 200 MSEC'S,
1617 4430      TSF /FLAG=1?
1620 6041      JMP P1E0A /NO, ERROR
1621 5227 P1TS0B, TSF /FLAG=1?
1622 6041      JMP P1E0B /ERROR, FAILED TO SKIP,
1623 5231      ISZ CTRA /DONE?
1624 2101      JMP P1TS0B /NO, REPEAT,
1625 5222      JMP I CHAIN /YES, CHAIN
1626 5424 P1E0A, HLT CLA /ERR HALT A, FLAG NOT=1 AFTER
1627 7602      JMP P1TS0A /200 MSEC'S, OR TSF FAILURE
1630 5215 P1E0B, HLT CLA /ERR HALT B, TSF FAILED TO SKIP
1631 7602      TSF /SCOPE LOOP, SKIPS ON
1632 6041      JMP ,-1 /FLAG CONTINUOUSLY,
1633 5232      JMP ,-2
1634 5232

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1635 0001 P1TS1, 1
1636 1656 P1TS2
/ISSUE TCF TO CLEAR FLAG, SKIP ON FLAG 1000 TIMES TO VERIFY THAT NO
/SKIP OCCURS WITH FLAG=0
1637 4426 JMS I SETCTR /-1000 TO CTRA
1640 0101 CTRA
1641 6030 -1750
1642 6042 TCF /CLEAR FLAG
1643 6041 P1TS1A, TSF
1644 7410 SKP
1645 5251 JMP P1E1
1646 2101 ISZ CTRA
1647 5243 JMP P1TS1A
1650 5424 JMP I CHAIN
1651 7602 P1E1, HLT CLA /ERR HALT, AFTER CLEAR FLAG (TCF),
/TSF INSTRUCTION SKIPPED,
/SCOPE LOOP, CLEARS FLAG,
/ADN THEN SKIPS ON FLAG
/CONTINUOUSLY,
1652 6042 TCF
1653 6041 TSF
1654 5253 JMP ,-1
1655 5253 JMP ,-2
/
1656 0002 P1TS2, 2
1657 1701 P1TS3
/ISSUE TLS, WAIT FOR FLAG TO SET, CLEAR FLAG (TCF), SKIP ON FLAG=1, NO SKIP
/SHOULD OCCUR, IF SKIP OCCURS, TCF INSTRUCTION (CLEAR FLAG), FAILED,
1660 4426 JMS I SETCTR /-100 TO CTRA
1661 0101 CTRA
1662 7634 -144
1663 7200 P1TS2A, CLA
1664 6046 TLS
1665 6041 TSF
1666 5265 JMP ,-1
1667 6042 TCF
1670 6041 TSF
1671 7410 SKP
1672 5276 JMP P1E2
1673 2101 ISZ CTRA
1674 5263 JMP P1TS2A
1675 5424 JMP I CHAIN
1676 7602 P1E2, HLT CLA /ERR HALT, TCF FAILED TO RESET
/FLAG,
/SCOPE LOOP, CLEARS FLAG
/CONTINUOUSLY,
1677 6042 TCF
1720 5277 JMP ,-1

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1701 0003 P1TS3, 3
1702 1746 P1TS4
/THIS ROUTINE CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT,
/AND THEN CHECKS THAT THE PUNCH/PRINTER FLAG CAN CAUSE AN INTERRUPT,
1703 4426 JMS I SETCTR /SET INTERRUPT RETURN TO
1704 0002 2 /P1E3A
1705 1717 P1E3A
1706 6032 P1TS3A, KCC /CLEAR READER FLAG IF UP,
1707 6046 TLS
1710 6041 TSF
1711 5310 JMP ,=1
1712 6042 TCF /CLEAR PUNCH/PRINTER FLAG
1713 6001 ION /ENABLE INTERRUPTS,
1714 7000 NOP
1715 6002 IOF /DISABLE INTERRUPTS
1716 5321 JMP ,+3
1717 7402 P1E3A, HLT /UNEXPECTED INTERRUPT,
1720 5306 JMP P1TS3A /TRY AGAIN,
1721 4426 JMS I SETCTR /-1000 TO CTRA,
1722 0101 CTRA
1723 6030 =1750
1724 4426 JMS I SETCTR /SET INTERRUPT RETURN
1725 0002 2 /TO P1TS3C
1726 1743 P1TS3C
1727 6046 TLS /START PUNCH/PRINTER
1730 6041 TSF /FLAG UP?
1731 5330 JMP ,=1 /NO, TEST AGAIN
1732 6001 P1TS3B, ION /YES, ENABLE INTERRUPT
1733 7000 NOP
1734 7402 P1E3B, HLT /PRINTER FLAG FAILED TO INTERRUPT
/OR INTERRUPT MALFUNCTION,
/SET INTERRUPT RETURN
/TO P1TS3C-1
1735 4426 JMS I SETCTR
1736 0002 2
1737 1742 P1TS3C-1
1740 6001 ION /SCOPE LOOP,
1741 7000 NOP
1742 5340 JMP ,=2
1743 2101 P1TS3C, ISZ CTRA /DONE?
1744 5332 JMP P1TS3B /NO, REPEAT
1745 5424 JMP I CHAIN /YES, CHAIN

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1746 0004 P1TS4, 4
1747 7777 7777
/PUNCH/PRINTER TIMING TEST, CHECKS THAT FLAG IS=1 NO LATER THAN
/110 MILLISECONDS AFTER TLS INSTRUCTION
1750 4426 JMS I SETCTR /-110 TO DELAYM
1751 0023 DELAYM
1752 7622 =156
1753 4426 JMS I SETCTR /-100 TO CTRA
1754 0101 CTRA
1755 7634 =144
1756 6046 P1TS4A, TLS /START PUNCH/PRINTER
1757 4430 JMS I DLY1MS /GO DELAY 110 MSECS,
1760 6041 TSF /FLAG=1?
1761 5365 JMP P1E4 /NO, ERROR,
1762 2101 ISZ CTRA /YES, DONE?
1763 5356 JMP P1TS4A /NO, REPEAT,
1764 5424 JMP I CHAIN /YES, CHAIN
1765 7602 P1E4, HLT CLA /ERR HALT, FLAG NOT 1 110 MSECS
/AFTR TLS INSTRUCTION,
/SCOPE LOOP, START PRINTER
1766 6046 TLS
1767 6041 TSF /FLAG=1?
1770 5367 JMP ,=1 /NO, CHECK AGAIN
1771 5366 JMP ,=3 /YES REPEAT,

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2000      *, 177*1
          /PROGRAM 2, ASR33/35 TELETYPE READER TEST, CHECKS ABILITY OF READER
          /TO CORRECTLY READ AT FULL SPEED AND WITH RANDOM STALLS,
2000  4426  PRG2,   JMS I   SETCTR /SET KSTART TO INITIAL
2001  0020          KSTART  /ROUTINE ADDRESS,
2002  2005          P2TS0
2003  5604          JMP I ,+1   /GO START TEST
2004  0232          SRSET
          /
2005  0000  P2TS0, 0
2006  2035          P2TS1      /NEXT RTN ADDR,
          /READ 4095 CHARACTERS, AT FULL SPEED, MATCHING EACH CHARACTER
          /READ AGAINST COUNT PATTERN
          /
2007  4506          JMS I SYNC  /GO SYNC TAPE
2010  4426          JMS I SETCTR /SET COUNT OF
2011  0101          CTRA        /-4095(DEC) IN
2012  0001          -7777      /CTRA
2013  6032          KCC        /START READER
2014  4507          JMS I INPATT /GO INITIALIZE PATTERN
2015  4510  P2TS0A, JMS I GETPT /GET PATTERN CHARACTER
2016  3223          DCA SB0    /STORE AT SB0
2017  6031          KSF        /READY?
2020  5217          JMP ,=1    /NO, TEST AGAIN
2021  6036          KRH        /YES, READ CHARACTER
2022  4511          JMS I CHECK /GO CHECK FOR CORRECT MATCH
2023  0000  SB0,   0          /CORRECT CHAR HERE
2024  5230          JMP P2E0    /ERROR, GO TO P2E0
2025  2101  P2T0B, ISZ CTRA    /OK, ALL DONE?
2026  5215          JMP P2TS0A /NO, REPEAT
2027  5424          JMP I CHAIN /YES, CHAIN
2030  7402  P2E0,  HLT        /TST10 ERR HALT, AC CONTAINS
          /CHAR THAT DID NOT MATCH
          /AGAINST PATTERN. EPRESS
          /KEY CONTINUE
2031  7200          CLA
2032  1223          TAD SB0    /GET CORRECT CHARACTER
2033  7402          HLT        /AC CONTAINS THE EXPECTED CHARACTER
2034  5225          JMP P2T0B

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2035 2001 P2TS1, 1
2036 2067 P2TS2
/READ 2000 CHARACTERS WITH RANDOM DELAY BETWEEN CHARACTERS,
/MATCH EACH CHARACTER READ AGAINST COUNT PATTERN
/

2037 4506 JMS I SYNC /TO SYNC TAPE
2040 4426 JMS I SETCTR /SET COUNT OF
2041 0101 CTRA /-2000 (DEC) IN
2042 4060 -3720 /CTRA
2043 6032 KCC /START READER
2044 4507 JMS I INPATT /INITIALIZE PATTERN
2045 4510 P2TS1A, JMS I GETPT /GET PATTERN CHARACTER
2046 3255 DCA SB1 /STORE AT SB1
2047 4513 JMS I DLYCNT /GENERATE RANDOM DELAY
2050 4430 JMS I DLY1MS /DELAY
2051 6031 KSF /READY?
2052 5251 JMP ,=-1 /NO, TEST AGAIN
2053 6036 KRB /YES, READ CHARACTER
2054 4511 JMS I CHECK /GO CHECK FOR CORRECT MATCH

2055 0000 SB1, 0 /CORRECT CHAR HERE
2056 5262 JMP P2E1 /ERROR, GO TO P2E1
2057 2101 P2T1B, ISZ CTRA /OK, ALL DONE?
2060 5245 JMP P2TS1A /NO,
2061 5424 JMP I CHAIN /YES, CHAIN
2062 7402 P2E1, HLT /TST1 ERR HALT, AC CONTAINS
/CHARACTER THAT DID NOT MATCH
/AGAINST PATTERN, DEPRESS
/KEYCONTINUE

2063 7200 CLA
2064 1255 TAD SB1 /GET CORRECT CHARACTER
2065 7402 HLT /AC CONTAINS THE EXPECTED
/CHARACTER

2066 5257 JMP P2T1B

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2067 0002 P2TS2, 2
2070 7777 7777
/READ WITH RANDOM STALL BETWEEN RANDOM CHARACTER GROUPS
/100 GROUPS READ,
/
2071 4506 JMS I SYNC /GO SYNC TAPE
2072 4426 JMS I SETCTR /SET COUNT OF
2073 0101 CTRA /-100 (DEC) IN
2074 7634 -144 /CTRA
2075 6032 KCC /START READER
2076 4507 JMS I INPATT /INITIALIZE PATTERN
2077 4513 P2TS2A, JMS I DLYCNT /SET RANDOM DELAY
2100 4512 JMS I CRCNT /SET RANDOM CHARACTER
2101 0102 CTRB /COUNT IN CTRB
2102 4510 P2TS2B, JMS I GETPT /GET PATTERN CHARACTER
2103 3311 DCA SB2 /AND STORE AT SB2
2104 4430 JMS I DLY1MS /GO DELAY NO OF
2105 6031 KSF /READY?
2106 5305 JMP ,=1 /NO TEST AGAIN
2107 6036 KRB /READ CHARACTER
2110 4511 JMS I CHECK /CHECK FOR CORRECT MATCH
2111 0000 SB2, 0 /AGAINST SB2 CONTENTS
2112 5320 JMP P2E2 /ERROR, GO TO P2E2
2113 2102 ISZ CTRB /OK, ALL CHARS FOR GROUP DONE?
2114 5302 JMP P2TS2B /NO
2115 2101 P2T2C, ISZ CTRA /YES, ALL GROUPS DONE?
2116 5277 JMP P2TS2A /NO
2117 5424 JMP I CHAIN /YES, CHAIN
2120 7402 P2E2, HLT /TST2 ERROR HALT, AC CONTAINS CHAR THAT
/DID NOT MATCH AGAINST PATTERN, DEPRESS KEY
/CONTINUE

2121 7200 CLA
2122 1311 TAD SB2 /GET CORRECT CHARACTER
2123 7402 HLT /AC CONTAINS THE EXPECTED CHARACTER
2124 5315 JMP P2T2C
/

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/PRG12, ASR33TY AUTOMTIC PUNCH OPTION TEST  
 /CHECKS OPERATION OF AUTOMATIC PUNCH BY PUNCHING RUBOUTS WITH  
 /PCHON, AND ALL 0'S CHARACTERS WITH PCHOF, THE TAPE RESULTING  
 /SHOULD HAVE ALL RUBOUTS, AS THE TAPE SHOULD NOT ADVANCE  
 /WHEN PUNCHING WITH PCHOFF, THE READER IS USED TO CHECK THE  
 /TAPE, REPEATED FAILURE OF THE PUNCH FEED TO TURN ON WILL  
 /EVENTUALLY BE INDICATED BY TIGHTENING OF SLACK BETWEEN  
 /READER AND PUNCH,  
 /

2244	1242	PRG12,	TAD K7650	/GET (SNA CLA) CODE AND
2245	3326		DCA TTOUTA	/SET AT TTOUTA,
2246	4273		JMS CRPIN	/INITIALIZE DELAY AND CHAR COUNT,
2247	1236		TAD PCHOFF	/TURN OFF PUNCH FEED
2250	4311		JMS TTOUT	
2251	1233		TAD RDRON	/TURN ON READER,
2252	4311		JMS TTOUT	
2253	4311		JMS TTOUT	/PUNCH ALL 0'S CHAR,
2254	2102		ISZ CTRB	/DONE FOR N 0 CHARS?
2255	5253		JMP ,=2	/NO, REPEAT,
2256	1241		TAD K0377	/YES, PUNCH A RUBOUT
2257	4311		JMS TTOUT	
2260	1101		TAD CTRA	/RELOAD CHAR COUNT
2261	3102		DCA CTRB	/INTO CTRB
2262	1235		TAD PCHON	/SET SPFLAG
2263	3237		DCA SPFLAG	
2264	1235		TAD PCHON	/TURN ON PUNCH FEED,
2265	4311		JMS TTOUT	
2266	1241		TAD K0377	/PUNCH A RUBOUT
2267	4311		JMS TTOUT	
2270	2102		ISZ CTRB	/DONE FOR N RUBOUTS?
2271	5266		JMP ,=3	/NO, REPEAT,
2272	5246		JMP PRG12+2	/YES, START OVER.

		/SUB TO	INITIALIZE DELAY CAUSED AND SET CHAR COUNT	
2273	0000	CRPIN,	0	
2274	4426		JMS I SETCTR	/=110 TO DELAYM
2275	0023		DELAYM	
2276	7622		=156	
2277	4432		JMS I RANDNO	/GET RANDOM NUMBER
2300	0240		AND K0007	
2301	7450		SNA	/STILL NON=0?
2302	5277		JMP ,=3	/NO,
2303	7041		CIA	
2304	3101		DCA CTRA	/SET IN CTRA
2305	1101		TAD CTRA	/AND CTRB
2306	3102		DCA CTRB	
2307	3237		DCA SPFLAG	/CLEAR SPFLAG
2310	5673		JMP I CRPIN	/EXIT

2200

PAGE

/PRG11, ASR33TY AUTOMATIC READER OPTION TEST,  
 /CHECKS THAT READER FLAG RESPONDS TO KCC AFTER "READER ON" COMMAND,  
 /AND THAT FLAG DOES NOT RESPOND TO KCC AFTER "READER OFF" COMMAND,  
 /A TEST IS DONE BETWEEN 1 AND 7 CHARACTERS AFTER EACH READER CONTROL  
 /COMMAND, TEST IS CONTINUOUS RUNNING, FAILURES ARE INDICATED BY HALTS,  
 /

2200	3237	PRG11, DCA SPFLAG	/CLEAR SPFLAG,
2201	1236	TAD PCHOFF	/TURN OFF PUNCH FEED
2202	4311	JMS TTOUT	
2203	4273	JMS CRPIN	/INITIALIZE DELAY AND CHAR COUNT,
2204	1233	TAD RDRON	/TURN ON READER
2205	4311	JMS TTOUT	
2206	4430	JMS I DLY1MS	/WAIT AN ADDITIONAL 110 MSECS,
2207	6032	KCC	/ISSUE READER START,
2210	4430	JMS I DLY1MS	/DELAY 110 MSECS.
2211	6031	KSF	/FLAG UP?
2212	7602	HLT CLA	/NO, ERROR. FLAG SHOULD BE UP
2213	2102	ISZ CTRB	/DONE FOR N CHARACTER?
2214	5207	JMP ,-5	/NO, REPEAT,
2215	1101	TAD CTRA	/YES, RELOAD CHAR COUNT
2216	3102	DCA CTRB	/INTO CTRB,
2217	1234	TAD RDROFF	/TURN OFF READER
2220	4311	JMS TTOUT	
2221	6032	KCC	/CLEAR READER FLAG,
2222	4430	JMS I DLY1MS	/DELAY 110 MSECS
2223	6032	KCC	/ISSUE READER START
2224	4430	JMS I DLY1MS	/WAIT 110 MSECS,
2225	6031	KSF	/FLAG UP?
2226	7410	SKP	/NO, OK,
2227	7602	HLT CLA	/YES, HALT. FLAG SHOULD BE DOWN
2230	2102	ISZ CTRB	/DONE N TIMES
2231	5223	JMP ,-6	/NO, REPEAT
2232	5203	JMP PRG1103	/YES, START OVER.
/			
2233	0221	RDRON, 221	
2234	0223	RDROFF, 223	
2235	0222	PCHON, 222	
2236	0224	PCHOFF, 224	
2237	0000	SPFLAG, 0	
2240	0007	K0007, 7	
2241	0377	K0377, 377	
2242	7650	K7650, 7650	
2243	7610	K7610, 7610	



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/SUB TO OUTPUT DATA TO TELEPRINTER/PUNCH. IF SPFLAG
/IS SET, READ A CHARACTER FROM TAPE READER AND CHECK
/THAT IT IS A RUBOUT,
TTOUT, 0
2311 0000      TLS           /OUTPUT CHAR,
2312 6046      TSF           /DONE?
2313 6041      JMP ,=1       /NO, WAIT
2314 5313      TCF           /YES, CLEAR FLAG,
2315 6042
2316 7200      CLA
2317 1237      TAD SPFLAG
2320 7650      SNA CLA       /PUNCH ON?
2321 5711      JMP I TTOUT   /NO, EXIT,
2322 6032      KCC           /YES, START READER,
2323 6031      KSF           /FLAG UP?
2324 5323      JMP ,=1       /NO, WAIT
2325 6034      KRS           /YES, READ CHAR
2326 7650      TTOUTA, SNA CLA /OR (SKP CLA)
2327 5711      JMP I TTOUT   /CHAR IS 0, EXIT,
2330 1243      TAD K7610     /GET (SKP CLA) AND
2331 3326      DCA TTOUTA    /SET AT TTOUTA,
2332 6034      KRS           /REREAD CHAR,
2333 1117      TAD MRBOUT    /TAD (=377
2334 7650      SNA CLA       /WAS IT A RUBOUT?
2335 5711      JMP I TTOUT   /YES, OK,
2336 6034      KRS           /NO, ERROR, REREAD CHAR,
2337 7402      HLT           /DISPLAY CHAR,
2340 7200      CLA
2341 5711      JMP I TTOUT   /EXIT,

```



AL1 1141  
 AL2 1144  
 ALIGN 1120  
 ATEMP 1147  
 C100 0075  
 C240 0076  
 CHAIN 0024  
 CHAINN 0257  
 CHCK 0531  
 CHECK 0111  
 CHR CNT 0502  
 CPID 0056  
 CRCNT 0112  
 CRMSK 0517  
 CRPIN 2273  
 CTRA 0101  
 CTRB 0102  
 CTSK 0566  
 CURTST 0057  
 DELAYM 0023  
 DLCNT 0520  
 DLY1MS 0030  
 DLY1SC 0027  
 DLYCNT 0113  
 DLYMS 0345  
 DLYMSK 0530  
 DLYSC 0333  
 ERR CNT 1101  
 ERRCTR 1117  
 FADDR 0623  
 FLAG 0072  
 FORWD 0276  
 GETPT 0110  
 GETPTT 0453  
 GETRDY 0233  
 GIVE 1150  
 HLYTST 1111  
 ID 0215  
 INCR TN 0255  
 IND 1146  
 INITPT 0444  
 INPATT 0107  
 K0007 2240  
 K0377 2241  
 K100 0104  
 K2000 0105  
 K7610 2243  
 K7650 2242  
 K77 0073  
 KP0 0066  
 KP0S 0067  
 KSTART 0020

M40 0074  
 MCTR 0625  
 MIL1 0065  
 MILCTR 0064  
 MOVE 0600  
 MOVEA 0613  
 MRROUT 0117  
 MSCTR 0063  
 NXTST 0061  
 P0E0 1221  
 P0E1 1244  
 P0E2A 1267  
 P0E2B 1271  
 P0E3A 1320  
 P0E3B 1322  
 P0E4A 1345  
 P0E4B 1362  
 P0E5 1417  
 P0E6A 1456  
 P0E6B 1462  
 P0TS0 1205  
 P0TS1 1225  
 P0TS1A 1232  
 P0TS1B 1235  
 P0TS2 1246  
 P0TS2A 1256  
 P0TS3 1275  
 P0TS3A 1305  
 P0TS4 1327  
 P0TS4A 1334  
 P0TS4B 1360  
 P0TS4C 1371  
 P0TS5 1400  
 P0TS5A 1410  
 P0TS6 1424  
 P0TS6A 1431  
 P0TS6B 1441  
 P1E0A 1627  
 P1E0B 1631  
 P1E1 1651  
 P1E2 1676  
 P1E3A 1717  
 P1E3B 1734  
 P1E4 1765  
 P1TS0 1605  
 P1TS0A 1615  
 P1TS0B 1622  
 P1TS1 1635  
 P1TS1A 1643  
 P1TS2 1656  
 P1TS2A 1663  
 P1TS3 1701

P1TS3A 1706  
 P1TS3B 1732  
 P1TS3C 1743  
 P1TS4 1746  
 P1TS4A 1756  
 P2E0 2030  
 P2E1 2062  
 P2E2 2120  
 P2T0B 2025  
 P2T1B 2057  
 P2T2C 2115  
 P2TS0 2005  
 P2TS0A 2015  
 P2TS1 2035  
 P2TS1A 2045  
 P2TS2 2067  
 P2TS2A 2077  
 P2TS2B 2102  
 PCHOFF 2236  
 PCHON 2235  
 PFLAG 0114  
 PRG0 1200  
 PRG1 1600  
 PRG10 1060  
 PRG11 2200  
 PRG12 2244  
 PRG2 2000  
 PRG3 1000  
 PRG4 1006  
 PRG5 1013  
 PRG6 1031  
 PRG7 1042  
 PRGADR 0231  
 PRGEND 0274  
 PRGLIM 0034  
 PRGMASK 0033  
 PRGNUM 0035  
 PRGTAB 0037  
 PSW 0036  
 PT0 0450  
 PT1 0451  
 PTEMP 0021  
 PTEMP1 0022  
 PTMSK 0452  
 PUNCH 0465  
 RANCON 0430  
 RANDEX 0427  
 RANDNO 0032  
 RANGEN 0400  
 RANSAV 0443  
 RANTAD 0415  
 RANTBL 0431

RANTND 0442  
 RDR OFF 2234  
 RDRON 2233  
 READCK 1071  
 RTNNO 0060  
 SB0 2023  
 SB1 2055  
 SB2 2111  
 SBSP 1076  
 SCCTR 0062  
 SCNT 0103  
 SETCTR 0026  
 SHALT 0313  
 SHLT 0025  
 SKIPMA 0077  
 SKIPPA 0100  
 SPFLAG 2237  
 SRMSK 0055  
 SRSET 0232  
 SRST 0031  
 SRT0A 1017  
 SRT0B 1022  
 SRT1A 1035  
 SRT2A 1046  
 SRT2B 1051  
 SRT3A 1064  
 START 0200  
 STCTR 0322  
 SYNC 0106  
 SYNK 0546  
 SYNKA 0552  
 TADDR 0624  
 TEMP 0052  
 TEMP1 0053  
 TEMQ 0070  
 TEMR 0071  
 TSTMSK 0054  
 TTOUT 2311  
 TTOUTA 2326  
 UMOVE 0116  
 UPUNCH 0115  
 WCHK 0549  
 WTS6A 1466  
 WTS6B 1467

ERRORS DETECTED: 0

RUN-TIME: 26 SECONDS

5K CORE USED