IDENTIFICATION

Product Code:	Maindec-08-D2QD-D
Product Name:	Family of 8 ASR33/35 Teletype Tests, Part 2 of 2
Date Created:	June 4, 1968
Maintainer:	Diagnostics Group

1. ABSTRACT

The Family-of-8 ASR33/35 Teletype Tests, Part 2 is the second part of a 2 part package used to test the ASR33 or ASR35 Teletype when attached to a Family-of-8 system.

Part 2 contains nine selectable programs numbered from 0 to 10 (octal). The programs are selected by means of Switch Register (SR).

The available programs are:

PRG0	Printer Test
PRG1	Punch Test
PRG2	Keyboard Test
PRG3	Combined Reader, Printer, Punch Test
PRG4	Printer Exerciser. Prints lines of characters stored in LOC 0021 and 0022. No stalls.
PRG5	Same as PRG4, but stalls between characters.
PRG6	Punch Exerciser. Punches and read checks data blocks of data stored in LOC 0021 and 0022. No stalls.
PRG7	Same as PRG6, but random stalls between characters punched.
PRG10	Punch Exerciser. Punches and read checks blocks of Binary Count pattern. Random stalls between characters punched.

2. REQUIREMENTS

2.1 Equipment

a. Standard PDP-8/S, PDP-8, or PDP-8/I with

b. ASR33 or ASR35 Teletype.

2.2 Storage

Locations 0000 through 5173 are used.

2.3 Preliminary Programs

Family-of-8 ASR33/35 Teletype Tests, Part 1. PRG0, PRG1, and PRG2 must have been run successfully.

3. LOADING PROCEDURES

3.1 Method

The Binary Loader is used to load the program.

4. STARTING PROCEDURES (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. Turn off Teletype reader and punch.

c. Load address 0200.

d. Set SR to 0000.

e. Press START.

f. Program halts at LOC 0232 to permit setting of options.

g. Select desired options, if any, in SR. For normal run SR should be 0000. Press CONTINUE.

h. Program is executed and halts at program end halt at LOC 0274, unless prevented from ending, by SR options.

NOTE

The resulting printouts during execution of PRG0 must be verified visually by user to determine correct teleprinter operation. Refer to Section 9. Program description.

4.A 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.
SR5=1	Halt on error. Bad character in AC.
SR5=0	Halt at end of data block. Error count in AC.
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. Turn on Teletype punch.

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

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

d. Turn on reader.

e. Load address 0200.

f. Set SR to 0001.

g. Press START.

h. Program halts at LOC 0232 to permit setting of options.

i. Set desired options, if any, in SR. For normal run, set SR to 0000. Press CONTINUE.

j. Program is executed and halts at program end halt at LOC 0274, unless prevented from ending by SR options, or if errors occur.

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. Turn off Teletype reader and punch.

c. Load address 0200.

d. Set SR to 0002.

e. Press START.

f. Program title is printed and program halts at LOC 0232 to permit setting of options.

g. Set desired options, if any, in SR. For normal run, set SR to 0000. Press CONTINUE.

h. Follow program instructions.

i. When last routine is completed, and provided that no SR options prevent it, the program stops at program end halt at LOC 0274.

NOTE

Correct operation of the keyboard is determined by user, by checking that the printed characters match with the characters keyed.

4.C STARTING PROCEDURES (PRG3)

4.1C Control Switch Settings (PRG3)

SR0	Halt at end of routine. Routine number in AC.
SR1	Select routine whose number is set in SR6 through SR11.
SR2	Loop program.
SR5=1	Halt on error. Bad character in AC.
SR5=0	Halt at end of data block if errors occurred. Error count in AC.
SR6 through SR11	Routine number to be selected.

4.2C Starting Addresses (PRG3)

This program starts at LOC 0200.

4.3C Program and/or Operator Action (PRG3)

a. Turn on Teletype punch.

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

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

d. Turn on reader.

e. Load address 0200.

f. Set SR to 0003.

g. Press START.

h. Program halts at LOC 0232 to permit setting of options.

i. Set desired options, if any, in SR. For normal run, set SR to 0000. Press CONTINUE.

j. Program is executed and halts at program end halt at LOC 0274, unless prevented from ending, by SR options, or if errors occur.

4.D STARTING PROCEDURES (PRG4 and PRG5)

4.1D Control Switch Settings (PRG4 and PRG5)

None

4.2D Starting Addresses (PRG4 and PRG5)

Both programs are started at LOC 0200.

4.3D Program and/or Operator Action (PRG4 and PRG5)

a. Insure Teletype is on-line.

b. Turn off Teletype reader and punch.

c. Deposit in LOC 0021 and 0022 the 8-bit codes for characters to be printed.

d. For PRG5, 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 0004, or 0005.

g. Press START.

h. The program runs continuously, printing lines with characters stored in LOC 0021 and 0021.

4.E STARTING PROCEDURES (PRG6, PRG7, and PRG10)

4.1E Control Switch Settings (PRG6, PRG7, and PRG10)

SR5=1 Halt on error. Bad character in AC.

SR5=0 Halt at end of data block if errors occurred. Error count in AC.

4.2E Starting Addresses (PRG6, PRG7, and PRG10)

These programs start at LOC 0200.

4.3E Program and/or Operator Action (PRG6, PRG7, and PRG10)

a. Turn on Teletype punch.

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

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

d. Turn on reader.

e. For PRG6 and PRG7, deposit in LOC 0021 and 0022 the 8-bit codes for characters to be punched.

f. Load address 0200.

g. Set SR to 0006, 0007, or 0010.

h. Press START.

i. The program runs continuously, unless errors occur.

5. OPERATING PROCEDURE

5.1 Program and/or Operator Action

5.1.1 Normal Halts

LOC 0232	SR SET halt. Occurs to permit setting of desired options. Press CONTINUE. (PRG0, PRG1, PRG2, PRG3).
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. (PRG0, PRG1, PRG2, PRG3).
LOC 0320	Routine end halt. Occurs at end of routine if SR0 = 1. To proceed, press CONTINUE. (PRG0, PRG1, PRG2, PRG3).

6. ERRORS

6.1 Error Halts and Description

LOC 0177	Incorrect program number selected. Set SR to correct program number and press CONTINUE. (All programs).
LOC 0255	Nonexistent routine selected. Set correct routine number in SR6 through SR11 and press CONTINUE. (PRG0, PRG1, PRG2, PRG3).
LOC 1137	Sync error halt. Sync reader subroutine has not found sync character within 145 characters. Position tape in reader so that sync character (rubout) is within 145 characters from read station, and press CONTINUE. (PRG1, PRG3, PRG6, PRG7 and PRG10).
LOC 1160	Unexpected Interrupt. A non-Teletype device has caused interrupt. Turn off device, and press CONTINUE. (PRG1, PRG3, PRG6, PRG7, and PRG10).
LOC 1343	Read Check error A. Bad character in AC. Press CONTINUE. (SR5 must be on).
LOC 1346	Read check error B. Follow up halt. Correct character in AC. To proceed, press CONTINUE. (PRG1, PRG3, PRG6, PRG7, PRG10).
LOC 1356	Block errors halt. Number of errors in AC. To proceed press CONTINUE. (SR5 must be off). (PRG1, PRG3, PRG6, PRG7, PRG10).

7. RESTRICTIONS

7.1 Starting Restrictions

All programs must be started at LOC 0200.

7.2 Operating Restrictions

PRG0 and PRG1 must precede execution of PRG3. PRG0 must precede execution of PRG2.

8. MISCELLANEOUS

8.1 Execution Time

PRG0 execution time: 15 minutes

PRG1 execution time: 19 minutes

PRG2 execution time: User dependent

PRG3 execution time: 37 minutes

PRG4 through PRG10 are continuous running programs.

9. PROGRAM DESCRIPTIONS

The Family-of-8 ASR33/35 Teletype Tests Part 2, consists of 9 programs numbered from 0 to 10 (octal).

9.1 PRG0 - Printer Test

This program contains 31 routines numbered from 0 to 36 (octal).

RTN0 Carriage return test. Checks ability of carriage return to print position 1 from all other print positions. No printing should occur in any print position other than position 1.

RTN1 Right margin test. This test shows when the right margin is not correctly adjusted. The test prints 14 groups of ---- I followed by characters - I -. A correctly adjusted margin will give the following printout:

```
----I----I----I----I----I----I----I----I----I----I----I----I----I----I----I-I
```

The I's are printed to facilitate counting print positions.

RTN2 Space Test. The test prints / in alternate positions of the line. After a double carriage return it scapes to the blank positions and prints a left slant slash. A double carriage return is issued after printing each left slant slash.

RTN3 Line Feed Test. The test prints a left slant slash followed by a line feed, followed by a 250 ms delay until 72 slashes have been printed. The result should appear to be a left slanted line from position 1 to 72. Vertical spacing variations should be apparent if adjustment is required.

RTN4 Types line of characters ABC.

RTN5 Types line of characters DEF.

RTN6	Types line of characters	GHI.
RTN7	Types line of characters	JKL.
RTN10	Types line of characters	MNO.
RTN11	Types line of characters	PQR.
RTN12	Types line of characters	STU.
RTN13	Types line of characters	VWX.
RTN14	Types line of characters	YZO.
RTN15	Types line of characters	123
RTN16	Types line of characters	456
RTN17	Types line of characters	789
RTN20	Types line of characters	!"#
RTN21	Types line of characters	$%&
RTN22	Types line of characters	'( )
RTN23	Types line of characters	*+ ,
RTN24	Types line of characters	-./
RTN25	Types line of characters	: ; <
RTN26	Types line of characters	= > ?
RTN27	Types line of characters	@ [\
RTN30	Types line of characters	[↑ ←
RTN31	Types line of all characters	
RTN32	Types line of all characters. Fixed delay between characters in a line. Delay is determined at random.	
RTN33	Types six lines of ASR33 WORST CASE PATTERN.	
RTN34	Types six lines of ASR33 WORST CASE PATTERN. Fixed delay between characters in a line. Delay is determined at random.	
	The ASR33 WORST CASE PATTERN consists of characters ^ ← W/W←	
RTN35	Types six lines of ASR35 WORST CASE PATTERN.	
RTN36	Types six lines of ASR35 WORST CASE PATTERN. Fixed delay between character in a line. Delay is determined at random.	
	The ASR35 WORST CASE PATTERN consists of characters ^ [? C ? [	

9.2 PRG1 - Punch Test

This program contains 15 routines numbered from 0 to 16 (octal). The test sequence used by the routines is:

a. Set up data block
b. Punch leader
c. Punch sync character (Rubout)
d. Punch data block
e. Sync the reader
f. Read data block
g. Punch trailer
h. Wait for reader to complete reading of data block before going to next routine.

RTN0	Punch and read check block of all 0s.
RTN1	Punch and read check block of channel 1.
RTN2	Punch and read check block of channel 2.
RTN3	Punch and read check block of channel 3.
RTN4	Punch and read check block of channel 4.
RTN5	Punch and read check block of channel 5.
RTN6	Punch and read check block of channel 6.
RTN7	Punch and read check block of channel 7.
RTN10	Punch and read check block of channel 8.
RTN11	Punch and read check block of sliding 1 pattern.
RTN12	Punch and read check block of sliding 0 pattern.
RTN13	Punch and read check block of 1s and 0s pattern.
RTN14	Same as RTN13, but random delay between characters punched.
RTN15	Punch and read check block of binary count pattern.
RTN16	Same as RTN15, but random delay between characters punched.

9.3 PRG2 - Keyboard Test

This program contains 3 routines numbered from 0 to 2.

RTN0	Checks that KSF command skips when flag = 1. Test is done 1000 times.
RTN1	Echo Test. Any characters read from keyboard are typed. Correct operation verification is done visually by user. Reading a rubout character ends the test.
RTN2	Octal equivalence test. The octal equivalent of any characters keyed is typed. Reading a rubout ends the test.

9.4 PRG3 - Combined Reader, Printer, Punch Test

This program contains 27 routines numbered from 0 to 32 (octal). All routines use the following test sequence:

a. Fill core block with data to be punched/printed.
b. Punch leader.
c. Punch sync character.
d. Punch data block (no delay between characters).
e. Sync the reader.
f. Read/Check data block (Random delay between characters).
g. Punch data block (Random delay between characters).
h. Read data block (no delay between characters).
i. Punch trailer.
j. Wait for reader to complete reading data block.
k. End of test sequence.

RTN0	Punch/Print and read check block of ABC
RTN1	Punch/Print and read check block of DEF
RTN2	Punch/Print and read check block of GHI
RTN3	Punch/Print and read check block of JKL
RTN4	Punch/Print and read check block of MNO
RTN5	Punch/Print and read check block of PQR
RTN6	Punch/Print and read check block of STU
RTN7	Punch/Print and read check block of VWX
RTN10	Punch/Print and read check block of YZ0
RTN11	Punch/Print and read check block of 123
RTN12	Punch/Print and read check block of 456
RTN13	Punch/Print and read check block of 789
RTN14	Punch/Print and read check block of ! "#
RTN15	Punch/Print and read check block of $ %&
RTN16	Punch/Print and read check block of '( ).
RTN17	Punch/Print and read check block of *+ ,
RTN20	Punch/Print and read check block of - . /
RTN21	Punch/Print and read check block of : ; <
RTN22	Punch/Print and read check block of = > ?
RTN23	Punch/Print and read check block of @ [\

RTN24	Punch/Print and read check block of] ↑ ←
RTN25	Punch/Print and read check block of all printable characters.
RTN26	Punch/Print and read check block of ASR33 Printer worst case pattern (◢ ← W/)
RTN27	Punch/Print and read check block of ASR33 Printer worst case pattern with interspersed blanks.
RTN30	Punch/Print and read check block of ASR35 Printer worst case pattern. (▼[?C)
RTN31	Punch/Print and read check block of ASR35 Printer worst case pattern with interspersed blanks.
RTN32	Punch/Print and read check blocks of space, rubout (1s and 0s).

9.5 PRG4 - Printer Exerciser

Prints lines with data stored in LOC 0021 and 0022, no stalls.

9.6 PRG5 - Printer Exerciser

Prints lines with data stored in LOC 0021 and 0022. Fixed delay between characters. Delay is determined at random.

9.7 PRG6, PRG7, and PRG10 Punch Exerciser

PRG6 punches and read checks data blocks with data stored in LOC 0021 and 0022. No stalls.

PRG7 is the same as PRG6, but random stalls between characters punched.

PRG10 punches and read checks blocks of Binary Count pattern. Random stalls between characters.

The three exercisers use the following sequence:

a. Set up data block
b. Punch leader
c. Punch sync character (rubout)
d. Punch data block
e. Sync the reader
f. Read data block
g. Punch data block
h. Back to step f.

B. Kolla

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/FAMILY-0F=8 ASR33/35 TELETYPE TESTS = PART 2
/
/PRG0=PRINTER TEST
/PRG1=PUNCH TEST
/PRG2=KEYBOARD TEST
/PRG3=COMBINED READER, PRINTER, PUNCH TEST,
/PRG4=PRINTER EXERCISER,  PRINTS LINES OF CHARACTERS STORED IN LOC 0021 AND 0022,
/                 NO STALLS,
/PRG5=PRINTER EXERCISER,  PRINTS LINES OF CHARACTERS STORED IN LOC 0021 AND 0022, STALLS
/                 BETWEEN CHARACTERS,
/PRG6=PUNCH EXERCISER, PUNCHES AND READ CHECKS DATA BLOCKS OF DATA STORED IN LOC 0021
/                 AND 0022,  NO STALLS
/PRG7= SAME AS PRG6, BUT RANDOM STALLS BETWEEN CHARACTERS PUNCHED,
/PRG10=PUNCH EXERCISER, PUNCHES AND READ CHECKS BLOCKS OF BINARY COUNT PATTERN,
/                 RANDOM STALLS
/
/STARTING ADDRESS:0200
/
/SR OPTIONS
/
/SR0=HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC,
/SR1=SELECT ROUTINE WHERE NUMBER IS SET IN SR6 TO 11,
/SR2=LOOP PROGRAM
/SR5=1=HALT ON ERROR, BAD CHARACTER IN AC,
/SR5=0= HALT AT END OF DATA BLOCK, ERROR COUNT IN AC
/SR6 TO SR11 = ROUTINE NUMBER TO BE SELECTED,
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```
                    /ASR33/35 TELETYPE TESTS - PART 2
     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
0021 0000           PTEMP,  0
0022 0000           PTEMP1, 0
0023 0000           DELAYM, 0
0024 0000           DELAYS, 0
0025 0000           PRGNUM, 0
0026 0017           PRGMSK, 17
0027 7770           PRGLIM, -10
0030 0161           PSW,    PRGTAB
0031 0000           CPID,   0
0032 7444           KP8,    -334
0033 7764           KP8S,   -14
0034 0000           RTNNO,  0
0035 0000           CURTST, 0
0036 0000           NXTST,  0
0037 0077           TSTMSK, 77
0040 0000           MSCTR,  0
0041 0000           MILCTR, 0
0042 0000           MIL1,   0
0043 0535           DLY1MS, DLYMS
0044 0257           CHAIN,  CHAINN
0045 0515           SHLT,   SHALT
0046 0522           SETCTR, STCTR
0047 0400           RANDNO, RANGEN
0050 0444           XTYPST, TYPSTG
0051 1246           URRDY,  RRDY
0052 0550           DLYCNT, DLCNT
0053 0560           UCRLF,  CRLF
0054 0526           UPUNCH, PUNCH
0055 0542           UMOVE,  MOVVE
0056 1530           UTYPE,  TYPE
0057 0621           USTBF,  STBF
0060 1516           UTPLNS, TYPLNS
0061 0637           UFBF3,  FBF3
0062 0661           UFBALL, FBALL
0063 0677           UFBTMP, FBTMP
0064 0715           UFW334, FW334
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0065  0735          UFW336, FW336
0066  0751          UFW335, FW335
0067  1000          UFW354, FW354
0070  1016          UFW356, FW356
0071  1034          UFW355, FW355
0072  1067          UPLTLR, PLTLR
0073  1102          UPSYNC, PSYNC
0074  1100          URSYNC, RSYNC
0075  1400          UDLMSK, DLMSR
0076  1417          UDCNTP, DLCNTP
0077  1161          UOUT,   OUT
0100  1217          UPBLK,  PBLK
0101  1225          UPBLKR, PBLKR
0102  1270          URDBLK, RDBLK
0103  1277          URBLKR, RDBLKR
0104  1445          UNTST,  NTST
0105  1500          UCNTST, CNTST
0106  1600          UASCCN, ASCCN
0107  1461          USTST,  STST
0110  1052          CHECK,  CHCK
0111  0600          INPATI, INITPT
0112  0607          GETPT,  GETPTT
0113  0000          TEMP,   0
0114  0000          TEMP1,  0
0115  0000          TEMPU,  0
0116  0000          UTEMP,  0
0117  0000          UTEMP1, 0
0120  0000          UTEMP2, 0
0121  0000          CTRA,   0
0122  0000          CTRB,   0
0123  0100          SRDMSK, 100
0124  0000          ERRCR,  0
0125  0000          ERRCTR, 0
0126  0277          DLYMSK, 277
0127  0000          PFLAG,  0
0130  0000          BLKCNT, 0
0131  0215          CR,     215
0132  0212          LF,     212
0133  7401          MRBOUT, -377
0134  0000          RBUSY,  0
0135  0000          LINK,   0
0136  0000          AC,     0
0137  0240          SPACE,  240
0140  0257          C257,   257
0141  0334          C334,   334
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0142  7777          M1,     -1
0143  7776          M2,     -2
0144  7762          M16,    -16
0145  7734          M44,    -44
0146  7670          M110,   -110
0147  7667          M111,   -111

0150  0000          TEMQ,   0
0151  0000          TEMR,   0
0152  0000          FLAG,   0
0153  0077          K77,    77
0154  7740          M40,    -40
0155  0100          C100,   100
0156  0240          C240,   240
0157  7500          SKIPMA, SMA
0160  7510          SKIPPA, SPA
0161  2400          PRGTAB, PRG0
0162  3060                  PRG1
0163  3440                  PRG2
0164  3537                  PRG3
0165  4076                  PRG4
0166  4104                  PRG5
0167  4111                  PRG6
0170  4131                  PRG7
0171  4151                  PRG10
      4446          SETLOC=JMS I SETCTR
      4455          MOVE=JMS I UMOVE
      4443          DELAY=JMS I DLY1MS
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      0177                *177
0177  7402                      HLT             /INCORRECT PROGRAM NUMBER HALT.
0200  7604          START,      LAS             /READ SR
0201  0026                      AND PRGMSK
0202  1027                      TAD PRGLIM
0203  7540                      SMA SZA /VALID PROGRAM NUMBER?
0204  5177                      JMP 177         /NO. GO TO LOC 177
0205  7604                      LAS             /READ SR
0206  0026                      AND PRGMSK
0207  3025                      DCA PRGNUM      /SAVE PROGRAM NUMBER
0210  1025                      TAD PRGNUM      /DEVELOP PROGRAM
0211  1030                      TAD PSW         /START ADDRESS AND
0212  3113                      DCA TEMP
0213  1513                      TAD I TEMP
0214  3231                      DCA PRGADR
0215  7550          ID,         CLA CLL CMA RAR /DETERMINE CPU ID.
0216  7710                      SPA CLA         /IS IT PDP8/8I?
0217  5222                      JMP .+3         /NO, IT IS A PDP8/S.
0220  1032                      TAD KP8         /YES, IT IS PDP8/8I
0221  7410                      SKP
0222  1033                      TAD KP8S
0223  3042                      DCA MIL1        /SET DELAY CONSTANT
0224  4455                      JMS I UMOVE
0225  0005                      5
0226  0001                      1
0227  7776                      -2
0230  5631                      JMP I .+1       /GO TO SELECTED PROGRAM.
0231  0000          PRGADR,     0
0232  7602          SRSET,      HLT CLA
0233  7200          GETRDY,     CLA
0234  1020                      TAD KSTART              /GET ADDRESS OF 1ST ROUTINE
0235  3036                      DCA NXTST       /STORE AT NXTST
0236  4276                      JMS FORWD
0237  7604                      LAS             /READ SR
0240  7004                      RAL
0241  7500                      SMA             /ROUTINE SELECT?
0242  5435                      JMP I CURTST    /NO. START WITH CURRENT ROUTINE.
0243  7604                      LAS             /YES, READ SR
0244  0037                      AND TSTMSK      /GET ROUTINE NUMBER.
0245  7041                      CIA             /2'S COMPLEMENT IT.
0246  1034                      TAD RTNNO       /ADD CURRENT ROUTINE NUMBER.
0247  7650                      SNA CLA         /IS IT THIS ROUTINE?
0250  5435                      JMP I CURTST    /YES, GO DO IT.
0251  1036                      TAD NXTST       /NO. IS THIS THE LAST ROUTINE?
0252  7001                      IAC
0253  7640                      SZA CLA
0254  5236                      JMP GETRDY+3    /NO.
0255  7402          INCRTN,     HLT             /YES, INCORRECT ROUTINE NUMBER
0256  5233                      JMP GETRDY
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```
0257  4313          CHAINN, JMS SHALT       /HALT? (SR0) GO CHECK.
0260  7604                  LAS             /READ SR
0261  7020                  RTL
0262  7630                  SZL CLA         /ROUTINE SELECT?(SR1)
0263  5233                  JMP GETRDY      /YES.
0264  1330                  TAD NXTST
0265  7001                  IAC
0266  7640                  SZA CLA         /LAST ROUTINE?
0267  5236                  JMP GETRDY+3    /NO. SET UP TO DO NEXT ROUTINE
0270  7604                  LAS
0271  7020                  RTL
0272  7710                  SPA CLA         /LOOP PROGRAM? (SR2)
0273  5233                  JMP GETRDY      /YES, GO REPEAT PROGRAM.
0274  7402          PRGEND, HLT             /PROGRAM END HALT
0275  5257                  JMP CHAINN      /GO CHECK FOR OPTIONS AGAIN.
0276  0000          FORWD,  0
0277  7300                  CLA CLL
0300  1430                  TAD I NXTST     /GET AND STORE NEXT ROUTINE
0301  3034                  DCA RTNNO       /NUMBER.
0302  2030                  ISZ NXTST
0303  1030                  TAD NXTST       /SET CURRENT
0304  3113                  DCA TEMP        /ROUTINE NUMBER
0305  2030                  ISZ NXTST
0306  1030                  TAD NXTST       /SET CURRENT
0307  3035                  DCA CURTST      /ROUTINE ADDRESS.
0310  1513                  TAD I TEMP      /SET NEXT
0311  3030                  DCA NXTST       /ROUTINE ADDRESS.
0312  5676                  JMP I FORWD     /EXIT.
0313  0000          SHALT,  0
0314  7604                  LAS             /READ SR.
0315  7700                  SMA CLA         /HALT? (SR0)
0316  5713                  JMP I SHALT     /NO. EXIT
0317  1034                  TAD RTNNO       /GET CURRENT RTN NUMBER
0320  7402                  HLT             /UNCONDITIONAL HALT.
0321  5713                  JMP I SHALT     /EXIT.
```

```
0322  0000  STCTR,  0
0323  7200          CLA
0324  1726          TAD I STCTR       /GET CTR ADDRESS
0325  3113          DCA TEMP          /STORE AT TEMP.
0326  2322          ISZ STCTR
0327  1726          TAD I STCTR       /GET COUNT AND STORE
0330  3513          DCA I TEMP        /PER C(TEMP)
0331  2322          ISZ STCTR
0332  5722          JMP I STCTR       /EXIT.
0333  0000  DLYMS,  0
0334  7300          CLA CLL
0335  1023          TAD  DELAYM       /GET MILLISECOND COUNT
0336  3040          DCA MSCTR         /STORE AT MSCTR
0337  5740          JMP I .+1
0340  0341          .+1
0341  1042          TAD MIL1          /GET 1MS CONSTANT
0342  3041          DCA MILCTR        /STORE IN MILCTR
0343  2041          ISZ MILCTR        /DELAYED 1 MILLISECOND?
0344  5343          JMP .-1           /NO.
0345  2040          ISZ MSCTR         /YES. DONE DELAYING?
0346  5337          JMP .-7           /NO. GO DELAY ANOTHER MILSEC.
0347  5733          JMP I DLYMS       /EXIT.
0350  0000  DLCNT,  0
0351  4447          JMS I RANDNO      /GENERATE RANDOM NUMBER
0352  0126          AND DLYMSK        /MASK OUT UNDESIRED BITS
0353  7450          SNA               /RESULT ZERO?
0354  5351          JMP DLCNT+1       /YES. GET ANOTHER NUMBER
0355  7041          CMA IAC           /NO, 2'S COMPLEMENT IT
0356  3023          DCA DELAYM        /STORE AT DELAYM
0357  5750          JMP I DLCNT       /EXIT
0360  0000  CRLF,   0
0361  7200          CLA
0362  1760          TAD I CRLF
0363  3375          DCA CRCTR
0364  2360          ISZ CRLF
0365  4450          JMS I XTYPST
0366  0372          .+4
0367  2375          ISZ CRCTR
0370  5365          JMP .-3
0371  5760          JMP I CRLF
0372  0015          0015
0373  0012          0012
0374  0001          0001
0375  0000  CRCTR,  0
```

```
        0400            *. 17/*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    7536    RANTND, -.
0443    0000    RANSAV, 0
```

```
                        /TYPE CHARACTER STRING SUBROUTINE
0444  0000              TYPSTG, 0
0445  7200                      CLA
0446  1644                      TAD I TYPSTG      /GET AND STORE
0447  3150                      DCA TEMQ          /INITIAL ADDRESS
0450  3152                      DCA FLAG          /CLEAR FLAG.
0451  2244                      ISZ TYPSTG        /SET UP EXIT
0452  1550              TSC1,   TAD I TEMQ        /PICK UP DATA
0453  7012                      RTR
0454  7012                      RTR
0455  7012                      RTR
0456  4263                      JMS TSC2          /GO TYPE 1ST CHARACTER
0457  1550                      TAD I TEMQ        /PICK UP DATE
0460  4263                      JMS TSC2          /GO TYPE 2ND CHARACTER
0461  2150                      ISZ TEMQ          /EVEN STRING ADDRESS
0462  5252                      JMP TSC1          /GO BACK FOR MORE
0463  0000              TSC2,   0
0464  0153                      AND K77           /MASK OFF 6 BITS
0465  3151                      DCA TEMR          /SAVE CHARACTER
0466  1152                      TAD FLAG          /TEST "SPECIAL" FLAG,
0467  7640                      SZA CLA
0470  5300                      JMP TYPSP         /SET TYPE SPECIAL
0471  1151                      TAD TEMR          /NO, REGULAR CHARACTER
0472  7450                      SNA               /ZERO?
0473  5276                      JMP .+3           /YES, SET FLAG.
0474  4317              TYPAT,  JMS PRINT         /NO, PRINT IT.
0475  5663                      JMP I TSC2        /RETURN,
0476  2152                      ISZ FLAG          /SET "SPECIAL" FLAG,
0477  5663                      JMP I TSC2        /EXIT
0500  3152              TYPSP,  DCA FLAG          /CLEAR FLAG.
0501  1151                      TAD TEMR          /TEST FOR 0,
0502  7041                      CIA
0503  7450                      SNA
0504  5274                      JMP TYPAT         /0:TYPE "@"
0505  7001                      IAC               /TEST FOR 01
0506  7650                      SNA CLA
0507  5644                      JMP I TYPSTG      /YES, EXIT CODE.
0510  1157                      TAD SKIPMA        /ALTER INSTRUCTION
0511  3321                      DCA SWITCH        /TO BE "SMA"
0512  1151                      TAD TEMR          /TYPE CHAR
0513  4317                      JMS PRINT
0514  1160                      TAD SKIPPA        /ALTER INSTRUCTION
0515  3321                      DCA SWITCH        /TO BE "SPA"
0516  5663                      JMP I TSC2        /RETURN
0517  0000              PRINT,  0
0520  1154                      TAD M40           /COMPARE WITH 40
0521  7510              SWITCH, SPA               /OR SMA FOR SPECIAL CODES,
0522  1155                      TAD C100
0523  1156                      TAD C240
0524  4454                      JMS I UPUNCH      /GO PRINT CHARACTER
0525  5717                      JMP I PRINT       /RETURN
```

```
0526  0000          PUNCH,  0
0527  2127                  ISZ PFLAG       /SET PFLAG
0530  6046                  TLS             /PUNCH/PRINT
0531  7200                  CLA
0532  1127                  TAD PFLAG       /GET C(PFLAG)
0533  7650                  SNA CLA         /FLAG RESET?
0534  5537                  JMP .+3         /YES
0535  6041                  TSF             /NO, FLAG UP?
0536  5532                  JMP .-4         /NO,
0537  6042                  TCF             /YES, CLEAR PRINTER FLAG,
0540  3127                  DCA PFLAG       /CLEAR PFLAG
0541  5726                  JMP I PUNCH     /EXIT,
0542  0000          MOVVE,  0
0543  7200                  CLA
0544  1742                  TAD I MOVVE     /GET AND STORE
0545  3364                  DCA FADDR       /"FROM" ADDRESS
0546  2342                  ISZ MOVVE
0547  1742                  TAD I MOVVE     /GET AND STORE
0550  3365                  DCA TADDR       /"TO" ADDRESS
0551  2342                  ISZ MOVVE
0552  1742                  TAD I MOVVE     /GET AND STORE
0553  3366                  DCA MCTR        /"MOVE" COUNT,
0554  2342                  ISZ MOVVE       /SET UP EXIT,
0555  1764          MOVEA,  TAD I FADDR     /GET "FROM" WORD
0556  3765                  DCA I TADDR     /STORE AT "TO" LOCATION
0557  2364                  ISZ FADDR       /+1 TO FADDR
0560  2365                  ISZ TADDR       /+1 TO TADDR
0561  2366                  ISZ MCTR        /DONE MOVING?
0562  5555                  JMP MOVEA       /NO, REPEAT
0563  5742                  JMP I MOVVE     /YES, EXIT,
0564  0000          FADDR,  0
0565  0000          TADDR,  0
0566  0000          MCTR,   0
```

```
      0600          *, 17/+1
                    /INITIALIZE BINARY PATTERN SUBROUTINE
0600  0000          INITPT, 0
0601  7200                  CLA
0602  3204                  DCA PT0           /SET PT0=0
0603  5600                  JMP I INITPT      /EXIT,
0604  0000          PT0,    0
0605  0000          PT1,    0
0606  0377          PTMSK,  377
                    /SUBROUTINE TO SET AC TO NEXT BINARY PATTERN CHARACTER
0607  0000          GETPTT, 0
0610  7200                  CLA
0611  1204                  TAD PT0           /GET PT0
0612  3205                  DCA PT1           /STORE AT PT1
0613  1205                  TAD PT1           /GET PT1
0614  7001                  IAC               /+1 TO AC
0615  0206                  AND PTMSK         /LIMIT TO 8 BITS
0616  3204                  DCA PT0           /STORE AT PT0
0617  1205                  TAD PT1           /GET PT1
0620  5607                  JMP I GETPTT      /EXIT

                    /SET BUFFER AREA SUBROUTINE
0621  0000          STBF,   0
0622  4455                  JMS I UMOVE       /MOVE CRLF TO BLOCKA
0623  0131                  CR
0624  4175                  BLOCKA
0625  7776                  -2
0626  4455                  JMS I UMOVE       /MOVE CRLF TO BLOCKB
0627  0131                  CR
0630  4307                  BLOCKB
0631  7776                  -2
0632  4455                  JMS I UMOVE       /MOVE CRLF TO BLOCKC
0633  0131                  CR
0634  4421                  BLOCKC
0635  7776                  -2
0636  5621                  JMP I STBF        /EXIT,
```

```
0637  0000          FBF3,   0
0640  7200                  CLA             /FILL 144 CHARACTER BUFFER
0641  1637                  TAD I FBF3      /WITH 3 CHARACTERS WHOSE
0642  3245                  DCA .+3         /ADDRESS IS SPECIFIED
0643  2237                  ISZ FBF3        /AT CALL+1
0644  4455                  JMS I UMOVE
0645  0000                  0
0646  4177                  BLOCK1
0647  7775                  -3
0650  4455                  JMS I UMOVE
0651  4177                  BLOCK1
0652  4202                  BLOCK1+3
0653  7673                  -103
0654  4455                  JMS I UMOVE
0655  4177                  BLOCK1
0656  4311                  BLOCK2
0657  7670                  -110
0660  5637                  JMP I FBF3      /EXIT
0661  0000          FBALL,  0
0662  4455                  JMS I UMOVE     /FILL 144 CHARACTER BUFFER
0663  1710                  A               /WITH ALL PRINTABLE ASCII
0664  4177                  BLOCK1          /CHARACTERS,
0665  7701                  -77
0666  4455                  JMS I UMOVE
0667  1710                  A
0670  4276                  BLOCK1+77
0671  7767                  -11
0672  4455                  JMS I UMOVE
0673  4177                  BLOCK1
0674  4311                  BLOCK2
0675  7670                  -110
0676  5661                  JMP I FBALL     /EXIT

0677  0000          FBTMP,  0
0700  4455                  JMS I UMOVE     /FILL 144 CHARACTER BUFFER
0701  0021                  PTEMP           /WITH DATA IN PTEMP
0702  4177                  BLOCK1          /AND PTEMP1,
0703  7776                  -2
0704  4455                  JMS I UMOVE
0705  4177                  BLOCK1
0706  4201                  BLOCK1+2
0707  7672                  -106
0710  4455                  JMS I UMOVE
0711  4177                  BLOCK1
0712  4311                  BLOCK2
0713  7670                  -110
0714  5677                  JMP I FBTMP     /EXIT,
```

```
0715  0000              FW334,  0
0716  4455                      JMS I UMOVE       /MOVE 4 CHARACTER ASR33 PRINTER
0717  1644                      ASSWP4            /WORST CASE PATTERN TO
0720  4177                      BLOCK1            /BLOCK1
0721  7774                      -4
0722  4455                      JMS I UMOVE       /FILL BLOCK1 WITH PATTERN
0723  4177                      BLOCK1
0724  4203                      BLOCK1+4
0725  7674                      -104
0726  4455                      JMS I UMOVE       /FILL BLOCK2 WITH PATTERN
0727  4177                      BLOCK1
0730  4311                      BLOCK2
0731  7670                      -110
0732  5715                      JMP I FW334       /EXIT
0733  0000              FW336,  0
0734  4455                      JMS I UMOVE       /MOVE 6 CHARACTER ARS33 PRINTER
0735  1650                      ASSWP6            /WORST CASE PATTERN TO
0736  4177                      BLOCK1            /BLOCK1
0737  7772                      -6
0740  4455                      JMS I UMOVE       /FILL BLOCKS WITH PATTERN
0741  4177                      BLOCK1
0742  4205                      BLOCK1+6
0743  7676                      -102
0744  4455                      MOVE              /FILL BLOCK2 WITH PATTERN.
0745  4177                      BLOCK1
0746  4311                      BLOCK2
0747  7670                      -110
0750  5733                      JMP I FW336       /EXIT

0751  0000              FW33S,  0
0752  4455                      JMS I UMOVE       /MOVE 8 CHARACTER ASR33 PRINTER
0753  1656                      ASSWPS                  /WORST CASE PATTERN WITH
0754  4177                      BLOCK1            /INTERSPERSED BLANKS TO BLOCK1.
0755  7770                      -10
0756  4455                      JMS I UMOVE       /FILL BLOCK1 WITH PATTERN
0757  4177                      BLOCK1
0760  4207                      BLOCK1+10
0761  7700                      -100
0762  4455                      JMS I UMOVE       /FILL BLOCK2 WITH PATTERN
0763  4177                      BLOCK1
0764  4311                      BLOCK2
0765  7670                      -110
0766  5751                      JMP I FW33S       /EXIT
```

```
      1000              *, 17/+1
1000  0000  FW354,  0
1001  4455              JMS I UMOVE     /MOVE 4 CHARACTER ASR35 PRINTER
1002  1006              ASCWP4          /WORST CASE PATTERN TO BLOCK1.
1003  4177              BLOCK1
1004  7774              -4
1005  4455              JMS I UMOVE     /FILL BLOCK1 WITH PATTERN
1006  4177              BLOCK1
1007  4203              BLOCK1+4
1010  7674              -104
1011  4455              JMS I UMOVE     /FILL BLOCK2 WITH PATTERN
1012  4177              BLOCK1
1013  4311              BLOCK2
1014  7670              -110
1015  5600              JMP I FW354     /EXIT
1016  0000  FW356,  0
1017  4455              JMS I UMOVE     /MOVE 6 CHARACTER ASR35 PRINTER
1020  1012              ASCWP6          /WORST CASE PATTERN TO BLOCK1
1021  4177              BLOCK1
1022  7772              -6
1023  4455              JMS I UMOVE     /FILL BLOCK1 WITH PATTERN
1024  4177              BLOCK1
1025  4205              BLOCK1+6
1026  7676              -102
1027  4455              JMS I UMOVE     /FILL BLOCK2 WITH PATTERN
1030  4177              BLOCK1
1031  4311              BLOCK2
1032  7670              -110
1033  5616              JMP I FW356     /EXIT
1034  0000  FW358,  0
1035  4455              JMS I UMOVE     /MOVE 8 CHARACTER ASR35 PRINTER
1036  1700              ASCWP8          /WORST CASE PATTERN TO BLOCK1
1037  4177              BLOCK1
1040  7770              -10
1041  4455              JMS I UMOVE     /FILL BLOCK1 WITH PATTERN
1042  4177              BLOCK1
1043  4207              BLOCK1+10
1044  7700              -100
1045  4455              JMS I UMOVE     /FILL BLOCK2 WITH PATTERN
1046  4177              BLOCK1
1047  4311              BLOCK2
1050  7670              -110
1051  5634              JMP I FW358     /EXIT
```

```
                        /SUBROUTINE TO COMPARE C(AC) TO C(CALL+1)
1052  0000              CHCK,   0
1053  3266                      DCA WCHK          /STORE AC AT WCHK
1054  1652                      TAD I CHCK        /SET COMPARE DATA
1055  7041                      CIA               /2'S COMPLEMENT IT
1056  1266                      TAD WCHK          /ADD C(WCHK)
1057  2252                      ISZ CHCK          /SET UP FOR UNEQUAL EXIT
1060  7640                      SZA CLA           /EQUAL?
1061  5264                      JMP .+3           /NO,
1062  2252                      ISZ CHCK          /YES, SET UP FOR EQUAL EXIT,
1063  5652                      JMP I CHCK        /EQUAL EXIT
1064  1266                      TAD WCHK          /RESTORE AC
1065  5652                      JMP I CHCK        /UNEQUAL EXIT,
1066  0000              WCHK,   0

                        /PUNCH 70 (CODE 376) CHARACTERS SUBROUTINE
1067  0000              PLTLR,  0
1070  4446                      JMS I SETCTR      /SET P70CTR TO -70
1071  1100                      P70CTR
1072  7672                      -106
1073  1301                      TAD LCODE                 /GET 376 CODE
1074  4454                      JMS I UPUNCH      /GO PUNCH IT
1075  2300                      ISZ P70CTR        /ALL CHARACTERS PUNCHED?
1076  5275                      JMP .-3           /NO, REPEAT,
1077  5667                      JMP I PLTLR       /YES, EXIT,
1100  0000              P70CTR, 0
1101  0376              LCODE,  376
                        /PUNCH SYNC CHARACTER SUBROUTINE (RUBOUT)
1102  0000              PSYNC,  0
1103  7240                      CLA CMA           /SET AC TO 7777
1104  4454                      JMS I UPUNCH      /PUNCH A RUBOUT
1105  5702                      JMP I PSYNC       /EXIT.
                        /SYNC READER SUBROUTINE
1106  0000              RSYNC,  0
1107  4446                      JMS I SETCTR      /SET RSCTR TO -145
1110  1122                      RSCTR
1111  7557                      -221
1112  4451                      JMS I URRDY       /WAIT FOR READER NOT BUSY
1113  7240                      CLA CMA           /READER NOT BUSY,
1114  3134                      DCA RBUSY         /SET READER BUSY INDICATOR
1115  4446                      JMS I SETCTR      /SET READER INTERRUPT
1116  1157                      VCTR              /SERVICE RETURN ADDRESS,
1117  1123                      RSSERV
1120  6001                      ION               /ENABLE INTERRUPT
1121  5700                      JMP I RSYNC       /EXIT
1122  0000              RSCTR,  0
```

```
1123  6036              RSSERV, KRB             /READ
1124  1133                      TAD MRBOUT      /ADD MINUS RUBOUT
1125  7640                      SZA CLA         /IS IT A RUBOUT?
1126  5535                      JMP .+7 /NO.
1127  3134                      DCA RBUSY       /YES, CLEAR READER BUSY,
1130  7300                      CLA CLL
1131  1135                      TAD LINK
1132  7004                      RAL             /RESTORE LINK
1133  1136                      TAD AC          /RESTORE AC
1134  5400                      JMP I 0         /RETURN
1135  2522                      ISZ RSCTR       /145 CHARACTER READ?
1136  5477                      JMP I UOUT      /NO.
1137  7602                      HLT CLA         /YES, NO SYNC.
1140  4446                      JMS I SETCTR    /SET RSCTR TO -145
1141  1122                      RSCTR
1142  7557                      -221
1143  5477                      JMP I UOUT      /RETURN

1144  3136              INTSVC, DCA AC          /SAVE AC
1145  7010                      RAR
1146  3135                      DCA LINK        /SAVE LINK
1147  6041                      TSF             /PUNCH/PRINTER?
1150  5354                      JMP .+4         /NO.
1151  6042                      TCF             /YES, CLEAR FLAG,
1152  3127                      DCA PFLAG       /CLEAR PFLAG
1153  5561                      JMP OUT         /RETURN
1154  6031                      KSF             /READER/KYBD?
1155  5560                      JMP .+3         /NO ERROR,
1156  5757                      JMP I .+1       /GO SERVICE READER
1157  0000              VCTR,   0
1160  7402                      HLT             /UNEXPECTED INTERRUPT
1161  7300              OUT,    CLA CLL
1162  1135                      TAD LINK
1163  7004                      RAL             /RESTORE LINK
1164  1136                      TAD AC          /RESTORE AC,
1165  6001                      ION             /ENABLE INTERRUPT
1166  5400                      JMP I 0         /RETURN
```

```
                *. 17/+1
1200            *, 17/+1
1200 0000 PSTUP, 0                       /PUNCH SETUP
1201 4446        SETLOC                  /SET DATA ADDR
1202 1245        PADDR
1203 4175        BLOCKA
1204 4455        MOVE                    /SET BLOCK LENGTH
1205 0130        BLKCNT
1206 1244        PCTR
1207 7777        -1
1210 5600        JMP I PSTUP             /EXIT
                 /
1211 0000 PDCR,  0                       /PUNCH  DATA CHAR SUB,
1212 7200        CLA
1213 1645        TAD I PADDR             /GET DATA
1214 2245        ISZ PADDR                       /UPDATE PADDR,
1215 4454        JMS I UPUNCH            /GO PUNCH/PRINT DATA
1216 5611        JMP I PDCR              /EXIT
                 /
1217 0000 PBLK,  0                       /PUNCH DATA BLOCK FULL SPEED
1220 4200        JMS PSTUP
1221 4211        JMS PDCR                /GO PUNCH CHARACTER
1222 2244        ISZ PCTR                        /ALL CHARS PUNCHED?
1223 5221        JMP .-2                 /NO, REPEAT
1224 5617        JMP I PBLK              /YES, EXIT
                 /
1225 0000 PBLKR, 0                       /PUNCH DATA BLOCK RANDOM STALLS,
1226 4200        JMS PSTUP                       /GO DO SET UP
1227 4476        JMS I UDCNTP                    /FILL DELAY BLOCK
1230 4446        SETLOC                  /DBLK ADDRESS TO DAP
1231 1243        DAP
1232 4575        DBLK
1233 1645        TAD I DAP                       /GET DELAY WORD
1234 3023        DCA DELAYM              /TO DELAYM
1235 2243        ISZ DAP                 /UPDATE DAP,
1236 4443        DELAY                   /DELAY,
1237 4211        JMS PDCR                        /GO PUNCH CHARACTER
1240 2244        ISZ PCTR                        /ALL CHARS PUNCHED?
1241 5233        JMP .-6                         /NO, REPEAT
1242 5625        JMP I PBLKR             /YES, EXIT,
1243 0000 DAP,   0
1244 0000 PCTR,  0
1245 0000 PADDR, 0
```

```
1246  0000          RRDY,   0               /WAIT FOR RDR NOT BUSY SUB.
1247  7200                  CLA
1250  1134                  TAD RBUSY               /FETCH RBUSY.
1251  7640                  SZA CLA         /READER BUSY?
1252  5250                  JMP .-2         /YES, TRY AGAIN
1253  5646                  JMP I RRDY      /NO,EXIT
1254  0000          RSTUP,  0
1255  4246                  JMS RRDY                /WAIT FOR RDR NOT BUSY
1256  2134                  ISZ RBUSY               /SET RBUSY INDICATOR
1257  4446                  SETLOC                  /SET DATA ADDR
1260  1312                  RADDR
1261  4175                  BLOCKA
1262  4455                  MOVE            /SET DATA BLOCK LENGTH
1263  0130                  BLKCNT
1264  1313                  RBCTR
1265  7771                  -1
1266  3125                  DCA ERRCTR      /CLEAR ERROR COUNTER
1267  5654                  JMP I RSTUP     /EXIT.
1270  0000          RDBLK,  0               /READ DATA BLOCK, FULL SPEED
1271  4254                  JMS RSTUP               /GO DO SETUP
1272  4446                  SETLOC                  /SET READER SERVICE
1273  1157                  VCTR            /ADDRESS.
1274  1321                  RDSRV
1275  6001                  ION             /ENABLE INT.
1276  5670                  JMP I RDBLK
1277  0000          RDBLKR, 0               /READ DATA BLOCK,RANDOM STALLS
1300  4254                  JMS RSTUP               /GO DO SETUP.
1301  4446                  SETLOC                  /SET READER SERVICE
1302  1157                  VCTR            /ADDRESS.
1303  1314                  RDRSRV
1304  4446                  SETLOC          /SET DELAY BLOCK ADDRESS.
1305  1311                  DAR
1306  4175                  DBLK
1307  6001                  ION             /ENABLE INT.
1310  5671                  JMP I RDBLKR    /EXIT
1311  0000          DAR,    0
1312  0000          RADDR,  0
1313  0000          RBCTR,  0
                    /READER SERVICE ROUTINES
1314  7200          RDRSRV, CLA
1315  1711                  TAD I DAR               /MOVE DELAY WORD TO
1316  3024                  DCA DELAYS      /DELAYS.
1317  2311                  ISZ DAR         /UPDATE DAR
1320  4475                  JMS I DBLMSR    /STALL.
1321  1712          RDSRV,  TAD I RADDR     /GET EXPECTED CHARACTER
1322  3320                  DCA SB          /STORE AT SB
1323  2312                  ISZ RADDR               /UPDATE RADDR
1324  6030                  KRB             /READ CHARACTER
1325  4310                  JMS I CHECK     /GO CHECK IT.
1326  0000          SB,     0
1327  5331                  JMP ERROR               /ERROR
1330  5347                  JMP RDDONE      /GOOD.
```

```
1331  3124  ERROR,  DCA ERROR          /STORE BAD CHARACTER
1332  2123          ISZ ERRCTR         /INCREMENT ERROR COUNTER
1333  5336          JMP .+3
1334  7240          CLA CMA            /OFLOW, 7777 TO AC
1335  3123          DCA ERRCTR         /RESTORE TO 7777,
1336  7604          LAS                /READ SR
1337  0126          AND SR5MSK
1340  7650          SNA CLA            /HALT ON ERROR?(SR5)
1341  5347          JMP RUDONE         /NO,
1342  1124          TAD ERROR                 /YES, GET BAD CHARACTER
1343  7402          HLT                /ERROR HALT, BAD CHAR IN AC
1344  7200          CLA
1345  1326          TAD SB
1346  7402          HLT                /GOOD CHAR IN AC
1347  2313  RUDONE, ISZ RBCTR                /ALL DONE?
1350  5477          JMP I UOUT         /NO, TO MAINLINE
1351  7200          CLA                /YES,
1352  1123          TAD ERRCTR         /GET C(ERRCTR)
1353  7650          SNA CLA            /ANY ERRORS?
1354  5357          JMP .+3            /NO,
1355  1123          TAD ERRCTR         /YES,
1356  7402          HLT                /NUMBER OF ERRORS IN AC,
1357  7300          CLA CLL
1360  3134          DCA RBUSY                 /CLEAR RBUSY INDICATOR
1361  1135          TAD LINK
1362  7004          RAL                /RESTORE LINK
1363  1136          TAD AC             /TO MAINLINE
1364  5400          JMP I 0
```

```
                        /
      1400              *, 17/+1
1400  0000    DLMSR,    0
1401  7300              CLA CLL
1402  1024              TAD DELAYS        /GET AND STORE MSEC
1403  3215              DCA RCTRA                 /DELAY COUNT
1404  5605              JMP I ,+1
1405  1406              .+1
1406  1042              TAD MIL1                  /GET AND STORE
1407  3216              DCA RCTRB                 /1MS CONSTANT
1410  2216              ISZ RCTRB                 /DELAYED 1 MS?
1411  5210              JMP .-1           /NO.
1412  2215              ISZ RCTRA                 /YES, DONE DELAYING?
1413  5204              JMP .-7           /NO.
1414  5600              JMP I DLMSR       /YES, EXIT
1415  0000    RCTRA,    0
1416  0000    RCTRB,    0


1417  0000    DLCNTP,   0                 /SUB TO FILL DELAY BLOCK
1420  4455              MOVE              /SET DELAY BLOCK LENGTH
1421  0130              BLKCNT
1422  1442              DCTR
1423  7777              -1
1424  4446              SETLOC            /DBLK ADDR TO DADDR
1425  1441              DADDR
1426  4575              DBLK
1427  4447    GNRND,    JMS I RANDNO              /GET RANDOM NUMBER,
1430  0126              AND DLYMSK        /REMOVE EXCESS BITS
1431  7450              SNA               /ZERO?
1432  5227              JMP GNRND                 /YES, GET ANOTHER NUMBER
1433  7041              CIA               /NO, 2'S COMPLEMENT IT
1434  3641              DCA I DADDR       /STORE IT IN DELAY BLOCK
1435  2241              ISZ DADDR                 /UPDATA DELAY BLOCK ADDR,
1436  2242              ISZ DCTR                  /BLOCK FULL?
1437  5227              JMP GNRND                 /NO, REPEAT,
1440  5617              JMP I DLCNTP      /YES, EXIT,
1441  0000    DADDR,    0
1442  0000    DCTR,     0
```

```
                        /PUNCH TEST NORMAL TEST SEQUENCE ROUTINE
1443  0000              NTST,   0
1444  4446                      SETLOC                    /CLEAR RBUSY
1445  0134                      RBUSY
1446  0000                      0
1447  1643                      TAD I NTST        /SELECT PUNCH MODE
1450  3253                      DCA NTSTA
1451  4472                      JMS I UPLTLR      /PUNCH LEADER
1452  4473                      JMS I UPSYNC      /PUNCH SYNC CHARACTER
1453  0000              NTSTA,  0
1454  4474                      JMS I URSYNC      /SYNC READER
1455  4502                      JMS I URDBLK      /READ DATA BLOCK
1456  4472                      JMS I UPLTLR      /PUNCH TRAILER
1457  4451                      JMS I URRDY       /WAIT FOR RDR NOT BUSY
1460  5444                      JMP I CHAIN       /CHAIN
                        /PUNCH TESTS SPECIAL TEST SEQUENCE ROUTINE.
1461  0000              STST,   0
1462  4446                      SETLOC            /CLEAR RBUSY
1463  0134                      RBUSY
1464  0000                      0
1465  1661                      TAD I STST        /SELECT PUNCH MODE
1466  3273                      DCA STSTA
1467  1273                      TAD STSTA
1470  3276                      DCA STSTC
1471  4472                      JMS I UPLTLR      /PUNCH LEADER
1472  4473                      JMS I UPSYNC      /PUNCH SYNC CHARACTER
1473  0000              STSTA,  0                 /PUNCH DATA BLOCK
1474  4474                      JMS I URSYNC      /SYNC READER
1475  4502              STSTB,  JMS I URDBLK      /READ DATA BLOCK
1476  0000              STSTC,  0                 /PUNCH DATA BLOCK
1477  5275                      JMP STSTB                 /GO READ AGAIN
                        /COMBINED TEST NORMAL TEST SEQUENCE
1500  0000              CNTST,  0
1501  4446                      SETLOC                    /CLEAR RBUSY
1502  0134                      RBUSY
1503  0000                      0
1504  4472                      JMS I UPLTLR      /PUNCH LEADER
1505  4473                      JMS I UPSYNC      /PUNCH SYNC CHARACTER
1506  4506                      JMS I UPBLK       /PUNCH DATA BLOCK (NO STALLS)
1507  4474                      JMS I URSYNC      /SYNC READER
1510  4503                      JMS I URBLKR      /READ DATA BLOCK (STALLS)
1511  4501                      JMS I UPBLKR      /PUNCH DATA BLOCK (STALLS)
1512  4504                      JMS I URDBLK      /READ DATA BLOCK (NO STALLS)
1513  4472                      JMS I UPLTLR      /PUNCH TRAILER
1514  4451                      JMS I URRDY       /WAIT FOR READER NOT BUSY
1515  5444                      JMP I CHAIN       /CHAIN
```

```
                        /TYPE LINE OF 3 CHARACTERS (NO DELAY)
1516  0000              TYPLN3, 0
1517  7200                      CLA
1520  3023                      DCA DELAYM        /CLEAR DELAYM
1521  1710                      TAD I TYPLN3      /SET AND STORE
1522  3525                      DCA .+3           /ADDRESS OF DATA
1523  2516                      ISZ TYPLN3
1524  4461                      JMS I UFBF3       /GO FILL BUFFER WITH 3 CHARACTERS
1525  0000                      0
1526  4456                      JMS I UTYPE       /GO TYPE LINE
1527  5716                      JMP I TYPLN3      /EXIT
                        /TYPE LINE OF ASCII PRINTABLE CHARACTERS
1530  0000              TYPE,   0
1531  4446                      JMS I SETCTR      /SET TCTR TO -76
1532  1551                      TCTR
1533  7664                      -114
1534  4446                      JMS I SETCTR      /SET FETCH TO ADDRESS
1535  1550                      FETCH             /OF BLOCKA,
1536  4175                      BLOCKA
1537  1023              TYPEA,  TAD DELAYM        /GET C(DELAYM)
1540  7640                      SZA CLA           /0?
1541  4443                      JMS I DLY1MS      /NO, SO DELAY,
1542  1750                      TAD I FETCH       /YES, SET CHARACTER
1543  4454                      JMS I UPUNCH      /GO PRINT CHARACTER
1544  2550                      ISZ FETCH         /SET UP FOR NEXT CHARACTER
1545  2551                      ISZ TCTR          /DONE?
1546  5337                      JMP TYPEA         /NO, REPEAT
1547  5730                      JMP I TYPE        /YES, EXIT,
1550  0000              FETCH,  0
1551  0000              TCTR,   0
```

```
      1600              *. 17/+1
1600  0000    ASCCN,    0
1601  1600              TAD I ASCCN
1602  3236              DCA WASC
1603  2200              ISZ ASCCN
1604  1600              TAD I ASCCN
1605  3237              DCA SASC
1606  2200              ISZ ASCCN
1607  1241              TAD K7700
1610  0636              AND I WASC
1611  7114              RTR CLL
1612  7012              RTR
1613  7012              RTR
1614  4223              JMS CNV
1615  2237              ISZ SASC
1616  1241              TAD K7700
1617  7040              CMA
1620  0636              AND I WASC
1621  4223              JMS CNV
1622  5600              JMP I ASCCN
1623  0000    CNV,      0
1624  3240              DCA ASCT
1625  1240              TAD ASCT
1626  7006              RTL
1627  7004              RAL
1630  0242              AND K0707
1631  1240              TAD ASCT
1632  0242              AND K0707
1633  1243              TAD K6060
1634  3637              DCA I SASC
1635  5623              JMP I CNV
1636  0000    WASC,     0
1637  0000    SASC,     0
1640  0000    ASCT,     0
1641  7700    K7700,    7700
1642  0707    K0707,    0707
1643  6060    K6060,    6060
```

```
1644  0247          A33WP4,  0247          /"'"
1645  0337                   0337          /LEFT ARROW
1646  0327                   0327          /"W"
1647  0257                   0257          /"/"
1650  0247          A33WP6,  0247          /"'"
1651  0337                   0337          /LEFT ARROW
1652  0327                   0327          /"W"
1653  0257                   0257          /"/"
1654  0327                   0327          /"W"
1655  0337                   0337          /LEFT ARROW
1656  0247          A33WP5,  0247          /"'"
1657  0240                   0240          /SPACE
1660  0337                   0337          /LEFT ARROW
1661  0240                   0240          /SPACE
1662  0327                   0327          /"W"
1663  0240                   0240          /SPACE
1664  0257                   0257          /"/"
1665  0240                   0240          /SPACE
1666  0247          A35WP4,  0247          /'
1667  0335                   0335          /"["
1670  0277                   0277          /"?"
1671  0305                   0305          /"C"
1672  0247          A35WP6,  0247          /"'"
1673  0335                   0335          /"["
1674  0277                   0277          /"?"
1675  0305                   0305          /"C"
1676  0277                   0277          /"?"
1677  0335                   0335          /"["
1700  0247          A35WP5,  0247          /"'"
1701  0240                   0240          /SPACE
1702  0335                   0335          /"["
1703  0240                   0240          /SPACE
1704  0277                   0277          /"?"
1705  0240                   0240          /SPACE
1706  0305                   0305          /"C"
1707  0240                   0240          /SPACE

1710  0301          A,       301
1711  0302                   302
1712  0303                   303
1713  0304          D,       304
1714  0305                   305
1715  0306                   306
1716  0307          G,       307
1717  0310                   310
1720  0311                   311
1721  0312          J,       312
1722  0313                   313
1723  0314                   314
1724  0315          M,       315
1725  0316                   316
1726  0317                   317
```

```
1727  0320                P,      320
1730  0321                        321
1731  0322                        322
1732  0323                S,      323
1733  0324                        324
1734  0325                        325
1735  0326                V,      326
1736  0327                        327
1737  0330                        330
1740  0331                Y,      331
1741  0332                        332
1742  0260                        260
1743  0261                ONE,    261
1744  0262                        262
1745  0263                        263
1746  0264                FOUR,   264
1747  0265                        265
1750  0266                        266

1751  0267                SEVEN,  267
1752  0270                        270
1753  0271                        271
1754  0241                C241,   241
1755  0242                        242
1756  0243                        243
1757  0244                C244,   244
1760  0245                        245
1761  0246                        246
1762  0247                C247,   247
1763  0250                        250
1764  0251                        251
1765  0252                C252,   252
1766  0253                        253
1767  0254                        254
1770  0255                C255,   255
1771  0256                        256
1772  0257                        257
1773  0272                C272,   272
1774  0273                        273
1775  0274                        274
1776  0275                C275,   275
1777  0276                        276
2000  0277                        277
2001  0300                C300,   300
2002  0333                        333
2003  0334                        334
2004  0335                C335,   335
2005  0336                        336
2006  0337                        337
```

```
2007  0001          SLID1,  0001          /SLIDING 1 PATTERN
2010  0002                  0002
2011  0004                  0004
2012  0010                  0010
2013  0020                  0020
2014  0040                  0040
2015  0100                  0100
2016  0200                  0200
2017  0100                  0100
2020  0040                  0040
2021  0020                  0020
2022  0010                  0010
2023  0004                  0004
2024  0002                  0002
2025  0376          SLID0,  0376          /SLIDING 0 PATTERN
2026  0375                  0375
2027  0373                  0373
2030  0367                  0367
2031  0357                  0357
2032  0337                  0337
2033  0277                  0277
2034  0177                  0177
2035  0277                  0277
2036  0337                  0337
2037  0357                  0357
2040  0367                  0367
2041  0373                  0373
2042  0375                  0375

2043  4003          CRTST,  4003          /SPC,C
2044  2240                  2240          /R,SPC
2045  2405                  2405          /T,E
2046  2324                  2324          /S,T
2047  0001                  0001          /END CODE
2050  4022          RMTST,  4022          /SPC,R
2051  1107                  1107          /I,G
2052  1024                  1024          /H,T
2053  4015                  4015          /SPC,M
2054  0122                  0122          /A,R
2055  0711                  0711          /G,I
2056  1640                  1640          /N,SPC
2057  2405                  2405          /T, E
2060  2324                  2324          /S,T
2061  0001                  0001          /END CODE
```

```
2062  4023          SPTST,  4023          /SPC,S
2063  2001                  2001          /P,A
2064  0305                  0305          /C,E
2065  4024                  4024          /SPC,T
2066  0523                  0523          /E,S
2067  2400                  2400          /T
2070  0100                  0100          /END CODE
2071  4014          LFTST,  4014          /SPC,L
2072  0640                  0640          /F,SPC
2073  2405                  2405          /T,E
2074  2324                  2324          /S,T
2075  0001                  0001          /END CODE
2076  4003          CHRTST, 4003          /SPC,C
2077  1001                  1001          /H,A
2100  2201                  2201          /R,A
2101  0324                  0324          /C,T
2102  0522                  0522          /E,R
2103  4024                  4024          /SPC,T
2104  0523                  0523          /E,S
2105  2423                  2423          /T,S
2106  0001                  0001          /END CODE
2107  4027          WCPTST, 4027          /SPC,W
2110  1722                  1722          /O,R
2111  2324                  2324          /O,R
2112  4003                  4003          /SPC,C
2113  0123                  0123          /A,S
2114  0540                  0540          /E,SPC
2115  2001                  2001          /P,A
2116  2424                  2424          /T,T
2117  0522                  0522          /E,R
2120  1640                  1640          /N,SPC
2121  2405                  2405          /T,E
2122  2324                  2324          /S,T
2123  0015                  0015          /CR
2124  0012                  0012          /LF
2125  0001                  0001          /END CODE
```

```
2126  0015                KMSG1,  0015            /CR
2127  0012                        0012            /LF
2130  4001                        4001                    /SP,A
2131  2322                        2322                    /S,R
2132  6363                        6363                    /3,3
2133  3763                        3703                    /1,3
2134  6540                        6540                    /5,SP
2135  1331                        1331                    /K,Y
2136  0204                        0204                    /B,D
2137  4024                        4024                    /SP,T
2140  0523                        0523                    /E,S
2141  2400                        2400                    /T
2142  1500                        1500                    /CR
2143  1200                        1200                    /LF
2144  0100                        0100                    /END CODE
                          /
                          /KMSG2, TYPE: PRESS A KEY
2145  0015                KMSG2,  0015                    /CR
2146  0012                        0012                    /LF
2147  4020                        4020                    /SP,P
2150  2205                        2205                    /R,E
2151  2323                        2323                    /S,S
2152  4001                        4001                    /SP,A
2153  4013                        4013                    /SP,K
2154  0531                        0531                    /E,Y
2155  5600                        5600                    /,
2156  1500                        1500                    /CR
2157  1200                        1200                    /LF
2160  0100                        0100                    /END CODE
```

```
2161  0015          KMSG3,  0015          /CR
2162  0012                  0012          /LF
2163  4005                  4005          /SP,E
2164  0510                  0510          /C,H
2165  1740                  1740          /0,SP
2166  2405                  2405          /T,E
2167  2524                  2524          /S,T
2170  0015          KMSG3A, 0015          /CR
2171  0012                  0012          /LF
2172  4003                  4003          /SP,C
2173  1001                  1001          /H,A
2174  2201                  2201          /R,A
2175  0524                  0524          /C,T
2176  0522                  0522          /E,R
2177  2540                  2540          /S,P
2200  1505                  1505          /K,E
2201  3105                  3105          /Y,E
2202  0440                  0440          /D,SP
2203  2711                  2711          /W,I
2204  1414                  1414          /L,L
2205  4002                  4002          /SP,B
2206  0540                  0540          /E,SP
2207  2431                  2431          /T,Y
2210  2005                  2005          /P,E
2211  0456                  0450          /D,.
2212  0015                  0015          /CR
2213  0012                  0012          /LF
2214  4022                  4022          /SP,R
2215  2502                  2502          /U,B
2216  1725                  1725          /0,U
2217  2440                  2440          /T,SP
2220  0516                  0510          /E,N
2221  0423                  0423          /D,S
2222  4022                  4022          /SP,R
2223  1725                  1725          /0,U
2224  2411                  2411          /T,I
2225  1605                  1605          /N,E
2226  5600                  5000          /.
2227  1500                  1500          /CR
2230  1200                  1200          /LF
2231  1500                  1500          /CR
2232  1200                  1200          /LF
2233  0100                  0100          /END CODE
```

```
2234  0015          KMSG4,  0015          /CR
2235  0012                  0012          /LF
2236  0015                  0015          /CR
2237  0012                  0012          /LF
2240  4017                  4017          /SP,0
2241  0324                  0324          /C,T
2242  0114                  0114          /A,L
2243  4005                  4005          /SP,E
2244  2125                  2125          /Q,U
2245  1126                  1126          /I,V
2246  0114                  0114          /A,L
2247  0516                  0516          /E,N
2250  2440                  2440          /T,SR
2251  2405                  2405          /T,E
2252  2324                  2324          /S,T
2253  0015                  0015          /CR
2254  0001                  0001          /END CODE

2255  0015          KMSG5,  0015          /CR
2256  0012                  0012          /LF
2257  4040          OCTEQV, 4040
2260  4040                  4040
2261  0001                  0001          /END CODE
```

```
      2400              *. 17/+1
2400  4457  PRG0,      JMS I USTBF       /SET UP BUFFER AREA
2401  4446              JMS I SETCTR      /SET KSTART TO INITIAL
2402  0020              KSTART            /ROUTINE ADDRESS
2403  2406              P0TS0
2404  5603              JMP I .+1         /GO START PROGRAM
2405  0232              SRSET
                        /CARRIAGE RETURN TEST
2406  0000  P0TS0,      0
2407  2441              P0TS1
2410  4453              JMS I UCRLF       /CRLF TWICE
2411  7776              -2
2412  4450              JMS I XTYPST      /PRINT TEST TITLE
2413  2043              CRTST
2414  4453              JMS I UCRLF       /CRLF TWICE
2415  7776              -2
2416  1141              TAD C334          /GET "\" CODE
2417  4454              JMS I UPUNCH      /PRINT IT
2420  1147              TAD M111
2421  3116              DCA UTEMP         /-73 TO UTEMP
2422  2116  CRTSTA,     ISZ UTEMP         /ALL DONE?
2423  7410              SKP               /NO
2424  5444              JMP I CHAIN       /YES, CHAIN
2425  1116  CRTSTB,     TAD UTEMP
2426  3117              DCA UTEMP1        /UTEMP TO UTEMP1
2427  1137              TAD SPACE         /SET "SPACE" CODE
2430  4454              JMS I UPUNCH      /PRINT IT
2431  2117              ISZ UTEMP1        /SPACED NO. OF TIMES IN UTEMP1?
2432  5227              JMP .-3           /NO. SO SPACE AGAIN
2433  1131              TAD CR            /YES, SET "CR" CODE.
2434  4454              JMS I UPUNCH      /PRINT IT.
2435  4454              JMS I UPUNCH      /DUMMY CYCLE.
2436  1140              TAD C257          /SET "/" CODE
2437  4454              JMS I UPUNCH      /PRINT IT
2440  5222              JMP CRTSTA        /GO TO CRTSTA
```

```
                        /RIGHT MARGIN TEST
2441  0001              PØTS1,  1
2442  2473                      PØTS2
2443  4453                      JMS I UCRLF       /CRLF TWICE
2444  7776                      -2
2445  4450                      JMS I XTYPST      /PRINT TEST TITLE
2446  2050                      RMTST
2447  4453                      JMS I UCRLF       /CRLF TWICE
2450  7776                      -2
2451  1144                      TAD M16           /-14 TO UTEMP
2452  3116                      DCA UTEMP
2453  4450              RMTSTA, JMS I XTYPST      /PRINT ----I
2454  2456                      .+2
2455  5262                      JMP .+5
2456  5555                      5555
2457  5555                      5555
2460  1100                      1100
2461  0100                      0100
2462  2116                      ISZ UTEMP         /DONE 14 TIMES?
2463  5253                      JMP RMTSTA        /NO, SO DO IT AGAIN
2464  4450                      JMS I XTYPST      /YES, PRINT -I-
2465  2467                      .+2
2466  5272                      JMP .+4
2467  5511                      5511
2470  5500                      5500
2471  0100                      0100
2472  5444                      JMP I CHAIN       /CHAIN
```

```
                        /SPACE TEST
2473  0002              PUTS2,  2
2474  2041                      PUTSS
2475  4453                      JMS I UCRLF       /CRLF TWICE
2476  7776                      -2
2477  4450                      JMS I XTYPST      /PRINT TEST TITLE
2500  2062                      SPTST
2501  4453                      JMS I UCRLF       /CRLF TWICE
2502  7776                      -2
2503  1143                      TAD M44
2504  3116                      DCA UTEMP         /=36 TO UTEMP
2505  4450              SPTSTA, JMS I XTYPST      /PRINT \, SPACE
2506  2510                      .+2
2507  5312                      JMP .+3
2510  3440                      3440              /"\", SPC
2511  0001                      0001              /END CODE
2512  2116                      ISZ UTEMP         /DONE 36 TIMES?
2513  5305                      JMP SPTSTA        /NO, SO DO IT AGAIN.
2514  1143                      TAD M44
2515  3116                      DCA UTEMP         /-36 TO UTEMP
2516  1142                      TAD M1            /GET =1
2517  3117              SPTSTB, DCA UTEMP1        /AC TO UTEMP1
2520  1117                      TAD UTEMP1        /UTEMP1
2521  3120                      DCA UTEMP2        /TO UTEMP2
2522  1131                      TAD CR            /GET "CR" CODE
2523  4454                      JMS I UPUNCH      /PRINT IT
2524  4454                      JMS I UPUNCH      /DUMMY CYCLE
2525  1137                      TAD SPACE         /GET "SPACE" CODE
2526  4454                      JMS I UPUNCH      /PRINT IT
2527  2120                      ISZ UTEMP2        /DONE SPACING?
2530  5325                      JMP .-3           /NO,
2531  1140                      TAD C257          /GET "/" CODE
2532  4454                      JMS I UPUNCH      /PRINT IT
2533  2116                      ISZ UTEMP         /DONE 36 TIMES?
2534  7410                      SKP               /NO,
2535  5444                      JMP I CHAIN       /YES, CHAIN
2536  1143                      TAD M2            /=2 TO AC
2537  1117                      TAD UTEMP1        /ADD C(UTEMP1)
2540  5317                      JMP SPTSTB        /GO TO SPTSTB
```

```
                        /LINE FEED TEST
2541  0003              P0TS3,  3
2542  2600                      -P0TS4
2543  4453                      JMS I UCRLF     /CRLF TWICE
2544  7776                      -2
2545  4450                      JMS I XTYPST    /PRINT TEST TITLE
2546  2071                      LFTST
2547  4453                      JMS I UCRLF     /CRLF TWICE
2550  7776                      -2
2551  1146                      TAD M110
2552  3110                      DCA UTEMP             /-1/2 TO UTEMP
2553  1141              LFTSTA, TAD C334              /GET "\" CODE
2554  4454                      JMS I UPUNCH    /PRINT IT
2555  1132                      TAD LF          /GET "LF" CODE
2556  4454                      JMS I UPUNCH    /PRINT IT
2557  2110                      ISZ UTEMP             /DONE?
2560  7410                      SKP             /NO.
2561  5444                      JMP I CHAIN     /YES, CHAIN
2562  4452                      JMS I DLYCNT    /GENERATE RANDOM DELAY COUNT
2563  4443                      JMS I DLY1MS    /GO DELAY.
2564  5353                      JMP LFTSTA      /GO TO LFTSTA
```

```
      2600                    *. 17/+1
2600  0004                    P0TS4,  4
2601  2615                            P0TS5
                              /TYPE LINE OF CHARACTERS ABC
2602  4455                            JMS I UCRLF       /CRLF TWICE
2603  7776                            -2
2604  4450                            JMS I XTYPST      /PRINT TITLE
2605  2076                            CHRTST
2606  4455                            JMS I UCRLF       /CRLF TWICE
2607  7776                            -2
2610  4460                            JMS I UTPLN3      /PRINT LINE
2611  1710                            A
2612  5444                            JMP I CHAIN
2613  0005                    P0TS5,  5
2614  2620                            P0TS6
                              /TYPE LINE OF CHARACTERS DEF
2615  4460                            JMS I UTPLN3
2616  1713                            D
2617  5444                            JMP I CHAIN
2620  0006                    P0TS6,  6
2621  2625                            P0TS7
                              /TYPE LINE OF CHARACTERS GHI
2622  4460                            JMS I UTPLN3
2623  1710                            G
2624  5444                            JMP I CHAIN
2625  0007                    P0TS7,  7
2626  2634                            P0TS10
                              /TYPE LINE OF CHARACTERS JKL
2627  4460                            JMS I UTPLN3
2630  1721                            J
2631  5444                            JMP I CHAIN
2632  0010                    P0TS10, 10
2633  2637                            P0TS11
                              /TYPE LINE OF CHARACTERS MNO
2634  4460                            JMS I UTPLN3
2635  1724                            M
2636  5444                            JMP I CHAIN
2637  0011                    P0TS11, 11
2640  2644                            P0TS12
                              /TYPE LINE OF CHARACTERS PQR
2641  4460                            JMS I UTPLN3
2642  1727                            P
2643  5444                            JMP I CHAIN
2644  0012                    P0TS12, 12
2645  2651                            P0TS13
                              /TYPE LINE OF CHARACTERS STU
2646  4460                            JMS I UTPLN3
2647  1730                            S
2650  5444                            JMP I CHAIN
```

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2651  0016          PØTS16, 16
2652  2656                  PØTS17
                    /TYPE LINE OF CHARACTERS 456
2653  4460                  JMS I UTPLN3
2654  1746                  FOUR
2655  5444                  JMP I CHAIN
2656  0017          PØTS17, 17
2657  2662                  PØTS20
                    /TYPE LINE OF CHARACTERS 789
2660  4460                  JMS I UTPLN3
2661  1751                  SEVEN
2662  5444                  JMP I CHAIN
2663  0020          PØTS20, 20
2664  2667                  PØTS21
                    /TYPE LINE OF CHARACTERS !"#
2665  4460                  JMS I UTPLN3
2666  1754                  0241
2667  5444                  JMP I CHAIN
2670  0021          PØTS21, 21
2671  2674                  PØTS22
                    /TYPE LINE OF CHARACTERS $%&
2672  4460                  JMS I UTPLN3
2673  1757                  0244
2674  5444                  JMP I CHAIN
2675  0022          PØTS22, 22
2676  2701                  PØTS23
                    /TYPE LINE OF CHARACTERS '()
2677  4460                  JMS I UTPLN3
2700  1760                  0247
2701  5444                  JMP I CHAIN
```

```
2721  0025          PØTS25, 25
2722  2726                  PØTS24
                    /TYPE LINE OF CHARACTERS **,
2723  4460                  JMS I UTPLN3
2724  1765                  C255
2725  5444                  JMP I CHAIN
2726  0024          PØTS24, 24
2727  2735                  PØTS25
                    /TYPE LINE OF CHARACTERS =,(
2730  4460                  JMS I UTPLN3
2731  1770                  C260
2732  5444                  JMP I CHAIN
2733  0025          PØTS25, 25
2734  2740                  PØTS26
                    /TYPE LINE OF CHARACTERS ;;<
2735  4460                  JMS I UTPLN3
2736  1773                  C273
2737  5444                  JMP I CHAIN
2740  0026          PØTS26, 26
2741  2745                  PØTS27
                    /TYPE LINE OF CHARACTERS =>?
2742  4460                  JMS I UTPLN3
2743  1776                  C275
2744  5444                  JMP I CHAIN
2745  0027          PØTS27, 27
2746  2752                  PØTS30
                    /TYPE LINE OF CHARACTERS @ L\
2747  4460                  JMS I UTPLN3
2750  2001                  C300
2751  5444                  JMP I CHAIN
2752  0030          PØTS30, 30
2753  2757                  PØTS31
                    /TYPE LINE OF CHARACTERS ]↑ AND LEFT ARROW
2754  4460                  JMS I UTPLN3
2755  2004                  C335
2756  5444                  JMP I CHAIN
2757  0031          PØTS31, 31
2760  2765                  PØTS32
                    /TYPE LINE OF ALL CHARACTERS
2761  4462                  JMS I UFBALL    /FILL BUFFER WITH ALL CHARS.
2762  3025                  UCA DELAYM      /Ø TO DELAYM.
2763  4456                  JMS I UTYPE     /TYPE LINE
2764  5444                  JMP I CHAIN     /CHAIN
2765  0032          PØTS32, 32
2766  3000                  PØTS33
                    /TYPE LINE OF ALL CHARACTERS, FIXED DELAY BETWEEN CHARACTERS
2767  4462                  JMS I UFBALL    /FILL BUFFER WITH ALL CHARS
2770  4454                  JMS I DLYCNT    /GENERATE DELAY COUNT
2771  4456                  JMS I UTYPE     /TYPE LINE
2772  5444                  JMP I CHAIN     /CHAIN
```

```
      3000              *, 17/+1
3000  0033              PØTS33, 33
3001  3017                      PØTS34
                        /TYPE 6 LINES OF ASR33 WORST CASE PATTERN, NO DELAY.
3002  4455                      JMS I UCRLF     /CRLF TWICE
3003  7776                      -2
3004  4450                      JMS I XTYPST    /PRINT TITLE
3005  2107                      WCPTST
3006  4465                      JMS I UFW336    /PATTERN TO BUFFER
3007  3023                      UCA DELAYM      /Ø TO DELAYM
3010  4446                      JMS I SETCTR    /-6 TO CTRA
3011  0121                      CTRA
3012  7772                      -6
3013  4456                      JMS I UTYPE     /TYPE LINE
3014  2121                      ISZ CTRA                /ALL LINES TYPED?
3015  5213                      JMP .-2         /NO, REPEAT
3016  5444                      JMP I CHAIN     /YES, CHAIN,
3017  0034              PØTS34, 34
3020  3032                      PØTS35
                        /TYPE 6 LINES OF ASR33 WORST CASE PATTERN, FIXED DELAY BETWEEN CHARACTERS
3021  4465                      JMS I UFW336    /PATTERN TO BUFFER
3022  4446                      JMS I SETCTR    /-6 TO CTRA
3023  0121                      CTRA
3024  7772                      -6
3025  4452                      JMS I DLYCNT    /GENERATE DELAY COUNT
3026  4456                      JMS I UTYPE     /TYPE LINE
3027  2121                      ISZ CTRA                /ALL LINES TYPED?
3030  5225                      JMP .-3         /NO, REPEAT
3031  5444                      JMP I CHAIN     /YES, CHAIN
3032  0035              PØTS35, 35
3033  3045                      PØTS36
                        /TYPE 6 LINES OF ASR35 WORST CASE PATTERN, NO DELAY
3034  4470                      JMS I UFW356    /PATTERN TO BUFFER
3035  3023                      UCA DELAYM      /Ø TO DELAYM
3036  4446                      JMS I SETCTR    /-6 TO CTRA
3037  0121                      CTRA
3040  7772                      -6
3041  4456                      JMS I UTYPE     /TYPE LINE
3042  2121                      ISZ CTRA                /ALL LINES TYPED?
3043  5241                      JMP .-2         /NO, REPEAT,
3044  5444                      JMP I CHAIN     /YES, CHAIN
3045  0036              PØTS36, 36
3046  7777                      /777
                        /TYPE 6 LINES OF ASR35 WORST CASE PATTERN, FIXED DELAY BETWEEN CHARACTERS
3047  4470                      JMS I UFW356    /PATTERN TO BUFFER
3050  4446                      JMS I SETCTR    /-6 TO CTRA
3051  0121                      CTRA
3052  7772                      -6
3053  4452                      JMS I DLYCNT    /GENERATE DELAY COUNT
3054  4456                      JMS I UTYPE     /TYPE LINE
3055  2121                      ISZ CTRA                /ALL LINES TYPED?
3056  5255                      JMP .-3         /NO, REPEAT
3057  5444                      JMP I CHAIN     /YES, CHAIN
```

```
                        /PROGRAM 1, ASR33/35 PUNCH FUNCTION TEST
                        /
3060  4446              PRG1,   JMS I SETCTR    /SET INTERRUPT SERVICE ADDRESS
3061  0002                      2               /TO INTSVC
3062  1144                      INTSVC
3063  4446                      SETLOC          /SET DATA BLOCK
3064  0130                      BLKCNT          /LENGTH TO
3065  7400                      -400            /-256
3066  4446                      JMS I SETCTR    /SET KSTART TO INITIAL
3067  0020                      KSTART          /ROUTINE ADDRESS,
3070  3073                      P1T0
3071  5672                      JMP I .+1       /GO START PROGRAM
3072  0232                      SRSET
                        /ROUTINE 0,
                        /PUNCH AND READ CHECK BLOCK OF ALL 0'S
3073  0000              P1T0,   0
3074  3106                      P1T1
3075  4446                      SETLOC          /0 TO BLOCK A
3076  4175                      BLOCKA          /FILL BUFFER
3077  0000                      0
3100  4455                      MOVE
3101  4175                      BLOCKA
3102  4176                      BLOCKA+1
3103  7401                      -377
3104  4504                      JMS I UNTST     /GO TO NORMAL TEST,
3105  4500                      JMS I UPBLK     /USE THIS CALL
                        /ROUTINE 1
                        /PUNCH AND READ CHECK BLOCK OF CHANNEL 1 PUNCHES,
3106  0001              P1T1,   1
3107  3121                      P1T2
3110  4446                      SETLOC          /1 TO BLOCKA
3111  4175                      BLOCKA
3112  0001                      1
3113  4455                      MOVE            /FILL BUFFER
3114  4175                      BLOCKA
3115  4176                      BLOCKA+1
3116  7401                      -377
3117  4504                      JMS I UNTST     /GO TO NORMAL TEST
3120  4500                      JMS I UPBLK     /USE THIS CALL
                        /ROUTINE 2
                        /PUNCH AND READ CHECK BLOCK OF CHANNEL 2 PUNCHES
3121  0002              P1T2,   2
3122  3200                      P1T3
3123  4446                      SETLOC          /2 TO BLOCKA
3124  4175                      BLOCKA
3125  0002                      2
3126  4455                      MOVE            /FILL BUFFER
3127  4175                      BLOCKA
3130  4176                      BLOCKA+1
3131  7401                      -377
3132  4504                      JMS I UNTST     /GO TO NORMAL TEST
3133  4500                      JMS I UPBLK     /USE THIS CALL
```

```
      3200              *, 17/+1
                        /ROUTINE 3
                        /PUNCH AND READ CHECK BLOCK OF CHANNEL 3 PUNCHES
3200  0003              P1T3,   3
3201  3213                      P1T4
3202  4446                      SETLOC          /4 TO BLOCK A
3203  4175                      BLOCKA
3204  0004                      4
3205  4455                      MOVE            /FILL BUFFER
3206  4175                      BLOCKA
3207  4176                      BLOCKA+1
3210  7401                      -377
3211  4504                      JMS I UNTST     /GO TO NORMAL TEST
3212  4500                      JMS I UPBLK     /USE THIS CALL
                        /ROUTINE 4
                        /PUNCH AND READ CHECK BLOCK OF CHANNEL 4 PUNCHES
3213  0004              P1T4,   4
3214  3226                      P1T5
3215  4446                      SETLOC          /10 TO BLOCKA
3216  4175                      BLOCKA
3217  0010                      10
3220  4455                      MOVE            /FILL BUFFER
3221  4175                      BLOCKA
3222  4176                      BLOCKA+1
3223  7401                      -377
3224  4504                      JMS I UNTST     /60 TO NORMAL TEST
3225  4500                      JMS I UPBLK     /USE THIS CALL
                        /ROUTINE 5
                        /PUNCH AND READ CHECK BLOCK OF CHANNEL 5 PUNCHES
3226  0005              P1T5,   5
3227  3241                      P1T6
3230  4446                      SETLOC          /10 TO BLOCKA
3231  4175                      BLOCKA
3232  0020                      20
3233  4455                      MOVE            /FILL BUFFER
3234  4175                      BLOCKA
3235  4176                      BLOCKA+1
3236  7401                      -377
3237  4504                      JMS I UNTST     /GO TO NORMAL TEST
3240  4500                      JMS I UPBLK     /USE THIS CALL
```

```
                        /ROUTINE 6
                        /PUNCH AND READ CHECK BLOCK OF CHANNEL 6 PUNCHES
3241  0006              P1T6,   6
3242  3254                      P1T7
3243  4446                      SETLOC          /40 TO BLOCKA
3244  4175                      BLOCKA
3245  0040                      40
3246  4455                      MOVE            /FILL BUFFER
3247  4175                      BLOCKA
3250  4176                      BLOCKA+1
3251  7401                      -377
3252  4504                      JMS I UNTST     /GO TO NORMAL TEST
3253  4500                      JMS I UPBLK     /USE THIS CALL
                        /ROUTINE 7
                        /PUNCH AND READ CHECK BLOCK OF CHANNEL 7 PUNCHES
3254  0007              P1T7,   7
3255  3267                      P1T10
3256  4446                      SETLOC          /100 TO BLOCK A
3257  4175                      BLOCKA
3260  0100                      100
3261  4455                      MOVE            /FILL BUFFER
3262  4175                      BLOCKA
3263  4176                      BLOCKA+1
3264  7401                      -377
3265  4504                      JMS I UNTST     /GO TO NORMAL TEST
3266  4500                      JMS I UPBLK     /USE THIS CALL.
                        /ROUTINE 10
                        /PUNCH AND READ CHECK BLOCK OF CHANNEL 8 PUNCHES
3267  0010              P1T10,  10
3270  3302                      P1T11
3271  4446                      SETLOC          /200 TO BLOCK A
3272  4175                      BLOCKA
3273  0200                      200
3274  4455                      MOVE            /FILL BUFFER
3275  4175                      BLOCKA
3276  4176                      BLOCKA+1
3277  7401                      -377
3300  4504                      JMS I UNTST     /GO TO NORMAL TEST
3301  4500                      JMS I UPBLK     /USE THIS CALL.
                        /ROUTINE 11
                        /PUNCH AND READ CHECK BLOCK OF SLIDING 1 PATTERN
3302  0011              P1T11,  11
3303  3316                      P1T12
3304  4455                      MOVE            /FILL BUFFER WITH
3305  2007                      SL1D1           /SLIDING 1 PATTERN
3306  4175                      BLOCKA
3307  7762                      -16
3310  4455                      MOVE
3311  4175                      BLOCKA
3312  4215                      BLOCKA+16
3313  7410                      -302
3314  4504                      JMS I UNTST     /GO TO NORMAL TEST
3315  4500                      JMS I UPBLK     /USE THIS CALL
```

```
                        /ROUTINE 12
                        /PUNCH AND READ CHECK BLOCK OF SLIDING Ø PATTERN.
3316  0012              P1T12,  12
3317  3332                      P1T13
3320  4455                      MOVE              /FILL BUFFER WITH
3321  2025                      SLIDØ             /SLIDING Ø PATTERN
3322  4175                      BLOCKA
3323  7762                      -16
3324  4455                      MOVE
3325  4175                      BLOCKA
3326  4213                      BLOCKA+16
3327  7416                      -302
3330  4504                      JMS I UNTST       /GO TO NORMAL TEST
3331  4500                      JMS I UPBLK       /USE THIS CALL
                        /ROUTINE 13
                        /PUNCH AND READ CHECK BLOCK OF ONES AND ZEROES.
3332  0013              P1T13,  13
3333  3350                      P1T14
3334  4446                      SETLOC            /377 TO BLOCK A
3335  4175                      BLOCKA
3336  0377                      377
3337  4446                      SETLOC            /Ø TO BLOCKA+1
3340  4176                      BLOCKA+1
3341  0000                      Ø
3342  4455                      MOVE              /FILL BUFFER
3343  4175                      BLOCKA
3344  4177                      BLOCKA+2
3345  7402                      -376
3346  4504                      JMS I UNTST       /GO TO NORMAL TEST
3347  4500                      JMS I UPBLK       /USE THIS CALL
                        /ROUTINE 14
                        /PUNCH AND READ CHECK BLOCK OF ONES AND ZEROES, RANDOM
                        /STALLS BETWEEN CHARACTERS PUNCHED.
3350  0014              P1T14,  14
3351  3400                      P1T15
3352  4446                      SETLOC            /377 TO BLOCKA
3353  4175                      BLOCKA
3354  0377                      377
3355  4446                      SETLOC            /Ø TO BLOCKA+1
3356  4176                      BLOCKA+1
3357  0000                      Ø
3360  4455                      MOVE              /FILL BUFFER
3361  4175                      BLOCKA
3362  4177                      BLOCKA+2
3363  7402                      -376
3364  4504                      JMS I UNTST       /GO TO NORMAL TEST
3365  4501                      JMS I UPBLKR      /USE THIS CALL
```

```
       3400             *, 177+1
                        /ROUTINE 15
                        /PUNCH AND READ CHECK BLOCK OF BINARY COUNT PATTERN
3400   0015             P1T15,  15
3401   3420                     P1T16
3402   4446                     SETLOC          /BLOCK A ADDR TO TEMPU
3403   0115                     TEMPU
3404   4175                     BLOCKA
3405   4446                     SETLOC          /-256 TO CTRA
3406   0121                     CTRA
3407   7400                     -400
3410   4511                     JMS I INPATT    /INITIALIZE B, PATTERN
3411   4512             P1T15A, JMS I GETPT     /FILL BUFFER WITH
3412   3515                     DCA I TEMPU     /BINARY COUNT PATTERN
3413   2115                     ISZ TEMPU
3414   2121                     ISZ CTRA
3415   5211                     JMP P1T15A
3416   4504                     JMS I UNTST     /GO TO NORMAL TEST
3417   4500                     JMS I UPBLK     /USE THIS CALL.
                        /ROUTINE 16
                        /PUNCH AND READ CHECK BLOCK OF BINARY COUNT PATTERN
                        /RANDOM STALLS BETWEEN CHARACTERS PUNCHED.
3420   0016             P1T16,  16
3421   7777                     7777
3422   4446                     SETLOC          /BLOCK A ADDR TO TEMPU
3423   0115                     TEMPU
3424   4175                     BLOCKA
3425   4446                     SETLOC          /-256 TO CTRA
3426   0121                     CTRA
3427   7400                     -400
3430   4511                     JMS I INPATT    /INITIALIZE B, PATTERN
3431   4512             P1T16A, JMS I GETPT     /FILL BUFFER WITH
3432   3515                     DCA I TEMPU     /BINARY COUNT PATTERN
3433   2115                     ISZ TEMPU
3434   2121                     ISZ CTRA
3435   5231                     JMP P1T16A
3436   4504                     JMS I UNTST     /GO TO NORMAL TEST
3437   4501                     JMS I UPBLKR    /USE THIS CALL
```

```
                        /PROGRAM 2, KEYBOARD TEST
3440  4446              PRG2,   SETLOC          /SET KSTART TO INITIAL
3441  0020                      KSTART          /ROUTINE ADDRESS
3442  3447                      P2T0
3443  4450                      JMS I XTYPST    /PRINT
3444  2126                      KMSG1
3445  5646                      JMP I .+1
3446  0232                      SRSET
                        /ROUTINE 0
                        /CLEAR AC AND FLAG (KCC), WAIT FOR FLAG TO SET, WITH FLAG SET, SKIP
                        /ON FLAG 1000 TIMES. KSF SHOULD SKIP EVERY TIME.
3447  0000              P2T0,   0
3450  3472                      P2T1
3451  4446                      SETLOC          /-1000 TO CTRA
3452  7121                      CTRA
3453  6030                      -1750
3454  6032                      KCC             /CLEAR AC AND FLAG
3455  4450                      JMS I XTYPST
3456  2145                      KMSG2
3457  6031                      KSF             /READY?
3460  5257                      JMP .-1         /WAIT
3461  6031                      KSF             /READY, SKIP ON FLAG
3462  5266                      JMP P2E0                /NO SKIP, ERROR
3463  2121                      ISZ CTRA                /ALL DONE?
3464  5261                      JMP .-3         /NO, REPEAT
3465  5444                      JMP I CHAIN     /YES, CHAIN
3466  7602              P2E0,   HLT CLA         /KSF FAILURE
3467  6031                      KSF             /SCOPE LOOP
3470  5267                      JMP .-1         /SKIPS ON FLAG
3471  5267                      JMP .-2         /CONTINUOUSLY
                        /ROUTINE 1,
                        /ECHO TEST CHARACTER RECEIVED FROM KEYBOARD IS TYPED, THE
                        /CHARACTER TYPED SHOULD MATCH CHARACTER KEYED, RUBOUT CHARCTER
                        /ENDS ROUTINE.
3472  0001              P2T1,   1
3473  3511                      P2T2
3474  6032                      KCC             /CLEAR AC AND FLAG
3475  4450                      JMS I XTYPST
3476  2161                      KMSG3
3477  6031              P2T1A,  KSF             /READY?
3500  5277                      JMP .-1         /WAIT
3501  6036                      KRB             /READ CHARACTER
3502  6046                      TLS             /PRINT IT
3503  6041                      TSF             /PRINTER READY?
3504  5303                      JMP .-1         /NO, WAIT
3505  1163                      TAD MRBOUT
3506  7440                      SZA             /IS IT RUBOUT?
3507  5277                      JMP P2T1A               /NO
3510  5444                      JMP I CHAIN             /YES, CHAIN
```

```
                        /ROUTINE 2,
                        /OCTAL EQUIVALENT TEST, THE OCTAL EQUIVALENT OF ANY
                        /CHARACTER KEYED IS PRINTED, RUBOUT ENDS ROUTINE,
3511  0002              P2T2,   2
3512  7777                      7777
3513  6032                      KCC               /CLEAR AC AND FLAG
3514  4450                      JMS I XTYPST      /PRINT TITLE AND
3515  2234                      KMSG4             /INSTRUCTION
3516  4450                      JMS I XTYPST
3517  2170                      KMSG3A
3520  6031              P2T2A,  KSF               /FLAG 1?
3521  5320                      JMP .-1           /NO, WAIT
3522  6036                      KRB               /YES, READ KEYBOARD
3523  3336                      DCA P2T2W         /STORE CHARACTER
3524  4506                      JMS I UASCON      /CONVERT CHARACTER
3525  3336                      P2T2W             /TO PRINTABLE OCTAL,
3526  2257                      OCTEQV
3527  4450                      JMS I XTYPST      /PRINT CHARACTER
3530  2255                      KMSG5
3531  1336                      TAD P2T2W
3532  1133                      TAD MRBOUT
3533  7640                      SZA CLA           /WAS IT A RUBOUT?
3534  5320                      JMP P2T2A         /NO,
3535  5444                      JMP I CHAIN       /YES, CHAIN
3536  0000              P2T2W,  0
```

```
                        /PROGRAM 3, COMBINED READER, PRINTER, PUNCH TEST.
3537  4446      PRG3,   SETLOC           /SET INTERRUPT SERVICE
3540  0002              2               /ADDRESS TO INTSVC
3541  1144              INTSVC
3542  4446              SETLOC          /SET DATA BLOCK LENGTH
3543  0130              BLKCNT          /TO =150
3544  7552              -220
3545  4457              JMS I USTBF     /SET UP BUFFER AREA
3546  4446              SETLOC          /SET KSTART TO INITIAL
3547  0020              KSTART          /ROUTINE ADDRESS
3550  3553              P3T0
3551  5752              JMP I .+1               /START PROGRAM
3552  0232              SRSET
3553  0000      P3T0,   0
3554  3560              P3T1
3555  4461              JMS I UFBF3     /DATA: ABC
3556  1710              A
3557  4503              JMS I UCNTST
3560  0001      P3T1,   1
3561  3565              P3T2
3562  4461              JMS I UFBF3     /DATA: DEF
3563  1711              D
3564  4503              JMS I UCNTST
3565  0002      P3T2,   2
3566  3572              P3T3
3567  4461              JMS I UFBF3     /DATA: GHI
3570  1710              G
3571  4503              JMS I UCNTST
3572  0003      P3T3,   3
3573  3577              P3T4
3574  4461              JMS I UFBF3     /DATA: JKL
3575  1721              J
3576  4503              JMS I UCNTST
3577  0004      P3T4,   4
3600  3604              P3T5
3601  4461              JMS I UFBF3     /DATA: MNO
3602  1724              M
3603  4503              JMS I UCNTST
3604  0005      P3T5,   5
3605  3611              P3T6
3606  4461              JMS I UFBF3     /DATA: PQR
3607  1727              P
3610  4503              JMS I UCNTST
3611  0006      P3T6,   6
3612  3616              P3T7
3613  4461              JMS I UFBF3     /DATA: STU
3614  1732              S
3615  4503              JMS I UCNTST
```

```
3616  0007          P3T7,   7
3617  3625                  P3T10
3620  4461                  JMS I UFBF3     /DATA: VWX
3621  1735                  V
3622  4505                  JMS I UCNTST
3623  0010          P3T10,  10
3624  3630                  P3T11
3625  4461                  JMS I UFBF3     /DATA: Y≠0
3626  1740                  Y
3627  4505                  JMS I UCNTST
3630  0011          P3T11,  11
3631  3635                  P3T12
3632  4461                  JMS I UFBF3     /DATA: 123
3633  1743                  ONE
3634  4505                  JMS I UCNTST
3635  0012          P3T12,  12
3636  3642                  P3T13
3637  4461                  JMS I UFBF3     /DATA: 456
3640  1746                  FOUR
3641  4505                  JMS I UCNTST
3642  0013          P3T13,  13
3643  3647                  P3T14
3644  4461                  JMS I UFBF3     /DATA: 789
3645  1751                  SEVEN
3646  4505                  JMS I UCNTST
3647  0014          P3T14,  14
3650  3654                  P3T15
3651  4461                  JMS I UFBF3     /DATA: !"#
3652  1754                  C241
3653  4505                  JMS I UCNTST
3654  0015          P3T15,  15
3655  3661                  P3T16
3656  4461                  JMS I UFBF3     /DATA: $%&
3657  1757                  C244
3660  4505                  JMS I UCNTST
3661  0016          P3T16,  16
3662  3666                  P3T17
3663  4461                  JMS I UFBF3     /DATA: '()
3664  1762                  C247
3665  4505                  JMS I UCNTST
3666  0017          P3T17,  17
3667  4000                  P3T20
3670  4461                  JMS I UFBF3     /DATA: *+,
3671  1765                  C252
3672  4505                  JMS I UCNTST
```

```
      4000              *, 17/+1
4000  0020    P3T20,    20
4001  4005              P3T21
4002  4461              JMS I UFBF3       /DATA: =./
4003  1770              C255
4004  4505              JMS I UCNTST

4005  0021    P3T21,    21
4006  4012              P3T22
4007  4461              JMS I UFBF3       /DATA: ;;<
4010  1773              C272
4011  4505              JMS I UCNTST
4012  0022    P3T22,    22
4013  4017              P3T23
4014  4461              JMS I UFBF3       /DATA: =>?
4015  1776              C275
4016  4505              JMS I UCNTST
4017  0023    P3T23,    23
4020  4024              P3T24
4021  4461              JMS I UFBF3       /DATA: @L\
4022  2001              C500
4023  4505              JMS I UCNTST
4024  0024    P3T24,    24
4025  4031              P3T25
4026  4461              JMS I UFBF3       /DATA: ]↑ AND LEFT ARROW
4027  2004              C535
4030  4505              JMS I UCNTST
4031  0025    P3T25,    25
4032  4035              P3T26
4033  4462              JMS I UFBALL      /DATA: ALL PRINTABLE ASCII
4034  4505              JMS I UCNTST
4035  0026    P3T26,    26
4036  4041              P3T27
4037  4464              JMS I UFW334      /DATA: ASR33 PRINTER WORST CASE
4040  4505              JMS I UCNTST      /PATTERN
4041  0027    P3T27,    27
4042  4045              P3T30
4043  4466              JMS I UFW335      /DATA: ASR33 PRINTER WORST CASE
4044  4505              JMS I UCNTST      /PATTERN WITH INTERSPERSED BLANKS
4045  0030    P3T30,    30
4046  4051              P3T31
4047  4467              JMS I UFW354      /DATA: ASR35 PRINTER WORST CASE
4050  4505              JMS I UCNTST      /PATTERN
4051  0031    P3T31,    31
4052  4055              P3T32
4053  4471              JMS I UFW355      /DATA: ASR33 PRINTER WORST CASE
4054  4505              JMS I UCNTST      /PATTERN WITH INTERSPERSED BLANKS
```

```
4055  0032          P3T32,  32
4056  7777                  ////
4057  4446                  SETLOC          /DATA: ONE'S AND ZEROES
4060  4177                  BLOCK1
4061  0377                  377
4062  4446                  SETLOC
4063  4200                  BLOCK1+1
4064  0000                  0
4065  4455                  MOVE
4066  4177                  BLOCK1
4067  4201                  BLOCK1+2
4070  7672                  -106
4071  4455                  MOVE
4072  4177                  BLOCK1
4073  4311                  BLOCK2
4074  7670                  -110
4075  4505                  JMS I UCNTST
                    /
                    /PROGRAM 4, PRINT LINES WITH DATA IN PTEMP AND PTEMP1, NO DELAY,
4076  7200          PRG4,   CLA
4077  3023                  DCA DELAYM      /0 TO DELAYM
4100  4457                  JMS I USTBF
4101  4463                  JMS I UFBTMP    /FILL BUFFER WITH DATA
4102  4456                  JMS I UTYPE     /TYPE LINE
4103  5302                  JMP .-1         /REPEAT
                    /
                    /PROGRAM 5, PRINT LINES WITH DATA IN PTEMP AND PTEMP1, FIXED RANDOM DELAY
4104  4463          PRG5,   JMS I UFBTMP    /FILL BUFFER WITH DATA,
4105  4457                  JMS I USTBF
4106  4452                  JMS I DLYCNT    /GENERATE DELAY COUNT,
4107  4456                  JMS I UTYPE     /TYPE LINE
4110  5306                  JMP .+2         /REPEAT
                    /PROGRAM 6, PUNCH AND READ CHECK DATA BLOCKS
                    /WITH DATA IN PTEMP AND PTEMP1, NO DELAY
4111  4446          PRG6,   SETLOC          /SET INTERRUPT SERVICE
4112  0002                  2               /ADDRESS TO INTSVC
4113  1144                  INTSVC
4114  4446                  SETLOC          /SET BLOCK LENGTH TO
4115  0130                  BLKCNT          /-256
4116  7400                  -400
4117  4455                  MOVE            /FILL BUFFER WITH DATA
4120  0021                  PTEMP           /IN PTEMP AND PTEMP1
4121  4175                  BLOCKA
4122  7776                  -2
4123  4455                  MOVE
4124  4175                  BLOCKA
4125  4177                  BLOCKA+2
4126  7402                  -376
4127  4507                  JMS I USTST     /GO TO SPECIAL TEST SEQUENCE
4130  4500                  JMS I UPBLK     /CLSE THIS CALL.
```

```
                        /PROGRAM 7, PUNCH AND READ CHECK DATA BLOCKS WITH DATA
                        /IN PTEMP AND PTEMP1, RANDOM STALLS BETWEEN CHARS PUNCHED
4131  4446      PRG7,   SETLOC           /SET INTERRUPT SERVICE
4132  0002              2               /ADDRESS TO INTSVC
4133  1144              INTSVC
4134  4446              SETLOC          /SET BLOCK LENGTH TO
4135  0130              BLKCNT          /-256
4136  7400              -400
4137  4455              MOVE            /FILL BUFFER WITH DATA IN
4140  0021              PTEMP           /PTEMP AND PTEMP1
4141  4175              BLOCKA
4142  7776              -2
4143  4455              MOVE
4144  4175              BLOCKA
4145  4177              BLOCKA+2
4146  7402              -376
4147  4507              JMS I USTST     /GO TO SPECIAL TEST SEQUENCE
4150  4501              JMS I UPBLKR    /USE THIS CALL,

                        /PROGRAM 10, PUNCH AND READ CHECK BLOCKS OF BINARY
                        /COUNT PATTERN, RANDOM STALLS BETWEEN CHARACTERS PUNCHED
4151  4446      PRG10,  SETLOC          /SET INTERRUPT SERVICE
4152  0002              2               /ADDRESS TO INTSVC
4153  1144              INTSVC
4154  4446              SETLOC          /SET BLOCK LENGTH TO
4155  0130              BLKCNT          /-256
4156  7400              -400
4157  4446              SETLOC
4160  0115              TEMPU
4161  4175              BLOCKA
4162  4446              SETLOC
4163  0121              CTRA
4164  7400              -400
4165  4511              JMS I INPATT    /FILL BUFFER WITH BINARY
4166  4512      PRG10A, JMS I GETPT     /COUNT PATTERN
4167  5515              JCA I TEMPU
4170  2115              ISZ TEMPU
4171  2121              ISZ CTRA
4172  5366              JMP PRG10A
4173  4507              JMS I USTST     /GO TO SPECIAL TEST SEQUENCE
4174  4501              JMS I UPBLKR    /USE THIS CALL
```

```
                        /
4175  0215              BLOCKA, 215             /CR
4176  0212                      212             /LF

4177  0000              BLOCK1, 0

      4307              *BLOCK1+110
4307  0215              BLOCKB, 215             /CR
4310  0212                      212             /LF

4311  0000              BLOCK2, 0

      4421              *BLOCK2+110
4421  0215              BLOCKC, 215             /CR
4422  0212                      212             /LF

      4575              *BLOCKA+400
4575  0000              DBLK,   0

      5175              *DBLK+400

                        $
```

RE ARE NO ERRORS