IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D2AA-D-(D)

PRODUCT TEST: PDP-8/E TELETYPE CONTROL TESTS

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1. ABSTRACT

THIS PROGRAM CONSISTS OF A PACKAGE OF TEST PROGRAMS FOR
TESTING A TELETYPE. ONLY ONE TELETYPE MAY BE TESTED AT A TIME.
THE TELETYPE TO BE TESTED CAN BE A KSR33, ASR33, KSR35, ASR35, OR KSR37

THE TEST PROGRAMS ARE:

PRG0 - BASIC INPUT TESTS (USES TTY READER)
PRG1 - BASIC OUTPUT TEST (USES TTY PRINTER)
PRG2 - READER TEST
PRG3 - PRINTER TEST
PRG4 - PUNCH TEST
PRG5 - KEYBOARD TEST
PRG6 - COMBINED TEST
PRG7 - READER EXERCISER, BINARY COUNT PATTERN
PRG10 - PRINTER EXERCISER
PRG11 - BINARY COUNT TAPE GENERATOR.

2. REQUIREMENTS

2.1 EQUIPMENT

A. PDP-8/E WITH 4K OF MEMORY.

B. KSR33, ASR33, KSR35, ASR35, OR KSR37 TELETYPE.

2.2 STORAGE

LOCATIONS 0000 THROUGH 7577 ARE USED.

3. LOADING PROCEDURE

THE BINARY LOADER IS USED TO LOAD THE PROGRAM. REFER TO
BINARY LOADER DOCUMENTATION IF UNFAMILIAR WITH ITS USE.

4. USE PROCEDURE

4.1 DEVICE CODE SELECTION

BEFORE ANY PROGRAM CAN BE RUN, THE PROGRAM MUST HAVE THE FOLLOWING INFORMATION:

1. TYPE OF TELETYPE (33, 35, OR 37).
2. DEVICE CODES ASSIGNED.

TO PROVIDE THIS INFORMATION, PROCEED AS FOLLOWS:

A. SET LOCATION 0020 TO:

   1. 0000 FOR KSR OR ASR 33 TELETYPE
   2. 0001 FOR KSR OR ASR 35 TELETYPE
   3. 0002 FOR KSR37 TELETYPE

B. SET LOCATION 0021 AS FOLLOWS:

   1. LOAD ADDRESS 0021.
   2. SET SR0 THROUGH 5 TO THE DEVICE CODE OF THE KEYBOARD/READER TO BE TESTED.
   3. SET SR6 THROUGH 11 TO THE DEVICE CODE OF THE PRINTER/PUNCH TO BE TESTED.
   4. PRESS DEPOSIT.

C. REFER TO INDIVIDUAL PROGRAM USE PROCEDURE.

4.2 PRGØ USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE, REFER TO SECTION 4.1.

B. INSURE THAT TELETYPE IS ON-LINE.

C. LOAD BINARY COUNT PATTERN TEST TAPE IN READER.

D. TURN ON READER.

E. LOAD ADDRESS Ø2ØØ.

F. SET SR TO ØØØØ.

G. PRESS CLEAR AND CONTINUE.

H. PROGRAM HALTS AT LOC Ø233 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=ØØØØ. PRESS CONTINUE.

PRGØ SR OPTIONS:

SRØ - HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1 - SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2 - LOOP PROGRAM.
SR6 THROUGH SR11 - ROUTINE NUMBER TO BE SELECTED.

I. PROGRAM IS EXECUTED AND HALTS AT LOC Ø275, PROGRAM END HALT, IF NO "LOOP" OPTIONS ARE SET, AND IF NO ERRORS OCCUR.

4.3 PRG1 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE.
REFER TO SECTION 4.1.

B. INSURE TELETYPE IS ON-LINE.

C. INSURE THAT THERE IS PAPER IN TELEPRINTER.

D. LOAD ADDRESS 0200.

E. SET SR TO 0001.

F. PRESS CLEAR AND CONTINUE.

G. PROGRAM HALTS AT LOC 0233 TO PERMIT SETTING OF SR OPTIONS.
SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH IS WITH
SR=0000. PRESS CONTINUE.

PRG1 SR OPTIONS

SR0 HALT AT END OF ROUTINE. ROUTINE NUMBER IN AC.
SR1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2 LOOP PROGRAM
SR6 THROUGH SR11-ROUTINE NUMBER TO BE SELECTED.

H. PROGRAM IS EXECUTED AND HALTS AT LOC 0275 PROGRAM END
HALT, IF NO LOOP OPTIONS ARE SET, AND IF NO ERRORS OCCUR.

4.4 PRG2 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE.
REFER TO SECTION 4.1.

B. INSURE TELETYPE IS ON-LINE.

C. LOAD BINARY COUNT PATTERN TEST TAPE IN READER.

D. TURN ON READER

E. LOAD ADDRESS 0200.

F. SET SR TO 0002.

G. PRESS CLEAR AND CONTINUE.

H. PROGRAM HALTS AT LOC 0233 TO PERMIT SETTING OF SR OPTIONS.
SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=0000.
PRESS CONTINUE.

PRG2 SR OPTIONS:

SR0 = HALT AT END OF ROUTINE. ROUTINE NUMBER IS AC.
SR1 = SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 THROUGH SR11.
SR2 = LOOP PROGRAM.
SR6 THROUGH SR11 - ROUTINE NUMBER TO BE SELECTED.

I. PROGRAM IS EXECUTED AND HALTS AT LOC 0275 PROGRAM END
HALT, IF NO "LOOP" OPTIONS ARE SET, AND IF NO ERRORS OCCUR.

4.5 PRG3 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE.
REFER TO SECTION 4.1.

B. INSURE TELETYPE IS ON LINE.

C. LOAD ADDRESS 0200.

D. SET SR TO 0003.

E. PRESS CLEAR AND CONTINUE.

F. PROGRAM HALTS AT LOC 0233 TO PERMIT SETTING OF SR OPTIONS.
SET ANY DESIRED OPTIONS, NORMAL RUN IS WITH SR=0000.
PRESS CONTINUE.

PRG3 SR OPTIONS

SR0 - HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1 - SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2 - LOOP PROGRAM.
SR6 THROUGH SR11 - ROUTINE NUMBER TO BE SELECTED.

G. PROGRAM IS EXECUTED AND HALTS AT LOC 0275.
PROGRAM END HALT, UNLESS PREVENTED FROM ENDING BY SR OPTIONS.

NOTE

THE PRINTOUTS RESULTING FROM EXECUTION OF PRG3 MUST BE VISUALLY EXAMINED BY USER TO VERIFY CORRECT PRINTER OPERATION.

4.6 PRG4 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE. REFER TO SECTION 4.1.

B. TURN ON TELETYPE PUNCH.

C. WITH TELETYPE OFF-LINE, PUNCH A SECTION OF BLANK LEADER ABOUT 6 INCHES LONG. RETURN TELETYPE TO ON-LINE POSITION.

D. LOAD LEADER IN READER, LEAVING VERY LITTLE SLACK BETWEEN PUNCH AND READER.

E. TURN ON READER.

F. LOAD ADDRESS 0200.

G. GET SR TO 0004.

H. PRESS CLEAR AND CONTINUE.

I. PROGRAM BEGINS EXECUTION. SET SR5 TO A 1 IF YOU WISH TO STOP ON ERROR. SR5 SET TO A 0 WILL CAUSE PROGRAM TO HALT AT END OF DATA BLOCK IF ERRORS OCCURRED. THE AC WILL CONTAIN THE ERROR COUNT.

J. THE PROGRAM RUNS CONTINUOUSLY, UNTIL STOPPED BY USER.

4.7 PRG5 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE. REFER TO SECTION 4.1.

B. INSURE TELETYPE IS ON-LINE

C. MAKE SURE THAT THE TELETYPE "PROCEED" LIGHT IS ON, IF TESTING A KSR37 KEYBOARD.

D. LOAD ADDRESS 0200

E. SET SR TO 0005

F. PRESS CLEAR AND CONTINUE.

G. PROGRAM TITLE IS TYPED, AND PROGRAM HALTS AT LOC 0233 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS, NORMAL RUN IS WITH SR=0002. PRESS CONTINUE.

PRG5 SR OPTIONS

SR0 = HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1 = SELECT ROUTINE WHOSE NUMBER IS SET IN SR6-SR11
SR2 = LOOP PROGRAM
SR6 THROUGH SR11 = ROUTINE NUMBER TO BE SELECTED

H. FOLLOW TYPED INSTRUCTIONS.

I. WHEN PROGRAM IS COMPLETED, AND PROVIDED THAT NO SR OPTIONS PREVENT IT, THE PROGRAM STOPS AT PROGRAM END HALT AT LOC 0275.

NOTE

CORRECT OPERATION OF KEYBOARD IS VERIFIED BY USER CHECKING THAT THE PRINTED CHARACTERS MATCH WITH THE CHARACTERS KEYED.

4.8 PRG6 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE.
REFER TO SECTION 4.1.

B. TURN ON TELETYPE PUNCH.

C. WITH TELETYPE OFF-LINE, PUNCH A SECTION OF BLANK LEADER
ABOUT 6 INCHES LONG. RETURN TELETYPE TO ON-LINE POSITION.

D. LOAD LEADER IN READER, LEAVING VERY LITTLE SLACK BETWEEN
PUNCH AND READER

E. TURN ON READER.

F. LOAD ADDRESS 0200.

G. SET SR TO 0006.

H. PRESS CLEAR AND CONTINUE.

I. PROGRAM HALTS AT LOC 0235 TO PERMIT SETTING OF SR OPTIONS.
SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=0200, TO
HALT ON ERROR. PRESS CONTINUE.

PRG6 SR OPTIONS:

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.

J. PROGRAM IS EXECUTED AND HALTS AT PROGRAM END HALT AT
LOC 0275 UNLESS PREVENTED FROM ENDING, BY SR OPTIONS,
OR IF ERRORS OCCUR.

4.9 PRG7 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE.
REFER TO SECTION 4.1.

B. INSURE THAT TELETYPE IS ON-LINE.

C. LOAD BINARY COUNT PATTERN TEST TAPE IN READER.

D. TURN ON READER.

E. LOAD ADDRESS 0200.

F. SET SR TO 0007.

G. PRESS CLEAR AND CONTINUE.

H. PROGRAM RUNS CONTINUOUSLY UNTIL STOPPED BY USER.
THE FOLLOWING SR OPTIONS MAY BE SET AT ANY TIME.

SR0 - PROGRAM HALTS WITH ACCUMULATED ERROR COUNT IN AC.
SR3=1 - PROGRAM READS TAPE AT FULL SPEED.
SR3=0 - PROGRAM READS TAPE WITH RANDOM STALLS BETWEEN CHARACTERS.
SR5=1 - HALT ON ERROR. PROGRAM HALTS IF READ ERROR OCCURS. BAD CHARACTER IS DISPLAYED IN AC.
SR6=0 - NO HALT ON ERROR.

4.10 PRG10 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE. REFER TO SECTION 4.1.

B. MAKE SURE THAT TELETYPE IS ON-LINE, AND IF KSR37, THAT KEYBOARD "PROCEED" LIGHT IS ON.

C. LOAD ADDRESS 0200

D. SET SR TO 0010

E. PRESS CLEAR AND CONTINUE

F. THE PROGRAM IDENTIFIES ITSELF, AND REQUESTS DATA TO BE TYPED.

G. TYPE IN DATA AS FOLLOWS:

   1. TYPE THE 3 CHARACTERS TO BE TYPED AND A DELETE CODE (RUBOUT) IF YOUR WISH NOT TO STALL BETWEEN CHARACTERS OR,

   2. TYPE THE 3 CHARACTERS TO BE TYPED AND ANY OTHER CHARACTER OTHER THAN THE DELETE CODE TO STALL BETWEEN CHARACTERS.

H. THE PROGRAM WILL CONTINUOUSLY TYPE LINES CONTAINING THE THREE DESIRED CHARACTERS.

I. TO CHANGE THE CHARACTER TO BE TYPED, SET SR0 TO A 1, THE PROGRAM WILL REQUEST NEW DATA WHEN THE CURRENT LINE IS COMPLETED. TYPE IN THE DATA AS IN STEP G.

4.11 PRG11 USE PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE. REFER TO SECTION 4.1.

B. INSURE TELETYPE IS ON-LINE.

C. TURN OFF TELETYPE READER.

D. LOAD BLANK TAPE IN PUNCH.

E. TURN ON PUNCH.

F. LOAD ADDRESS 0200.

G. SET SR TO 0011.

H. PRESS CLEAR AND CONTINUE.

I. PROGRAM PUNCHES BINARY COUNT PATTERN TEST TAPE UNTIL STOPPED BY USER.

5. PROGRAM AND/OR OPERATOR ACTION

5.1 NORMAL HALTS

LOC 0233 — SR SET HALT, OCCURRS TO PERMIT SETTING OF DESIRED OPTIONS. PRESS CONTINUE AFTER SETTING DESIRED OPTIONS. (PRG0,PRG1,PGR2).

LOC 0275 — PROGRAM END HALT, OCCURS AT END OF PROGRAM, IF NO "LOOP" TYPE OPTION IS SET, SET DESIRED OPTIONS AND PRESS CONTINUE. THIS HALT REOCCURS IF NO OPTIONS ARE SET. (PRG0,PRG1,PRG2,PRG3, PRG5,PRG6).

LOC 0321 — ROUTINE END HALT. THIS HALT OCCURS AT END OF A TEST ROUTINE IF SR0 IS SET TO A 1. THE AC CONTAINS THE NUMBER OF ROUTINE JUST COMPLETED. (PRG0,PRG1,PRG2,PRG3,PRG5,PRG6).

6. ERRORS

6.1 ERROR HALTS AND DESCRIPTION

LOC 0201 — INCORRECT PROGRAM NUMBER SELECTED. SET SR TO CORRECT PROGRAM NUMBER AND PRESS CONTINUE (ALL PROGRAMS)

LOC 0256 — NON-EXISTENT ROUTINE SELECTED. SET CORRECT ROUTINE NUMBER IN SR6 THROUGH SR11 AND PRESS CONTINUE. (PRG0,PRG1,PRG2,PRG3,PRG5,PRG6).

LOC 537 — SYNC ERROR. PROGRAM UNABLE TO SYNC READER WITHIN 256 CHARACTERS. PRESS CONTINUE TO TRY AGAIN. (PRG2,PRG6).

LOC 1247 — SYNC ERROR. PROGRAM UNABLE TO SYNC READER WITHIN 145 CHARACTERS. PRESS CONTINUE TO TRY AGAIN. (PRG4,PRG6).

LOC 1270 — UNEXPECTED INTERRUPT. A NON-TELETYPE DEVICE HAS CAUSED INTERRUPT. TURN OFF DEVICE, AND PRESS CONTINUE. (PRG4,PRG6),

LOC 1453 — READ CHECK ERROR A. BAD CHARACTER IN AC. PRESS CONTINUE. (SR5 MUST BE SET TO A 1 FOR THIS ERROR HALT TO OCCUR). (PRG4,PRG6).

LOC 1456 — READ CHECK ERROR B. FOLLOW UP HALT. CORRECT CHARACTER IN AC. TO PROCEED, PRESS CONTINUE (PRG4,PRG6).

LOC 1466 — BLOCK ERRORS HALT. NUMBER OF ERRORS IN AC. TO PROCEED, PRESS CONTINUE. (PRG4,PRG6).

LOC 2021 — PRG0, ROUTINE 0 ERROR HALT. KCC INSTRUCTION FAILED TO CLEAR THE AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT SETS AC TO ALL 1'S. ISSUES KCC TO CLEAR AC, AND REPEATS. MANUAL RESTART.

LOC 2044 — PRG0, ROUTINE 1 ERROR HALT. 200 MS AFTER KRB INSTRUCTION THE FLAG IS NOT SET, OR KSF INSTRUCTION FAILED TO SKIP ON FLAG = 1. PRESSING CONTINUE REPEATS THE TEST.

LOC 2067 — PRG0, ROUTINE 2 ERROR HALT A. SAME AS PRG0, ROUTINE 1 ERROR HALT.

(6.1 CONT'D)

LOC 2071 — PRGØ, ROUTINE 2 ERROR HALT B. KSF INSTRUCTION FAILED TO SKIP WITH FLAG=1. PRESSING CONTINUE ENTERS SCOPE LOOP THAT SKIPS ON FLAG CONTINUOUSLY, MANUAL RESTART.

LOC 2120 — PRGØ, ROUTINE 3 ERROR HALT A. SAME AS PRGØ, ROUTINE 1 ERROR HALT.

LOC 2122 — PRGØ, ROUTINE 3 ERROR HALT B. KCC FAILED TO RESET, OR KSF INSTRUCTION SKIPPED WITH FLAG=Ø, PRESSING CONTINUE ENTERS SCOPE LOOP THAT CLEARS THE FLAG AND SKIPS ON FLAG CONTINUOUSLY. MANUAL RESTART.

LOC 2162 — PRGØ, ROUTINE 4, ERROR HALT. WITH READER FLAG=1 AND INTERRUPT ENABLED, NO INTERRUPT OCCURRED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT TURNS ON INTERRUPT CONTINUOUSLY. MANUAL RESTART.

LOC 2217 — PRGØ, ROUTINE 5, ERROR HALT, TIMING ERROR, FLAG NOT=1 11ØMS AFTER KRB COMMAND, PRESSING CONTINUE ENTERS SCOPE LOOP THAT READS TAPE CONTINOUSLY TO AID IN TIMING ADJUSTMENT. MANUAL RESTART.

LOC 2257 — PRGØ, ROUTINE 6, ERROR HALT A, REREAD ERROR. A REREAD OF THE TELETYPE BUFFER DID NOT MATCH WITH THE ORIGINAL READ. NEW CHARACTER IS DISPLAYED IN AC. PRESS CONTINUE.

LOC 2262 — PRGØ, ROUTINE 6, ERROR HALT B, FOLLOW UP HALT, TO PRGØ, ROUTINE 6, ERROR HALT A, THE "OLD" CHARACTER IS DISPLAYED IN AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT READS THE TELETYPE BUFFER CONTINUOUSLY. MANUAL RESTART.

LOC 2354 — PRGØ AND PRG1 UNEXPECTED INTERRUPT ERROR HALT. A DEVICE OTHER THAN THE ONE BEING TESTED HAS CAUSED AN INTERRUPT, THE AC CONTAINS THE IOT CODE THAT DETECTED THE INTERRUPT (EG. 6Ø31 FOR SYSTEM TELETYPE KEYBOARD). PRESS CONTINUE, THE PROGRAM WILL ATTEMPT TO CLEAR THE UN-DESIRABLE FLAG. IF SUCCESSFUL, THIS HALT WILL NOT REOCCUR.

LOC 2421 — PRG1, ROUTINE Ø, ERROR A, 2ØØ MILLISECONDS AFTER TLS COMMAND THE FLAG IS NOT SET, OR TSF COMMAND FAILED TO SKIP. PRESSING CONTINUE REPEATS TEST.

(6.1 CONT'D)

LOC 2423	PRG1, ROUTINE Ø, ERROR B, WITH FLAG SET, TSF COMMAND FAILED TO SKIP, PRESSING CONTINUE ENTERS SCOPE LOOP THAT SKIPS ON FLAG CONTINUOUSLY, MANUAL RESTART.
LOC 2443	PRG1, ROUTINE 1, TCF COMMAND FAILED TO CLEAR FLAG, OR TSF COMMAND SKIPPED WITH FLAG RESET, PRESSING CONTINUE ENTERS SCOPE LOOP THAT CLEARS THE FLAG AND THEN SKIPS ON FLAG CONTINOUSLY, MANUAL RESTART.
LOC 2467	PRG1, ROUTINE 2, TCF COMMAND FAILED TO CLEAR FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TCF COMMAND CONTINUOUSLY. MANUAL RESTART.
LOC 2525	PRG1, ROUTINE 3, ERROR. WITH FLAG SET AND THE INTERRUPT ENABLED, NO INTERRUPT OCCURRED, PRESSING CONTINUE ENTERS SCOPE LOOP THAT TURNS ON THE INTERRUPT CONTINUOUSLY. MANUAL RESTART.
LOC 2565	PRG1, ROUTINE 4. TIMING ERROR. 79 MILLISECONDS AFTER TLS COMMAND THE FLAG IS SET, EITHER THE PDP-8E TIMING IS TOO SLOW OR TTY TOO FAST, (IS THE JUMPER OR THE TIMING BOARD REMOVED)? PRESSING CONTINUE ENTERS SCOPE LOOP THAT RUNS PRINTER CONTINUOUSLY TO AID IN TIMING ADJUST-MENT. MANUAL RESTART.
LOC 2567	PRG1, ROUTINE 4, TIMING ERROR. 80 MILLISECONDS AFTER TLS COMMAND THE FLAG IS NOT SET. PRES-SING CONTINUE ENTERS SCOPE LOOP THAT RUNS PRINTER CONTINUOUSLY TO AID IN TIMING ADJUSTMENT, MANUAL RESTART.
LOC 2624	PRG1, ROUTINE 5A, ERROR HALT 1. SPF COMMAND FAILED TO SET PRINTER FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPF CONTINUOUSLY, MANUAL RESTART.
LOC 2630	PRG1, ROUTINE 5A, ERROR HALT 2. PRINTER FLAG SETTING LATE. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPF AND DELAYS 110 MS CONTINUOUSLY. MANUAL RESTART.
LOC 2670	PRG2, ROUTINE Ø, ERROR HALT A. READ ERROR, BAD CHARACTER IN AC. PRESS CONTINUE.

(6.1 CONT'D)

LOC 2673 — PRG2, ROUTINE 0 ERROR HALT B, FOLLOW UP HALT. EXPECTED CHARACTER IN AC, PRESSING CONTINUE RESUMES TEST.

LOC 2722 — PRG2, ROUTINE 1, ERROR HALT A. READ ERROR, BAD CHARACTER IN AC. PRESS CONTINUE.

LOC 2725 — PRG2, ROUTINE 1, ERROR HALT B. FOLLOW UP HALT. EXPECTED CHARACTER IN AC. PRESSING CONTINUE RESUMES TESY.

LOC 2760 — PRG2, ROUTINE 2, ERROR HALT A. READ ERROR. BAD CHARACHER IN AC. PRESS CONTINUE.

LOC 2763 — PRG2, ROUTINE 2, ERROR HALT B. FOLLOW UP HALT. EXPECTED CHARACTER IN AC. PRESSING CONTINUE RESUMES TEST.

LOC 4070 — PRG5, ROUTINE 0, KSF COMMAND FAILED TO SKIP ON KEYBOARD FLAG. PRESS CONTINUE TO ENTER SCOPE LOOP THAT SKIPS ON FLAG CONTINUOUSLY.

LOC 4453 — PRG7, READ ERROR HALT A. BAD CHARACTER IN AC. PRESS CONTINUE. HALT OCCURS IF SR5=1.

LOC 4456 — PRG7, READ ERROR HALT B. FOLLOW UP HALT TO PRG7 READ ERROR HALT A. EXPECTED CHARACTER IS DISPLAYED IN AC. TO PROCEED, PRESS CONTINUE.

LOC 4463 — PRG7, ERROR COUNT HALT. HALT OCCURS WHENEVER SR0 IS SET TO A 1. THE AC THEN CONTAINS THE ACCUMULATED ERROR COUNT, IF ANY. TO PROCEED, PRESS CONTINUE.

LOC 7027 — PRG0, ROUTINE7, ERROR HALT A. KCR INSTRUCTION CLEARED THE AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KCR CONTINUOUSLY WITH AC=7777. MANUAL RESTART.

LOC 7033 — PRG0, ROUTINE 7, ERROR HALT B. KCR INSTRUCTION FAILED TO CLEAR READER FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KCR WITH READER FLAG SET CONTINUOUSLY. MANUAL RESTART.

(6.1 CONT'D)

LOC 7113 — PRG0, ROUTINE 10, ERROR HALT A. KIE INSTRUCTION FAILED TO DISABLE TTY INTERRUPT OR ILLEGAL INTERRUPT OCCURED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT WILL CHECK FOR AN ILLEGAL INTERRUPT, AND IF THERE WAS NONE IT CONTINUES INTO THE LOOP THAT ISSUES KIE WITH AC=000 CONTINUOUSLY. IF AN ILLEGAL INTERRUPT OCCURRED, THE PROGRAM WILL HALT AT LOC. 2354 WITH THE AC CONTAINING THE IOT THAT CAUSED THE INTERRUPT. IF AC=7777, IT COULD NOT DETERMINE THE IOT. PRESSING CONTINUE WILL ATTEMPT TO CLEAR THE UNDESIRABLE FLAG. STOP THE PROGRAM AT THIS POINT AND RESTART IT AT PRG0, ROUTINE 10, OR AT THE BEGINNING. MANUAL RESTART.

LOC 7131 — PRG0,ROUTINE 10, ERROR HALT B. SRQ INSTRUCTION FAILED TO SKIP WITH TTY DISABLED AND FLAG SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SRQ WITH FLAG SET AND TTY DISABLED, CONTINUOUSLY. MANUAL RESTART.

LOC 7141 — PRG0, ROUTINE 10, ERROR HALT C. SPI INSTRUCTION FAILED TO SKIP WITH TTY DISABLED AND FLAG SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPI WITH FLAG SET AND TTY DISABLED, CONTINUOUSLY. MANUAL RESTART.

LOC 7151 — PRG0, ROUTINE 10, ERROR HALT D. KIE INSTRUCTION FAILED TO ENABLE TTY INTERRUPT WITH AC11=1. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KIE WITH AC11=1 CONTINUOUSLY. MANUAL RESTART.

LOC 7165 — PRG0, ROUTINE 10, ERROR HALT E. SRQ INSTRUCTION FAILED TO SKIP WITH TTY ENABLED AND FLAG SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SRQ CONTINUOUSLY WITH TTY ENABLED AND FLAG SET. MANUAL RESTART.

LOC 7200 — PRG0, ROUTINE 10, ERROR HALT F. SPI INSTRUCTION FAILED TO SKIP WITH TTY ENABLED AND FLAG SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPI CONTINUOUSLY WITH TTY ENABLED AND FLAG SET. MANUAL RESTART.

LOC 7247 — PRG0, ROUTINE 11, ERROR HALT A. CAF INSTRUCTION FAILED TO CLEAR AC AND LINK. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES CAF CONTINUOUSLY WITH AC AND LINK SET. MANUAL RESTART.

(6.1 CONT'D)

LOC 7256	PRG0, ROUTINE 11, ERROR HALT B. READER FLAG WAS NOT CLEARED BY CAF OR SET AFTER BEING CLEARED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES CAF AND DELAYS 200 MS WITH READER FLAG SET CONTINUOUSLY. MANUAL RESTART.
LOC 7267	PRG0, ROUTINE 11, ERROR HALT C. CAF INSTRUCTION FAILED TO ENABLE TTY INTERRUPT F.F. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES CAF CONTINUOUSLY WITH TTY DISABLED. MANUAL RESTART.
LOC 7322	PRG1, ROUTINE 6, ERROR HALT A. PRINTER FLAG WAS NOT CLEARED BY CAF OR SET AFTER BEING CLEARED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES CAF AND DELAYS 200 MS WITH PRINTER FLAG SET CONTINUOUSLY. MANUAL RESTART.
LOC 7347	PRG1, ROUTINE 7, ERROR HALT A1. SRQ INSTRUCTION FAILED TO SKIP WITH PRINTER FLAG SET AND TTY ENABLED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SRQ CONTINUOUSLY WITH TTY ENABLED AND PRINTER FLAG SET.
LOC 7355	PRG1, ROUTINE 7, ERROR HALT A2. SPI INSTRUCTION FAILED TO SKIP WITH PRINTER FLAG SET AND TTY ENABLED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPI CONTINUOUSLY WITH TTY ENABLED AND PRINTER FLAG SET.
LOC 7461	PRG1, ROUTINE 10, ERROR HALT A. WITH LINK, ION, AND INT BUS EQUAL TO ZERO, AC DID NOT EQUAL ZERO AFTER ISSUING GTF. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES GTF CONTINUOUSLY WITH LINK, ION, AND INT BUS=0. MANUAL RESTART.
LOC 7470	PRG1, ROUTINE 10, ERROR HALT B. GTF INSTRUCTION CLEARED THE LINK. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES GTF CONTINUOUSLY WITH LINK SET. MANUAL RESTART.
LOC 7476	PRG1, ROUTINE 10, ERROR HALT C. GTF INSTRUCTION FAILED TO BRING LINK INTO AC0. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES GTF CONTINUOUSLY WITH LINK SET. MANUAL RESTART.

(6.1 CONT'D)

LOC 7506	PRG1, ROUTINE 10, ERROR HALT D. GTF INSTRUCTION FAILED TO BRING INT BUS INTO AC 2. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES GTF CONTINUOUSLY WITH INT BUS SET. MANUAL RESTART.
LOC 7520	PRG1, ROUTINE 10, ERROR HALT E. GTF INSTRUCTION CLEARED ION. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES GTF CONTINUOUSLY WITH ION SET. MANUAL RESTART.
LOC 7525	PRG1, ROUTINE 10, ERROR HALT F. GTF INSTRUCTION FAILED TO BRING ION INTO AC 4. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES GTF CONTINUOUSLY WITH ION SET. MANUAL RESTART.
LOC 7556	PRG1, ROUTINE 11, ERROR HALT A. RTF FAILED TO RESET LINK WITH AC 0=0. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES RTF CONTINUOUSLY WITH AC 0=0. MANUAL RESTART.
LOC 7563	PRG1, ROUTINE 11, ERROR HALT B. RTF FAILED TO SET LINK WITH AC0=1. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES RTF CONTINUOUSLY WITH AC0=1. MANUAL RESTART.
LOC 7570	PRG1, ROUTINE 11, ERROR HALT C. RTF FAILED TO TURN THE INTERRUPT ON. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES RTF CONTINUOUSLY. MANUAL RESTART.

7. MISCELLANEOUS

7.1 EXECUTION TIME

PRG0: NO MORE THAN 2 MIN. 15 SEC.
PRG1: 60 SECONDS MAX
PRG2: 18 MINUTES
PRG3: 80 MINUTES MAX.
PRG4: CONTINUOUS RUNNING
PRG5: USER DEPENDENT
PRG6: 37 MINUTES APPROX
PRG7: CONTINUOUS RUNNING
PRG10: USER DEPENDENT
PRG11: CONTINUOUS RUNNING

7.2 TEST TAPES

MAINDEC-00-D2G3-PT BINARY COUNT PATTERN TEST TAPE IS PROVIDED WITH THIS PROGRAM. FOR CONVENIENCE OF USE, A TAPE LOOP SHOULD BE MADE, MAKING SURE THAT THE PATTERN IS MATCHED AT THE SPLICE POINT.

8. PROGRAM DESCRIPTION

8.1 PRG0 - BASIC INPUT LOGIC TESTS

THIS PROGRAM CONTAINS 10 ROUTINES NUMBERED FROM 0 TO 11 (OCTAL).

RTN0 CHECKS THAT KCC COMMAND IS ABLE TO CLEAR THE AC. TEST IS DONE 1000 TIMES.

RTN1 ISSUES KCC, WAITS 200MS AND CHECKS THAT FLAG IS SET. A FAILURE TO SKIP INDICATES THAT THE FLAG IS NOT SET, OR THAT KSF COMMAND FAILED TO SKIP.

RTN2 WITH FLAG SET, CHECKS THAT KSF COMMAND SKIPS RELIABLY. DONE 1000 TIMES.

RTN3 CHECKS THAT KSF COMMAND DOES NOT SKIP WITH FLAG RESET. DONE 500 TIMES.

RTN4 CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT, AND THEN CHECKS THAT READER IS CAPABLE OF INTERRUPTING.

RTN5 TIMING TEST.

RTN6 READS A CHARACTER FROM TAPE AND SAVES IT. IT THEN REREADS THE TTI STATICALLY 1000 TIMES TO CHECK FOR CONSISTENT READING FROM TTI. 256 CHARACTERS ARE READ IN THIS MANNER.

RTN7 CHECKS THAT KCR DOES NOT CLEAR AC AND SETS READER FLAG, BUT DOES NOT SET READER RUN. DONE 100 TIMES.

RTN10 CHECKS THAT KIE WILL ENABLE AND DISABLE TTY INTERRUPT F.F. AND THAT SRQ AND SPI WILL AND WILL NOT SKIP. DONE 1000 TIMES.

RTN11 CHECKS THAT CAF WILL ENABLE TTY INTERRUPT F.F. AND THAT IT WILL CLEAR AC, LINK, AND READER FLAG. DONE 100 TIMES.

8.2 PRG1 - BASIC OUTPUT LOGIC TESTS

THIS PROGRAM CONTAINS 10 ROUTINES NUMBERED FROM 0 TO 11 (OCTAL).

RTN0 ISSUES TLS, WAITS 200 MS, AND CHECKS FOR FLAG=1. A FAILURE TO SKIP INDICATES THAT FLAG IS NOT 1, OR KSF COMMAND FAILED. IF THIS PART IS SATISFIED THE ROUTINE SKIPS ON FLAG 1000 TIMES. FAILURE TO SKIP INDICATES TSF FAILURE.

RTN1 CHECKS THAT TSF COMMAND DOES NOT SKIP WITH FLAG=0, DONE 1000 TIMES.

RTN2 CHECKS THAT TCF COMMAND CLEARS FLAG. DONE 100 TIMES.

RTN3 CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT, AND THEN CHECKS THAT THE PRINTER/PUNCH IS ABLE TO INTERRUPT.

RTN4 TIMING TEST.

RTN5 CHECKS THAT SPF COMMAND SET THE PRINTER FLAGS. DONE 100 TIMES.

RTN6 CHECKS THAT CAF WILL CLEAR PRINTER FLAG AND DELAYS 200 MS TO MAKE SURE THE FLAG DOES NOT SET AGAIN, DONE 100 TIMES.

RTN7 CHECKS THAT SRQ AND SPI WILL AND WILL NOT SKIP. DONE 1000 TIMES.

RTN10 CHECKS THE GTF INSTRUCTION. DONE 1000 TIMES.

RTN11 CHECKS THE RTF INSTRUCTION. DONE 1000 TIMES.

8.3 PRG2 - READER TEST

THIS PROGRAM CONTAINS 3 ROUTINES NUMBERED FROM 0 TO 2.

RTN0 READS 4095 CHARACTERS OF BINARY COUNT PATTERN. FULL SPEED.

RTN1 READS 2000 CHARACTERS OF BINARY COUNT PATTERN WITH RANDOM STALLS BETWEEN CHARACTERS.

RTN2 READS 100 RANDOM LENGTH CHARACTER BLOCKS. FIXED STALL BETWEEN CHARACTERS IN A BLOCK. THE STALL CHANGES FOR EACH BLOCK AND IS DETERMINED AT RANDOM.

8.4 PRG3 - PRINTER TEST

THIS PROGRAM CONTAINS 41 ROUTINES NUMBERED FROM 0 TO 50 (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 16 GROUPS OF ----I FOLLOWED BY CHARACTERS I-.

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 RANDOM DELAY UNTIL 81 SLASHES HAVE BEEN PRINTED. THE RESULT SHOULD APPEAR TO BE A LEFT SLANTED LINE FROM POSITION 1 TO 81. VERTICAL SPACING VARIATIONS SHOULD BE APPARENT IF ADJUSTMENT IS REQUIRED.

ROUTINES 4 THROUGH 41 TYPES LINES CONTAINING 3 CHARACTERS AT FULL SPEED AS FOLLOWS:

RTN4	ABC (CAPITALS)
RTN5	DEF "
RTN6	GHI "
RTN7	JKL "
RTN10	MNO "
RTN11	PQR "
RTN12	STU "
RTN13	VWX "
RTN14	YZ0 "
RTN15	123
RTN16	456
RTN17	789
RTN20	!"#
RTN21	$%&
RTN22	'()
RTN23	*+,
RTN24	-./
RTN25	:;<
RTN26	=>?
RTN27	@[\
RTN30	]↑ AND LEFT ARROW

(8.4 CONT'D)

RTN31	ABC (LOWER CASE) (KSR37 ONLY)
RTN32	DEF " "
RTN33	GHI " "
RTN34	JKL " "
RTN35	MNO " "
RTN36	PQR " "
RTN37	STU " "
RTN40	VWX " "
RTN41	YZ AND CODE 340 "

RTN42 TYPES LINE OF 4 CHARACTERS WHOSE CODE IS 373, 374, 375, AND 376 (KSR37 ONLY).

RTN43 TYPES 2 LINES OF ALL CHARACTERS. FIRST LINE IS TYPED AT FULL SPEED, AND THE 2ND LINE WITH RANDOM STALLS BETWEEEN CHARACTERS.

RTN44 TYPES 12 LINES OF ASR33 PRINTER WORST CASE PATTERN. ALTERNATE LINES ARE TYPED WITH RANDOM STALLS BETWEEN CHARACTERS. ROUTINE RUNS ONLY IF KSR33 OR ASR33 IS PRESENT.

THE ASR33 WORST CASE PATTERN USED IS 'LEFT ARROW W/W LEFT ARROW.

RTN45 TYPES 12 LINES OF ASR35 PRINTER WORST CASE PATTERN. ALTERNATE LINES ARE TYPED WITH RANDOM STALLS BETWEEN CHARACTERS. ROUTINE RUNS ONLY IF KSR35 OR ASR35 IS PRESENT.

THE ASR35 WORST CASE PATTERN USED IS 'C?C?C

RTN46 TYPES 12 LINES OF KSR37 PRINTER WORST CASE PATTERN. ALTERNATE LINES ARE TYPED WITH RANDOM STALLS BETWEEN CHARACTERS. ROUTINE RUNS ONLY IF KSR37 IS PRESENT.

THE KSR37 WORST CASE PATTERN USED IS:
CAPITAL N, LOWER CASE Q, CAPITAL A, SWING DASH, CAPITAL A, LOWER CASE Q.

RTN47 TAB TEST, EXECUTED FOR 37 OR 35 TELETYPE ONLY. THE TEST IS RUN AFTER ROUTINE 3.

RTN50 BACKSPACE TEST. EXECUTED FOR KSR37 TYLETYPE ONLY. THIS TEST IS RUN AFTER ROUTINE 47.

8.5 PGR4 - PUNCH TEST

THIS PROGRAM TESTS THE PUNCH WITH A SPECIAL BINARY COUNT PATTERN. EVERY BINARY COUNT CHARACTER PUNCHED IS FOLLOWED BY ITS 1'S COMPLEMENT CHARACTER.

THE TEST SEQUENCE IS AS FOLLOWS:

A) PUNCH LEADER (CODE 376)
B) PUNCH SYNC CHARACTER (CODE 377)
C) PUNCH DATA BLOCK AT FULL SPEED (512 CHARACTERS)
D) PUNCH TRAILER (CODE 376)
E) SYNC THE READER
F) READ AND CHECK DATA BLOCK
G) PUNCH LEADER (CODE 376)
H) PUNCH SYNC CHARACTER (CODE 377)
I) PUNCH DATA BLOCK WITH STALLS. (512 CHARACTERS)
J) PUNCH TRAILER (CODE 376)
K) SYNC THE READER
L) READ ANC CHECK DATA BLOCK
M) REPEAT. (GO TO STEP A)

8.6 PRG5 - 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.

8.7 PRG6 - COMBINED READER, PRINT, PUNCH TEST

THIS PROGRAM CONTAINS 25 ROUTINES NUMBERED FROM 0 TO 32 (OCTAL). ALL ROUTINES USE THE FOLLOWING TEST SEQUENCE:

A) FILL CORE WITH DATA TO BE PUNCHED/PRINTED.
B) PUNCH LEADER.
C) PUNCH SYNC CHARACTER.
D) PUNCH DATA BLOCK (NO DELAY BETWEEN CHARACTERS.)
D) 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
RNT2 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 ASR35 PRINTER
WORST CASE PATTERN, (E?C)
RTN30 PUNCH/PRINT AND READ CHECK BLOCKS OF SPACE,
RUBOUT (DATA; ALL 1'S, ALL 1'S, ALL 0'S),

8.8 PRG7 - READER EXERCISER, BINARY COUNT PATTERN

THE PROGRAM READS AND CHECKS A BINARY COUNT PATTERN TEST TAPE. WITH PROGRAM RUNNING SETTTING SR0 TO A 1 CAUSES PROGRAM TO HALT AND DISPLAY THE ACCUMULATED ERROR COUNT IN AC. SR3 SET TO A 1 GIVES FULL SPEED READING, SR3 SET TO A 0 CAUSES STALLS BETWEEN CHARACTERS. SR5 SET TO A 1 WILL HALT THE PROGRAM WHEN AN ERROR OCCURS. THE BAD CHARACTER IS THEN DISPLAYED IN THE AC. PRESSING CONTINUE DISPLAYS THE EXPECTED CHARACTER.

8.9 PRG10 - PRINTER EXERCISER

THIS PROGRAM CONTINUOUSLY TYPES LINES OF ANY 3 CHARACTERS KEYED BY USER. ON PROGRAM REQUEST THE USER KEYS IN THE 3 CHARACTERS TO BE TYPED. FOLLOWED BY A DELETE CODE IF FULL SPEED TYPING IS DESIRED, OR BY ANY OTHER CHARACTER IF RANDOM STALLS AFTER EACH CHARACTER ARE DESIRED.

8.10 PRG11 - TAPE GENERATOR - BINARY COUNT PATTERN

PUNCHES BINARY COUNT PATTERN TEST TAPE.

```
                /PDP-8/E TELETYPE CONTROL TEST.

                /COPYRIGHT 1970, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS. 01754
                /
                /PRG0-BASIC INPUT CONTROL LOGIC TEST - (USES READER)
                /PRG1-BASIC OUTPUT CONTROL LOGIC TEST - (USES PRINTER)
                /PRG2-READER TEST
                /PRG3-PRINTER TEST
                /PRG4-PUNCH TEST
                /PRG5-KEYBOARD TEST
                /PRG6-COMBINED TEST
                /PRG7-READER EXERCISER, BINARY COUNT PATTERN.
                /PRG10-PRINTER EXERCISER,
                /PRG11-TAPE GENERATOR, BINARY COUNT PATTERN.
                /
                /
6003    SRQ=6003                        /SKIP IF INTERRUPT REQUEST.
6004    GTF=6004                        /GET INTERRUPT FLAGS
6005    RTF=6005                        /RESTORE INTERRUPT FLAGS AND TURN INTERRUPT ON
6007    CAF=6007                        /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY INTERRUPT
6030    KCR=6030                        /CLEAR KBRD FLAG BUT DO NOT SET RDR RUN
6035    KIE=6035                        /ENABLE TTY INTERRUPT WHEN AC11 EQUALS 1
6040    SPF=6040                        /SET PRINTER FLAG
6045    SPI=6045                        /SKIP IF TTY INTERRUPT
7002    BSW=7002                        /SWAP BYTES IN AC.
0000    OPEN=0
4577    SETLOC=JMS I [STCTR
4576    DELAY=JMS I [DLYMS
4575    CRLF=JMS I [CRALF
4574    MOVE=JMS I [MOVVE
4573    TYPE=JMS I [TYPSTG
6117    MTON=6117                       /DC02, MULTIPLE TTY ON.
6127    MTRS=6127                       /DC02, MULTIPLE TTY READ STATUS.
6115    MINT=6115                       /DC02, MULTIPLE TTY INTERRUPT CONTROL.
4572    UKSF=JMS I [XKSF
4571    UKCC=JMS I [XKCC
4570    UKRS=JMS I [XKRS
4567    UKRB=JMS I [XKRB
4566    UTSF=JMS I [XTSF
4565    UTCF=JMS I [XTCF
4564    UTLS=JMS I [XTLS
4563    UKCR=JMS I [XKCR
4562    UKIE=JMS I [XKIE
4561    USPF=JMS I [XSPF
4560    USPI=JMS I [XSPI
4557    STALL=JMS I [STAL
4556    CKSR37=JMS I [CK37
4555    CKSR33=JMS I [CK33
4554    CKSR35=JMS I [CK35
5340    BLOCKA=END
5342    BLOCK1=BLOCKA+2
5452    BLOCKB=BLOCKA+112
5463    BLKBB=BLOCKA+123
5454    BLOCK2=BLOCKA+114
5465    BLK2=BLOCKA+125
```

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```
                5564    BLOCKC=BLOCKA+224
                5575    BLKCC=BLOCKA+235
                6340    DBLK=BLOCKA+1000
                6740    DEND=DBLK+400

                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    TTYTYP, OPEN
          0021  6304    TTYIOT, 6304
          0022  0000    KSTART, 0               /USER PROGRAM START.
          0023  0000    DELAYM, 0
          0024  0260    CHAIN,  CHAINN          /CHAIN RTN ENTRY.
          0025  0000    PRGNUM, 0
          0026  2000    PRGTAB, PRG0
          0027  2363            PRG1
          0030  2640            PRG2
          0031  3000            PRG3
          0032  4000            PRG4
          0033  4042            PRG5
          0034  4200            PRG6
          0035  4415            PRG7
          0036  4466            PRG10
          0037  4531            PRG11
          0040  0000    TEMP,   0               /WORK
          0041  0000    TEMP1,  0               /LOCATIONS
          0042  0077    TSTMSK, 77              /SR 6-11 ENABLE MASK
          0043  0000    CURTST, 0               /FOR CURRENT TEST ADDRESS
          0044  0000    RTNNO,  0               /FOR CURRENT TEST NUMBER
          0045  0000    NXTST,  0               /FOR NEXT TEST ADDRESS
          0046  0000    MSCTR,  0               /MILLISECONDS COUNTER
          0047  0000    MILCTR, 0
          0050  7370    MIL1,   -410            /FOR 1 MSEC CONSTANT
          0051  0000    CTRA,   0               /COUNTER A.
          0052  0000    CTRB,   0               /COUNTER B.
          0053  0000    STLID,  OPEN
                        /
          0054  0521    SYNC,   SYNK            /ENTRY TO SYNC TAPE RTN.
          0055  0436    INPATT, IBIN            /ENTRY TO INITIATE PATTERN
          0056  0444    GETPT,  GTBIN           /ENTRY TO GET PATTERN CHAR.
          0057  0504    CHECK,  CHCK
          0060  0000    PFLAG,  0
          0061  1271    UOUT,   OUT
          0062  1615    UTPLN3, TYPLN3
          0063  0721    UPUNCH, PUNCH
          0064  0600    UMOVE,  MOVVE
          0065  0000    RBUSY,  0
          0066  0000    AC,     0
          0067  0000    LINK,   0
```

```
0070  0000    BLKCNT, 0
0071  0000    DELAYS, 0
0072  0000    ERRCR,  0
0073  0000    UTEMP,  0
0074  0000    UTEMP1, 0
0075  0000    UTEMP2, 0
0076  0215    CR,     215
0077  0212    LF,     212
0100  0277    DLYMSK, 277


                /CONTROL ROUTINE
      0200      *200
0200  7610    START,  SKP CLA
0201  7402            HLT             /INCORRECT PROGRAM NUMBER
0202  7604            LAS             /READ SR
0203  0153            AND C17         /PROGRAM MASK = 17
0204  1152            TAD C-11        /PROGRAM LIMIT = -12
0205  7540            SMA SZA         /VALID PROGRAM NUMBER?
0206  5201            JMP 201         /NO.
0207  7604            LAS             /YES. READ SR.
0210  0153            AND C17
0211  3025            DCA PRGNUM      /SAVE PROGRAM NUMBER.
0212  1025            TAD PRGNUM      /DEVELOP PROGRAM START
0213  1151            TAD CPRGTAB     /ADDRESS AND STORE AT
0214  3040            DCA TEMP        /PRGADR.
0215  1440            TAD I TEMP
0216  3232            DCA PRGADR
0217  4777'           JMS DVCSEL      /PERFORM IOT SELECTION
0220  7604    SLDC02, LAS             /SELECT DC02 UNIT
0221  0150            AND C7760
0222  6117            MTON
0223  7201            CLA IAC
0224  6115            MINT            /ENABLE DC02 INTERRUPT
0225  4464            JMS I UMOVE     /INITIALIZE
0226  0005            5               /INTERRUPT,
0227  0001            1               /AREA.
0230  7776            -2
0231  5632            JMP I .+1
0232  0000    PRGADR, 0
0233  7602    SRSET,  HLT CLA
0234  7200    GETRDY, CLA
0235  1022            TAD KSTART      /SET ADDRESS OF 1ST ROUTINE
0236  3045            DCA NXTST       /STORE AT NXTST
0237  4277            JMS FORWD
0240  7604            LAS             /READ SR
0241  7004            RAL
0242  7500            SMA             /ROUTINE SELECT? (SR1)
0243  5443            JMP I CURTST    /NO.  START WITH 1ST RTN
0244  7604            LAS             /YES
0245  0042            AND TSTMSK
0246  7041            CIA
0247  1044            TAD RTNNO
0250  7650            SNA CLA         /IS IT THIS RTN?
```

```
0291  5443            JMP I CURTST    /YES.  GO DO IT
0292  1045            TAD NXTST       /NO
0293  7001            IAC             /IS THIS LAST TRN?
0294  7640            SZA CLA         /NO
0295  5237            JMP GETRDY+3
0296  7402  INCRTN,   HLT             /YES.  INCORRECT ROUTINE NO.
0297  5234            JMP GETRDY

0260  4314  CHAINN,   JMS SHALT       /HALT? (SR0)
0261  7604            LAS             /READ SR
0262  7006            RTL
0263  7630            SZL CLA         /SELECT ROUTINE? (SR1)
0264  5234            JMP GETRDY      /YES
0265  1045            TAD NXTST
0266  7001            IAC
0267  7640            SZA CLA         /LAST ROUTINE?
0270  5237            JMP GETRDY+3    /NO.
0271  7604            LAS
0272  7006            RTL
0273  7710            SPA CLA         /LOOP PROGRAM? (SR2)
0274  5234            JMP GETRDY      /YES
0275  7402  PRGEND,   HLT             /END OF PROGRAM HALT
0276  5260            JMP CHAINN
0277  0000  FORWD,    0
0300  7300            CLA CLL
0301  1445            TAD I NXTST     /GET NEXT RTN NO
0302  3044            DCA RTNNO       /STORE AT RTNNO
0303  2045            ISZ NXTST
0304  1045            TAD NXTST       /SET CURRENT
0305  3040            DCA TEMP        /RTN NUMBER
0306  2045            ISZ NXTST
0307  1045            TAD NXTST       /SET CURRENT
0310  3043            DCA CURTST      /RTN ADDR.
0311  1440            TAD I TEMP      /SET NEXT
0312  3045            DCA NXTST       /RTN ADDR.
0313  5677            JMP I FORWD     /EXIT

0314  0000  SHALT,    0
0315  7604            LAS             /READ SR
0316  7700            SMA CLA         /HALT? (SR0)
0317  5714            JMP I SHALT
0320  1044            TAD RTNNO
0321  7402            HLT             /UNCONDITIONAL HALT (SR0 = 1)
0322  5714            JMP I SHALT     /EXIT.S/-10L
0323  0000  STCTR,    0
0324  7200            CLA
0325  1723            TAD I STCTR     /GET CTR ADDR
0326  3040            DCA TEMP        /AND SAVE AT TEMP
0327  2323            ISZ STCTR
0330  1723            TAD I STCTR     /GET COUNT AND
0331  3440            DCA I TEMP      /STORE PER C(TEMP)
0332  2323            ISZ STCTR
0333  5723            JMP I STCTR     /EXIT
0334  0000  DLYMS,    0
0335  7300            CLA CLL
```

```
0336  1023            TAD DELAYM      /GET MS COUNT
0337  3046            DCA MSCTR       /STORE IN MSCTR
0340  1050            TAD MIL1        /GET 1 MS CONSTANT
0341  3047            DCA MILCTR      /STORE IN MILCTR
0342  2047            ISZ MILCTR      /DELAYED 1 MSEC?
0343  5342            JMP .-1
0344  2046            ISZ MSCTR       /DONE DELAYING
0345  5340            JMP .-5
0346  5734            JMP I DLYMS     /EXIT
0347  0000  CK33,     OPEN            /SUB TO CHECK FOR 33 TTY
0350  7200            CLA
0351  1020            TAD TTYTYP      /GET TTY TYPE
0352  7650            SNA CLA         /33?
0353  2347            ISZ CK33        /YES.
0354  5747            JMP I CK33
0355  0000  CK35,     OPEN            /SUB TO CHECK FOR 35 TTY
0356  7240            CLA CMA
0357  1020            TAD TTYTYP      /GET TTY TYPE
0360  7650            SNA CLA         /35?
0361  2355            ISZ CK35        /YES.
0362  5755            JMP I CK35
0363  0000  CK37,     OPEN            /SUB TO CHECK FOR 37 TTY
0364  7200            CLA
0365  1020            TAD TTYTYP      /GET TTY TYPE.
0366  1147            TAD [-2
0367  7650            SNA CLA         /37?
0370  2363            ISZ CK37        /YES.
0371  5763            JMP I CK37
0377  4535
      0400            PAGE


      0400            PAGE
0400  0000  RGNA,     OPEN            /RANDOM NUMBER SUB A.
0401  7300            CLA CLL
0402  1215            TAD RP1A
0403  7006            RTL
0404  1216            TAD RP2A
0405  3215            DCA RP1A
0406  1215            TAD RP1A
0407  7006            RTL
0410  1216            TAD RP2A
0411  7006            RTL
0412  3216            DCA RP2A
0413  1215            TAD RP1A
0414  5600            JMP I RGNA      /EXIT RGNA SUB.
0415  1233  RP1A,     1233
0416  7622  RP2A,     7622
0417  0000  RGNB,     OPEN            /RANDOM NUMBER SUB B.
0420  7300            CLA CLL
0421  1234            TAD RP1B
0422  7006            RTL
0423  1235            TAD RP2B
0424  3234            DCA RP1B
0425  1234            TAD RP1B
```

```
0426  7006          RTL
0427  1235          TAD RP2B
0430  7006          RTL
0431  3235          DCA RP2B
0432  1234          TAD RP1B
0433  5617          JMP I RGNB      /EXIT RGNB SUB
0434  1233  RP1B,   1233
0435  7622  RP2B,   7622

              /SUBROUTINE TO INITIALIZE BINARY COUNT PATTERN
0436  0000  IBIN,   0
0437  7200          CLA             /SET PT0 = 0
0440  3242          DCA PT0
0441  5636          JMP I IBIN      /EXIT
0442  0000  PT0,    0
0443  0000  PT1,    0

              /SUBROUTINE TO PROVIDE NEXT BINARY COUNT PATTERN CHARACTER (IN AC)
0444  0000  GTBIN,  0
0445  7200          CLA
0446  1242          TAD PT0         /GET PT0
0447  3243          DCA PT1         /STORE AT PT1
0450  1243          TAD PT1         /GET PT1
0451  7001          IAC             /INCREMENT ACCUMULATOR
0452  0146          AND [377        /LIMIT TO 8 BITS
0453  3242          DCA PT0         /STORE AT PT0
0454  1243          TAD PT1         /GET PT1
0455  5644          JMP I GTBIN     /EXIT

              /SUBROUTINE TO GENERATE RANDOM CHARACTER COUNT.  (NOT MORE THAN 77(8))
0456  0000  CHRCNT, 0
0457  4200          JMS RGNA        /GO GENERATE RANDOM NUMBER
0460  0145          AND [77         /REMOVE HIGH ORDER 6 BITS
0461  7450          SNA
0462  5257          JMP CHRCNT+1
0463  7041          CIA             /2'S COMPLEMENT IT
0464  3273          DCA SCNT
0465  1656          TAD I CHRCNT
0466  3240          DCA TEMP
0467  1273          TAD SCNT
0470  3440          DCA I TEMP      /STORE AT SPECIFIED ADDRESS
0471  2256          ISZ CHRCNT      /SET UP EXIT
0472  5656          JMP I CHRCNT    /EXIT
0473  0000  SCNT,   OPEN
              /SUBROUTINE TO GENERATE RANDOM DELAY COUNT (NOT MORE THAN 3777(8)).
0474  0000  DLCNT,  0
0475  4200          JMS RGNA        /GO GENERATE RANDOM NUMBER
0476  0100          AND DLYMSK      /MASK OUT UNDESIRED BITS.
0477  7450          SNA             /ZERO?
0500  5275          JMP DLCNT+1     /YES, GET ANOTHER NUMBER
0501  7041          CIA             /2'S COMPLEMENT IT
0502  3023          DCA DELAYM
0503  5674          JMP I DLCNT     /EXIT

              /SUBROUTINE TO COMPARE C(AC) TO CONTI    )STORED AT CALL+1
```

```
0504  0000  CHCK,   0
0505  3320          DCA WCHK          /STORE AC AT WCHK
0506  1704          TAD I CHCK        /GET COMPARE DATA
0507  7041          CIA               /2'S COMPLEMENT IT
0510  1320          TAD WCHK          /ADD C(WCHK)
0511  2304          ISZ CHCK          /SET UP FOR UNEQUAL EXIT
0512  7640          SZA CLA           /EQUAL (AC = 0)
0513  5316          JMP .+3           /NO
0514  2304          ISZ CHCK          /YES.  SET UP FOR EQUAL EXIT
0515  5704          JMP I CHCK        /EQUAL EXIT
0516  1320          TAD WCHK          /RESTORE AC
0517  5704          JMP I CHCK        /UNEQUAL EXIT
0520  0000  WCHK,   0

              /SYNC ON TAPE SUBROUTINE
0521  0000  SYNK,   0
0522  4577          SETLOC            /SET COUNT OF
0523  0541          CTSK              /-256 (DEC) IN
0524  7400          -400              /CTSK
0525  4571  SYNKA,  UKCC              /CLEAR AC AND FLAG
0526  4572          UKSF              /READY?
0527  5326          JMP .-1           /NO, TEST AGAIN
0530  4570          UKRS              /YES. READ
0531  1144          TAD [-377
0532  7640          SZA CLA           /377?
0533  7410          SKP
0534  5721          JMP I SYNK        /YES.  EXIT

0535  2341          ISZ CTSK          /BUMP CHAR CTR +1
0536  5325          JMP SYNKA         /GO READ AGAIN
0537  7402          HLT               /256 CHARS READ.  CAN'T SYNC
0540  5322          JMP SYNK+1        /GO TO SRST
0541  0000  CTSK,   0                 /CHAR COUNTER
0542  0000  STAL,   OPEN
0543  7200          CLA
0544  1053          TAD STLID
0545  7700          SMA CLA           /STALL?
0546  5742          JMP I STAL        /NO, EXIT
0547  4274          JMS DLCNT         /YES SET STALL COUNT
0550  4576          DELAY             /STALL
0551  5742          JMP I STAL        /EXIT
0552  0000  CRCTR,  OPEN
0553  0000  CRALF,  OPEN
0554  7200          CLA
0555  1753          TAD I CRALF
0556  3352          DCA CRCTR
0557  2353          ISZ CRALF
0560  4573          TYPE
0561  0565          .+4
0562  2352          ISZ CRCTR
0563  5360          JMP .-3
0564  5753          JMP I CRALF
0565  4543          TEXT '%#@?'
0566  0077
0567  0000
```

```
                0600            PAGE


                0600            PAGE
                        /SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
        0600    0000    MOVVE,  0
        0601    7200            CLA
        0602    1600            TAD I MOVVE     /GET "FROM ADDR" AND
        0603    3223            DCA FADDR       /STORE AT FADDR
        0604    2200            ISZ MOVVE
        0605    1600            TAD I MOVVE     /GET "TO ADDR" AND
        0606    3224            DCA TADDR       /STORE AT TADDR.
        0607    2200            ISZ MOVVE
        0610    1600            TAD I MOVVE     /GET "MOVE COUNT" AND
        0611    3225            DCA MCTR        /STORE AT MCTR.
        0612    2200            ISZ MOVVE       /SET UP FOR EXIT.
        0613    7200    MOVEA,  CLA
        0614    1623            TAD I FADDR     /GET "FROM" WORD
        0615    3624            DCA I TADDR     /STORE AT "TO" LOCATION
        0616    2223            ISZ FADDR       /+1 TO "FROM" ADDR
        0617    2224            ISZ TADDR       /+1 TO "TO" ADDR.
        0620    2225            ISZ MCTR        /ALL WORDS MOVED?
        0621    5213            JMP MOVEA       /NO, GO MOVE AGAIN
        0622    5600            JMP I MOVVE     /YES. EXIT
        0623    0000    FADDR,  0
        0624    0000    TADDR,  0
        0625    0000    MCTR,   0
                        /TYPE CHARACTER STRING SUBROUTINE
        0626    0000    TYPSTG, 0
        0627    7200            CLA
        0630    1626            TAD I TYPSTG    /GET AND STORE
        0631    3316            DCA TEMQ        /INITIAL ADDRESS
        0632    3320            DCA FLAG        /CLEAR FLAG.
        0633    2226            ISZ TYPSTG      /SET UP EXIT
        0634    1716    TSC1,   TAD I TEMQ      /PICK UP DATA
        0635    7012            RTR
        0636    7012            RTR
        0637    7012            RTR
        0640    4245            JMS TSC2        /GO TYPE 1ST CHARACTER
        0641    1716            TAD I TEMQ      /PICK UP DATE
        0642    4245            JMS TSC2        /GO TYPE 2ND CHARACTER
        0643    2316            ISZ TEMQ        /EVEN STRING ADDRESS
        0644    5234            JMP TSC1        /GO BACK FOR MORE
        0645    0000    TSC2,   0
        0646    0145            AND C77         /MASK OFF 6 BITS
        0647    3317            DCA TEMR        /SAVE CHARACTER
        0650    1320            TAD FLAG        /TEST "SPECIAL" FLAG.
        0651    7640            SZA CLA
        0652    5262            JMP TYPSP       /SET TYPE SPECIAL
        0653    1317            TAD TEMR        /NO, REGULAR CHARACTER
        0654    7450            SNA             /ZERO?
        0655    5260            JMP .+3         /YES, SET FLAG.
        0656    4273    TYPAT,  JMS PRINT       /NO, PRINT IT.
        0657    5645            JMP I TSC2      /RETURN.
        0660    2320            ISZ FLAG        /SET "SPECIAL" FLAG.
```

```
0661  5645            JMP I TSC2      /EXIT
0662  3320  TYPSP,    DCA FLAG        /CLEAR FLAG.
0663  1317            TAD TEMR        /TEST FOR 0.
0664  7450            SNA             /0?
0665  5645            JMP I TSC2      /IGNORE IT.
0666  1143            TAD C-77
0667  7650            SNA CLA         /77?
0670  5626            JMP I TYPSTG    /YES. EXIT CODE.
0671  1317            TAD TEMR
0672  5256            JMP TYPAT
0673  0000  PRINT,    OPEN
0674  1142            TAD C-45
0675  7640            SZA CLA         /IS IT 45?
0676  5302            JMP .+4         /NO.
0677  1141            TAD C215        /YES. PRINT CR
0700  4463            JMS I UPUNCH
0701  5673            JMP I PRINT
0702  1317            TAD TEMR
0703  1140            TAD C-43
0704  7640            SZA CLA         /IS IT 43?
0705  5310            JMP .+3         /NO.
0706  1137            TAD C212        /YES. TYPE LF
0707  5300            JMP PRINT+3
0710  1317            TAD TEMR
0711  1136            TAD C-40
0712  7510            SPA
0713  1135            TAD C100
0714  1134            TAD C240
0715  5300            JMP PRINT+3
0716  0000  TEMQ,     OPEN
0717  0000  TEMR,     OPEN
0720  0000  FLAG,     OPEN
0721  0000  PUNCH,    0
0722  2060            ISZ PFLAG       /SET PFLAG
0723  6046  OUT0,     TLS             /PUNCH/PRINT
0724  7200            CLA
0725  1060            TAD PFLAG       /GET C(PFLAG)
0726  7650            SNA CLA         /FLAG RESET?
0727  5332            JMP .+3         /YES
0730  6041  OUT1,     TSF             /NO. FLAG UP?
0731  5325            JMP .-4         /NO.
0732  6042  OUT2,     TCF             /YES. CLEAR PRINTER FLAG.
0733  3060            DCA PFLAG       /CLEAR PFLAG
0734  5721            JMP I PUNCH     /EXIT
0735  0000  XKSF,     OPEN            /SUB TO ISSUE KSF.
0736  6031            KSF             /KSF
0737  5735            JMP I XKSF      /NO SKIP
0740  2335            ISZ XKSF        /SKIP
0741  5735            JMP I XKSF
0742  0000  XKCC,     OPEN            /SUB TO ISSUE KCC.
0743  6032            KCC
0744  5742            JMP I XKCC      /EXIT
0745  0000  XKRS,     OPEN            /SUB TO ISSUE KRS.
0746  6034            KRS
0747  5745            JMP I XKRS      /EXIT
```

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0750  0000  XKRB,   OPEN            /SUB TO ISSUE KRB.
0751  6036          KRB
0752  5750          JMP I XKRB      /EXIT
0753  0000  XTSF,   OPEN            /SUB TO ISSUE TSF.
0754  6041          TSF             /TSF
0755  5753          JMP I XTSF      /NO SKIP.
0756  2353          ISZ XTSF        /SKIP.
0757  5753          JMP I XTSF
0760  0000  XTCF,   OPEN            /SUB TO ISSUE TCF.
0761  6042          TCF
0762  5760          JMP I XTCF      /EXIT
0763  0000  XTLS,   OPEN            /SUB TO ISSUE TLS
0764  6046          TLS
0765  5763          JMP I XTLS      /EXIT
0766  0000  XKCR,   OPEN            /SUB TO ISSUE KCR.
0767  6030          KCR
0770  5766          JMP I XKCR      /EXIT
0771  0000  XKIE,   OPEN            /SUB TO ISSUE KIE.
0772  6035          KIE
0773  5771          JMP I XKIE      /EXIT.
      1000          PAGE


      1000  PAGE
1000  0000  STBF,   OPEN            /SUB TO SET UP BUFFER AREA.
1001  4574          MOVE            /CRLF TO BLOCKA.
1002  0076          CR
1003  5340          BLOCKA
1004  7776          -2
1005  4556          CKSR37          /KSR37?
1006  5220          JMP ST33B       /NO.
1007  4574          MOVE            /CRLF TO BLKBB
1010  0076          CR
1011  5463          BLKBB
1012  7776          -2
1013  4574          MOVE            /CRLF TO BLKCC.
1014  0076          CR
1015  5575          BLKCC
1016  7776          -2
1017  5600          JMP I STBF      /EXIT STBF
1020  4574  ST33B,  MOVE            /CRLF TO BLOCKB.
1021  0076          CR
1022  5452          BLOCKB
1023  7776          -2
1024  4574          MOVE            /CRLF TO BLOCKC.
1025  0076          CR
1026  5564          BLOCKC
1027  7776          -2
1030  5600          JMP I STBF      /EXIT STBF.
1031  0000  FBF3,   OPEN            /SUB TO FILL CHAR BUFFER WITH
1032  7200          CLA             /3 CHARACTERS SPECIFIED AT CALL+1.
1033  1631          TAD I FBF3
1034  3237          DCA .+3
1035  2231          ISZ FBF3
```

```
1036  4574            MOVE
1037  0000            OPEN
1040  5342            BLOCK1
1041  7775            -3
1042  4556            CKSR37          /37?
1043  5255            JMP FBF33       /NO.
1044  4574            MOVE            /YES.
1045  5342            BLOCK1
1046  5345            BLOCK1+3
1047  7662            -116
1050  4574            MOVE
1051  5342            BLOCK1
1052  5465            BLK2
1053  7657            -121
1054  5631            JMP I FBF3      /EXIT FBF3.
1055  4574    FBF33,  MOVE
1056  5342            BLOCK1
1057  5345            BLOCK1+3
1060  7673            -105
1061  4574            MOVE
1062  5342            BLOCK1
1063  5454            BLOCK2
1064  7670            -110
1065  5631            JMP I FBF3      /EXIT FBF3.
1066  0000    FBALL,  OPEN            /FILL BUFFER WITH ALL CHARACTERS
1067  4556            CKSR37          /KSR37?
1070  5302            JMP FBA33       /NO.
1071  4574            MOVE            /YES.
1072  4647            A
1073  5342            BLOCK1
1074  7657            -121
1075  4574            MOVE
1076  5342            BLOCK1
1077  5465            BLK2
1100  7657            -121
1101  5666            JMP I FBALL     /EXIT FBALL.
1102  4574    FBA33,  MOVE
1103  4647            A
1104  5342            BLOCK1
1105  7701            -77
1106  4574            MOVE
1107  4647            A
1110  5441            BLOCK1+77
1111  7767            -11
1112  4574            MOVE
1113  5342            BLOCK1
1114  5454            BLOCK2
1115  7670            -110
1116  5666            JMP I FBALL     /EXIT FBALL
1117  0000    PW336,  0
1120  4574            MOVE            /MOVE 6 CHARACTERS ARS33 PRINTER
1121  4625            A33WP6          /WORST CASE PATTERN TO
1122  5342            BLOCK1          /BLOCK1
1123  7772            -6
1124  4574            MOVE            /FILL BLOCKS WITH PATTERN
```

```
1125  5342            BLOCK1
1126  5350            BLOCK1+6
1127  7676            -102
1130  4574            MOVE
1131  5342            BLOCK1
1132  5454            BLOCK2
1133  7670            -110
1134  5717            JMP I FW336     /EXIT
1135  0000  FW356,    0
1136  4574            MOVE            /MOVE 6 CHARACTER ASR35 PRINTER
1137  4633            A35WP6          /WORST CASE PATTERN TO BLOCK1
1140  5342            BLOCK1
1141  7772            -6
1142  4574            MOVE            /FILL BUFFER WITH PATTERN
1143  5342            BLOCK1
1144  5350            BLOCK1+6
1145  7676            -102
1146  4574            MOVE
1147  5342            BLOCK1
1150  5454            BLOCK2
1151  7670            -110
1152  5735            JMP I FW356     /EXIT
1153  0000  FW376,    OPEN            /MOVE 6 CHARACTER KSR37 PRINTER
1154  4574            MOVE            /WORST CASE PATTERN TO BLOCK1.
1155  4641            A37WP6
1156  5342            BLOCK1
1157  7772            -6
1160  4574            MOVE            /FILL BUFFER WITH PATTERN
1161  5342            BLOCK1
1162  5350            BLOCK1+6
1163  7669            -113
1164  5753            JMP I FW376     /EXIT
1165  0000  XSPF,     OPEN            /SUB TO ISSUE SPF
1166  6040            SPF
1167  5765            JMP I XSPF      /EXIT
1170  0000  XSPI,     OPEN            /SUB TO ISSUE SPI
1171  6045            SPI
1172  5770            JMP I XSPI      /NO SKIP
1173  2370            ISE XSPI        /SKIP
1174  5770            JMP I XSPI
      1200            PAGE


      1200            PAGE
                      /PUNCH 70 (CODE 376) CHARACTERS SUBROUTINE
1200  0000  PLTLR,    0
1201  4577            SETLOC          /SET P70CTR TO -70
1202  1211            P70CTR
1203  7672            -106
1204  1133            TAD C376        /GET 376 CODE
1205  4463            JMS I UPUNCH    /GO PUNCH IT
1206  2211            ISZ P70CTR      /ALL CHARACTERS PUNCHED?
1207  5204            JMP .-3         /NO, REPEAT.
1210  5600            JMP I PLTLR     /YES, EXIT.
```

```
1211  0000    P70CTR, 0
                /PUNCH SYNC CHARACTER SUBROUTINE (RUBOUT)
1212  0000    PSYNC,  0
1213  7240            CLA CMA         /SET AC TO 7777
1214  4463            JMS I UPUNCH    /PUNCH A RUBOUT
1215  5612            JMP I PSYNC     /EXIT.
                /SYNC READER SUBROUTINE
1216  0000    RSYNC,  0
1217  4577            SETLOC          /SET RSCTR TO -145
1220  1232            RSCTR
1221  7557            -221
1222  4345            JMS RRDY        /WAIT FOR READER NOT BUSY
1223  7240            CLA CMA         /READER NOT BUSY.
1224  3065            DCA RBUSY       /SET READER BUSY INDICATOR
1225  4577            SETLOC          /SET READER INTERRUPT
1226  1267            VCTR            /SERVICE RETURN ADDRESS.
1227  1233            RSSERV
1230  6001            ION             /ENABLE INTERRUPT
1231  5616            JMP I RSYNC     /EXIT
1232  0000    RSCTR,  0

1233  6036    RSSERV, KRB             /READ
1234  1144            TAD [-377       /ADD MINUS RUBOUT
1235  7640            SZA CLA         /IS IT A RUBOUT?
1236  5245            JMP .+7         /NO.
1237  3065            DCA RBUSY       /YES. CLEAR READER BUSY.
1240  7300            CLA CLL
1241  1067            TAD LINK
1242  7004            RAL             /RESTORE LINK
1243  1066            TAD AC          /RESTORE AC
1244  5400            JMP I 0         /RETURN
1245  2232            ISZ RSCTR       /145 CHARACTER READ?
1246  5461            JMP I UOUT      /NO.
1247  7602            HLT CLA         /YES. NO SYNC.
1250  4577            SETLOC          /SET RSCTR TO -145
1251  1232            RSCTR
1252  7557            -221
1253  5461            JMP I UOUT      /RETURN

1254  3066    INTSVC, DCA AC          /SAVE AC
1255  7010            RAR
1256  3067            DCA LINK        /SAVE LINK
1257  6041    INTSF,  TSF             /PUNCH/PRINTER?
1260  5264            JMP .+4         /NO.
1261  6042    INTCF,  TCF             /YES. CLEAR FLAG.
1262  3060            DCA PFLAG       /CLEAR PFLAG
1263  5271            JMP OUT         /RETURN
1264  6031    INKSF,  KSF             /READER/KYBD?
1265  5270            JMP .+3         /NO ERROR.
1266  5667            JMP I .+1       /GO SERVICE READER
1267  0000    VCTR,   0
1270  7402            HLT             /UNEXPECTED INTERRUPT
1271  7300    OUT,    CLA CLL
1272  1067            TAD LINK
1273  7004            RAL             /RESTORE LINK
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1274  1066            TAD AC          /RESTORE AC.
1275  6001            ION             /ENABLE INTERRUPT
1276  5400            JMP I 0         /RETURN
1277  0000  PSTUP,   0               /PUNCH SETUP
1300  4577            SETLOC          /SET DATA ADDR
1301  1344            PADDR
1302  5340            BLOCKA
1303  4574            MOVE            /SET BLOCK LENGTH
1304  0070            BLKCNT
1305  1343            PCTR
1306  7777            -1
1307  5677            JMP I PSTUP     /EXIT
                      /
1310  0000  PDCR,     0               /PUNCH  DATA CHAR SUB.
1311  7200            CLA
1312  1744            TAD I PADDR     /GET DATA
1313  2344            ISE PADDR       /UPDATE PADDR.
1314  4463            JMS I UPUNCH    /GO PUNCH/PRINT DATA
1315  5710            JMP I PDCR      /EXIT
                      /
1316  0000  PBLK,     0               /PUNCH DATA BLOCK FULL SPEED
1317  4277            JMS PSTUP
1320  4310            JMS PDCR        /GO PUNCH CHARACTER
1321  2343            ISE PCTR        /ALL CHARS PUNCHED?
1322  5320            JMP .-2         /NO, REPEAT
1323  5716            JMP I PBLK      /YES, EXIT
                      /
1324  0000  PBLKR,    0               /PUNCH DATA BLOCK RANDOM STALLS.
1325  4277            JMS PSTUP       /GO DO SET UP
1326  4777'           JMS DLCNTP      /FILL DELAY BLOCK
1327  4577            SETLOC          /DBLK ADDRESS TO DAP
1330  1342            DAP
1331  6340            DBLK
1332  1742            TAD I DAP       /GET DELAY WORD
1333  3023            DCA DELAYM      /TO DELAYM
1334  2342            ISE DAP         /UPDATE DAP.
1335  4576            DELAY           /DELAY.
1336  4310            JMS PDCR        /GO PUNCH CHARACTER
1337  2343            ISE PCTR        /ALL CHARS PUNCHED?
1340  5332            JMP .-6         /NO, REPEAT
1341  5724            JMP I PBLKR     /YES, EXIT.
1342  0000  DAP,      0
1343  0000  PCTR,     0
1344  0000  PADDR,    0

1345  0000  RRDY,     0               /WAIT FOR RDR NOT BUSY SUB.
1346  7200            CLA
1347  1065            TAD RBUSY       /FETCH RBUSY.
1350  7640            SZA CLA         /READER BUSY?
1351  5347            JMP .-2         /YES, TRY AGAIN
1352  5745            JMP I RRDY      /NO,EXIT
1353  0000  RSTUP,    0
1354  4345            JMS RRDY        /WAIT FOR RDR NOT BUSY
 355  2065            ISE RBUSY       /SET RBUSY IND ATOR
 356  4577            SETLOC          /SET DATA ADD
```

```
1357  1422            RADDR
1360  5340            BLOCKA
1361  4574            MOVE            /SET DATA BLOCK LENGTH
1362  0070            BLKCNT
1363  1423            RBCTR
1364  7777            -1
1365  3776'           DCA ERRCTR      /CLEAR ERROR COUNTER
1366  5753            JMP I RSTUP     /EXIT.
1376  4465
1377  1514
      1400            PAGE


      1400            PAGE
1400  0000  RDBLK,    0               /READ DATA BLOCK, FULL SPEED
1401  4777'           JMS RSTUP       /GO DO SETUP
1402  4577            SETLOC          /SET READER SERVICE
1403  1267            VCTR            /ADDRESS,
1404  1431            RDSRV
1405  6001            ION             /ENABLE INT.
1406  5600            JMP I RDBLK
1407  0000  RDBLKR,   0               /READ DATA BLOCK,RANDOM STALLS
1410  4777'           JMS RSTUP       /GO DO SETUP.
1411  4577            SETLOC          /SET READER SERVICE
1412  1267            VCTR            /ADDRESS,
1413  1424            RDRSRV
1414  4577            SETLOC          /SET DELAY BLOCK ADDRESS.
1415  1421            DAR
1416  6340            DBLK
1417  6001            ION             /ENABLE INT.
1420  5607            JMP I RDBLKR    /EXIT
1421  0000  DAR,      0
1422  0000  RADDR,    0
1423  0000  RBCTR,    0
            /READER SERVICE ROUTINES
1424  7200  RDRSRV,   CLA
1425  1621            TAD I DAR       /MOVE DELAY WORD TO
1426  3071            DCA DELAYS      /DELAYS,
1427  2221            ISZ DAR         /UPDATE DAR
1430  4275            JMS DLMSR       /STALL.
1431  1622  RDSRV,    TAD I RADDR     /GET EXPECTED CHARACTER
1432  3236            DCA SB          /STORE AT SB
1433  2222            ISZ RADDR       /UPDATE RADDR
1434  6036  IN0,      KRB             /READ CHARACTER
1435  4457            JMS I CHECK     /GO CHECK IT.
1436  0000  SB,       0
1437  5241            JMP ERROR       /ERROR
1440  5257            JMP RUDONE      /GOOD.

1441  3072  ERROR,    DCA ERRCR       /STORE BAD CHARACTER
1442  2776'           ISZ ERRCTR      /INCREMENT ERROR COUNTER
1443  5246            JMP .+3
1444  7240            CLA CMA         /OFLOW, 7777 TO AC
1445  3776'           DCA ERRCTR      /RESTORE TO 7777,
```

```
1446  7604            LAS             /READ SR
1447  0135            AND C100
1450  7650            SNA CLA         /HALT ON ERROR?(SR5)
1451  5257            JMP RUDONE      /NO.
1452  1072            TAD ERRCR       /YES. GET BAD CHARACTER
1453  7402            HLT             /ERROR HALT. BAD CHAR IN AC
1454  7200            CLA
1455  1236            TAD SB
1456  7402            HLT             /GOOD CHAR IN AC
1457  2223    RUDONE, ISZ RBCTR       /ALL DONE?
1460  5461            JMP I UOUT      /NO. TO MAINLINE
1461  7200            CLA             /YES.
1462  1776'           TAD ERRCTR      /GET C(ERRCTR)
1463  7650            SNA CLA         /ANY ERRORS?
1464  5267            JMP .+3         /NO.
1465  1776'           TAD ERRCTR      /YES.
1466  7402            HLT             /NUMBER OF ERRORS IN AC.
1467  7300            CLA CLL
1470  3065            DCA RBUSY       /CLEAR RBUSY INDICATOR
1471  1067            TAD LINK
1472  7004            RAL             /RESTORE LINK
1473  1066            TAD AC          /TO MAINLINE
1474  5400            JMP I 0
1475  0000    DLMSR,  0
1476  7300            CLA CLL
1477  1071            TAD DELAYS      /GET AND STORE MSEC
1500  3312            DCA RCTRA       /DELAY COUNT
1501  5702            JMP I .+1
1502  1503            .+1
1503  1050            TAD MIL1        /GET AND STORE
1504  3313            DCA RCTRB       /1MS CONSTANT
1505  2313            ISZ RCTRB       /DELAYED 1 MS?
1506  5305            JMP .-1         /NO.
1507  2312            ISZ RCTRA       /YES. DONE DELAYING?
1510  5301            JMP .-7         /NO.
1511  5675            JMP I DLMSR     /YES. EXIT
1512  0000    RCTRA,  0
1513  0000    RCTRB,  0
1514  0000    DLCNTP, 0               /SUB TO FILL DELAY BLOCK
1515  4574            MOVE            /SET DELAY BLOCK LENGTH
1516  0070            BLKCNT
1517  1537            DCTR
1520  7777            -1
1521  4577            SETLOC          /DBLK ADDR TO DADDR
1522  1536            DADDR
1523  6340            DBLK
1524  4775'   GNRND,  JMS RGNA        /GET RANDOM NUMBER.
1525  0100            AND DLYMSK      /REMOVE EXCESS BITS
1526  7450            SNA             /ZERO?
1527  5324            JMP GNRND       /YES. GET ANOTHER NUMBER
1530  7041            CIA             /NO. 2'S COMPLEMENT IT
1531  3736            DCA I DADDR     /STORE IT IN DELAY BLOCK
1532  2336            ISZ DADDR       /UPDATA DELAY BLOCK ADDR.
1533  2337            ISZ DCTR        /BLOCK FULL?
1534  5324            JMP GNRND       /NO. REPEAT.
```

```
1535  5714            JMP I DLCNTP    /YES. EXIT.
1536  0000  DADDR,  0
1537  0000  DCTR,   0
              /PUNCH TEST NORMAL TEST SEQUENCE ROUTINE
1540  0000  NTST,   0
1541  7200            CLA             /CLEAR RBUSY
1542  3065            DCA RBUSY
1543  1740            TAD I NTST      /SELECT PUNCH MODE
1544  3347            DCA NTSTA
1545  4774'           JMS PLTLR       /PUNCH LEADER
1546  4773'           JMS PSYNC       /PUNCH SYNC CHARACTER
1547  0000  NTSTA,  0
1550  4772'           JMS RSYNC       /SYNC READER
1551  4200            JMS RDBLK       /READ DATA BLOCK
1552  4774'           JMS PLTLR       /PUNCH TRAILER
1553  4771'           JMS RRDY        /WAIT FOR RDR NOT BUSY
1554  5424            JMP I CHAIN     /CHAIN
1571  1345
1572  1216
1573  1212
1574  1200
1575  0400
1576  4465
1577  1353
      1600            PAGE


      1600            PAGE
              /COMBINED TEST NORMAL TEST SEQUENCE
1600  0000  CNTST,  0
1601  7200            CLA             /CLEAR RBUSY
1602  3065            DCA RBUSY
1603  4777'           JMS PLTLR       /PUNCH LEADER
1604  4776'           JMS PSYNC       /PUNCH SYNC CHARACTER
1605  4775'           JMS PBLK        /PUNCH DATA BLOCK (NO STALLS)
1606  4774'           JMS RSYNC       /SYNC READER
1607  4773'           JMS RDBLKR      /READ DATA BLOCK (STALLS)
1610  4772'           JMS PBLKR       /PUNCH DATA BLOCK (STALLS)
1611  4771'           JMS RDBLK       /READ DATA BLOCK (NO STALLS)
1612  4777'           JMS PLTLR       /PUNCH TRAILER
1613  4770'           JMS RRDY        /WAIT FOR READER NOT BUSY
1614  5424            JMP I CHAIN     /CHAIN
              /TYPE LINE OF 3 CHARACTERS (NO DELAY)
1615  0000  TYPLN3, 0
1616  7200            CLA
1617  3053            DCA STLID       /CLEAR STLID
1620  1615            TAD I TYPLN3    /SET AND STORE
1621  3224            DCA .+3         /ADDRESS OF DATA
1622  2215            ISZ TYPLN3
1623  4767'           JMS FBF3        /GO FILL BUFFER WITH 3 CHARACTERS
1624  0000            0
1625  4227            JMS TYPLN       /GO TYPE LINE
1626  5615            JMP I TYPLN3    /EXIT
              /TYPE LINE OF ASCII PRINTABLE CHARACTERS
```

```
1627  0000  TYPLN,  0
1630  4556          CKSR37          /KSR37?
1631  1132          TAD C11         /NO.
1632  1131          TAD C-125       /YES.
1633  3247          DCA TCTR        /-76, OR -85
1634  4577          SETLOC          /SET FETCH TO ADDRESS
1635  1646          FETCH           /OF BLOCKA.
1636  5340          BLOCKA
1637  4557  TYPEA,  STALL
1640  1646          TAD I FETCH     /YES. SET CHARACTER
1641  4463          JMS I UPUNCH    /GO PRINT CHARACTER
1642  2246          ISZ FETCH       /SET UP FOR NEXT CHARACTER
1643  2247          ISZ TCTR        /DONE?
1644  5237          JMP TYPEA       /NO, REPEAT
1645  5627          JMP I TYPLN     /YES. EXIT.
1646  0000  FETCH,  0
1647  0000  TCTR,   0

1650  0000  ASCCN,  0
1651  1650          TAD I ASCCN
1652  3306          DCA WASC
1653  2250          ISZ ASCCN
1654  1650          TAD I ASCCN
1655  3307          DCA SASC
1656  2250          ISZ ASCCN
1657  1130          TAD C7700
1660  0706          AND I WASC
1661  7112          RTR CLL
1662  7012          RTR
1663  7012          RTR
1664  4273          JMS CNV
1665  2307          ISZ SASC
1666  1130          TAD C7700
1667  7040          CMA
1670  0706          AND I WASC
1671  4273          JMS CNV
1672  5650          JMP I ASCCN
1673  0000  CNV,    0
1674  3310          DCA ASCT
1675  1310          TAD ASCT
1676  7006          RTL
1677  7004          RAL
1700  0127          AND C707
1701  1310          TAD ASCT
1702  0127          AND C707
1703  1126          TAD C6060
1704  3707          DCA I SASC
1705  5673          JMP I CNV
1706  0000  WASC,   0
1707  0000  SASC,   0
1710  0000  ASCT,   0
1711  0000  SINPT,  OPEN                    /SUB TO INITIALIZE SGET SUB.
1712  7200          CLA
1713  3316          DCA SPT0                /ZERO SPT0
1714  3320          DCA SPIND               /ZERO SPIND
```

```
1715  5711            JMP I SINPT             /EXIT
1716  0000  SPT0,    OPEN
1717  0000  SPT1,    OPEN
1720  0000  SPIND,   OPEN
1721  0000  SGET,    OPEN                    /"SPECIAL" BINARY COUNT
1722  7320            CLA STL                 /PATTERN SUBROUTINE.
1723  0320            ISE SPIND
1724  7340            CLA CMA CLL
1725  3320            DCA SPIND
1726  1316            TAD SPT0
1727  7420            SNL
1730  5333            JMP .+3
1731  7041            CIA
1732  7410            SKP
1733  7040            CMA
1734  3316            DCA SPT0
1735  1146            TAD C377
1736  0316            AND SPT0
1737  3317            DCA SPT1
1740  1317            TAD SPT1
1741  5721            JMP I SGET              /EXIT SGET SUB.


1767  1031
1770  1345
1771  1400
1772  1324
1773  1407
1774  1216
1775  1316
1776  1212
1777  1200
      2000            PAGE
                /PROGRAM 0. ASR 33/35 TELETYPE BASIC INPUT TESTS.
                /PROGRAM CHECKS INPUT IOT'S, INTERRUPT, AND READER TIMING
2000  4577    PRG0,   SETLOC          /SET KSTART TO INITIAL
2001  0022            KSTART          /ROUTINE ADDRESS.
2002  2005            P0TS0
2003  5604            JMP I .+1       /GO START TEST
2004  0233            SRSET
                /
                /ISSUE KCC WITH AC=7777.  AC SHOULD GO TO 0.
                /AC NOT 0 INDICATES KCC FAILURE.  TEST IS DONE 1000 TIMES.
2005  0000    P0TS0,  0
2006  2025            P0TS1
2007  4577            SETLOC          /SET COUNT OF
2010  0051            CTRA            /-1000 (DEC) IN
2011  6030            -1750           /CTRA
2012  7240            CLA CMA         /SET AC TO 7777
2013  4571            UKCC            /CLEAR AC AND FLAG
2014  7440            SZA             /IS AC = 0?
2015  5221            JMP P0E0        /NO.  ERROR.  GO TO P0E0
2016  2051            ISE CTRA        /DONE?
2017  5212            JMP .-5         /NO.  REPEAT
```

```
2000  5424            JMP I CHAIN     /CHAIN
2021  7402  P0E0,     HLT             /TST0 ERR HALT.  KCC DID
                                      /NOT RESULT IN AC = 0
2022  7240            CLA CMA         /SET A TO 7777
2023  6571            UKCC            /CLEAR AC AND FLAG
2024  5222            JMP .-2         /RPEAT

                /ISSUE KCC, WAIT 200 MSEC FOR FLAG TO SET,
                /SKIP ON FLAG.  FAILURE TO SKIP INDICATES
                /THAT FLAG IS NOT SET, OR KSF FAILURE.
                /TEST IS DONE 100 TIMES.
2025  0001  P0TS1,  1
2026  2046            P0TS2
2027  6577            SETLOC          /SET DELAYM
2030  0023            DELAYM          /TO -200
2031  7470            -310
2032  6577  P0TS1A, SETLOC            /GO SET COUNT OF
2033  0051            CTRA            /-100 (DEC) IN
2034  7634            -144            /CTRA
2035  6571  P0TS1B, UKCC              /CLEAR AC AND FLAG
2036  6576            DELAY           /GO DELAY
2037  6572            UKSF            /SKIP ON FLAG = 1
2040  5244            JMP P0E1        /ERROR, GO TO E1
2041  2051            ISZ CTRA        /ALL DONE?
2042  5235            JMP P0TS1B      /NO, REPEAT
2043  5424            JMP I CHAIN     /CHAIN
2044  7402  P0E1,     HLT             /TST1 ERROR HALT, FLAG IS NOT
                                      /SET, OR KSF FAILED
2045  5232            JMP P0TS1A      /RESTARTING TEST.


                /ISSUE KCC, WAIT 200 MSEC FOR FLAG TO BE SET,
                /SKIP ON FLAG 1000 TIMES TO VERIFY CONSISTENT SKIPPING.
2046  0002  P0TS2,  2
2047  2075            P0TS3
                /
2050  6577            SETLOC          /SET DELAYM
2051  0023            DELAYM          /TO -200
2052  7470            -310
2053  6577            SETLOC          /GO SET COUNT OF 1000
2054  0051            CTRA            /(DEC) IN
2055  6030            -1750           /CTRA
2056  6571  P0TS2A, UKCC              /CLEAR AC AND FLAG
2057  6576            DELAY           /GO DELAY
2060  6572            UKSF            /SKIP ON FLAG = 1
2061  5267            JMP P0E2A       /DID NOT SKIP, GO TO E2A
2062  6572            UKSF            /SKIP ON FLAG = 1
2063  5271            JMP P0E2B       /DID NOT SKIP, GO TO E2B
2064  2051            ISZ CTRA        /ALL DONE?
2065  5262            JMP .-3         /NO,  REPEAT
2066  5424            JMP I CHAIN     /CHAIN
2067  7402  P0E2A,  HLT               /TST2 ERROR HALT, FLAG
                                      /NOT SET OR KSF FAILURE.
2070  5256            JMP P0TS2A
2071  7402  P0E2B,  HLT               /TST2 ERR HA    ).
```

```
                                        /KSF FAILURE
2072  4572          UKSF                /SKIP ON FLAG = 1
2073  5272          JMP .-1             /REPEAT
2074  5272          JMP .-2             /REPEAT


                    /ISSUE KCC.  WAIT 200 MSECS FOR FLAG TO SET.
                    /VERIFY THAT FLAG IS SET,  RESET FLAG (KCC) AND
                    /SKIP ON FLAG 500 TIMES TO VERIFY THAT NO
                    /SKIP OCCURS WITH FLAG = 0.
2075  0003  P0TS3,  3
2076  2127          P0TS4
2077  4577          SETLOC              /SET DELATM
2100  0023          DELAYM              /TO -200.
2101  7470          -310
2102  4577          SETLOC              /SET COUNT OF
2103  0051          CTRA                /-500 (DEC) IN
2104  7014          -764                /CTRA
2105  4571  P0TS3A, UKCC                /CLEAR FLAG
2106  4576          DELAY               /GO DELAY
2107  4572          UKSF                /READY?
2110  5320          JMP P0E3A           /NO.  ERROR
2111  4571          UKCC                /YES.  RESET FLAG
2112  4572          UKSF                /READY?
2113  5315          JMP .+2             /NO.  OK
2114  5322          JMP P0E3B           /YES.  ERROR
2115  2051          ISZ CTRA            /ALL DONE TESTING?
2116  5312          JMP .-4             /NO.  REPEAT
2117  5424          JMP I CHAIN         /YES.  CHAIN
2120  7402  P0E3A,  HLT                 /TST3 ERR HALT A.  FLAG
                                        /NOT SET OR KSF FAILURE
2121  5305          JMP P0TS3A          /TRY AGAIN
2122  7402  P0E3B,  HLT                 /TST3 ERR HALT B.  FLAG
                                        /FAILED TO RESET, OR KSF
                                        /SKIPPED ERRONEOUSLY.

                    /TURN OFF READER BEFORE ENTERING
                    /SCOPE LOOP.
2123  4571          UKCC                /CLEAR FLAG AND AC
2124  4572          UKSF                /SKIP ON FLAG = 1
2125  5323          JMP .-2             /REPEAT
2126  5323          JMP .-3             /REPEAT


                    /THIS ROUTINE CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT,
                    /AND THEN CHECKS THAT THE READER FLAG IS CAPABLE OF INTERRUPTING.
2127  0004  P0TS4,  4
2130  2200          P0TS5
2131  4577          SETLOC              /SET INTERRUPT RETURN
2132  0002          2                   /TO P0E4A.
2133  2145          P0E4A
2134  4565  P0TS4A, UTCF                /CLEAR PUNCH/PRINTER FLAG
2135  4571          UKCC                /CLEAR READER FLAG AFTER
2136  4572          UKSF                /IT COMES UP
2137  5336          JMP .-1
```

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2140  4571            UKCC            /CLEAR READER FLAG
2141  6001            ION             /ENABLE INTERRUPT
2142  7000            NOP
2143  6002            IOF             /TURN OFF INTERRUPT
2144  5347            JMP .+3
2145  4777  P0E4A,    JMS INTFND      /UNEXPECTED INTERRUPT
2146  5334            JMP P0TS4A      /TRY AGAIN
2147  4577            SETLOC          /SET CTRA TO
2150  0051            CTRA            /-1000
2151  6030            -1750
2152  4577            SETLOC          /SET INTERRUPT RETURN
2153  0002            2               /TO P0TS4C.
2154  2171            P0TS4C
2155  4571            UKCC
2156  4572            UKSF            /WAIT FOR READER FLAG
2157  5356            JMP .-1         /TO SET
2160  6001  P0TS4B,   ION             /ENABLE INTERRUPT
2161  7000            NOP
2162  7402  P0E4B,    HLT             /READER FLAG FAILED TO INTERRUPT,
                                      /OR INTERRUPT SYSTEM MALFUNCTION
2163  4577            SETLOC          /SET INTERRUPT RETURN
2164  0002            2               /TO P0TS4C-1.
2165  2170            P0TS4C-1
                /SCOPE LOOP
2166  6001            ION
2167  7000            NOP
2170  5366            JMP .-2
                /
2171  2051  P0TS4C,   ISZ CTRA        /DONE?
2172  5360            JMP P0TS4B      /NO.REPEAT
2173  5424            JMP I CHAIN
2177  2270
      2200            PAGE


      2200      PAGE
                /READER TIMING TEST, CHECKS THAT READER FLAG IS =1 NO
                /LATER THAN 110 MILLISECONDS AFTER KCC INSTRUCTION IS ISSUED.
                /
2200  0005      P0TS5,  5
2201  2224              P0TS6
2202  4577              SETLOC          /SET DELAYM
2203  0023              DELAYM          /TO-110
2204  7622              -156
2205  4577              SETLOC          /SET COUNT OF
2206  0051              CTRA            /-100 (DEC) IN
2207  7634              -144            /CTRA
2210  4571  P0TS5A,     UKCC            /START READER, CLEAR PC FLAG
2211  4576              DELAY           /CC DELAY 110 MILLISECS
2212  6572              UKSF
2213  5217              JMP P0E5
2214  2051              ISZ CTRA
2215  5210              JMP P0TS5A
2216  5424              JMP I CHAIN
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2217  7402    P0E5,   HLT             /TST5 ERR HALT. FLAG NOT=1
                                      /110 MSECS AFTER KCC INSTRUCTION.
2220  4571            UKCC            /START READER, CLEAR FLAG, AC.
2221  4572            UKSF            /FLAG=1?
2222  5221            JMP .-1         /NO. TEST AGAIN
2223  5220            JMP .-3         /YES. REPEAT.

                /READ 256 DIFFERENT CHARACTERS. EACH CHARACTER IS READ 1000 TIMES
                /TO VERIFY CONSISTENCY OF READING FROM TTI.
                /
2224  0006    P0TS6,  6
2225  7000            P0TS7
2226  4577            SETLOC          /SET COUNT OF
2227  0051            CTRA            /-256(DEC)
2230  7400            -400            /IN CTRA
2231  4571    P0TS6A, UKCC            /CLEAR AC, FLAG, START RDR.
2232  4572            UKSF            /READY?
2233  5232            JMP .-1         /NO. TEST AGAIN.
2234  4570            UKRS            /READ CHARACTER.
2235  3266            DCA WTS6A       /SAVE AT WTS6A.
2236  4577            SETLOC          /SET COUNT OF
2237  0052            CTRB            /CTRB
2240  6030            -1750           /-1000 (DEC) IN
2241  7200    P0TS6B, CLA
2242  4570            UKRS            /READ CHARACTER.
2243  3267            DCA WTS6B       /SAVE AT WTS6B
2244  1267            TAD WTS6B       /GET IT BACK.
2245  7041            CIA             /2'S COMPLEMENT IT
2246  1266            TAD WTS6A       /ADD EXPECTED CHAR.
2247  7640            SZA CLA         /RESULT 0?
2250  5256            JMP P0E6A       /NO. ERROR. GO TO E6A.
2251  2052            ISZ CTRB        /READ CHAR 1000 TIMES?
2252  5241            JMP P0TS6B      /NO. GO READ IT AGAIN.
2253  2051            ISZ CTRA        /YES. READ 256 DIFF. CHARS?
2254  5231            JMP P0TS6A      /NO.
2255  5424            JMP I CHAIN     /YES. CHAIN
2256  1267    P0E6A,  TAD WTS6B
2257  7402            HLT             /TST6 ERR HALT A. AC DISPLAYS
                /                     /INCORRECTLY READ CHAR. DEPRESS
                /                     /KEY CONTINUE
2260  7200            CLA
2261  1266            TAD WTS6A
2262  7402    P0E6B,  HLT             /TST6 ERR HALT B. AC DISPLAYS
                /                     /WHAT THE CORRECT CHAR SHOULD
                /                     /BE.
2263  7200            CLA
2264  4570            UKRS            /READ CHARACTER
2265  5263            JMP .-2         /LOOP BACK
2266  0000    WTS6A,  0
2267  0000    WTS6B,  0


                /ROUTINE TO DETERMINE DEVICE CAUSING UNEXPECTED INTERRUPT.
2270  0000    INTFND, OPEN
2271  7200            CLA
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2272  6031          KSF                 /KEYBOARD/READER?
2273  7410          SKP                 /NO.
2274  4347          JMS     HLTD        /GO BOLT AND DISPLAY IOT
2275  6041          TSF                 /TTY PRINTER/PUNCH?
2276  7410          SKP                 /NO.
2277  4347          JMS     HLTD        /GO BOLT AND DISPLAY IOT
2300  6011          RSF                 /H.S. READER?
2301  7410          SKP                 /NO.
2302  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2303  6021          PSF                 /H.S. PUNCH?
2304  7410          SKP                 /NO.
2305  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2306  6401          6401                /PT08/LT08 UNIT 1 IN?
2307  7410          SKP                 /NO.
2310  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2311  6411          6411                /PT08/LT08 UNIT 1 OUT?
2312  7410          SKP                 /NO.
2313  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2314  6421          6421                /PT08/LT08 UNIT 2 IN?
2315  7410          SKP                 /NO
2316  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2317  6431          6431                /PT08/LT08 UNIT 2 OUT?
2320  7410          SKP                 /NO.
2321  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2322  6441          6441                /PT08/LT08 UNIT 3 IN?
2323  7410          SKP                 /NO.
2324  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2325  6451          6451                /PT08/LT08 UNIT 3 OUT?
2326  7410          SKP                 /NO.
2327  4347          JMS     HLTD        /HALT AND DISPLEY IOT
2330  6461          6461                /PT08/LT08 UNIT 4 IN?
2331  7410          SKP                 /NO.
2332  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2333  6471          6471                /PT08/LT08 UNIT 4 OUT?
2334  7410          SKP                 /NO.
2335  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2336  6111          6111                /PT08/LT08 UNIT 5 OR DC02 IN?
2337  7410          SKP                 /NO.
2340  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2341  6121          6121                /PT08/LT08 UNIT 5 OR DC02 OUT?
2342  5346          JMP     .+4         /NO.
2343  4347          JMS     HLTD        /HALT AND DISPLAY IOT
2344  7777          7777                /DON'T KNOW WHAT DEVICE
2345  7777          7777                /CAUSED THE INTERRUPT,
2346  4347          JMS     HLTD        /HALT AND DISPLAY ALL 1'S.
2347  0000  HLTD,   OPEN
2350  1347          TAD     HLTD
2351  1362          TAD     MS
2352  3347          DCA     HLTD
2353  1747          TAD I   HLTD        /GET IOT THAT CAUSED SKIP
2354  7402          HLT                 /AND HALT. IOT IN AC.
2355  7001          IAC
2356  3357          DCA .+1
2357  0000          OPEN
2360  7200          CLA
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```
2361  5670          JMP I   INTFND          /EXIT
2362  7775  M3,     -3



                    /PROGRAM 1, ASR33/35 TELETYPE BASIC OUTPUT TESTS.
                    /PROGRAM CHECKS OUTPUT IOT'S, INTERRUPT, AND TIMING.
2363  4577  PRG1,   SETLOC           /SET KSTART TO INITIAL
2364  0022          KSTART           /ROUTINE ADDRESS.
2365  2400          P1TS0
2366  5767          JMP I .+1        /GO START TEST
2367  0233          SRSET
      2400          PAGE
                    /
                    /1. TLS AND WAIT 200 MSECS FOR FLAG TO SET, SKIP ON FLAG=1 (TSF).
                    /TSF SHOULD SKIP, OR ERROR HALT P1E0A OCCURS. FLAG NOT SET, OR TSF FAILURE.
                    /2. WITH FLAG=1, SKIP ON FLAG 1000 TIMES TO TEST FOR CONSISTENT SKIPPING.
                    /FAILURE TO SKIP CAUSES ERROR HALT P1E0B.
2400  0000  P1TS0,   0
2401  2427          P1TS1
2402  4577          SETLOC           /-200 TO DELAYM
2403  0023          DELAYM
2404  7470          -310
2405  4577          SETLOC           /-1000 TO CTRA
2406  0051          CTRA
2407  6030          -1750
2410  4564  P1TS0A, UTLS             /START PRINTER/PUNCH
2411  4576          DELAY            /DELAY 200 MSECS.
2412  4566          UTSF             /FLAG=1?
2413  5221          JMP P1E0A        /NO, ERROR
2414  4566  P1TS0B, UTSF             /FLAG=1?
2415  5223          JMP P1E0B        /ERROR, FAILED TO SKIP.
2416  2051          ISZ CTRA         /DONE?
2417  5214          JMP P1TS0B       /NO, REPEAT.
2420  5424          JMP I CHAIN      /YES, CHAIN
2421  7602  P1E0A,  HLT CLA          /ERR HALT A, FLAG NOT=1 AFTER
2422  5210          JMP P1TS0A       /200 MSECS, OR TSF FAILURE
2423  7602  P1E0B,  HLT CLA          /ERR HALT B, TSF FAILED TO SKIP
2424  4566          UTSF             /SCOPE LOOP, SKIPS ON
2425  5224          JMP .-1          /FLAG CONTINUOUSLY.
2426  5224          JMP .-2



                    /ISSUE TCF TO CLEAR FLAG, SKIP ON FLAG 1000 TIMES TO VERIFY THAT NO
                    /SKIP OCCURS WITH FLAG=0
2427  0001  P1TS1,   1
2430  2450          P1TS2
2431  4577          SETLOC           /-1000 TO CTRA
2432  0051          CTRA
2433  6030          -1750
2434  4565          UTCF             /CLEAR FLAG
2435  4566  P1TS1A, UTSF
2436  7410          SKP
2437  5243          JMP P1E1
2440  2051          ISZ CTRA
```

```
2441  5235            JMP P1TS1A
2442  5424            JMP I CHAIN
2443  7602  P1E1,     HLT CLA           /ERR HALT, AFTER CLEAR FLAG (TCF),
                                        /TSF INSTRUCTION SKIPPED.
2444  4565            UTCF              /SCOPELOOP, CLEARS FLAG,
2445  4566            UTSF              /ADN THEN SKIPS ON FLAG
2446  5245            JMP .-1           /CONTINUOUSLY.
2447  5245            JMP .-2
                      /
                      /ISSUE TLS, WAIT FOR FLAG TO SET, CLEAR FLAG (TCF), SKIP ON FLAG=1,NO SKIP
                      /SHOULD OCCUR, IF SKIP OCCURS, TCF INSTRUCTION (CLEAR FLAG), FAILED.
                      /DO TEST 100 TIMES.
2450  0002  P1TS2,    2
2451  2472            P1TS3
2452  4577            SETLOC            /-100 TO CTRA
2453  0051            CTRA
2454  7634            -144
2455  4564  P1TS2A,   UTLS
2456  4566            UTSF
2457  5256            JMP .-1
2460  4565            UTCF
2461  4566            UTSF
2462  7610            SKP CLA
2463  5267            JMP P1E2
2464  2051            ISZ CTRA
2465  5255            JMP P1TS2A
2466  5424            JMP I CHAIN
2467  7602  P1E2,     HLT CLA           /ERR HALT, TCF FAILED TO RESET
                                        /FLAG.
2470  4565            UTCF              /SCOPE LOOP, CLEARS FLAG
2471  5270            JMP .-1           /CONTINUOUSLY.


                      /THIS ROUTINE CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT,
                      /AND THEN CHECKS THAT THE PUNCH/PRINTER FLAG CAN CAUSE AN INTERRUPT.
2472  0003  P1TS3,    3
2473  2537            P1TS4
2474  4577            SETLOC            /SET INTERRUPT RETURN TO
2475  0002            2                 /P1E3A
2476  2510            P1E3A
2477  4571  P1TS3A,   UKCC              /CLEAR READER FLAG IF UP,
2500  4564            UTLS
2501  4566            UTSF
2502  5301            JMP .-1
2503  4565            UTCF              /CLEAR PUNCH/PRINTER FLAG
2504  6001            ION               /ENABLE INTERRUPTS.
2505  7000            NOP
2506  6002            IOF               /DISABLE INTERRUPTS
2507  5312            JMP .+3
2510  4777'  P1E3A,   JMS INTFND        /UNEXPECTED INTERRUPT.
2511  5277            JMP P1TS3A        /TRY AGAIN.
2512  4577            SETLOC            /-1000 TO CTRA.
2513  0051            CTRA
2514  6030            -1750
2515  4577            SETLOC            /SET INTERRI    RETURN
```

```
2516  0002            2               /TO P1TS3C
2517  2534            P1TS3C
2520  4564            UTLS            /START PUNCH/PRINTER
2521  4566            UTSF            /FLAG UP?
2522  5321            JMP .-1         /NO, TEST AGAIN
2523  6001  P1TS3B,   ION             /YES, ENABLE INTERRUPT
2524  7000            NOP
2525  7402  P1E3B,    HLT             /PRINTER FLAG FAILED TO INTERRUPT
                                      /OR INTERRUPT MALFUNCTION,
2526  4577            SETLOC          /SET INTERRUPT RETURN
2527  0002            2               /TO P1TS3C-1
2530  2533            P1TS3C-1
2531  6001            ION             /SCOPE LOOP,
2532  7000            NOP
2533  5331            JMP .-2
2534  2051  P1TS3C,   ISZ CTRA        /DONE?
2535  5323            JMP P1TS3B      /NO, REPEAT
2536  5424            JMP I CHAIN     /YES, CHAIN

                      /PUNCH/PRINTER TIMING TEST, CHECKS THAT FLAG IS=0 NO SOONER THAN
                      /79 MILLISECONDS OR NO LATER THAN 110 MILLISECONDS OR AFTER TLS INSTRUCTION
2537  0004  P1TS4,    4
2540  2600            P1TS5
2541  4577            SETLOC          /-100 TO CTRA
2542  0051            CTRA
2543  7634            -144
2544  4577  P1TS4A,   SETLOC          /SET DELAYM
2545  0023            DELAYM          /TO -79 (DEC),
2546  7661            -117
2547  4564            UTLS            /START PUNCH/PRINTER
2550  4576            DELAY           /GO DELAY 79 MSECS,
2551  4566            UTSF            /FLAG=1?
2552  7410            SKP
2553  5365            JMP P1E4        /NO, ERROR,
2554  4577            SETLOC          /SET DELAYM
2555  0023            DELAYM          /TO -31 (DEC)
2556  7741            -37
2557  4576            DELAY           /GO DELAY ANOTHER 31 MSEC,
2560  4566            UTSF            /FLAG = 1?
2561  5367            JMP P1E4A       /NO, ERROR, GO TO P1E4A
2562  2051            ISZ CTRA        /YES, DONE?
2563  5344            JMP P1TS4A      /NO, REPEAT,
2564  5424            JMP I CHAIN     /YES, CHAIN

2565  7602  P1E4,     HLT CLA         /PROCESSOR TIMING TOO SLOW OR
                                      /FLAG SETTING TOO SOON, (IS JUMPER REMOVED
                                      /ON TIMING BOARD)?
                      /SCOPE LOOP,  PRESS CONTINUE TO ENTER,
2566  5370            JMP P1E4A+1     /GO TO SCOPE LOOP AT P1E4A+1,

2567  7602  P1E4A,    HLT CLA         /ERR HALT, FLAG NOT 1 110 MSECS
                                      /AFTER TLS INSTRUCTION,
                      /SCOPE LOOP,  PRESS CONTINE TO ENTER,
2570  4564            UTLS            /SCOPE LOOP, START PRINTER
```

```
2571  4566            UTSF            /FLAG=1?
2572  5371            JMP .-1         /NO. CHECK AGAIN
2573  5370            JMP .-3         /YES REPEAT.
2577  2270
      0000            PAGE


      2600            PAGE
                /ISSUE TCF TO CLEAR PRINTER FLAG THEN ISSUE
                /SPF.  CHECK TO SEE IF FLAG SET AND THEN
                /DELAY 110 MILLISEC'S.  PRINTER FLAG NOT
                /SET BY SPF OR FLAG SETTING AFTER DELAY
                /INDICATES A FAILURE.  TEST IS DONE 100 TIMES.


2600  0005    P1TS5,  5
2601  7301            P1TS6
2602  4577            SETLOC          /SET COUNT OF
2603  0051            CTRA            /-100 (DEC)
2604  7634            -144            /IN CTRA.

2605  4577            SETLOC          /SET DELAYM
2606  0023            DELAYM          /TO -110 (DEC).
2607  7622            -156
2610  4565    P1TS5A, UTCF
2611  4541            USPF            /SET PRINTER FLAG.
2612  4566            UTSF            /FLAG SET?
2613  5224            JMP P1E5A1      /NO, ERROR, GO TO P1E5A1
2614  4565            UTCF
2615  4576            DELAY           /GO DELAY 110 MILLISEC'S.
2616  4566            UTSF            /FLAG NOW SET?
2617  7410            SKP
2620  5230            JMP P1E5A2      /YES, ERROR, GO TO P1E5A2.
2621  2051            ISZ CTRA        /TEST DONE?
2622  5210            JMP P1TS5A      /REPEAT
2623  5424            JMP I CHAIN

2624  7402    P1E5A1, HLT             /SPF FAILED TO SET PRINTER FLAG.
                /SCOPE LOOP, PRESS CONTINUE TO ENTER.
2625  4565            UTCF            /(SCOPE LOOP).
2626  4561            USPF
2627  5225            JMP P1E5A1+1    /REPEAT.

2630  7402    P1E5A2, HLT             /PRINTER FLAG UP AFTER BEING CLEARED.  SPF FAILED.
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
2631  4565            UTCF
2632  4561            USPF
2633  4576            DELAY
2634  4566            UTSF
2635  7410            SKP
2636  5231            JMP P1E5A2+1
2637  5231            JMP P1E5A2+1


                /PROGRAM 2. ASR33/35 TELETYPE READER     ). CHECKS ABILITY OF READER
```

```
                    /TO CORRECTLY READ AT FULL SPEED AND WITH RANDOM STALLS.
2640  4577  PRG2,   SETLOC          /SET KSTART TO INITIAL
2641  0022           KSTART         /ROUTINE ADDRESS.
2642  2645           P2TS0
2643  5644           JMP I .+1      /GO START TEST
2644  0233           SRSET
                    /READ 4095 CHARACTERS, AT FULL SPEED, MATCHING EACH CHARACTER
                    /READ AGAINST COUNT PATTERN
                    /
2645  0000  P2TS0,  0
2646  2675           P2TS1
2647  4454           JMS I SYNC     /GO SYNC TAPE
2650  4577           SETLOC         /SET COUNT OF
2651  0051           CTRA           /-4095(DEC) IN
2652  0001           -7777          /CTRA
2653  4571           UKCC           /START READER
2654  4455           JMS I INPATT   /GO INITIALIZE PATTERN
2655  4456  P2TS0A,  JMS I GETPT    /GET PATTERN CHARACTER
2656  3263           DCA SB0        /STORE AT SB0
2657  4572           UKSF           /READY?
2660  5257           JMP .-1        /NO.  TEST AGAIN
2661  4567           UKRB           /YES.  READ CHARACTER
2662  4457           JMS I CHECK    /GO CHECK FOR CORRECT MATCH
2663  0000  SB0,     0              /CORRECT CHAR HERE
2664  5270           JMP P2E0       /ERROR.  GO TO P2E0
2665  2051  P2T0B,   ISZ CTRA       /OK.  ALL DONE?
2666  5255           JMP P2TS0A     /NO.  REPEAT
2667  5424           JMP I CHAIN    /YES.  CHAIN
2670  7402  P2E0,    HLT            /TST10 ERR HALT.  AC CONTAINS
                                    /CHAR THAT DID NOT MATCH
                                    /AGAINST PATTERN.  EPRESS
                                    /KEY CONTINUE
2671  7200           CLA
2672  1263           TAD SB0        /GET CORRECT CHARACTER
2673  7402           HLT            /AC CONTAINS THE EXPECTED CHARACTER
2674  5265           JMP P2T0B


                    /READ 2000 CHARACTERS WITH RANDOM DELAY BETWEEN CHARACTERS.
                    /MATCH EACH CHARACTER READ AGAINST COUNT PATTERN
                    /
2675  0001  P2TS1,   1
2676  2727           P2TS2
2677  4454           JMS I SYNC     /TO SYNC TAPE
2700  4577           SETLOC         /SET COUNT OF
2701  0051           CTRA           /-2000 (DEC) IN
2702  4060           -3720          /CTRA
2703  4571           UKCC           /START READER
2704  4455           JMS I INPATT   /INITIALIZE PATTERN
2705  4456  P2TS1A,  JMS I GETPT    /GET PATTERN CHARACTER
2706  3315           DCA SB1        /STORE AT SB1
2707  4777           JMS DLCNT      /GENERATE RANDOM DELAY
2710  4576           DELAY          /DELAY
2711  4572           UKSF           /READY?
2712  5311           JMP .-1        /NO.  TEST AGAIN
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2713  4567          UKRB            /YES.  READ CHARACTER
2714  4457          JMS I CHECK     /GO CHECK FOR CORRECT MATCH

2715  0000  SB1,    0               /CORRECT CHAR HERE
2716  5322          JMP P2E1        /ERROR.  GO TO P2E1
2717  2051  P2T1B,  ISZ CTRA        /OK.  ALL DONE?
2720  5305          JMP P2TS1A      /NO.
2721  5424          JMP I CHAIN     /YES.  CHAIN
2722  7402  P2E1,   HLT             /TST1 ERR HALT.  AC CONTAINS
                                    /CHARACTER THAT DID NOT MATCH
                                    /AGAINST PATTERN.  DEPRESS
                                    /KEYCONTINUE
2723  7200          CLA
2724  1315          TAD SB1         /GET CORRECT CHARACTER
2725  7402          HLT             /AC CONTAINS THE EXPECTED
                                    /CHARACTER
2726  5317          JMP P2T1B

                    /READ WITH RANDOM STALL BETWEEN RANDOM CHARACTER GROUPS
                    /100 GROUPS READ.
                    /
2727  0002  P2TS2,   2
2730  7777          7777
2731  4454          JMS I SYNC      /GO SYNC TAPE
2732  4577          SETLOC          /SET COUNT OF
2733  0051          CTRA            /-100 (DEC) IN
2734  7634          -144            /CTRA
2735  4571          UKCC            /START READER
2736  4455          JMS I INPATT    /INITIALIZE PATTERN
2737  4777'  P2TS2A, JMS DLCNT      /SET RANDOM DELAY
2740  4776'         JMS CHRCNT      /SET RANDOM CHARACTER
2741  0052          CTRB            /COUNT IN CTRB
2742  4456  P2TS2B, JMS I GETPT     /GET PATTERN CHARACTER
2743  3351          DCA SB2         /AND STORE AT SB2
2744  4576          DELAY           /GO DELAY NO OF
2745  4572          UKSF            /READY?
2746  5345          JMP .-1         /NO.  TEST AGAIN
2747  4567          UKRB            /READ CHARACTER
2750  4457          JMS I CHECK     /CHECK FOR CORRECT MATCH
2751  0000  SB2,    0               /AGAINST SB2 CONTENTS
2752  5360          JMP P2E2        /ERROR.  GO TO P2E2
2753  2052          ISZ CTRB        /OK.  ALL CHARS FOR GROUP DONE?
2754  5342          JMP P2TS2B      /NO
2755  2051  P2T2C,  ISZ CTRA        /YES.  ALL GROUPS DONE?
2756  5337          JMP P2TS2A      /NO
2757  5424          JMP I CHAIN     /YES.  CHAIN
2760  7402  P2E2,   HLT             /TST2 ERROR HALT.  AC CONTAINS CHAR THAT
                                    /DID NOT MATCH AGAINST PATTERN.  DEPRESS KEY
                                    /CONTINUE
2761  7200          CLA
2762  1351          TAD SB2         /GET CORRECT CHARACTER
2763  7402          HLT             /AC CONTAINS THE EXPTECTED CHARACTER
2764  5355          JMP P2T2C
                    /
2776  0456
```

2777 8474

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                3000            PAGE


                3000    PAGE
          3000  4777'   PRG3,   JMS STBF        /SET UP BUFFER AREA
          3001  4577            SETLOC          /SET KSTART TO INITIAL
          3002  0022            KSTART          /ROUTINE ADDRESS
          3003  3006            P3TS0
          3004  5605            JMP I .+1       /GO START PROGRAM
          3005  0233            SRSET
                        /CARRIAGE RETURN TEST
          3006  0000   P3TS0,   0
          3007  3042            P3TS1
          3010  4556            CKSR37          /KSR37?
          3011  1132            TAD C11         /NO.
          3012  1125            TAD C-122       /YES
          3013  3241            DCA CRCNT
          3014  4573            TYPE            /PRINT TEST TITLE
          3015  5070            CRTST
          3016  1176            TAD C334        /GET "\" CODE
          3017  4463            JMS I UPUNCH    /PRINT IT
          3020  1241            TAD CRCNT
          3021  3073            DCA UTEMP
          3022  2073   CRTSTA,  ISZ UTEMP       /ALL DONE?
          3023  7410            SKP             /NO
          3024  5424            JMP I CHAIN     /YES, CHAIN
          3025  1073   CRTSTB,  TAD UTEMP
          3026  3074            DCA UTEMP1      /UTEMP TO UTEMP1
          3027  1134            TAD C240        /GET "SPACE" CODE
          3030  4463            JMS I UPUNCH    /PRINT IT
          3031  2074            ISZ UTEMP1      /SPACED NO. OF TIMES IN UTEMP1?
          3032  5227            JMP .-3         /NO, SO SPACE AGAIN
          3033  1141            TAD C215        /YES. GET "CR" CODE.
          3034  4463            JMS I UPUNCH    /PRINT IT.
          3035  4463            JMS I UPUNCH    /DUMMY CYCLE.
          3036  1124            TAD C257        /SET "/" CODE
          3037  4463            JMS I UPUNCH    /PRINT IT
          3040  5222            JMP CRTSTA      /GO TO CRTSTA
          3041  0000   CRCNT,   OPEN


                        /RIGHT MARGIN TEST
          3042  0001   P3TS1,   1
          3043  3073            P3TS2
          3044  7200            CLA
          3045  1123            TAD C-16
          3046  3272            DCA RMCNT
          3047  1122            TAD CRM33B
          3050  3270            DCA RMB
          3051  4556            CKSR37          /KSR37?
          3052  5257            JMP .+5         /NO.
          3053  1121            TAD C-17        /YES.
          3054  3272            DCA RMCNT
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3055  1120            TAD CRM37A
3056  3270            DCA RMB
3057  4573            TYPE              /PRINT TEST TITLE
3060  5100            RMTST
3061  1272            TAD RMCNT
3062  3073            DCA UTEMP
3063  4573    RMTSTA, TYPE              /PRINT ---- I
3064  5051            RM33A
3065  2073            ISZ UTEMP         /DONE TIMES?
3066  5263            JMP RMTSTA        /NO, SO DO IT AGAIN
3067  4573            TYPE              /YES, PRINT -I-
3070  0000    RMB,    OPEN
3071  5424            JMP I CHAIN       /CHAIN
3072  0000    RMCNT,  OPEN

                /SPACE TEST
3073  0002    P3TS2,  2
3074  3136            P3TS3
3075  4573            TYPE              /PRINT TEST TITLE
3076  5115            SPTST
3077  4556            CKSR37            /KSR37?
3100  1117            TAD C5            /NO
3101  1116            TAD C-91          /YES
3102  3073            DCA UTEMP         /-36 TO UTEMP
3103  4573    SPTSTA, TYPE              /PRINT \, SPACE
3104  5065            SPTSTC
3105  2073            ISZ UTEMP         /DONE 36 TIMES?
3106  5303            JMP SPTSTA        /NO, SO DO IT AGAIN.
3107  4556            CKSR37            /KSR37?
3110  1115            TAD C4            /NO
3111  1114            TAD C-50          /YES
3112  3073            DCA UTEMP         /-36 TO UTEMP
3113  1113            TAD C-1           /GET -1
3114  3074    SPTSTB, DCA UTEMP1        /AC TO UTEMP1
3115  1074            TAD UTEMP1        /UTEMP1
3116  3075            DCA UTEMP2        /TO UTEMP2
3117  1141            TAD C215          /GET "CR" CODE
3120  4463            JMS I UPUNCH      /PRINT IT
3121  4463            JMS I UPUNCH      /DUMMY CYCLE
3122  1134            TAD C240          /GET "SPACE" CODE
3123  4463            JMS I UPUNCH      /PRINT IT
3124  2075            ISZ UTEMP2        /DONE SPACING?
3125  5322            JMP .-3           /NO,
3126  1124            TAD C257          /GET "/" CODE
3127  4463            JMS I UPUNCH      /PRINT IT
3130  2073            ISZ UTEMP         /DONE 36 TIMES?
3131  7410            SKP               /NO,
3132  5424            JMP I CHAIN       /YES, CHAIN
3133  1147            TAD C-2           /-2 TO AC
3134  1074            TAD UTEMP1        /ADD C(UTEMP1)
3135  5314            JMP SPTSTB        /GO TO SPTSTB

                /LINE FEED TEST
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3136  0003    P3TS3,  3
3137  3600            P3TS47
3140  7240            CLA CMA         /SET STALL
3141  3053            DCA STLID       /INDICATOR
3142  4573            TYPE            /PRINT TEST TITLE
3143  5127            LFTST
3144  4556            CKSR37          /KSR37?
3145  1132            TAD C11         /NO,
3146  1112            TAD C-121       /YES.

3147  3073            DCA UTEMP
3150  1176    LFTSTA, TAD C334        /GET "\" CODE
3151  4463            JMS I UPUNCH    /PRINT IT
3152  1137            TAD C212        /GET "LF" CODE
3153  4463            JMS I UPUNCH    /PRINT IT
3154  2073            ISZ UTEMP       /DONE?
3155  7410            SKP             /NO,
3156  5424            JMP I CHAIN     /YES. CHAIN
3157  4597            STALL
3160  5350            JMP LFTSTA      /GO TO LFTSTA

                /TYPE LINE OF CHARACTERS ABC
3161  0004    P3TS4,  4
3162  3170            P3TS5
3163  4573            TYPE            /PRINT TITLE
3164  5137            CHRTST
3165  4462            JMS I UTPLN3    /PRINT LINE
3166  4647            A
3167  5424            JMP I CHAIN
                /TYPE LINE OF CHARACTERS DEF
3170  0005    P3TS5,  5
3171  3200            P3TS6
3172  4462            JMS I UTPLN3
3173  4652            D
3174  5424            JMP I CHAIN
3177  1000
      3200            PAGE


      3200            PAGE
                /TYPE LINE OF CHARACTERS GHI
3200  0006    P3TS6,  6
3201  3205            P3TS7
3202  4462            JMS I UTPLN3
3203  4655            G
3204  5424            JMP I CHAIN
                /TYPE LINE OF CHARACTERS JKL
3205  0007    P3TS7,  7
3206  3212            P3TS10
3207  4462            JMS I UTPLN3
3210  4660            J
3211  5424            JMP I CHAIN
                /TYPE LINE OF CHARACTERS MNO
3212  0010    P3TS10, 10
3213  3217            P3TS11
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3214  4462            JMS I UTPLN3
3215  4663            M
3216  5424            JMP I CHAIN
                    /TYPE LINE OF CHARACTERS PQR
3217  0011    P3TS11, 11
3220  3224            P3TS12
3221  4462            JMS I UTPLN3
3222  4666            P
3223  5424            JMP I CHAIN
                    /TYPE LINE OF CHARACTERS STU
3224  0012    P3TS12, 12
3225  3231            P3TS13
3226  4462            JMS I UTPLN3
3227  4671            S
3230  5424            JMP I CHAIN


                    /TYPE LINE OF CHARACTERS VWX
3231  0013    P3TS13, 13
3232  3236            P3TS14
3233  4462            JMS I UTPLN3
3234  4674            V
3235  5424            JMP I CHAIN
                    /TYPE LINE OF CHARACTERS YZ@
3236  0014    P3TS14, 14
3237  3243            P3TS15
3240  4462            JMS I UTPLN3
3241  4677            Y
3242  5424            JMP I CHAIN
                    /TYPE LINE OF CHARACTERS 123
3243  0015    P3TS15, 15
3244  3250            P3TS16
3245  4462            JMS I UTPLN3
3246  4702            ONE
3247  5424            JMP I CHAIN
                    /TYPE LINE OF CHARACTERS 456
3250  0016    P3TS16, 16
3251  3255            P3TS17
3252  4462            JMS I UTPLN3
3253  4705            FOUR
3254  5424            JMP I CHAIN
                    /TYPE LINE OF CHARACTERS 789
3255  0017    P3TS17, 17
3256  3262            P3TS20
3257  4462            JMS I UTPLN3
3260  4710            SEVEN
3261  5424            JMP I CHAIN
                    /TYPE LINE OF CHARACTERS !"#
3262  0020    P3TS20, 20
3263  3267            P3TS21
3264  4462            JMS I UTPLN3
3265  4713            C241
3266  5424            JMP I CHAIN
                    /TYPE LINE OF CHARACTERS $%&
3267  0021    P3TS21, 21
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3270  3274          P3TS22
3271  4462          JMS I UTPLN3
3272  4716          C244
3273  5424          JMP I CHAIN
                /TYPE LINE OF CHARACTERS '()
3274  0022    P3TS22, 22
3275  3301          P3TS23
3276  4462          JMS I UTPLN3
3277  4721          C247
3300  5424          JMP I CHAIN


                /TYPE LINE OF CHARACTERS *+,
3301  0023    P3TS23, 23
3302  3306          P3TS24
3303  4462          JMS I UTPLN3
3304  4724          C252
3305  5424          JMP I CHAIN
                /TYPE LINE OF CHARACTERS -.(
3306  0024    P3TS24, 24
3307  3313          P3TS25
3310  4462          JMS I UTPLN3
3311  4727          C255
3312  5424          JMP I CHAIN
                /TYPE LINE OF CHARACTERS ;:<
3313  0025    P3TS25, 25
3314  3320          P3TS26
3315  4462          JMS I UTPLN3
3316  4732          C272
3317  5424          JMP I CHAIN
                /TYPE LINE OF CHARACTERS =>?
3320  0026    P3TS26, 26
3321  3325          P3TS27
3322  4462          JMS I UTPLN3
3323  4735          C275
3324  5424          JMP I CHAIN
                /TYPE LINE OF CHARACTERS @ [\
3325  0027    P3TS27, 27
3326  3332          P3TS30
3327  4462          JMS I UTPLN3
3330  4740          C300
3331  5424          JMP I CHAIN
                /TYPE LINE OF CHARACTERS ]↑ AND LEFT ARROW
3332  0030    P3TS30, 30
3333  3337          P3TS31
3334  4462          JMS I UTPLN3
3335  4743          C335
3336  5424          JMP I CHAIN

                /TYPE LINE OF SMALL A, B, AND C
3337  0031    P3TS31, 31
3340  3346          P3TS32
3341  4556          CKSR37          /KSR37?
3342  5424          JMP I CHAIN     /NO. BYPASS TEST.
3343  4462          JMS I UTPLN3    /YES.
```

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3344  4746            SA
3345  5424            JMP I CHAIN
                  /TYPE LINE OF SMALL D, E, AND F
3346  0032      P3TS32, 32
3347  3355            P3TS33
3350  4556            CKSR37          /KSR37?
3351  5424            JMP I CHAIN     /NO, BYPASS TEST.
3352  4462            JMS I UTPLN3    /YES.
3353  4791            SD
3354  5424            JMP I CHAIN
                  /TYPE LINE OF SMALL G, H, AND I
3355  0033      P3TS33, 33
3356  3364            P3TS34
3357  4556            CKSR37          /KSR37?
3360  5424            JMP I CHAIN     /NO, BYPASS TEST
3361  4462            JMS I UTPLN3    /YES.
3362  4754            SG
3363  5424            JMP I CHAIN
                  /TYPE LINE OF SMALL J, K, AND L
3364  0034      P3TS34, 34
3365  3400            P3TS35
3366  4556            CKSR37          /KSR37?
3367  5424            JMP I CHAIN     /NO, BYPASS TEST
3370  4462            JMS I UTPLN3    /YES.
3371  4797            SJ
3372  5424            JMP I CHAIN

      3400            PAGE


      3400            PAGE
                  /TYPE LINE OF SMALL M, N, AND O
3400  0035      P3TS35, 35
3401  3407            P3TS36
3402  4556            CKSR37          /KSR37?
3403  5424            JMP I CHAIN     /NO, BYPASS TEST
3404  4462            JMS I UTPLN3    /YES.
3405  4762            SM
3406  5424            JMP I CHAIN
                  /TYPE LINE OF SMALL P, Q, AND R
3407  0036      P3TS36, 36
3410  3416            P3TS37
3411  4556            CKSR37          /KSR37?
3412  5424            JMP I CHAIN     /NO, BYPASS TEST.
3413  4462            JMS I UTPLN3    /YES.
3414  4765            SP
3415  5424            JMP I CHAIN
                  /TYPE LINE OF SMALL S, T, AND U
3416  0037      P3TS37, 37
3417  3425            P3TS40
3420  4556            CKSR37          /KSR37?
3421  5424            JMP I CHAIN     /NO, BYPASS TEST
3422  4462            JMS I UTPLN3    /YES.
3423  4770            SS
3424  5424            JMP I CHAIN
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                    /TYPE LINE OF SMALL V, W, AND X
3425  0040          P3TS40, 40
3426  3434                  P3TS41
3427  4556                  CKSR37          /KSR37?
3430  5424                  JMP I CHAIN     /NO. BYPASS TEST
3431  4462                  JMS I UTPLN3    /YES.
3432  4773                  SV
3433  5424                  JMP I CHAIN
                    /TYPE LINE OF SMALL Y, AND Z, AND CODE 340 CHARACTER.
3434  0041          P3TS41, 41
3435  3443                  P3TS42
3436  4556                  CKSR37          /KSR37?
3437  5424                  JMP I CHAIN     /NO. BYPASS TEST
3440  4462                  JMS I UTPLN3
3441  4776                  SY
3442  5424                  JMP I CHAIN
                    /TYPE LINE OF CHARACTERS WHOSE CODE IS 373, 374, 375, 376.
3443  0042          P3TS42, 42
3444  3462                  P3TS43
3445  4556                  CKSR37          /KSR37?
3446  5424                  JMP I CHAIN     /NO. BYPASS TEST
3447  4574                  MOVE
3450  5001                  C373
3451  0342                  BLOCK1
3452  7774                  -4
3453  4574                  MOVE
3454  5342                  BLOCK1
3455  5346                  BLOCK1+4
3456  7663                  -115
3457  3053                  DCA STLID
3460  4777'                 JMS TYPLN
3461  5424                  JMP I CHAIN
                    /TYPE 2 LINES OF ALL CHARACTERS. 1ST LINE NO DELAY. 2ND LINE WITH STALLS.
3462  0043          P3TS43, 43
3463  3473                  P3TS44
3464  4776'                 JMS FBALL       /FILL BUFFER WITH ALL CHARS.
3465  3053                  DCA STLID       /0 TO STLID.
3466  4777'                 JMS TYPLN       /TYPE LINE
3467  7240                  CLA CMA         /SET STALL
3470  3053                  DCA STLID       /INDICATOR
3471  4777'                 JMS TYPLN       /TYPE LINE
3472  5424                  JMP I CHAIN     /CHAIN
                    /TYPE 12 LINES OF ASR33 WORST CASE PATTERN. ALTERNATE LINES WITH STALLS.
3473  0044          P3TS44, 44
3474  3515                  P3TS45
3475  4573                  TYPE            /PRINT TITLE
3476  5153                  WCPTST
3477  4555                  CKSR33          /33?
3500  5424                  JMP I CHAIN     /NO
3501  4775'                 JMS FW336       /PATTERN TO BUFFER
3502  4577                  SETLOC          /-6 TO CTRA
3503  0051                  CTRA
3504  7772                  -6
3505  3053          P3T44A, DCA STLID       /0 TO STLID
3506  4777'                 JMS TYPLN       /TYPE LINE
```

```
3507  7248            CLA CMA         /SET STALL
3510  3053            DCA STLID       /INDICATOR

3511  4777'           JMS TYPLN       /TYPE LINE
3512  2051            ISZ CTRA        /ALL LINES TYPED?
3513  5305            JMP P3T44A      /NO, REPEAT
3514  5424            JMP I CHAIN     /YES, CHAIN
                /TYPE 12 LINES OF ASR35 WORST CASE PATTERN, ALTERNATE LINES WITH STALLS.
3515  0045      P3TS45, 45
3516  3535            P3TS46
3517  4554            CKSR35          /35?
3520  5424            JMP I CHAIN     /NO,
3521  4774'           JMS FW356       /PATTERN TO BUFFER
3522  4577            SETLOC          /-6 TO CTRA
3523  0051            CTRA
3524  7772            -6
3525  3053      P3T45A, DCA STLID       /0 TO STLID
3526  4777'           JMS TYPLN       /TYPE LINE
3527  7248            CLA CMA         /SET STALL
3530  3053            DCA STLID       /INDICATOR
3531  4777'           JMS TYPLN       /TYPE LINE
3532  2051            ISZ CTRA        /ALL LINES TYPED?
3533  5325            JMP P3T45A      /NO, REPEAT
3534  5424            JMP I CHAIN     /YES, CHAIN
                /TYPE 12 LINES OF KSR37 WORST CASE PATTERN, ALTERNATE LINES WITH STALLS.
3535  0046      P3TS46, 46
3536  7777            7777
3537  4556            CKSR37          /37?
3540  5424            JMP I CHAIN     /NO, BYPASS TEST.
3541  4773'           JMS FW376       /YES, PATTERN TO BUFFER
3542  4577            SETLOC          /-6 TO CTRA
3543  0051            CTRA
3544  7772            -6
3545  3053      P3T46A, DCA STLID       /RESET STALL INDICATOR.
3546  4777'           JMS TYPLN       /TYPE LINE
3547  7248            CLA CMA         /SET STALL INDICATOR
3550  3053            DCA STLID
3551  4777'           JMS TYPLN       /TYPE LINE
3552  2051            ISZ CTRA        /ALL LINES TYPED?
3553  5345            JMP P3T46A      /NO, REPEAT
3554  5424            JMP I CHAIN     /YES, CHAIN
3573  1153
3574  1135
3575  1117
3576  1066
3577  1627
      3600            PAGE


      3600            PAGE
                /KSR37, KSR35, OR ASR35 TAB TEST
3600  0047      P3TS47, 47
3601  3706            P3TS50
3602  4556            CKSR37          /KSR37?
3603  5232            JMP TBTB        /NO,
```

```
4573                TYPE            /YES. TYPE TITLE
5024                TBTST
1377                TAD (-11        /-9 TO CTRA
3051                DCA CTRA
4573                TYPE            /MARK TAB POSITIONS
5035                TBMRK
4573                TYPE
5043                TBMRK1
2051                ISZ CTRA        /DONE?
5212                JMP .-3         /NO
1376                TAD (-12        /SET TAB COUNT
3224                DCA TBCNT       /TO -10
1375        TBTA,   TAD (-7         /YES. -7 TO CTRA
3051                DCA CTRA
3253                DCA SPCNT       /0 TO SPACE COUNT
4256                JMS TABP        /GO TAB AND PRINT SLASH 9 TIMES.
0000        TBCNT,  OPEN            /TAB COUNT.
2051                ISZ CTRA        /DONE?
7410                SKP             /NO.
5424                JMP I CHAIN     /YES. CHAIN
2253                ISZ SPCNT       /INCREMENT SPACE COUNT
5223                JMP TBTA+3      /REPEAT
4554        TBTB,   CKSR35          /KSR, ASR35?
5424                JMP I CHAIN     /NO. BYPASS TEST
4573                TYPE            /YES. TYPE TITLE
5024                TBTST
1375                TAD (-7         /-7 TO CTRA
3051                DCA CTRA
4573                TYPE            /MARK TAB POSITIONS
5035                TBMRK
4573                TYPE
5043                TBMRK1
2051                ISZ CTRA        /DONE?
5242                JMP .-3         /NO.
4573                TYPE            /YES.
5036                TBMRK+1
1377                TAD (-11        /SET TAB COUNT
3224                DCA TBCNT       /TO -9
5220                JMP TBTA
0000        SPCNT,  OPEN
0000        SPCTR,  OPEN
0000        TABCTR, OPEN
0000        TABP,   OPEN
1656                TAD I TABP      /SET TABCTR
3255                DCA TABCTR
2256                ISZ TABP
4575                CRLF            /CRLF ONCE
7777                -1
1253        SPAC,   TAD SPCNT       /GET SPACE COUNT
7450                SNA             /0?
5275                JMP TABPA       /YES. DON'T SPACE
7041                CIA             /NO. NEGATE COUNT
3254                DCA SPCTR
1374                TAD (240        /SPACE
4463                JMS I UPUNCH
```

```
3673  2254            ISZ SPCTR       /DONE SPACING?
3674  5271            JMP .-3         /NO. SPACE AGAIN
3675  1373  TABPA,   TAD (11         /GET TAB CODE
3676  4463            JMS I UPUNCH    /OUTPUT TO TELEPRINTER
3677  4463            JMS I UPUNCH    /DUMMY CYCLE.
3700  4463            JMS I UPUNCH    /DUMMY CYCLE
3701  1124            TAD C257        /GET "/" CODE
3702  4463            JMS I UPUNCH    /AND TYPE IT
3703  2255            ISZ TABCTR      /DONE?
3704  5264            JMP SPAC        /NO. REPEAT
3705  5656            JMP I TABP      /YES. EXIT

                /KSR37 BACKSPACE TEST.
3706  0000  P3TS56, 50
3707  3161            P3TS4
3710  4556            CKSR37          /KSR37?
3711  5424            JMP I CHAIN     /NO
3712  4573            TYPE            /YES. TYPE TITLE
3713  0010            BKSPT
3714  1372            TAD (-51        /-41 TO CTRA
3715  3051            DCA CTRA
3716  4573            TYPE            /TYPE ALTERNATE U'S.
3717  5335            BKSU
3720  2051            ISZ CTRA        /DONE?
3721  5316            JMP .-3         /NO.
3722  1371            TAD (-47        /-39 TO CTRA
3723  3051            DCA CTRA
3724  4340            JMS BKSPC       /BACKSPACE TWICE
3725  7776            -2
3726  1770'           TAD C252        /TYPE "*"
3727  4463            JMS I UPUNCH
3730  4340            JMS BKSPC       /BACKSPACE THRICE
3731  7775            -3
3732  1770'           TAD C252        /TYPE "*"
3733  4463            JMS I UPUNCH
3734  2051            ISZ CTRA        /DONE 39 TIMES?
3735  5330            JMP .-5         /NO.
3736  5424            JMP I CHAIN     /YES. CHAIN
3737  0000  BKSCTR,   OPEN
3740  0000  BKSPC,    OPEN
3741  1740            TAD I BKSPC     /GET BACKSPACE COUNT
3742  3337            DCA BKSCTR      /AND STORE AT BKSCTR
3743  2340            ISZ BKSPC       /SET UP EXIT
3744  1367            TAD (210        /GET BACKSPACE CODE
3745  4463            JMS I UPUNCH    /OUTPUT TO TELEPRINTER
3746  2337            ISZ BKSCTR      /DONE BACKSPACING?
3747  5344            JMP .-3         /NO. REPEAT
3750  5740            JMP I BKSPC     /YES. EXIT
3767  0210
3770  4724
3771  7731
3772  7727
3773  0011
3774  0240
3775  7771
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```
          3776  7766
          3777  7767
                4000            PAGE


                4000            PAGE
                        /PROGRAM 4, PUNCH TEST
          4000  4577    PRG4,   SETLOC          /SET INTERRUPT SERVICE ADDRESS
          4001  0002            2               /TO INTSVC
          4002  1254            INTSVC
          4003  4577            SETLOC          /SET DATA BLOCK
          4004  0070            BLKCNT          /LENGTH TO
          4005  7000            -1000           /-512
          4006  4571            UKCC
          4007  1111            TAD [BLOCKA     /SET UP ADDRESS TO
          4010  3073            DCA UTEMP       /STORE DATA.
          4011  1110            TAD [-1000      /-512 TO CTRA
          4012  3051            DCA CTRA
          4013  4777'           JMS SINPT       /INITIALIZE SPECIAL COUNT PATTERN
          4014  4776'           JMS SGET        /GET CHARACTER
          4015  3473            DCA I UTEMP     /STORE IT
          4016  2073            ISZ UTEMP       /INCREMENT POINTER.
          4017  2051            ISZ CTRA        /DONE 512 CHARACTERS?
          4020  5214            JMP .-4         /NO. REPEAT
          4021  7200    PRG4A,  CLA             /YES. CLEAR READY BUSY
          4022  3045            DCA RBUSY
          4023  4779'           JMS PLTLR       /PUNCH LEADER
          4024  4774'           JMS PSYNC       /PUNCH SYNC CHARACTER
          4025  4773'           JMS PBLK        /PUNCH DATA BLOCK FULL SPEED.
          4026  4775'           JMS PLTLR       /PUNCH TRAILER
          4027  4772'           JMS RSYNC       /SYNC READER
          4030  4771'           JMS RDBLK       /READ DATA BLOCK
          4031  4770'           JMS RRDY        /WAIT FOR READER NOT BUSY
          4032  4775'           JMS PLTLR       /PUNCH LEADER
          4033  4774'           JMS PSYNC       /PUNCH SYNC CHARACTER
          4034  4767'           JMS PBLKR       /PUNCH DATA BLOCK (WITH STALLS).
          4035  4775'           JMS PLTLR       /PUNCH TRAILER
          4036  4772'           JMS RSYNC       /SYNC READER
          4037  4771'           JMS RDBLK       /READ DATA BLOCK
          4040  4770'           JMS RRDY        /WAIT FOR READER NOT BUSY
          4041  5221            JMP PRG4A       /REPEAT.


                        /PROGRAM 5, KEYBOARD TEST
          4042  4577    PRG5,   SETLOC          /SET KSTART TO INITIAL
          4043  0022            KSTART          /ROUTINE ADDRESS
          4044  4051            PST0
          4045  4573            TYPE            /PRINT
          4046  5173            KMSG1
          4047  5652            JMP I .+1
          4050  6233            SRSET
                        /CLEAR AC AND FLAG (KCC), WAIT FOR FLAG TO SET, WITH FLAG SET, SKIP
                        /ON FLAG 1000 TIMES, KSF SHOULD SKIP EVERY TIME.
          4051  0000    PST0,   0
          4052  4074            PST1
```

```
4053  4577            SETLOC          /-1000 TO CTRA
4054  0051            CTRA
4055  6038            -1750
4056  4571            UKCC            /CLEAR AC AND FLAG
4057  4573            TYPE
4060  5204            KMSG2
4061  4572            UKSF            /READY?
4062  5261            JMP .-1         /WAIT
4063  4572            UKSF            /READY, SKIP ON FLAG
4064  5270            JMP P5E0        /NO SKIP, ERROR
4065  2051            ISZ CTRA        /ALL DONE?
4066  5263            JMP .-3         /NO, REPEAT
4067  5424            JMP I CHAIN     /YES, CHAIN
4070  7602  P5E0,     HLT CLA         /KSF FAILURE
4071  4572            UKSF            /SCOPE LOOP
4072  5271            JMP .-1         /SKIPS ON FLAG
4073  5271            JMP .-2         /CONTINUOUSLY
                /ECHO TEST CHARACTER RECEIVED FROM KEYBOARD IS TYPED, THE
                /CHARACTER TYPED SHOULD MATCH CHARACTER KEYED. RUBOUT CHARCTER
                /ENDS ROUTINE.
4074  0001  P5T1,     1
4075  4113            P5T2
4076  4571            UKCC            /CLEAR AC AND FLAG
4077  4573            TYPE
4100  5215            KMSG3
4101  4572  P5T1A,    UKSF            /READY?
4102  5301            JMP .-1         /WAIT
4103  4567            UKRB            /READ CHARACTER
4104  4564            UTLS            /PRINT IT
4105  4566            UTSF            /PRINTER READY?
4106  5305            JMP .-1         /NO, WAIT
4107  1144            TAD [-377
4110  7440            SZA             /IS IT RUBOUT?
4111  5301            JMP P5T1A       /NO
4112  5424            JMP I CHAIN     /YES, CHAIN


                /OCTAL EQUIVALENT TEST. THE OCTAL EQUIVALENT OF ANY
                /CHARACTER KEYED IS PRINTED, RUBOUT ENDS ROUTINE.
4113  0002  P5T2,     2
4114  7777            7777
4115  4571            UKCC            /CLEAR AC AND FLAG
4116  4573            TYPE            /PRINT TITLE AND
4117  5262            KMSG4           /INSTRUCTION
4120  4573            TYPE
4121  5223            KMSG3A
4122  4572  P5T2A,    UKSF            /FLAG 1?
4123  5322            JMP .-1         /NO, WAIT
4124  4567            UKRB            /YES, READ KEYBOARD
4125  3340            DCA P5T2W       /STORE CHARACTER
4126  4766'           JMS ASCCN       /CONVERT CHARACTER
4127  4140            P5T2W           /TO PRINTABLE OCTAL.
4130  5302            OCTEQV
4131  4573            TYPE            /PRINT CHARACTER
```

```
4132  5300          KMSG5
4133  1340          TAD P5T2W
4134  1144          TAD [-377
4135  7640          SZA CLA          /WAS IT A RUBOUT?
4136  5322          JMP P5T2A        /NO.
4137  5424          JMP I CHAIN      /YES. CHAIN
4140  0000  P5T2W,  0
4166  1650
4167  1324
4170  1345
4171  1400
4172  1216
4173  1316
4174  1212
4175  1200
4176  1721
4177  1711
      4200          PAGE

      4200          PAGE
                    /PROGRAM 6. COMBINED READER, PRINTER, PUNCH TEST.
4200  4577  PRG6,   SETLOC          /SET INTERRUPT SERVICE
4201  0002          2                /ADDRESS TO INTSVC
4202  1254          INTSVC
4203  4577          SETLOC           /SET DATA BLOCK LENGTH
4204  0070          BLKCNT           /TO -150
4205  7552          -226
4206  4571          UKCC
4207  4777'         JMS STBF         /SET UP BUFFER AREA
4210  4577          SETLOC           /SET KSTART TO INITIAL
4211  0002          KSTART           /ROUTINE ADDRESS
4212  4215          P6T0
4213  5614          JMP I .+1        /START PROGRAM
4214  0233          $RSET
4215  0000  P6T0,   0
4216  4222          P6T1
4217  4776'         JMS FBF3         /DATA: ABC
4220  4647          A
4221  4775'         JMS CNTST
4222  0001  P6T1,   1
4223  4227          P6T2
4224  4776'         JMS FBF3         /DATA: DEF
4225  4652          D
4226  4775'         JMS CNTST
4227  0002  P6T2,   2
4230  4234          P6T3
4231  4776'         JMS FBF3         /DATA: GHI
4232  4655          G
4233  4775'         JMS CNTST
4234  0003  P6T3,   3
4235  4241          P6T4
4236  4776'         JMS FBF3         /DATA: JKL
4237  4660          J
4240  4775'         JMS CNTST
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4241  0004  P6T4,   4
4242  4246          P6T5
4243  4776'         JMS FBF3        /DATA: MNO
4244  4663          M
4245  4775'         JMS CNTST
4246  0005  P6T5,   5
4247  4253          P6T6
4250  4776'         JMS FBF3        /DATA: PQR
4251  4666          P
4252  4775'         JMS CNTST
4253  0006  P6T6,   6
4254  4260          P6T7
4255  4776'         JMS FBF3        /DATA: STU
4256  4671          S
4257  4775'         JMS CNTST
4260  0007  P6T7,   7
4261  4265          P6T10
4262  4776'         JMS FBF3        /DATA: VWX
4263  4674          V
4264  4775'         JMS CNTST
4265  0010  P6T10,  10
4266  4272          P6T11
4267  4776'         JMS FBF3        /DATA: YZ0
4270  4677          Y
4271  4775'         JMS CNTST
4272  0011  P6T11,  11
4273  4277          P6T12
4274  4776'         JMS FBF3        /DATA: 123
4275  4702          ONE
4276  4775'         JMS CNTST
4277  0012  P6T12,  12
4300  4304          P6T13
4301  4776'         JMS FBF3        /DATA: 456
4302  4705          FOUR
4303  4775'         JMS CNTST
4304  0013  P6T13,  13
4305  4311          P6T14
4306  4776'         JMS FBF3        /DATA: 789
4307  4710          SEVEN
4310  4775'         JMS CNTST
4311  0014  P6T14,  14
4312  4316          P6T15
4313  4776'         JMS FBF3        /DATA: !"#
4314  4713          C241
4315  4775'         JMS CNTST
4316  0015  P6T15,  15
4317  4323          P6T16
4320  4776'         JMS FBF3        /DATA: $%&
4321  4716          C244
4322  4775'         JMS CNTST
4323  0016  P6T16,  16
4324  4330          P6T17
4325  4776'         JMS FBF3        /DATA: '()
4326  4721          C247
4327  4775'         JMS CNTST
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```
4330  0017    P6T17,  17
4331  4335            P6T20
4332  4776'           JMS FBF3        /DATA: **,
4333  4724            C252
4334  4775'           JMS CNTST
4335  0020    P6T20,  20
4336  4342            P6T21
4337  4776'           JMS FBF3        /DATA: -./
4340  4727            C255
4341  4775'           JMS CNTST

4342  0021    P6T21,  21
4343  4347            P6T22
4344  4776'           JMS FBF3        /DATA: 1;<
4345  4732            C272
4346  4775'           JMS CNTST
4347  0022    P6T22,  22
4350  4354            P6T23
4351  4776'           JMS FBF3        /DATA: =>?
4352  4735            C275
4353  4775'           JMS CNTST
4354  0023    P6T23,  23
4355  4361            P6T24
4356  4776'           JMS FBF3        /DATA: @[\
4357  4740            C300
4360  4775'           JMS CNTST
4361  0024    P6T24,  24
4362  4366            P6T25
4363  4776'           JMS FBF3        /DATA: ]↑ AND LEFT ARROW
4364  4743            C335
4365  4775'           JMS CNTST
4366  0025    P6T25,  25
4367  4400            P6T26
4370  4774'           JMS FBALL       /DATA: ALL PRINTABLE ASCII
4371  4775'           JMS CNTST
4374  1066
4375  1600
4376  1031
4377  1000
      4400            PAGE


      4400            PAGE
4400  0026    P6T26,  26
4401  4404            P6T27
4402  4777'           JMS FW336       /DATA: ASR33 PRINTER WORST CASE
4403  4776'           JMS CNTST       /PATTERN
4404  0027    P6T27,  27
4405  4410            P6T30
4406  4775'           JMS FW356       /DATA: ASR35 PRINTER WORST CASE
4407  4776'           JMS CNTST       /PATTERN
4410  0030    P6T30,  30
4411  7777            7777
4412  4774'           JMS FBF3        /DATA: 1'S AND 0'S
4413  0005            C377
```

```
4414  4776'           JMS CNTST
                    /PROGRAM 7-READS COUNT PATTERN.
4415  4454    PRG7,   JMS I SYNC      /SYNC TAPE
4416  3265            DCA ERRCTR      /CLEAR ERROR COUNTER
4417  4455            JMS I INPATT    /INITIALIZE PATTERN.
4420  4571            UKCC            /START READER
4421  7604    SRT0A,  LAS             /READ SR
4422  0107            AND [400
4423  7650            SNA CLA         /STALL? (SR3=0)
4424  7040            CMA             /YES
4425  3053            DCA STLID       /NO

4426  4456    SRT0B,  JMS I GETPT     /GET PATTERN CHAR.
4427  3237            DCA SBSP        /STORE AT SBSP.
4430  4557            STALL           /STALL
4431  4572            UKSF            /READY?
4432  5231            JMP .-1         /TEST AGAIN.
4433  4567            UKRB            /READ, CLEAR AC AND FLAG.
4434  3072            DCA ERRCR
4435  1072            TAD ERRCR
4436  4457            JMS I CHECK     /GO CHECK CHARACTER WORD.
4437  0000    SBSP,   0               /
4440  7410            SKP             /ERROR. NO MATCH. GO INC. ERRCNT
4441  5257            JMP HLTTST      /OK.
4442  2265    ERRCNT, ISZ ERRCTR      /INCREMENT ERROR COUNTER
4443  5246            JMP .+3
4444  7240            CLA CMA         /OFLOW. RESET TO 7777.
4445  3265            DCA ERRCTR
4446  7604            LAS             /READ SR.
4447  0135            AND [100
4450  7650            SNA CLA         /HALT ON ERROR? (SR5)
4451  5257            JMP HLTTST      /NO.
4452  1072            TAD ERRCR       /YES. GET BAD CHAR.
4453  7402            HLT
4454  7200            CLA
4455  1237            TAD SBSP        /GET GOOD CHARACTER
4456  7402            HLT
4457  7604    HLTTST, LAS             /READ SR
4460  7700            SMA CLA         /HALT? (SR0)
4461  5221            JMP SRT0A       /NO.
4462  1265            TAD ERRCTR      /GET ERROR COUNT
4463  7402            HLT             /HALT. ERROR COUNT IN AC
4464  5221            JMP SRT0A
4465  0000    ERRCTR, 0               /ERROR COUNTER
                    /PRG10. PRINTER EXERCISER. TYPES LINES OF ANY 3 CHARACTERS WITH
                    /STALLS. OR FULL SPEED. KEYBOARD CONTROLLED.
4466  4773'   PRG10,  JMS STBF
4467  4573            TYPE
4470  5307            P10MG1
4471  1106    PRG10A, TAD [BLOCK1-1
4472  3016            DCA 16
4473  4573            TYPE
4474  5323            P10MG2
4475  4317            JMS GKBCR
4476  3416            DCA I 16
```

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4477  4317          JMS GKBCR
4500  3416          DCA I 16
4501  4317          JMS GKBCR
4502  3416          DCA I 16
4503  4317          JMS GKBCR
4504  1144          TAD C-377
4505  7640          SZA CLA                 /STALL?
4506  7240          CLA CMA                 /YES.
4507  3053          DCA STLIO               /NO.
4510  4774'         JMS FBF3                /SET UP LINE.
4511  5342          BLOCK1
4512  4772'         JMS TYPLN               /TYPE LINE OF CHARACTERS
4513  7604          LAS                     /READ SR.
4514  7700          SMA CLA                 /CHANGE DATA? (SR0=1)
4515  5312          JMP .-3                 /NO.
4516  5271          JMP PRG10A              /YES.
4517  0000  GKBCR,  OPEN                    /SUB TO GET KEYBOARD CHARACTER.
4520  4572          UKSF                    /WAIT FOR FLAG.
4521  5320          JMP .-1
4522  4567          UKRB                    /READ CHARACTER.
4523  3330          DCA KBCR                /STORE CHARACTER.
4524  1330          TAD KBCR                /GET IT BACK.
4525  4463          JMS I UPUNCH            /ECHO IT.
4526  1330          TAD KBCR                /GET CHARACTER AGAIN.
4527  5717          JMP I GKBCR             /EXIT
4530  0000  KBCR,   OPEN
                    /
                    /PROGRAM 11, PUNCHES BINARY COUNT PATTERN.
4531  4455  PRG11,  JMS I INPATT     /INITIALIZE BINARY COUNT PATTERN
4532  4456          JMS I GETPT     /GET BINARY COUNT CHARACTER.
4533  4463          JMS I UPUNCH    /PUNCH CHARACTER
4534  5332          JMP .-2         /REPEAT.
                    /

4535  0000  DVCSEL, OPEN                    /DEVICE CODE SELECT ROUTINE.
4536  1105          TAD CINTAB              /GET START ADDR OF INPUT IOT TABLE.
4537  3040          DCA TEMP                /AND SAVE AT TEMP.
4540  1021          TAD TTYIOT              /OBTAIN NEW INPUT IOT AND
4541  7012          RTR                     /STORE AT UTEMP.
4542  7010          RAR
4543  0104          AND C0770
4544  3073          DCA UTEMP
4545  4357          JMS DVCOM               /PERFORM INPUT IOT SELECTION.
4546  1103          TAD COUTTAB             /GET START ADDR OF OUTPUT IOT TABLE.
4547  3040          DCA TEMP                /AND OBTAIN NEW OUTPUT IOT AND
4550  1021          TAD TTYIOT              /OBTAIN NEW OUTPUT IOT AND
4551  7006          RTL                     /STORE AT UTEMP.
4552  7004          RAL
4553  0104          AND C0770
4554  3073          DCA UTEMP
4555  4357          JMS DVCOM               /PERFORM OUTPUT IOT SELECTION.
4556  5735          JMP I DVCSEL            /EXIT DVCSEL.
4557  0000  DVCOM,  OPEN                    /COMMON SUB TO SELECT IOT'S.
4560  1440          TAD I TEMP
4561  7450          SNA                     /0?
```

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4562  5757              JMP I DVCOM             /YES. EXIT
4563  3074              DCA UTEMP1
4564  1474              TAD I UTEMP1
4565  0102              AND [7007               /REMOVE OLD DEVICE CODE.
4566  1073              TAD UTEMP               /INSERT NEW DEVICE CODE.
4567  3474              DCA I UTEMP1            /PUT BACK NEW IOT CODE.
4570  2040              ISZ TEMP                /SET UP FOR NEXT IOT CODE.
4571  5360              JMP DVCOM+1

4572  1627
4573  1000
4574  1031
4575  1135
4576  1600
4577  1117
      4600              PAGE


      4600              PAGE
4600  0736    INTAB,    XKSF+1
4601  0743              XKCC+1
4602  0746              XKRS+1
4603  0751              XKRB+1
4604  0767              XKCR+1
4605  0772              XKIE+1
4606  1233              RSSERV
4607  1264              INKSF
4610  1434              IN0
4611  0000              0
4612  0754    OUTTAB,   XTSF+1
4613  0761              XTCF+1
4614  0764              XTLS+1
4615  1166              XSPF+1
4616  1171              XSPI+1
4617  1261              INTCF
4620  1257              INTSF
4621  0723              OUT0
4622  0730              OUT1
4623  0732              OUT2
4624  0000              0
4625  0247    A33WP6,   0247            /"'"
4626  0337              0337            /LEFT ARROW
4627  0327              0327            /"W"
4630  0257              0257            /"/"
4631  0327              0327            /"W"
4632  0337              0337            /LEFT ARROW
4633  0247    A35WP6,   0247            /"'"
4634  0333              0333            /"["
4635  0277              0277            /"?"
4636  0303              0303            /"C"
4637  0277              0277            /"?"
4640  0333              0333            /"["
4641  0316    A37WP6,   0316            /BIG N
4642  0361              0361            /SMALL Q
4643  0301              0301            /BIG A
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4644  0376              0376          /SWUNG DASH
4645  0301              0301          /BIG A
4646  0361              0361          /SMALL Q

4647  0301    A,        301
4650  0302              302
4651  0303              303
4652  0304    D,        304
4653  0305              305
4654  0306              306
4655  0307    G,        307
4656  0310              310
4657  0311              311
4660  0312    J,        312
4661  0313              313
4662  0314              314
4663  0315    M,        315
4664  0316              316
4665  0317              317
4666  0320    P,        320
4667  0321              321
4670  0322              322
4671  0323    S,        323
4672  0324              324
4673  0325              325
4674  0326    V,        326
4675  0327              327
4676  0330              330
4677  0331    Y,        331
4700  0332              332
4701  0260              260
4702  0261    ONE,      261
4703  0262              262
4704  0263              263
4705  0264    FOUR,     264
4706  0265              265
4707  0266              266

4710  0267    SEVEN,    267
4711  0270              270
4712  0271              271
4713  0241    C241,     241
4714  0242              242
4715  0243              243
4716  0244    C244,     244
4717  0245              245
4720  0246              246
4721  0247    C247,     247
4722  0250              250
4723  0251              251
4724  0252    C252,     252
4725  0253              253
4726  0254              254
4727  0255    C255,     255
4730  0256              256
```

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4731  0257            257
4732  0272     C272,  272
4733  0273            273
4734  0274            274
4735  0275     C275,  275
4736  0276            276
4737  0277            277
4740  0300     C300,  300
4741  0333            333
4742  0334            334
4743  0335     C335,  335
4744  0336            336
4745  0337            337
4746  0341     $A,    341
4747  0342            342
4750  0343            343
4751  0344     $D,    344
4752  0345            345
4753  0346            346
4754  0347     $G,    347
4755  0350            350
4756  0351            351
4757  0352     $J,    352
4760  0353            353
4761  0354            354
4762  0355     $M,    355
4763  0356            356
4764  0357            357
4765  0360     $P,    360
4766  0361            361
4767  0362            362
4770  0363     $S,    363
4771  0364            364
4772  0365            365
4773  0366     $V,    366
4774  0367            367
4775  0370            370
4776  0371     $Y,    371
4777  0372            372
5000  0340            340
5001  0373     C373,  373
5002  0374            374
5003  0375            375
5004  0376            376
5005  0377     C377,  377
5006  0000            000
5007  0377            377
5010  4543     BKSPT, TEXT    '%##BACKSPACE TEST%##@?'
5011  4302
5012  0103
5013  1323
5014  2001
5015  0305
5016  4024
5017  0523
```

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5020  2445
5021  4343
5022  0077
5023  0000
5024  4543    TBTST,  TEXT    'X##TAB TESTX##@?'
5025  4324
5026  0102
5027  4024
5030  0523
5031  2445
5032  4343
5033  0077
5034  0000
5035  4040    TBMRK,  TEXT    '       /@?'
5036  4040
5037  4040
5040  4040
5041  5700
5042  7700
5043  4040    TBMRK1, TEXT    '       /@?'
5044  4040
5045  4040
5046  4057
5047  0077
5050  0000
5051  5555    RM33A,  TEXT    '----I@?'
5052  5555
5053  1100
5054  7700
5055  5511    RM33B,  TEXT    '-I-@?'
5056  5500
5057  7700
5060  5555    RM37A,  TEXT    '----I-I@?'
5061  5555
5062  1155
5063  1100
5064  7700
5065  3440    SPTSTC, TEXT    '\ @?'
5066  0077
5067  0000
5070  4543    CRTST,  TEXT    'X##CR TESTX##@?'
5071  4303
5072  2240
5073  2405
5074  2324
5075  4543
5076  4300
5077  7700
5100  4543    RMTST,  TEXT    'X##RIGHT MARGIN TESTX##@?'
5101  4322
5102  1107
5103  1024
5104  4015
5105  0122
5106  0711
```

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5107  1640
5110  2405
5111  2324
5112  4543
5113  4300
5114  7700
5115  4543    SPTST,  TEXT    'X##SPACE TESTX##0?'
5116  4323
5117  2001
5120  0305
5121  4024
5122  0523
5123  2445
5124  4343
5125  0077
5126  0000
5127  4543    LFTST,  TEXT    'X##LF TESTX##0?'
5130  4314
5131  0640
5132  2405
5133  2324
5134  4543
5135  4300
5136  7700
5137  4543    CHRTST, TEXT    'X##CHARACTER TESTSX##0?'
5140  4303
5141  1001
5142  2201
5143  0324
5144  0522
5145  4024
5146  0523
5147  2423
5150  4543
5151  4300
5152  7700
5153  4543    WCPTST, TEXT    'X##WORST CASE PATTERN TESTX##0?'
5154  4327
5155  1722
5156  2324
5157  4003
5160  0123
5161  0540
5162  2001
5163  2424
5164  0522
5165  1640
5166  2405
5167  2324
5170  4543
5171  4300
5172  7700
5173  4543    KMSG1,  TEXT    'X##KYBD TESTX#0?'
5174  4313
5175  3102
```

```
5176  0440
5177  2405
5200  2324
5201  4543
5202  0077
5203  0000
5204  4543    KMSG2,  TEXT    '%#PRESS A KEY%#@?'
5205  2022
5206  0523
5207  2340
5210  0140
5211  1305
5212  3145
5213  4300
5214  7700
5215  4543    KMSG3,  TEXT    'X#ECHO TEST'
5216  0503
5217  1017
5220  4024
5221  0523
5222  2400
5223  4543    KMSG3A, TEXT    'X#CHARACTER KEYED WILL BE TYPED.'
5224  0310
5225  0122
5226  0103
5227  2405
5230  2240
5231  1305
5232  3105
5233  0440
5234  2711
5235  1414
5236  4002
5237  0540
5240  2431
5241  2005
5242  0456
5243  0000
5244  4543            TEXT    '%#RUBOUT ENDS ROUTINE.%##@?'
5245  2225
5246  0217
5247  2524
5250  4005
5251  1604
5252  2340
5253  2217
5254  2524
5255  1116
5256  0556
5257  4543
5260  4300
5261  7700
5262  4543    KMSG4,  TEXT    '%##OCTAL EQUIVALENT TEST@?'
5263  4317
5264  0324
```

```
5265  0114
5266  4005
5267  2125
5270  1126
5271  0114
5272  0516
5273  2440
5274  2405
5275  2324
5276  0077
5277  0000
5300  4543    KMSG5,  TEXT    'X#'
5301  0000
5302  4040    OCTEQV, TEXT    '    X#0?'
5303  4040
5304  4543
5305  0077
5306  0000
5307  4543    P10MG1, TEXT    'X#PRINTER EXERCISERX#0?'
5310  2022
5311  1116
5312  2405
5313  2240
5314  0530
5315  0522
5316  0311
5317  2305
5320  2245
5321  4300
5322  7700
5323  4543    P10MG2, TEXT    'X#TYPE IN DATA !0?'
5324  2431
5325  2005
5326  4011
5327  1640
5330  0401
5331  2401
5332  4072
5333  0077
5334  0000
5335  2540    BKSU,   TEXT    'U 0?'
5336  0077
5337  0000
5340  0000    END,    0

      7000            *7000
                /ISSUE KCC, WAIT FOR FLAG TO SET,  ISSUE KCR WITH
                /AC=7777 AND DELAY 200 MSECS.  AC NOT 7777 OR KBRD
                /FLAG SET INDICATES A KCR FAILURE,  TEST IS DONE
                /100 TIMES.

7000  0007    P0TS7,  7
7001  7044            P0T10
7002  4577            SETLOC          /SET COUNT OF
```

```
7003  0051          CTRA            /-100 (DEC)
7004  7634          -144            /IN CTRA.
7005  4577          SETLOC          /SET DELAYM
7006  0023          DELAYM          /-200 (DEC).
7007  7478          -310
7010  4571  P0TS7A, UKCC
7011  4572          UKSF
7012  5211          JMP .-1
7013  7240          CLA CMA         /AC=7777.
7014  4563          UKCR            /CLEAR READER FLAG.
7015  7040          CMA             /AC SHOULD EQUAL ZERO NOW.
7016  7440          SZA             /RESULT 0?
7017  5227          JMP P0E7A       /NO. ERROR, GO TO P0E7A.
7020  4576  P0TS7B, DELAY           /GO DELAY 200 MILLISECS.
7021  4572          UKSF            /READER FLAG SET?
7022  7410          SKP             /NO.
7023  5233          JMP P0E7B       /YES, READER FLAG SET.  ERROR, GO TO P0E7B.
7024  2051          ISZ CTRA        /TEST DONE?
7025  5210          JMP P0TS7A      /NO, REPEAT.
7026  5424          JMP I CHAIN

7027  7402  P0E7A,  HLT             /KCR CLEARED AC.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7030  7240          CLA CMA         /AC=7777.  (SCOPE LOOP).
7031  4563          UKCR            /CLEAR READER FLAG.  SHOULD NOT CLEAR AC.
7032  5230          JMP .-2         /REPEAT.

7033  7402  P0E7B,  HLT             /KCR DID NOT CLEAR READER FLAG
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7034  4571          UKCC            /(SCOPE LOOP).
7035  4572          UKSF
7036  5235          JMP .-1
7037  4563          UKCR            /CLEAR READER FLAG.
7040  4576          DELAY           /GO DELAY 200 MILLISECS
7041  4572          UKSF
7042  5234          JMP P0E7B+1     /REPEAT.
7043  5234          JMP P0E7B+1     /REPEAT.

                    /ISSUE KCC, WAIT FOR FLAG TO SET.  ISSUE KIE WITH
                    /AC11=0 THEN TURN THE INTERUPT ON.  AN INTERRUPT AT THIS TIME
                    /INDICATES A KIE FAILURE.  WITH THE FLAG STILL SET ISSUE
                    /SRQ AND SPI.  A SKIP BY EITHER INDICATES A FAILURE.
                    /ISSUE KIE WITH AC11=1 AND THE INTERRUPT ON.  NO INTERRUPT
                    /INDICATES A KIE FAILURE.  ISSUE SRQ AND THEN SPI.  FAILURE OF
                    /EITHER TO SKIP INDICATES A FAILURE.  THIS TEST IS DONE 1000 TIMES.


7044  0010  P0T10,  10
7045  7211          P0T11
7046  4577          SETLOC          /SET COUNT OF
7047  0051          CTRA            /-1000 (DEC)
7050  6030          -1750           /IN CTRA.
7051  4571          UKCC
7052  4572          UKSF
7053  5252          JMP .-1
```

```
7054  4577    P0T10A, SETLOC          /SET INTERRUPT RETURN LOCATION
7055  0002            2               /TO P0E10A.
7056  7113            P0E10A
7057  6572            UKSF
7060  5251            JMP .-7
7061  7200            CLA             /AC=0
7062  6562            UKIE            /DISABLE TTY INTERRUPT
7063  6001            ION             /TURN INTERRUPT ON
7064  7000            NOP
7065  6002    P0T10B, IOF             /TURN INTERRUPT OFF.
7066  6003            SRQ             /SKIP IF INTERRUPT REQUEST.
7067  7410            SKP
7070  5331            JMP P0E10B      /ERROR. SRQ FAILED, GO TO P0E10B.
7071  6560    P0T10C, USPI            /SKIP IF TTY INTERRUPT.
7072  7410            SKP
7073  5341            JMP P0E10C      /ERROR.  SPI FAILED, GO TO P0E10C.
7074  4577    P0T10D, SETLOC          /SET INTERRUPT RETURN LOCATION
7075  0002            2               /TO P0T10E
7076  7104            P0T10E
7077  7201            CLA IAC         /AC11=1
7100  6562            UKIE            /ENABLE TTY INTERRUPT.
7101  6001            ION             /TURN INTERRUPT ON.
7102  7000            NOP             /(SHOULD INTERRUPT).
7103  5351            JMP P0E10D      /ERROR, GO TO P0E10D.
7104  6003    P0T10E, SRQ             /SKIP IF INTERRUPT REQUEST.
7105  5365            JMP P0E10E      /ERROR, GO TO P0E10E.
7106  6560    P0T10F, USPI            /SKIP IF TTY INTERRUPT.
7107  5777'           JMP P0E10F      /ERROR.  GO TO P0E10F.
7110  2051            ISZ CTRA        /DONE?
7111  5254            JMP P0T10A      /NO, REPEAT.
7112  5424            JMP I CHAIN


7113  7402    P0E10A, HLT             /KIE FAILED TO DISABLE TTY.
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
7114  4572            UKSF            /IS READER FLAG SET?
7115  4776'           JMS INTFND      /NO.  UNEXPECTED INTERRUPT.
7116  4577            SETLOC          /SET INTERRUPT RETURN LOCATION
7117  0002            2               /TO P0E10A+1.
7120  7114            P0E10A+1
7121  6571            UKCC            /(SCOPE LOOP).
7122  6572            UKSF
7123  5322            JMP .-1
7124  7200            CLA
7125  6562            UKIE            /DISABLE TTY INTERRUPT.
7126  6001            ION             /INTERRUPT ON.
7127  7000            NOP
7130  5314            JMP P0E10A+1    /REPEAT.

7131  7602    P0E10B, HLT CLA         /SRQ SKIPPED WITH TTY DISABLED.
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
7132  6571            UKCC
7133  6572            UKSF
7134  6562            UKIE            /DISABLE TTY INTERRUPT, (AC11=0).
7135  5334            JMP .-1
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7136  6003          SRQ             /SKIP IF INTERRUPT, (AC11=0), REQUEST.  (SHOULD NOT SKIP)
7137  5332          JMP P0E10B+1    /REPEAT
7140  5332          JMP P0E10B+1    /REPEAT

7141  7602    P0E10C, HLT CLA       /SPI SKIPPED WITH TTY DISABLED.
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
7142  4571          UKCC
7143  4572          UKSF
7144  5343          JMP .-1
7145  4562          UKIE            /DISABLE TTY INTERRUPT, (AC11=0),
7146  4560          USPI            /SKIP IF TTY INTERRUPT REQUEST  (SHOULD NOT SKIP),
7147  5342          JMP P0E10C+1    /REPEAT.
7150  5342          JMP P0E10C+1    /REPEAT.

7151  7402    P0E10D, HLT           /KIE FAILED TO ENABLE TTY INTERRUPT WITH AC11=1.
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
7152  4577          SETLOC          /SET INTERRUPT RETURN LOCATION
7153  0002          2               /TO P0E10D+4.
7154  7155          P0E10D+4
7155  7201          CLA IAC         /(SCOPE LOOP).
7156  4562          UKIE            /ENABLE TTY INTERRUPT.
7157  4571          UKCC
7160  4572          UKSF
7161  5360          JMP .-1
7162  6001          ION             /TURN INTERRUPT ON.
7163  7000          NOP
7164  5355          JMP P0E10D+4    /REPEAT.


7165  7402    P0E10E, HLT           /SRQ FAILED TO SKIP.
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
7166  7201          CLA IAC         /(SCOPE LOOP).
7167  4562          UKIE            /ENABLE TTY INTERRUPT.
7170  4571          UKCC
7171  4572          UKSF
7172  5371          JMP .-1
7173  6003          SRQ             /SKIP IF INTERRUPT REQUEST.
7174  5366          JMP P0E10E+1    /REPEAT.
7175  5366          JMP P0E10E+1    /REPEAT.
7176  2270
7177  7200
      7200          PAGE

7200  7402    P0E10F, HLT           /SPI FAILED TO SKIP.
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
7201  7201          CLA IAC         /(SCOPE LOOP).
7202  4562          UKIE            /ENABLE TTY INTERRUPT.
7203  4571          UKCC
7204  4572          UKSF
7205  5204          JMP .-1
7206  4560          USPI            /SKIP IF TTY INTERRUPT.
7207  5201          JMP P0E10F+1    /REPEAT.
7210  5201          JMP P0E10F+1    /REPEAT.
                /ISSUE KIE WITH AC11=0 TO DISABLE TTY
                /ISSUE CAF WITH AC, LINK, AND READER    ) SET.
```

```
                    /TTY NOT ENABLED, OR AC AND LINK NOT
                    /ZERO INICATES A FAILURE.  TEST IS DONE 100 TIMES.

7211  0011  P0T11,  11
7212  7777          7777
7213  4577          SETLOC          /SET COUNT OF
7214  0051          CTRA            /-100 (DEC)
7215  7634          -144            /IN CTRA.
7216  4577          SETLOC          /SET DELAYM
7217  0023          DELAYM          /-200 (DEC).
7220  7470          -310
7221  7200  P0T11A, CLA
7222  4562          UKIE            /DISABLE TTY (AC 11=0).
7223  4571          UKCC
7224  4572          UKSF
7225  5224          JMP .-1
7226  7360          CLA CMA CLL CML /AC AND LINK SET,
7227  6007          CAF             /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY.
7230  7420          SNL
7231  7440          SZA
7232  5247          JMP P0E11A      /ERROR, GO TO P0E11A.
7233  4576  P0T11B, DELAY          /GO DELAY 200 MILLI SEC.
7234  4572          UKSF            /DID FLAG COME UP?
7235  7410          SKP
7236  5256          JMP P0E11B      /YES, ERROR, GO TO P0E11B.
7237  4571  P0T11C, UKCC
7240  4572          UKSF
7241  5240          JMP .-1
7242  4560          USPI            /SKIP IF TTY INTERRUPT REQUEST.
7243  5267          JMP P0E11C      /ERROR, GO TO P0E11C.


7244  2051          ISZ CTRA        /TEST DONE?
7245  5221          JMP P0T11A      /NO, REPEAT.
7246  5424          JMP I CHAIN
7247  7402  P0E11A, HLT             /CAF FAILED TO CLEAR AC AND LINK.
                    /SCOPE LOOP, PRESS CONTINUE TO ENTER.
7250  7360          CLA CMA CLL CML /(SCOPE LOOP).
7251  6007          CAF             /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY.
7252  7420          SNL
7253  7440          SZA
7254  5250          JMP P0E11A+1    /REPEAT.
7255  5250          JMP P0E11A+1    /REPEAT.
7256  7402  P0E11B, HLT             /CAF DID NOT CLEAR FLAG OR FLAG SET AFTER BEING CLEARED.
                    /SCOPE LOOP, PRESS CONTINUE TO ENTER.
7257  4571          UKCC            /(SCOPE LOOP).
7260  4572          UKSF
7261  5260          JMP .-1
7262  6007          CAF             /CLEAR THE FLAG.
7263  4576          DELAY           /GO DELAY 200 MILLISEC.
7264  4572          UKSF            /FLAG SET?
7265  5257          JMP P0E11B+1    /REPEAT
7266  5257          JMP P0E11B+1    /REPEAT

7267  7402  P0E11C, HLT             /CAF FAILED TO ENABLE TTY.
```

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                        /SCOPE LOOP, PRESS CONTINUE TO ENTER.
7270  7200              CLA               /(SCOPE LOOP).
7271  4562              UKIE              /DISABLE TTY.  (AC11=0)
7272  6007              CAF               /ENABLE TTY.
7273  4571              UKCC
7274  4572              UKSF
7275  5274              JMP .-1
7276  4560              USPI              /SKIP IF INT REQUEST FROM TTY.
7277  5278              JMP P8E11C+1      /REPEAT
7300  5278              JMP P8E11C+1      /REPEAT.



                        /ISSUE CAF WITH PRINTER FLAG SET.  DELAY 200 MILLISEC'S
                        /PRINTER FLAG SET AFTER DELAY INDICATES A CAF FAILURE.
                        /TEST IS DONE 100 TIMES.

7301  0006              P1TS6,  6
7302  7331                      P1TS7
7303  4577                      SETLOC            /SET COUNT OF
7304  0051                      CTRA              /-100 (DEC)
7305  7634                      -144              /IN CTRA.
7306  4577                      SETLOC            /SET DELAYM TO
7307  0023                      DELAYM            /-200 (DEC).
7310  7470                      -310
7311  4561              P1TS6A, USPF              /SET PRINTER FLAG.
7312  6007                      CAF               /CLEAR ALL FLAGS.
7313  4576                      DELAY             /GO DELAY 200 MILLISEC.
7314  4566                      UTSF              /FLAG SET?
7315  7410                      SKP
7316  7322                      P1E6A             /YES.  ERROR GO TO P1E6A.
7317  2051                      ISZ CTRA          /DONE TEST 100 TIMES?
7320  5311                      JMP P1TS6A        /NO.
7321  5424                      JMP I CHAIN       /YES.

7322  7402              P1E6A,  HLT               /CAF FAILED TO CLEAR PRINTER FLAG OR FLAG CAME UP AFTER BEING CLEARED.

                        /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7323  4561                      USPF
7324  6007                      CAF
7325  4576                      DELAY
7326  4566                      UTSF
7327  5323                      JMP P1E6A+1
7330  5323                      JMP P1E6A+1

                        /ISSUE CAF AND THEN SPF, ISSUE SRQ
                        /AND SPI.  FAILURE TO SKIP BY EITHER
                        /INDICATES A FAILURE.  TEST IS
                        /DONE 1000 TIMES.
7331  0007              P1TS7,  7
7332  7400                      P1T10
7333  4577                      SETLOC            /SET COUNT OF
7334  0051                      CTRA              /-1000 (DEC)
```

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7335  6030            -1750           /IN CTRA
7336  6007  P1TS7A,  CAF              /CLEAR ALL FLAGS AND ENABLE TTY.
7337  4561            USPF            /SET PRINTER FLAG.
7340  6003            SRQ             /SKIP IF INTERRUPT REQUEST.
7341  5347            JMP P1E7A1      /ERROR.  GO TO P1E7A1.
7342  4560            USPI            /SKIP IF TTY INTERRUPT REQUEST.
7343  5355            JMP P1E7A2      /ERROR.  GO TO P1E7A2.
7344  2051            ISZ CTRA        /DONE?
7345  5336            JMP P1TS7A      /NO REPEAT
7346  5424            JMP I CHAIN


7347  7402  P1E7A1, HLT              /SRQ FAILED TO SKIP.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER
7350  6007            CAF             /(SCOPE LOOP).  CLEAR ALL FLAGS.
7351  4561            USPF            /SET PRINTER FLAG.
7352  6003            SRQ             /SKIP IF INTERRUPT REQUEST.
7353  5350            JMP .-3         /REPEAT.
7354  5350            JMP .-4         /REPEAT.

7355  7402  P1E7A2, HLT              /SPI FAILED TO SKIP.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER
7356  6007            CAF             /(SCOPE LOOP).  CLEAR ALL FLAGS.
7357  4561            USPF            /SET PRINTER FLAG
7360  4560            USPI            /SKIP IF TTY INTERRUPT REQUEST.
7361  5356            JMP .-3         /REPEAT.
7362  5356            JMP .-4         /REPEAT.
      7400            PAGE

                    /TEST OF GTF.  TEST IS DONE
                    /1000 TIMES.

7400  0010  P1T10,   10
7401  7527            P1T11
7402  4577            SETLOC          /SET COUNT OF
7403  0051            CTRA            /-1000 (DEC)
7404  6030            -1750           /IN CTRA
7405  6007  P1T10A, CAF              /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY INTERRUPT.
7406  7040            CMA
7407  6004            GTF             /GET INTERRUPT FLAGS
7410  0260            AND K5200       /MASK.
7411  7440            SZA
7412  5261            JMP P1E10A      /ERROR.  GO TO P1E10A.
7413  7360  P1T10B, CLA CMA CLL CML /SET LINK AND AC.
7414  6004            GTF             /GET INTERRUPT FLAGS.  (AC SHOULD EQUAL 4000).
7415  0260            AND K5200       /MASK.
7416  7420            SNL
7417  5270            JMP P1E10B      /ERROR.  GO TO P1E10B.
7420  7104  P1T10C, CLL RAL          /(AC SHOULD EQUAL ZERO, LINK SHOULD EQUAL 1).
7421  7430            SZL
7422  7440            SZA
7423  5276            JMP P1E10C      /ERROR.  GO TO P1E10C.
7424  6007  P1T10D, CAF              /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY INTERRUPT.
7425  4561            USPF            /SET PRINTER FLAG.
7426  6004            GTF             /GET INTERRUPT FLAGS.
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7427  0200            AND K5200       /MASK.
7430  7006            RTL             /PUT INTERRUPT BUS - (AC SHOULD EQUAL 1000)
7431  7004            RAL             /-FLAG INTO LINK, (AC SHOULD EQUAL ZERO).
7432  7430            SZL             /IS LINK 1?
7433  7440            SZA             /IS AC ZERO?
7434  5306            JMP P1E10D      /NO, ERROR,  GO TO P1E10D.
7435  4577  P1T10E, SETLOC           /SET INTERRUPT RETURN LOCATION
7436  0002            2               /TO P1T10E+12.
7437  7447            P1T10E+12
7440  6007            CAF             /CLEAR ALL FLAGS.
7441  6001            ION             /TURN INTERRUPT ON
7442  6004            GTF             /GET INTERRUPT FLAGS.
7443  0200            AND K5200
7444  4561            USPF            /SET PRINTER FLAG.
7445  7000            NOP             /(INTERRUPT).
7446  5320            JMP P1E10E      /ERROR.  GO TO P1E10E
7447  7102  P1T10F, CLL BSW           /PUT ION - (AC SHOULD EQUAL 0002).
7450  7012            RTR             /FLAG INTO LINK, (AC SHOULD EQUAL 0000).
7451  7430            SZL             /LINK 1?
7452  7440            SZA             /AC ZERO?
7453  5325            JMP P1E10F      /NO, ERROR,  GO TO P1E10F.
7454  2051            ISZ CTRA        /TEST DONE?
7455  5205            JMP P1T10A      /NO.  REPEAT.
7456  6007            CAF
7457  5424            JMP I CHAIN
7460  5200  K5200,  5200


7461  7402  P1E10A, HLT             /GTF FAILED.
              /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7462  6007            CAF             /(SCOPE LOOP).
7463  7040            CMA
7464  6004            GTF
7465  7440            SZA
7466  5262            JMP P1E10A+1    /REPEAT.
7467  5262            JMP P1E10A+1    /REPEAT.

7470  7402  P1E10B, HLT             /GTF CLEARED LINK.
              /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7471  7360            CLA CMA CLL CML /(SCOPE LOOP).
7472  6004            GTF
7473  7420            SNL
7474  5271            JMP .-3         /REPEAT.
7475  5271            JMP .-4         /REPEAT.

7476  7402  P1E10C, HLT             /GTF DID NOT GET LINK.
              /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7477  7360            CLA CMA CLL CML /(SCOPE LOOP).
7500  6004            GTF
7501  7104            CLL RAL
7502  7430            SZL
7503  7440            SZA
7504  5277            JMP P1E10C+1    /REPEAT.
7505  5277            JMP P1E10C+1    /REPEAT.
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7506  7402    P1E10D, HLT             /GTF FAILED TO GET INTERRUPT BUS.
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7507  6007            CAF             /(SCOPE LOOP).
7510  4561            USPF
7511  6004            GTF
7512  7006            RTL
7513  7004            RAL
7514  7430            SZL
7515  7440            SZA
7516  5307            JMP P1E10D+1    /REPEAT.
7517  5307            JMP P1E10D+1    /REPEAT.

7520  7402    P1E10E, HLT             /GTF CLEARED ION.
                /SCOPE LOOP.  CONTINUE TO ENTER
7521  6007            CAF             /(SCOPE LOOP).
7522  6001            ION
7523  6004            GTF
7524  5321            JMP .-3         /REPEAT.

7525  7402    P1E10F, HLT             /GTF FAILED TO GET ION.
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7526  5321            JMP P1E10E+1


                /TEST OF RTF. TEST IS DONE
                /1000 TIMES.

7527  0011    P1T11,  11
7530  7777            7777
7531  4577            SETLOC          /SET COUNT OF
7532  0051            CTRA            /-1000 (DEC)
7533  6030            -1750           /IN CTRA.
7534  4577            SETLOC          /SET INTERRUPT RETURN
7535  0002            2               /TO P1T11C+3.
7536  7553            P1T11C+3
7537  7320    P1T11A, CLA CLL CML     /AC EQUALS ZERO, LINK EQUALS 1.
7540  6005            RTF             /RESTORE FLAGS.
7541  7420            SNL             /LINK SET?
7542  7440            SZA             /AC ZERO?
7543  5356            JMP P1E11A      /YES, LINK OR AC SET.  GO TO P1E11A.
7544  7330    P1T11B, CLA CLL CML RAR /AC EQUALS 4000
7545  6005            RTF             /RESTORE FLAGS.  (LINK).
7546  7420            SNL             /LINK RESTORED?
7547  5363            JMP P1E11B      /NO, ERROR.  GO TO P1E11B.

7550  4561    P1T11C, USPF            /SET PRINTER FLAG.
7551  7000            NOP             /(INTERRUPT).
7552  5370            JMP P1E11C      /ERROR.  GO TO P1E11C.
7553  2051            ISZ CTRA        /TEST DONE?
7554  5337            JMP P1T11A      /NO, REPEAT.
7555  5424            JMP I   CHAIN

7556  7402    P1E11A, HLT             /RTF FAILED TO RESTORE LINK.
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
7557  7320            CLA CLL CML     /(SCOPE LOOP)
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7560  6005          RTF
7561  6002          IOF
7562  5357          JMP P1E11A+1    /REPEAT.

7563  7402  P1E11B, HLT             /RTF FAILED TO RESTORE LINK.
7564  7338          CLA CLL CML RAR /(SCOPE LOOP)
7565  6005          RTF
7566  6002          IOF
7567  5364          JMP P1E11B+1    /REPEAT.

7570  7402  P1E11C, HLT             /RTF DID NOT SET ION.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER
7571  4577          SETLOC
7572  0002          2
7573  7577          P1E11C+7
7574  6005          RTF             /(SCOPE LOOP)
7575  4561          USPF
7576  7000          NOP
7577  5374          JMP P1E11C+4    /REPEAT
                    $
0102  7007
0103  4612
0104  0770
0105  4600
0106  5341
0107  0400
0110  7000
0111  5340
0112  7657
0113  7777
0114  7730
0115  0004
0116  7727
0117  0005
0120  5060
0121  7761
0122  5055
0123  7762
0124  0257
0125  7656
0126  6060
0127  0707
0130  7700
0131  7653
0132  0011
0133  0376
0134  0240
0135  0100
0136  7740
0137  0212
0140  7735
0141  0215
0142  7733
0143  7701
0144  7401
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0145  0077
0146  0377
0147  7776
0150  7760
0151  0026
0152  7767
0153  0017
0154  0355
0155  0347
0156  0363
0157  0542
0160  1170
0161  1165
0162  0771
0163  0766
0164  0763
0165  0760
0166  0753
0167  0750
0170  0745
0171  0742
0172  0735
0173  0626
0174  0600
0175  0553
0176  0334
0177  0323
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```
0000  11110110  00000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  10111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000001

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000000

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110000

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111110  00000011

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111000  00000000  01111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11000000  00000000  00000001  11111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110001

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000000

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110001

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  11111000  00000011

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111001

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100000

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11111000  00000000  00011111

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111111  11111111  10000000  00000001  11111111
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4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111111  11111111  11111111  10000000  00000000  00000011  11111111

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11001111

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  10000000  00000000  00000000  00000000

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

7200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7300  11111111  11111111  11111111  11111111  11111111  11111111  11100000  00000000

7400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

7600
7700
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A	4647	CRTST	5070	INCRTN	0256	P0E10C	7141
A33WP6	4625	CRTSTA	3002	INKSF	1264	P0E10D	7151
A35WP6	4633	CRTSTB	3005	INPATT	0055	P0E10E	7165
A37WP6	4641	CTRA	0051	INTAB	4600	P0E10F	7200
AC	0006	CTRB	0052	INTCF	1261	P0E11A	7247
ASCCN	1650	CTSK	0541	INTFND	2270	P0E11B	7256
ASCT	1710	CURTST	0043	INTSF	1257	P0E11C	7267
BKSCTR	3737	D	4652	INTSVC	1254	P0E2A	2067
BKSPC	3740	DADDR	1536	J	4660	P0E2B	2071
BKSPT	5010	DAP	1342	K5200	7460	P0E3A	2120
BKSU	5335	DAR	1481	KBCR	4530	P0E3B	2122
BLK2	5465	DBLK	6340	KCR	6030	P0E4A	2145
BLKBB	5463	DCTR	1537	KIE	6035	P0E4B	2162
BLKCC	5575	DELAY	4576	KMSG1	5173	P0E5	2217
BLKCNT	0070	DELAYM	0023	KMSG2	5204	P0E6A	2256
BLOCK1	5342	DELAYS	0071	KMSG3	5215	P0E6B	2242
BLOCK2	5454	DEND	6740	KMSG3A	5223	P0E7A	7027
BLOCKA	5340	DLCNT	0074	KMSG4	5262	P0E7B	7033
BLOCKB	5452	DLCNTP	1514	KMSG5	5300	P0T10	7044
BLOCKC	5564	DLMSR	1475	KSTART	0022	P0T10A	7054
BSW	7002	DLYMS	0334	LF	0077	P0T10B	7065
C241	4713	DLYMSK	0100	LFTST	5127	P0T10C	7071
C244	4716	DVCOM	4557	LFTSTA	3130	P0T10D	7074
C247	4721	DVCSEL	4535	LINK	0067	P0T10E	7104
C252	4724	END	5340	M	4663	P0T10F	7106
C255	4727	ERRCNT	4442	M3	2362	P0T11	7211
C272	4732	ERRCR	0072	MCTR	0625	P0T11A	7221
C275	4735	ERRCTR	4445	MIL1	0050	P0T11B	7233
C300	4740	ERROR	1441	MILCTR	0047	P0T11C	7237
C335	4743	FADDR	0623	MINT	6115	P0TS0	2005
C373	5001	FBA33	1102	MOVE	4574	P0TS1	2025
C377	5005	FBALL	1066	MOVEA	0613	P0TS1A	2032
CAF	6007	FBF3	1031	MOVVE	0600	P0TS1B	2035
CHAIN	0024	FBF33	1055	MSCTR	0046	P0TS2	2046
CHAINN	0260	FETCH	1646	MTON	6117	P0TS2A	2056
CHCK	0504	FLAG	0720	MTRS	6127	P0TS3	2075
CHECK	0057	FORWD	0277	NTST	1540	P0TS3A	2105
CHRCNT	0456	FOUR	4705	NTSTA	1547	P0TS4	2127
CHRTST	5137	FW336	1117	NXTST	0045	P0TS4A	2134
CK33	0347	FW356	1135	OCTEQV	5302	P0TS4B	2160
CK35	0355	FW376	1153	ONE	4702	P0TS4C	2171
CK37	0363	G	4655	OPEN	0000	P0TS5	2200
CKSR33	4555	GETPT	0056	OUT	1271	P0TS5A	2210
CKSR35	4564	GETRDY	0234	OUT0	0723	P0TS6	2224
CKSR37	4556	GKBCR	4517	OUT1	0730	P0TS6A	2231
CNTST	1600	GNRND	1524	OUT2	0732	P0TS6B	2241
CNV	1673	GTBIN	0444	OUTTAB	4612	P0TS7	7000
CR	0076	GTF	6004	P	4666	P0TS7A	7010
CRALF	0553	HLTD	2347	P0E0	2021	P0TS7B	7020
CRCNT	3041	HLTTST	4457	P0E1	2044	P10MG1	5307
CRCTR	0552	IBIN	0436	P0E10A	7113	P10MG2	5323
CRLF	4575	IN0	1434	P0E10B	7131	P1E0A	2621

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P1E0B   2423
P1E1    2443
P1E10A  7461
P1E10B  7470
P1E10C  7476
P1E10D  7506
P1E10E  7520
P1E10F  7525
P1E11A  7556
P1E11B  7563
P1E11C  7570
P1E2    2467
P1E3A   2510
P1E3B   2525
P1E4    2565
P1E4A   2567
P1E5A1  2624
P1E5A2  2630
P1E6A   7322
P1E7A1  7347
P1E7A2  7355
P1T10   7400
P1T10A  7405
P1T10B  7413
P1T10C  7420
P1T10D  7424
P1T10E  7435
P1T10F  7447
P1T11   7527
P1T11A  7537
P1T11B  7544
P1T11C  7550
P1TS0   2400
P1TS0A  2410
P1TS0B  2414
P1TS1   2427
P1TS1A  2435
P1TS2   2450
P1TS2A  2455
P1TS3   2472
P1TS3A  2477
P1TS3B  2523
P1TS3C  2534
P1TS4   2537
P1TS4A  2544
P1TS5   2600
P1TS5A  2610
P1TS6   7301
P1TS6A  7311
P1TS7   7331
P1TS7A  7336
P2E0    2670
P2E1    2722
P2E2    2760
P2T0B   2665
P2T1B   2717
P2T2C   2795
P2TS0   2645
P2TS0A  2655
P2TS1   2675
P2TS1A  2705
P2TS2   2727
P2TS2A  2737
P2TS2B  2742
P3T44A  3505
P3T45A  3525
P3T46A  3545
P3TS0   3006
P3TS1   3042
P3TS10  3212
P3TS11  3217
P3TS12  3224
P3TS13  3231
P3TS14  3236
P3TS15  3243
P3TS16  3250
P3TS17  3255
P3TS2   3073
P3TS20  3262
P3TS21  3267
P3TS22  3274
P3TS23  3301
P3TS24  3306
P3TS25  3313
P3TS26  3320
P3TS27  3325
P3TS3   3136
P3TS30  3332
P3TS31  3337
P3TS32  3346
P3TS33  3355
P3TS34  3364
P3TS35  3400
P3TS36  3407
P3TS37  3416
P3TS4   3161
P3TS40  3425
P3TS41  3434
P3TS42  3443
P3TS43  3462
P3TS44  3473
P3TS45  3515
P3TS46  3535
P3TS47  3600
P3TS5   3170
P3TS50  3706
P3TS6   3200
P3TS7   3205
P5E0    4070
P5T0    4051
P5T1    4074
P5T1A   4101
P5T2    4113
P5T2A   4122
P5T2W   4140
P6T0    4215
P6T1    4222
P6T10   4265
P6T11   4272
P6T12   4277
P6T13   4304
P6T14   4311
P6T15   4316
P6T16   4323
P6T17   4330
P6T2    4227
P6T20   4335
P6T21   4342
P6T22   4347
P6T23   4354
P6T24   4361
P6T25   4366
P6T26   4400
P6T27   4404
P6T3    4234
P6T30   4410
P6T4    4241
P6T5    4246
P6T6    4253
P6T7    4260
P7ØCTR  1211
PADDR   1344
PBLK    1316
PBLKR   1324
PCTR    1343
PDCR    1310
PFLAG   0060
PLTLR   1200
PRG0    2000
PRG1    2363
PRG10   4466
PRG10A  4471
PRG11   4531
PRG2    2640
PRG3    3000
PRG4    4000
PRG4A   4021
PRG5    4042
PRG6    4200
PRG7    4415
PRGADR  0232
PRGEND  0275
PRGNUM  0025
PRGTAB  0026
PRINT   0673
PSTUP   1277
PSYNC   1212
PT0     0442
PT1     0443
PUNCH   0721
RADDR   1422
RBCTR   1423
RBUSY   0065
RCTRA   1512
RCTRB   1513
RDBLK   1400
RDBLKR  1407
RDRSRV  1424
RDSRV   1431
RGNA    0400
RGNB    0417
RM33A   5051
RM33B   5055
RM37A   5060
RMB     3070
RMCNT   3072
RMTST   5100
RMTSTA  3063
RP1A    0415
RP1B    0434
RP2A    0416
RP2B    0435
RRDY    1345
RSCTR   1232
RSSERV  1233
RSTUP   1353
RSYNC   1216
RTF     6008
RTNNO   0044
RUDONE  1457
S       4671
SA      4746
SASC    1707
SB      1436
SB0     2663
SB1     2715
SB2     2751
SBSP    4437
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SCNT	0473	TEMP	0040	Y	4677
SD	4751	TEMP1	0041		
SETLOC	4577	TEMQ	0716		
SEVEN	4710	TEMR	0717		
SG	4794	TSC1	0634		
SGET	1721	TSC2	0645		
SHALT	0314	TSTMSK	0042		
SINPT	1711	TTYIOT	0021		
SJ	4797	TTYTYP	0020		
SLDC02	0220	TYPAT	0656		
SM	4762	TYPE	4573		
SP	4765	TYPEA	1637		
SPAC	3644	TYPLN	1627		
SPCNT	3683	TYPLN3	1615		
SPCTR	3654	TYPSP	0642		
SPF	6040	TYPSTG	0626		
SPI	6045	UKCC	4571		
SPIND	1720	UKCR	4563		
SPT0	1716	UKIE	4562		
SPT1	1717	UKRB	4567		
SPTST	5115	UKRS	4570		
SPTSTA	3103	UKSF	4572		
SPTSTB	3114	UMOVE	0064		
SPTSTC	3065	UOUT	0061		
SRQ	6003	UPUNCH	0063		
SRSET	0233	USPF	4561		
SRT0A	4421	USPI	4560		
SRT0B	4426	UTCF	4565		
SS	4770	UTEMP	0073		
ST33B	1020	UTEMP1	0074		
STAL	0542	UTEMP2	0075		
STALL	4597	UTLS	4564		
START	0200	UTPLN3	0062		
STBF	1000	UTSF	4566		
STCTR	0323	V	4674		
STLIO	0053	VCTR	1247		
SV	4773	WASC	1706		
SY	4776	WCHK	0520		
SYNC	0054	WCPTST	5153		
SYNK	0521	WTS6A	2266		
SYNKA	0525	WTS6B	2247		
TABCTR	3655	XKCC	0742		
TABP	3656	XKCR	0766		
TABPA	3675	XKIE	0771		
TADDR	0624	XKRB	0750		
TBCNT	3624	XKRS	0745		
TBMRK	5035	XKSF	0735		
TBMRK1	5043	XSPF	1165		
TBTA	3620	XSPI	1170		
TBTB	3632	XTCF	0760		
TBTST	5024	XTLS	0763		
TCTR	1647	XTSF	0753		

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ERRORS DETECTED: 0
LINKS GENERATED: 119
RUN-TIME:  31 SECONDS
3K CORE USED
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