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 ar 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.

4.1 STARTING PROCEDURES (PRG 11)

4.11 Control Switch Settings (PRG 11)

None

4.21 Starting Addresses (PRG 11)

This program starts at LOC 0200.

4.31 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.

5.1 OPERATING PROCEDURE (PRG 11)

5.11 Normal Halts (PRG 11)

None

6.1 ERRORS (PRG 11)

6.11 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.

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 momemtary 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.

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 8 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      *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
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```
0052  0000  TEMP,   0                    /WORK
0053  0000  TEMP1,  0                    /LOCATIONS
0054  0077  TSTMSK, 77                   /SR 6-11 ENABLE MASK
0055  0100  SR5MSK, 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  MSCTR,  0                    /MILLISECONDS COUNTER
0064  0000  MILCTR, 0
0065  0000  MIL1,   0                    /FOR 1 MSEC CONSTANT
0066  7444  KP8,    -334                 /PDP8 1 MSEC CONSTANT
0067  7764  KP8S,   -14                  /PDP8S 1 MSEC CONSTANT
0070  0000  TEMQ,   0                    /CONSTANTS
0071  0000  TEMR,   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
        0177    * 177
 0177   7402            HLT             /INCORRECT PROGRAM NUMBER
 0200   7604    START,  LAS
 0201   0033            AND PRGMSK
 0202   1034            TAD PRGLIM
 0203   7540            SMA SZA
 0204   5177            JMP 177
 0205   7604            LAS
 0206   0033            AND PRGMSK
 0207   3035            DCA PRGNUM
 0210   1035            TAD PRGNUM
 0211   1036            TAD PSW
 0212   3052            DCA TEMP
 0213   1452            TAD I TEMP
 0214   3231            DCA PRGADR
 0215   7350    ID,     CLA CLL CMA RAR
 0216   7710            SPA CLA
 0217   5222            JMP .+3
 0220   1066            TAD KP8
 0221   7410            SKP
 0222   1067            TAD KP8S
 0223   3065            DCA MIL1
 0224   4516            JMS I UMOVE     /INITIALIZE
 0225   0005            5               /INTERRUPT,
 0226   0001            1               /AREA,
 0227   7776            -2
 0230   5631            JMP I .+1
 0231   0000    PRGADR, 0
 0232   7602    SRSET,  HLT CLA

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

```
0257  4313  CHAINN, JMS SHALT        /HALT? (SR0)
0260  7604          LAS              /READ SR
0261  7006          RTL
0262  7630          SZL CLA          /SELECT ROUTINE? (SR1)
0263  5233          JMP GETRDY       /YES
0264  1061          TAD NXTST
0265  7001          IAC
0266  7640          SZA CLA          /LAST ROUTINE?
0267  5236          JMP GETRDY+3     /NO,
0270  7604          LAS
0271  7006          RTL
0272  7710          SPA CLA          /LOOP PROGRAM? (SR2)
0273  5233          JMP GETRDY       /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  3062          DCA TEMP         /RTN NUMBER
0305  2061          ISZ NXTST
0306  1061          TAD NXTST        /SET CURRENT
0307  3057          DCA CURTST       /RTN ADDR,
0310  1462          TAD I TEMP       /SET NEXT
0311  3061          DCA NXTST        /RTN ADDR,
0312  5676          JMP I FORWD      /EXIT
```

```
0313  0000  SHALT, 0
0314  7634        LAS             /READ SR
0315  7700        SMA CLA         /HALT? (SR0)
0316  5713        JMP I SHALT
0317  1060        TAD RTNND
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
```

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

```
                        /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  GETPTT, 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  CHRCNT, 0
0503  4432          JMS I RANDNO    /GO GENERATE RANDOM NUMBER
0504  0317          AND CRMSK       /REMOVE HIGH ORDER 6 BITS
0505  7450          SNA
0506  5303          JMP CHRCNT+1
0507  7041          CIA             /2'S COMPLEMENT IT
0510  3103          DCA SCNT
0511  1702          TAD I CHRCNT
0512  3052          DCA TEMP
0513  1103          TAD SCNT
0514  3452          DCA I TEMP      /STORE AT SPECIFIED ADDRESS
0515  2302          ISZ CHRCNT      /SET UP EXIT
0516  5702          JMP I CHRCNT    /EXIT
0517  0077  CRMSK,  77
```

```
                        /SUBROUTINE TO GENERATE RANDOM DELAY COUNT (NOT MORE THAN 3777(8)).
                        /
0520  0000    DLCNT,    0
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

                        /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

                        /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
```

```
                0600    *, 177*1
                        /SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
  0620  0000    MOVE,   0
  0621  7200            CLA
  0622  1640            TAD I MOVE      /GET "FROM ADDR" AND
  0623  3223            DCA FADDR       /STORE AT FADDR
  0624  2200            ISZ MOVE
  0625  1640            TAD I MOVE      /GET "TO ADDR" AND
  0626  3224            DCA TADDR       /STORE AT TADDR,
  0627  2200            ISZ MOVE
  0630  1640            TAD I MOVE      /GET "MOVE COUNT" AND
  0631  3225            DCA MCTR        /STORE AT MCTR,
  0632  2200            ISZ MOVE        /SET UP FOR EXIT,
  0633  7200    MOVEA,  CLA
  0634  1623            TAD I FADDR     /GET "FROM" WORD
  0635  3624            DCA I TADDR     /STORE AT "TO" LOCATION
  0636  2223            ISZ FADDR       /+1 TO "FROM" ADDR
  0637  2224            ISZ TADDR       /+1 TO "TO" ADDR,
  0640  2225            ISZ MCTR        /ALL WORDS MOVED?
  0641  5213            JMP MOVEA       /NO, GO MOVE AGAIN
  0642  5640            JMP I MOVE      /YES, EXIT
  0643  0000    FADDR,  0
  0644  0000    TADDR,  0
  0645  0000    MCTR,   0
```

```
                1000    *. 177+1
                        /PROGRAM NUMBER 3, PUNCHES TEST TAPE WITH 2 CHARACTERS
                        /SPECIFIED IN SYMBOLIC LOCATIONS PTEMP, AND PTEMP1.
1020    7200    PRG3,   CLA
1021    1021            TAD PTEMP       /GET C(PTEMP)
1022    4515            JMS I UPUNCH    /PUNCH C(PTEMP)
1023    1022            TAD PTEMP1      /GET C(PTEMP1)
1024    4515            JMS I UPUNCH    /PUNCH C(PTEMP1)
1025    5200            JMP PRG3        /REPEAT.
                        /
                        /PROGRAM NUMBER 4, PUNCHES TEST TAPE WITH BINARY COUNT PATTERN.
1026    7200    PRG4,   CLA
1027    4507            JMS I INPATT    /INITIALIZE BINARY COUNT PATTERN
1030    4510            JMS I GETPT     /GET BINARY COUNT CHARACTER.
1031    4515            JMS I UPUNCH    /PUNCH CHARACTER
1032    5210            JMP .-2         /REPEAT.
                        /
                        /PROGRAM 5-READS COUNT PATTERN-RANDOM NUMBERED GROUPS,
                        /       FIXED RANDOM DELAY BETWEEN CHARACTERS IN A GROUP.
1033    4506    PRG5,   JMS I SYNC      /SYNC TAPE
1034    3317            DCA ERRCTR      /CLEAR ERROR COUNTER
1035    4507            JMS I INPATT    /INITIALIZE PATTERN.
1036    6032            KCC             /START READER
1037    4513    SRT0A,  JMS I DLYCNT    /GENERATE DELAY COUNT
1040    4512            JMS I CRCNT     /GO GENERATE AND STORE
1041    0101            CTRA            /RANDOM CHAR, COUNT
1042    4510    SRT0B,  JMS I GETPT     /GET PATTERN CHAR,
1043    3276            DCA SBSP        /STORE AT SBSP.
1044    4430            JMS I DLY1MS    /GO DELAY
1045    4271            JMS READCK      /GO READ AND CHECK CHAR,
1046    2101            ISZ CTRA        /GROUP DONE?
1047    5222            JMP SRT0B       /NO,
1050    5217            JMP SRT0A       /YES, START AGAIN
                        /
                        /PROGRAM 6-READS COUNT PATTERN-FIXED DELAY BETWEEN CHARACTERS
1051    4506    PRG6,   JMS I SYNC      /SYNC TAPE
1052    3317            DCA ERRCTR      /CLEAR ERROR COUNTER
1053    4507            JMS I INPATT    /INITIALIZE PATTERN
1054    6032            KCC             /START READER
1055    4510    SRT1A,  JMS I GETPT     /GET PATTERN CHAR,
1056    3276            DCA SBSP        /STORE AT SBSP
1057    4430            JMS I DLY1MS    /GO DELAY
1060    4271            JMS READCK      /GO READ AND CHECK CHAR,
1061    5235            JMP SRT1A       /REPEAT
```

```
                /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              CIRA            /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

                /
                /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 HLTTST
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      HLTTST, 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
```

```
                /
1120  3000  ALIGN,  0
1121  7200          CLA
1122  6031          KSF             /READY?
1123  5322          JMP .-1         /TEST AGAIN.
1124  6034          KRS             /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  IND,    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,
```

```
                1200    *. 177+1
                        /PROGRAM 2, 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            P0TS2
  1203  5604            JMP I .+1       /GO START TEST
  1204  0232            SRSET
                        /
  1205  0000    P0TS2,  0
  1206  1225            P0TS1
                        /ISSUE KCC WITH AC=7777.  AC SHOULD GO TO 2,
                        /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 P0F0
  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.
```

```
1246  0002  P0TS2,  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          JMP 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
```

```
1275  0003    P0IS3,  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
```

```
1327  0004    PØTS4,  4
1330  1400            PØTS5
                /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 PØE4A,
1333  1345            PØE4A
1334  6042    PØTS4A, 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    PØE4A,  HLT             /UNEXPECTED INTERRUPT
1346  5334            JMP PØTS4A      /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 PØTS4C,
1354  1371            PØTS4C
1355  6032            KCC
1356  6031            KSF             /WAIT FOR READER FLAG
1357  5356            JMP .-1         /TO SET
1360  6001    PØTS4B, ION             /ENABLE INTERRUPT
1361  7000            NOP
1362  7402    PØE4B,  HLT             /READER FLAG FAILED TO INTERRUPT,
                                      /OR INTERRUPT SYSTEM MALFUNCTION
1363  4426            JMS I SETCTR    /SET INTERRUPT RETURN
1364  0002            2               /TO PØTS4C-1,
1365  1370            PØTS4C-1
                /SCOPE LOOP
1366  6001            ION
1367  7000            NOP
1370  5366            JMP .-2
                /
1371  2101    PØTS4C, ISZ CTRA        /DONE?
1372  5360            JMP PØTS4B      /NO,REPEAT
1373  5424            JMP I CHAIN
```

```
      1400    *, 177+1
 1420 0005    P0TS5,  5
 1421 1424    P0TS6
              /READER TIMING TEST. CHECKS THAT READER FLAG IS =1 NO
              /LATER THAN 110 MILLISECONDS AFTER KCC INSTRUCTION IS ISSUED.
              /
 1422 4426            JMS I SETCTR     /SET DELAYM
 1423 0023            DELAYM           /TO -11
 1424 7622            -156
 1425 4426            JMS I SETCTR     /SET COUNT OF
 1426 0101            CTRA             /-100 (DEC) IN
 1427 7634            -144             /CTRA
 1430 6032    P0TS5A, KCC              /START READER, CLEAR PC FLAG
 1431 4430            JMS I DLY1MS     /GO DELAY 110 MILLISECS
 1432 6031            KSF
 1433 5217            JMP P0E5
 1434 2101            ISZ CTRA
 1435 5210            JMP P0TS5A
 1436 5424            JMP I CHAIN
 1437 7402    P0E5,   HLT              /TST5 ERR HALT, FLAG NOT=1
                                       /110 MSECS AFTER KCC INSTRUCTION.
 1440 6032            KCC              /START READER, CLEAR FLAG, AC,
 1441 6031            KSF              /FLAG=1?
 1442 5221            JMP .-1          /NO, TEST AGAIN
 1443 5220            JMP .-3          /YES, REPEAT.
```

```
1424  0006  PØTS6,  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  PØTS6A, 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  PØTS6B, 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 Ø?
1450  5256          JMP PØE6A         /NO, ERROR, GO TO E6A,
1451  2102          ISZ CTRB          /READ CHAR 1000 TIMES?
1452  5241          JMP PØTS6B        /NO, GO READ IT AGAIN,
1453  2101          ISZ CTRA          /YES, READ 256 DIFF, CHARS?
1454  5231          JMP PØTS6A        /NO,
1455  5424          JMP I CHAIN       /YES, CHAIN
1456  1267  PØE6A,  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  PØE6B,  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,  Ø
1467  0000  WTS6B,  Ø
```

```
                1600    * . 17/+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    1635            P1TS0
1603    5604            JMP I .+1       /GO START TEST
1604    0232            SRSET
                        /
1605    0000    P1TS0,  0
1606    1635            P1TS1
                        /1, TLS AND WAIT 200 MSECS 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
1615    7200    P1TS0A, CLA             /CLEAR AC
1616    6046            TLS             /START PRINTER/PUNCH
1617    4430            JMS I DLY1MS    /DELAY 200 MSECS,
1620    6041            TSF             /FLAG=1?
1621    5227            JMP P1E0A       /NO, ERROR
1622    6041    P1TS0B, TSF             /FLAG=1?
1623    5231            JMP P1E0B       /ERROR, FAILED TO SKIP,
1624    2101            ISZ CTRA        /DONE?
1625    5222            JMP P1TS0B      /NO, REPEAT,
1626    5424            JMP I CHAIN     /YES, CHAIN
1627    7602    P1E0A,  HLT CLA         /ERR HALT A, FLAG NOT=1 AFTER
1630    5215            JMP P1TS0A      /200 MSECS, OR TSF FAILURE
1631    7602    P1E0B,  HLT CLA         /ERR HALT B, TSF FAILED TO SKIP
1632    6041            TSF             /SCOPE LOOP, SKIPS ON
1633    5232            JMP .-1         /FLAG CONTINUOUSLY,
1634    5232            JMP .-2
```

```
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,
1652  6042            TCF             /SCOPELOOP, CLEARS FLAG,
1653  6041            TSF             /ADN THEN SKIPS ON FLAG
1654  5253            JMP ,-1         /CONTINUOUSLY,
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,
1677  6042            TCF             /SCOPE LOOP, CLEARS FLAG
1700  5277            JMP ,-1         /CONTINUOUSLY,
```

```
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,
1735  4426            JMS I SETCTR    /SET INTERRUPT RETURN
1736  0002            2               /TO P1TS3C-1
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
```

```
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
                                        /AFTER TLS INSTRUCTION,
1766  6046            TLS               /SCOPE LOOP, START PRINTER
1767  6041            TSF               /FLAG=1?
1770  5367            JMP .-1           /NO, CHECK AGAIN
1771  5366            JMP .-3           /YES REPEAT,
```

```
        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   2020            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            KRB             /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
```

```
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
```

```
2067  2002    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 EXPTECTED CHARACTER
2124  5315            JMP P2T2C
                /
```

```
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 PRG11+3       /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
```

```
                /PRG12, ASR33TY AUTOMTIC PUNCH OPTION TEST
                /CHECKS OPERATION OF AUTOMATIC PUNCH BY PUNCHING RUBOUTS WITH
                /PCHON, AND ALL Ø'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 Ø'S CHAR,
2254  2102              ISZ CTRB        /DONE FOR N Ø CHARS?
2255  5253              JMP .-2         /NO, REPEAT,
2256  1241              TAD KØ377       /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 KØ377       /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,  Ø
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 KØØØ7
2301  7450              SNA             /STILL NON-Ø?
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
```

```
                /SUB TO OUTPUT DATA TO TELEPRINTER/PUNCH, IF SPFLAG
                /IS SET, READ A CHARACTER FROM TAPE READER AND CHECK
                /THAT IT IS A RUBOUT,
2311  0000      TTOUT,  0
2312  6046              TLS             /OUTPUT CHAR,
2313  6041              TSF             /DONE?
2314  5313              JMP .-1         /NO, WAIT
2315  6042              TCF             /YES, CLEAR FLAG,
2316  7200              CLA
2317  1257              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
CHRCNT	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
ERRCNT	1101
ERRCTR	1117
FADDR	0623
FLAG	0072
FORWD	0276
GETPT	0110
GETPTT	0453
GETRDY	0233
GIVE	1150
HLTTST	1111
ID	0215
INCRTN	0255
IND	1146
INITPT	0444
INPATT	0107
K0007	2240
K0377	2241
K100	0104
K2000	0105
K7617	2243
K7650	2242
K77	0073
KPB	0066
KPBS	0067
KSTART	0020
M4	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
PRGMSK	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
RANTMD	0442
RDROFF	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
SR5MSK	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	0545
WTS6A	1466
WTS6B	1467

ERRORS DETECTED: 0

RUN-TIME: 26 SECONDS

9K CORE USED