IDENTIFICATION

PRODUCT CODE:	MAINDEC-8E-D2AB-D-(D)
PRODUCT TEST:	PDP-8/E TELETYPE AND KL8 ASYNCHRONOUS DATA CONTROL TESTS
DATE:	MAY 14, 1971
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	ED FORTMILLER

1. ABSTRACT

THIS PROGRAM CONSISTS OF A PACKAGE OF TEST PROGRAMS FOR TESTING THE KL8 LOGIC (EIA OR CURRENT) AND A TELETYPE. ONLY ONE TELETYPE MAY BE TESTED AT A TIME. THE TELETYPE TO BE TESTED CAN BE A KRS33, ASR33, KSR35, ASR35, OR KSR37.

THE TEST PROGRAMS ARE:

PRG0=BASIC TEST OF THE OUTPUT LOGIC (CURRENT)
PRG1=BASIC TEST OF THE OUTPUT AND INPUT LOGIC (LOOP AROUND)(EIA)
PRG2=BASIC TEST OF INPUT LOGIC (USES TTY READER)(CURRENT)
PRG3=READER TEST
PRG4=PRINTER TEST
PRG5=PUNCH TEST
PRG6=KEYBOARD TEST
PRG7=COMBINED TEST
PRG10-READER EXERCISER, BINARY COUNT PATTERN
PRG11-PRINTER EXERCISER
PRG12-BINARY COUNT TAPE GENERATOR

2. REQUIREMENTS

2.1 EQUIPMENT

A. PDP-8/E WITH AT LEAST 4K OF MEMORY
B. FOR EIA A JUMPER TO CONNECT INPUT TO OUTPUT, SEE TEST EQUIPMENT 7.3.
C. KSR33, ASR33, KSR35, ASR35 TO TEST AN 110 BAUD CURRENT OPTION.

2.2 STORAGE

LOCATIONS 0000 THROUGH 7600 ARE USED.

3. LOADING PROCEDURE

THE BINARY LOADER IS USED TO LOAD THE PROGRAM. REFER TO THE 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) IF TESTING WITH A TELETYPE
2. DEVICE CODES ASSIGNED.
3. BAUD RATE OF DEVICE

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 KSR 37 TELETYPE

B. SET LOCATION 0021 AS FOLLOWS:

   1. LOAD ADDRESS 0021.
   2. SET SR 0 THROUGH 5 TO THE DEVICE CODE OF THE KEY-
      BOARD/READER TO BE TESTED.
      (EG: READER CODE OF 03, SR0-5=03.
   3. SET SR 6 THROUGH 11 TO THE DEVICE CODE OF THE
      PRINTER/PUNCH TO BE TESTED.
      (EG: PRINTER CODE OF 04, SR6-11=04.
   4. PRESS DEPOSIT.

C. SET LOCATION 0022 AS FOLLOWS:

   1. LOAD ADDRESS 0022.
   2. PLACE THE FOLLOWING IN THE SR:
      0110 FOR 110 BAUD, OR
      0150 FOR 150 BAUD, OR
      0300 FOR 300 BAUD, OR
      0600 FOR 600 BAUD, OR
      1200 FOR 1200 BAUD.
   3. PRESS DEPOSIT.

D. REFER TO INDIVIDUAL PROGRAM USE PROCEDURE.

4.2 PRG0 USE PROCEDURE

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

B. INSURE THAT TELETYPE IS ON-LINE IF ON THE KL8 BEING TESTED.

C. INSURE THAT THERE IS PAPER IN TELEPRINTER.

D. LOAD ADDRESS 0200.

E. SET SR TO 0000.

F. PRESS CLEAR AND CONTINUE.

G. PROGRAM HALTS AT LOCATION 0236 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=0000. PRESS CONTINUE.

PRG0 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2=1 LOOP PROGRAM.
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED.

H. PROGRAM IS EXECUTED AND HALTS AT LOCATION 0300 PROGRAM END HALT, IF NO LOOP OPTIONS ARE SET, AND IF NO ERROR OCCURRED.

4.3 PRG1 USE PROCEDURE

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

B. CONNECT EIA OUTPUT TO EIA INPUT. ON THE 40 PIN SIDE CONNECTOR, CONNECT-
PIN E TO PIN M
PIN F TO PIN J

C. LOAD ADDRESS 0200.

D. SET SR TO 0001.

E. PRESS CLEAR AND CONTINUE.

(4.3 CONT'D)

F. PROGRAM HALTS AT LOCATION 0236 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=0000. PRESS CONTINUE.

PRG1 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2=1 LOOP PROGRAM.
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED.

G. PROGRAM IS EXECUTED AND HALTS AT LOCATION 0300 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 THAT TELETYPE IS ON-LINE.

C. LOAD THE BINARY COUNT PATTERN TEST TAPE IN THE READER.

D. TURN ON READER.

E. LOAD ADDRESS 0200.

F. SET SR TO 0002.

G. PRESS CLEAR AND CONTINUE.

H. PROGRAM HALTS AT LOCATION 0236 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=0000. PRESS CONTINUE.

PRG2 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2=1 LOOP PROGRAM.
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED.

I. PROGRAM IS EXECUTED AND HALTS AT LOCATION 0300, 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 BINARY COUNT PATTERN TEST TAPE IN READER.

D. TURN ON READER.

E. LOAD ADDRESS 0200.

F. SET SR TO 0003.

G. PRESS CLEAR AND CONTINUE.

H. PROGRAM HALTS AT LOCATION 0236 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=0000. PRESS CONTINUE.

PRG3 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 THROUGH SR11.
SR2=1 LOOP PROGRAM.
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED.

I. PROGRAM IS EXECUTED AND HALTS AT LOCATION 0300 PROGRAM END HALT, IF NO "LOOP" OPTIONS ARE SET, AND IF NO ERRORS OCCUR.

4.6 PRG4 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 0004.

(4,6 CONT'D)

E. PRESS CLEAR AND CONTINUE.

F. PROGRAM HALTS AT LOCATION 0236 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS, NORMAL RUN IS WITH SR=0000. PRESS CONTINUE.

PRG4 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2=1 LOOP PROGRAM.
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED.

G. PROGRAM IS EXECUTED AND HALTS AT LOCATION 0300, PROGRAM END HALT IF NO "LOOP" OPTIONS ARE SET, AND IF NO ERRORS OCCUR.

4.7 PRG5 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 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 0005.

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.

4.8 PRG6 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 0006.

F. PRESS CLEAR AND CONTINUE.

G. PROGRAM TITLE IS TYPED, AND PROGRAM HALTS AT LOC 0236 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=0000. PRESS CONTINUE.

PRG5 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2=1 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 0300.

NOTE

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

4.9 PRG7 USE PROCEDURE

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

B. TURN ON TELETYPE PUNCH.

C. THWITH 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 0007.

H. PRESS CLEAR AND CONTINUE.

I. PROGRAM HALTS AT LOC 0236 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=1 HALT AT END OF ROUTINE. ROUTINE NUMBER IN AC.
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 THROUGH SR11.
SR2=1 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 0300 UNLESS PREVENTED FROM ENDING, BY SR OPTIONS, OR IF ERRORS OCCUR.

4.10 PRG10 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 0010.

G. PRESS CLEAR AND CONTINUE.

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

SR0=1	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.

4.11 PRG11 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 0011.

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.

(4,11 CONT'D)

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

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

4.12 PRG12 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 Ø2ØØ.

G. SET SR TO ØØ12.

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 Ø236	SR SET HALT. OCCURRS TO PERMIT SETTING OF DESIRED OPTIONS. PRESS CONTINUE AFTER SETTING DESIRED OPTIONS. (PRGØ,PRG1,PRG2).
LOC Ø3ØØ	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. (PRGØ,PRG1,PRG2,PRG3, PRG4,PRG6,PRG1Ø).
LOC Ø324	ROUTINE END HALT, THIS HALT OCCURS AT END OF A TEST ROUTINE IF SRØ IS SET TO A 1, THE AC CONTAINS THE NUMBER OF ROUTINE JUST COMPLETED. (PRGØ,PRG1,PRG2,PRG3,PRG4,PRG6, PRG1Ø).

6. ERRORS

6.1 ERROR HALT AND DESCRIPTION

LOC 1524 — AN ILLEGAL BAUD RATE WAS SELECTED. RESELECT THE BAUD RATE AND RESTART PROGRAM.

LOC 2103 — PRG0, PRG1, AND PRG2 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. 6031 FOR SYSTEM TELETYPE KEYBOARD). PRESS CONTINUE, THE PROGRAM WILL ATTEMPT TO CLEAR THE UNDESIRABLE FLAG. IF SUCCESSFUL, THIS HALT WILL NOT REOCCUR.

LOC 2237 — PRG0, ROUTINE 0, ERROR HALT A. SPF INSTRUCTION FAILED TO SET PRINTER FLAG OR TSF INSTRUCTION FAILED TO SKIP ON PRINTER FLAG SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPF AND THEN TSF CONTINUOUSLY. MANUAL RESTART

LOC 2244 — PRG0, ROUTINE 0, ERROR HALT B. CAF INSTRUCTION FAILED TO CLEAR PRINTER FLAG OR TSF INSTRUCTION SKIPPED ON NO PRINTER FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT SETS PRINTER FLAG WITH SPF, AND THEN CAF AND TSF ARE ISSUED. MANUAL RESTART

LOC 2253 — PRG0, ROUTINE 0, ERROR HALT C. CAF INSTRUCTION FAILED TO CLEAR AC AND/OR LINK. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES CAF WITH AC AND LINK SET. MANUAL RESTART.

LOC 2262 — PRG0, ROUTINE 0, ERROR HALT E. TCF INSTRUCTION FAILED TO CLEAR PRINTER FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TCF WITH THE PRINTER FLAG SET. MANUAL RESTART.

LOC 2315 — PRG0, ROUTINE 1, ERROR HALT B. WITH THE PRINTER FLAG SET AND THE INTERRUPT ENABLED, NO INTERRUPT OCCURED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT TURNS ON INTERRUPT CONTINUOUSLY. MANUAL RESTART.

LOC 2415 — PRG0, ROUTINE 2, ERROR HALT A. KIE INSTRUCTION FAILED TO DISABLE THE TELETYPE INTERRUPT ENABLE FLIP-FLOP. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KIE CONTINUOUSLY WITH AC 11=0. MANUAL RESTART.

LOC 2427 — PRG0, ROUTINE 2, ERROR HALT B. SPI INSTRUCTION SKIPPED WITH FLAG SET AND TELETYPE INTERRUPT ENABLE FLIP-FLOP DISABLED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPI WITH PRINTER FLAG SET AND TTY INTERRUPT DISABLED MANUAL RESTART.

(6,1 CONT'D)

LOC 2435 — PRGØ, ROUTINE 2, ERROR HALT C. SRQ INSTRUCTION SKIPPED WITH PRINTER FLAG SET AND TELETYPE INTERRUPT ENABLE FLIP-FLOP DISABLED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SRQ WITH PRINTER FLAG SET AND TTY INTERRUPT DISABLED. MANUAL RESTART.

LOC 2443 — PRGØ, ROUTINE 2, ERROR HALT D. KIE INSTRUCTION FAILED TO ENABLE TELETYPE INTERRUPT FLIP-FLOP. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KIE CONTINUOUSLY WITH AC11=1. MANUAL RESTART.

LOC 2456 — PRGØ, ROUTINE 2, ERROR HALT E. SPI INSTRUCTION FAILED TO SKIP WITH PRINTER FLAG SET AND TTY INTERRUPT ENABLE FLIP-FLOP ENABLED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPI CONTINUOUSLY WITH PRINTER FLAG SET AND INTERRUPT ENABLED. MANUAL RESTART.

LOC 2465 — PRGØ, ROUTINE 2, ERROR HALT F. SRQ INSTRUCTION FAILED TO SKIP WITH PRINTER FLAG SET AND TTY INTERRUPT ENABLE FLIP-FLOP SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SRQ CONTINUOUSLY WITH PRINTER FLAG SET AND TTY INTERRUPT ENABLE FLIP-FLOP ENABLED. MANUAL RESTART.

LOC 2474 — PRGØ, ROUTINE 2, ERROR HALT G. CAF INSTRUCTION FAILED TO ENABLE TTY INTERRUPT ENABLE FLIP-FLOP. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES CAF CONTINUOUSLY. MANUAL RESTART.

LOC 2527 — PRGØ, ROUTINE 3, ERROR HALT A. TPC INSTRUCTION FAILED TO SET PRINTER FLAG IN TWICE THE REQUIRED TIME FOR IT TO SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TPC AND DELAYS, CONTINUOUSLY. MANUAL RESTART.

LOC 2534 — PRGØ, ROUTINE 3, ERROR HALT B. TLS FAILED TO CLEAR PRINTER FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TLS CONTINUOUSLY WITH PRINTER FLAG SET. MANUAL RESTART.

LOC 2540 — PRGØ, ROUTINE 3, ERROR HALT C. TLS INSTRUCTION FAILED TO SET PRINTER FLAG IN TWICE THE REQUIRED TIME FOR IT TO SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TLS AND DELAYS, CONTINUOUSLY. MANUAL RESTART.

(6,1 CONT'D)

LOC 2607 PRG0, ROUTINE 4, ERROR HALT A. PRINTER FLAG SET PRIOR TO 9 BIT TIMES. (EG, 110 BAUD: 9X9.09 MSEC = 81.81 MSEC AT WHICH TIME THE FLAG MUST BE SET, NOT PRIOR TO THIS TIME). EITHER THE PDP-8/E TIMING IS TOO SLOW OR THE TTY CLOCK TOO FAST. (IS THE SLOW CYCLE JUMPER REMOVED FROM THE PROCESSOR TIMING MODULE AND IS THE CORRECT BAUD RATE SELECTED IN LOC 22?). PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TLS CONTINUOUSLY. MANUAL RESTART.

LOC 2614 PRG0, ROUTINE 4, ERROR HALT B. PRINTER FLAG NOT SET AFTER 9.55 BIT TIMES. (EG, 110 BAUD 9.55X9.09 MSEC = 86.7 MSEC AT WHICH TIME THE FLAG MUST BE SET, NO LATER.) PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TLS CONTINUOUSLY. MANUAL RESTART.

LOC 2650 PRG0, ROUTINE 5, ERROR HALT A. WHEN ISSUING BACK TO BACK TLS'S, FLAG SETTING PRIOR TO 11 BIT TIMES FOR 110 BAUD OR 10 BIT TIMES FOR MORE THEN 110 BAUD. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TLS CONTINUOUSLY. MANUAL RESTART.

LOC 2652 PRG0, ROUTINE 5, ERROR HALT B. WHEN ISSUING BACK TO BACK TLS'S, FLAG TAKING LONGER THAN 11 BIT TIMES TO SET FOR 110 BAUD OR 10 BIT TIMES FOR MORE THAN 110 BAUD. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TLS CONTINUOUSLY. MANUAL RESTART.

LOC 2664 PRG0, ROUTINE 6, ERROR HALT A. WITH LINK, ION, AND INT BUS EQUAL TO ZERO, AC DID NOT EQUAL ZERO AFTER ISSUING GTF. NO SCOPE LOOP. MANUAL RESTART.

LOC 2671 PRG0, ROUTINE 6, ERROR HALT B. GTF INSTRUCTION CLEARED THE LINK. NO SCOPE LOOP. MANUAL RESTART.

LOC 2675 PRG0, ROUTINE 6, ERROR HALT C. GTF INSTRUCTION FAILED TO BRING LINK INTO AC 0. NO SCOPE LOOP. MANUAL RESTART.

LOC 2706 PRG0, ROUTINE 6, ERROR HALT D. GTF INSTRUCTION FAILED TO BRING INT BUS INTO AC 2. NO SCOPE LOOP. MANUAL RESTART.

LOC 2720 PRG0, ROUTINE 6, ERROR HALT E. GTF INSTRUCTION CLEARED ION. NO SCOPE LOOP. MANUAL RESTART.

LOC 2725 PRG0, ROUTINE 6, ERROR HALT F. GTF INSTRUCTION FAILED TO BRING ION INTO AC 4. NO SCOPE LOOP. MANUAL RESTART.

LOC 2744 PRG0, ROUTINE 7, ERROR HALT A. RTF INSTRUCTION FAILED TO RESET LINK WITH AC 0=0. NO SCOPE LOOP. MANUAL RESTART.

(6.1 CONT'D)

LOC 2750 — PRG0, ROUTINE 7, ERROR HALT B. RTF INSTRUCTION FAILED TO SET LINK WITH AC0=1. NO SCOPE LOOP. MANUAL RESTART.

LOC 2753 — PRG0, ROUTINE 7, ERROR HALT C. RTF INSTRUCTION FAILED TO TURN THE INTERRUPT ON. NO SCOPE LOOP. MANUAL RESTART.

LOC 3025 — PRG1, ROUTINE 1, ERROR HALT A. RECEIVER FLAG NOT SETTING UPON COMPLETION OF ISSUING A TLS OR KSF FAILED TO SKIP ON RECEIVER FLAG SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT CLEARS THE RECEIVER FLAG AND ISSUES A TLS AND WAITS TWICE THE TIME FOR THE FLAG TO SET AND THEN ISSUES A KSF. MANUAL RESTART.

LOC 3053 — PRG1, ROUTINE 2, ERROR HALT A. SAME AS PRG1, ROUTINE 1, ERROR HALT A.

LOC 3062 — PRG1, ROUTINE 2, ERROR HALT B. KSF INSTRUCTION FAILED TO SKIP ON RECEIVER FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KSF CONTINUOUSLY. MANUAL RESTART.

LOC 3113 — PRG1, ROUTINE 3, ERROR HALT A. SAME AS PRG1, ROUTINE 1, ERROR HALT A.

LOC 3122 — PRG1, ROUTINE 3, ERROR HALT B. KSF INSTRUCTION SKIPPED ON RECEIVER FLAG NOT SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KSF WITH NO RECEIVER FLAG SET CONTINUOUSLY. MANUAL RESTART.

LOC 3160 — PRG1, ROUTINE 4, ERROR HALT A. THE READER FLAG FAILED TO CAUSE AN INTERRUPT. PRESSING CONTINUE ENTERS SCOPE LOOP THAT TURNS THE INTERRUPT ON CONTINUOUSLY. MANUAL RESTART.

LOC 3230 — PRG1, ROUTINE 5, ERROR HALT A. SRQ INSTRUCTION FAILED TO SKIP ON READER FLAG SET AND TELETYPE INTERRUPT ENABLE FLIP-FLOP ENABLED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SRQ CONTINUOUSLY WITH TTY ENABLED AND READER FLAG SET. MANUAL RESTART.

LOC 3235 — PRG1, ROUTINE 5, ERROR HALT B. SPI INSTRUCTION FAILED TO SKIP ON READER FLAG SET AND TELETYPE INTERRUPT ENABLE FLIP-FLOP ENABLED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPI CONTINUOUSLY WITH TTY ENABLED AND READER FLAG SET. MANUAL RESTART.

LOC 3242 — PRG1, ROUTINE 5, ERROR HALT C. CAF INSTRUCTION FAILED TO CLEAR THE READER FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES CAF CONTINUOUSLY WITH THE RECEIVER FLAG SET. MANUAL

(6,1 CONT'D)

LOC 3257 — PRG1, ROUTINE 5, ERROR HALT D. SRQ INSTRUCTION SKIPPED WITH NO RECEIVER FLAG SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SRQ INSTRUCTION CONTINUOUSLY. MANUAL RESTART.

LOC 3264 — PRG1, ROUTINE 5, ERROR HALT E. SPI INSTRUCTION SKIPPED WITH NO RECEIVER FLAG SET. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES SPI CONTINUOUSLY WITH NO RECEIVER FLAG SET. MANUAL RESTART.

LOC 3310 — PRG1, ROUTINE 6, ERROR HALT A. RECEIVER FLAG NOT SETTING AT THE END OF 10 BIT TIMES FOR A NON 110 BAUD DEVICE OR 11 BIT TIMES FOR A 110 BAUD DEVICE. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES TLS CONTINUOUSLY TO SET RECEIVER FLAG. MANUAL RESTART.

LOC 3366 — PRG1, ROUTINE 7 OR 10, ERROR HALT. DATA SENT DOES NOT COMPARE WITH THE DATA RECEIVED. MQ CONTAINS DATA THAT WAS SENT. AC CONTAINS THE DATA THAT WAS RECEIVED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT SENDS THE DATA IN THE MQ. MANUAL RESTART.

LOC 3424 — PRG1, ROUTINE 11, ERROR HALT A. KRS INSTRUCTION FAILED TO INCLUSIVE "OR" KBRD BUFFER WITH AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KRS CONTINUOUSLY. MANUAL RESTART.

LOC 3464 — PRG1, ROUTINE 12, ERROR HALT A. KRB INSTRUCTION FAILED TO "JAM TRANSFER" THE KBRD BUFFER INTO THE AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KRB CONTINUOUSLY. MANUAL RESTART.

LOC 3474 — PRG1, ROUTINE 12, ERROR HALT B. KRB INSTRUCTION FAILED TO CLEAR THE READER FLAG. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KRB CONTINUOUSLY WITH THE RECEIVER FLAG SET. MANUAL RESTART.

LOC 3524 — PRG1 OR PRG2, ROUTINES 0, ERROR HALT. KCC INSTRUCTION FAILED TO CLEAR THE AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KCC CONTINUOUSLY WITH AC=7777. MANUAL RESTART.

LOC 3543 — PRG2, ROUTINE 1, ERROR HALT. AFTER ISSUING A KCC INSTRUCTION AND WAITING TWICE THE AMOUNT OF TIME REQUIRED FOR THE RECEIVER FLAG TO SET, IT WAS NOT SET. PRESSING CONTINUE ENTERS A SCOPE LOOP THAT REPEATS THE TEST. MANUAL RESTART.

LOC 3562 — PRG2, ROUTINE 2, ERROR HALT A. SAME AS PRG 2, ROUTINE 1, ERROR HALT.

(6.1 CONT'D)

LOC 3564 — PRG2, ROUTINE 2, ERROR HALT B. WITH RECEIVER FLAG SET, KSF COMMAND FAILED TO SKIP. PRESSING CONTINUE ENTERS SCOPE LOOP THAT SKIPS ON FLAG CONTINUOUSLY, MANUAL RESTART.

LOC 3621 — PRG2, ROUTINE 3, ERROR HALT A. SAME AS PRG 2, ROUTINE 1, ERROR HALT.

LOC 3623 — PRG2, ROUTINE 3, ERROR HALT B. KCC FAILED TO RESET, OR KSF INSTRUCTION SKIPPED WITH FLAG=0. PRESSING CONTINUE ENTERS SCOPE LOOP THAT CLEARS THE FLAG AND SKIPS ON THE FLAG CONTINUOUSLY. MANUAL RESTART.

LOC 3657 — PRG2, ROUTINE 4, ERROR HALT. WITH READER FLAG=1 AND INTERRUPT ENABLED, NO INTERRUPT OCCURRED. PRESSING CONTINUE ENTERS SCOPE LOOP THAT TURNS INTERRUPT ON CONTINUOUSLY. MANUAL RESTART.

LOC 3706 — PRG2, ROUTINE 5, ERROR HALT. TIMING ERROR, FLAG NOT=1 103 MSEC AFTER KCC INSTRUCTION. PRESSING CONTINUE ENTERS SCOPE LOOP THAT READS TAPE CONTINUOUSLY. MANUAL RESTART.

LOC 3747 — PRG2, ROUTINE 6, ERROR HALT A. REREAD ERROR. A REREAD OF THE RBRD BUFFER DID NOT MATCH WITH THE ORIGINAL READ. NEW CHARACTER IS DISPLAYED IN AC. PRESS CONTINUE.

LOC 3752 — PRG2, ROUTINE 6, ERROR HALT B. FOLLOW UP HALT, TO PRG2, ROUTINE 6, ERROR HALT A. THE "OLD" CHARACTER IS DISPLAYED IN THE AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT READS THE TELE-TYPE BUFFER CONTINUOUSLY. MANUAL RESTART.

LOC 3756 — PRG2, ROUTINE 6, ERROR HALT C. KRS INSTRUCTION FAILED TO "INCLUSIVE OR" KBRD BUFFER WITH AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KRS CONTINUOUSLY WITH AC=7777. MANUAL RESTART.

LOC 4015 — PRG2, ROUTINE 7, ERROR HALT A. KCR INSTRUCTION CLEARED THE AC. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KCR CONTINUOUSLY WITH AC=7777. MANUAL RESTART.

LOC 4021 — PRG2, ROUTINE 7, ERROR HALT B. KCR INSTRUCTION FAILED TO CLEAR READER RUN. PRESSING CONTINUE ENTERS SCOPE LOOP THAT ISSUES KCR CONTINUOUSLY WITH READER RUN SET. MANUAL RESTART.

LOC 4073 — PRG2, ROUTINE 10, ERROR HALT A. KIE INSTRUCTION FAILED TO DISABLE TELETYPE INTERRUPT ENABLE FLIP-FLOP. PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES KIE WITH AC=0 CONTINUOUSLY. MANUAL RESTART.

(6,1 CONT'D)

LOC 4305	PRG2, ROUTINE 12, ERROR HALT C, KRB INSTRUCTION FAILED TO READ THE CORRECT DATA OFF OF TAPE. PRESS CONTINUE TO TRY TEST AGAIN. MANUAL RESTART.
LOC 4337	PRG3, ROUTINE Ø, ERROR HALT A, READ ERROR, BAD CHARACTER IN AC. PRESS CONTINUE.
LOC 4342	PRG3, ROUTINE Ø, ERROR HALT B, FOLLOW UP HALT. EXPECTED CHARACTER IN AC. PRESSING CONTINUE RESUMES TEST.
LOC 4371	PRG3, ROUTINE 1, ERROR HALT A, READ ERROR. BAD CHARACTER IN AC. PRESS CONTINUE.
LOC 4374	PRG3, ROUTINE 1, ERROR HALT B, FOLLOW UP HALT. EXPECTED CHARACTER IN AC. PRESSING CONTINUE RESUMES TEST.
LOC 4427	PRG3, ROUTINE 2, ERROR HALT A, READ ERROR. BAD CHARACTER IN AC. PRESS CONTINUE.
LOC 4432	PRG3, ROUTINE 2, ERROR HALT B, FOLLOW UP HALT. EXPECTED CHARACTER IN AC. PRESSING CONTINUE RESUMES TEST.
LOC 5415	PRG6, ROUTINE Ø, KSF COMMAND FAILED TO SKIP ON KEYBOARD FLAG. PRESS CONTINUE TO ENTER SCOPE LOOP THAT SKIPS ON FLAG CONTINUOUSLY.
LOC 5707	PRG1Ø, READ ERROR HALT A, BAD CHARACTER IN AC. PRESS CONTINUE. HALT OCCURS IF SR5=1.
LOC 5712	PRG1Ø, READ ERROR HALT B, FOLLOW UP HALT TO PRG1Ø READ ERROR HALT A. EXPECTED CHARACTER IS DISPLAYED IN AC. TO PROCEED, PRESS CONTINUE.
LOC 5717	PRG1Ø, ERROR COUNT HALT. HALT OCCURS WHENEVER SRØ IS SET TO A 1. THE AC THEN CONTAINS THE ACCUMULATED ERROR COUNT, IF ANY. TO PROCEED, PRESS CONTINUE.

7. MISCELLANEOUS

7.1 EXECUTION TIME (MINUTES:SECONDS)

	110 CURRENT	110 EIA	150 EIA	300 EIA	600 EIA	1200 EIA
PRG0:	1:31	1:31	1:03	0:32	0:21	0:9
PRG1:	N/A	4:30	3:30	1:45	1:00	0:30
PRG2:	2:47	N/A	N/A	N/A	N/A	N/A
PRG3:	18:00	N/A	N/A	N/A	N/A	N/A
PRG4:	20:00	N/A	N/A	N/A	N/A	N/A
PRG5:	CONTINUOUS	N/A	N/A	N/A	N/A	N/A
PRG6:	USER DEP.	N/A	N/A	N/A	N/A	N/A
PRG7:	40:00	N/A	N/A	N/A	N/A	N/A
PRG10:	CONTINUOUS	N/A	N/A	N/A	N/A	N/A
PRG11:	USER DEP.	N/A	N/A	N/A	N/A	N/A
PRG12:	CONTINUOUS	N/A	N/A	N/A	N/A	N/A

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.

7.3 TEST EQUIPMENT

FOR TESTING OF THE EIA LOGIC THE INPUT MUST BE CONNECTED TO THE OUTPUT ON THE 40 PIN SIDE CONNECTOR WITH JUMPERS.

PIN E TO PIN M
PIN F TO PIN J

8. PROGRAM DESCRIPTION

8.1 PRG0 - BASIC OUTPUT LOGIC TESTS

THIS PROGRAM CONTAINS 8 ROUTINES NUMBERED FROM 0-7 (OCTAL)

RTN0: CHECKS THE ABILITY OF:
SPF TO SET PRINTER FLAG,
TSF TO SKIP ON PRINTER FLAG SET,
CAF TO CLEAR PRINTER FLAG, AC, AND LINK,
TCF TO CLEAR PRINTER FLAG,
TSF TO NOT SKIP ON PRINTER FLAG 0,
TEST IS DONE 100 TIMES.

RTN1: CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT
AND THEN CHECKS THAT THE PRINTER FLAG IS CAPABLE OF
INTERRUPTING. TEST IS DONE 4000 TIMES.

RTN2: CHECKS THE ABILITY OF:
KIE TO DISABLE TTY INTERRUPT ENABLE FLIP-FLOP,
SPI TO NOT SKIP WITH NO TTY INTERRUPT REQUEST,
SRQ TO NOT SKIP WITH NO TTY INTERRUPT REQUEST,
KIE TO ENABLE TTY INTERRUPT ENABLE FLIP-FLOP,
SPI TO SKIP ON A TTY INTERRUPT REQUEST,
SRQ TO SKIP ON A TTY INTERRUPT REQUEST,
CAF TO ENABLE TTY INTERRUPT ENABLE FLIP-FLOP,
TEST IS DONE 4000 TIMES.

RTN3: CHECKS THE ABILITY OF:
TPC TO SET THE PRINTER FLAG,
TLS TO CLEAR THE PRINTER FLAG,
TLS TO SET THE PRINTER FLAG,
TEST IS DONE 100 TIMES.

RTN4: PRINTER TIMING TEST:
CHECKS THAT THE FLAG IS NOT SET JUST PRIOR TO
9 BIT TIMES AND THAT THE FLAG IS SET AT 9.5 BIT TIMES.
TEST IS DONE 100 TIMES.

RTN5: PRINTER TIMING TEST:
AFTER ISSUING A TLS AND WAITING FOR THE FLAG
TO SET ANOTHER TLS IS ISSUED AND THE FLAG IS
CHECKED JUST PRIOR TO 11 BIT TIMES FOR 110 BAND
AND 10 BIT TIMES FOR NON 110 BAND - THE FLAG
SHOULD NOT BE SET. THE FLAG IS CHECKED AGAIN 1/2
BIT TIME LATER AND THE FLAG SHOULD BE SET AT THIS
TIME. TEST IS DONE 100 TIMES.

RTN6: TEST OF GTF INSTRUCTION. TEST IS DONE 4000 TIMES.

RTN7: TEST OF RTF INSTRUCTION. TEST IS DONE 4000 TIMES.

8.2 PRG1 - BASIC EIA INPUT AND OUTPUT LOGIC TESTS

NOTE: ON THE 40 SIN SIDE CONNECTOR: PIN E MUST BE CONNECTED TO PIN M. PIN F MUST BE CONNECTED TO PIN J.

RTN0: CHECKS THAT KCC WILL CLEAR THE AC. TEST IS DONE 100 TIMES.

RTN1: TLS IS USED TO SEND DATA AND KSF CHECKS TO SEE IF THE RECEIVER FLAG SET UPON COMPLETION OF RECEIVING THE DATA. TEST IS DONE 100 TIMES.

RTN2: TEST OF KSF TO SKIP ON RECEIVER FLAG CONSISTENTLY. TEST IS DONE 4000 TIMES.

RTN3: TEST OF KSF TO NOT SKIP ON NO RECEIVER FLAG. TEST IS DONE 500 TIMES.

RTN4: CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT AND THAT THE READER FLAG WILL INTERRUPT. TEST IS DONE 1000 TIMES.

RTN5: CHECKS THE ABILITY OF:

SRQ TO SKIP ON A READER INTERRUPT
SPI TO SKIP ON A READER INTERRUPT
CAF TO CLEAR KBRD/READER FLAG.
SRQ TO NOT SKIP ON NO READER FLAG
SPI TO NOT SKIP ON NO READER FLAG
TEST IS DONE 100 TIMES.

RTN6: CHECKS THAT THE READER FLAG SETS NO LATER THAN THE REQUIRED TIME FOR IT TO SET.

110 BAUD = 100 MSEC.
150 BAUD = 66.7 MSEC.
300 BAUD = 33.3 MSEC.
600 BAUD = 16.7 MSEC.
1200 BAUD = 8.33 MSEC.
TEST IS DONE 100 TIMES.

RTN7: CHECKS DATA HANDLING CAPABILITIES BY SENDING A NUMBER FOLLOWED BY ITS COMPLEMENT. TEST IS DONE 512 TIMES.

RT10: CHECKS DATA HANDLING CAPABILITIES BY SENDING RANDOM NUMBERS. TEST IS DONE 512 TIMES.

RTN11: CHECKS THAT KRS CAN "INCLUSIVE OR" READER BUFFER WITH AC. TEST IS DONE 500 TIMES.

RTN12: CHECKS THAT KRB WILL "JAM TRANSFER" RECEIVER BUFFER TO AC, AND THAT KRB WILL CLEAR READER FLAG. TEST IS DONE 500 TIMES.

8.3 PRG2 - BASIC INPUT LOGIC TESTS

THIS PROGRAM CONTAINS 11 ROUTINES NUMBERED FROM 0 TO 12 (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 500 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, BIT 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.

RTN12: CHECKS THAT KRB CAN CLEAR THE READER FLAG AND THAT KRB CAN SET THE FLAG. ALSO KRB IS CHECKED FOR READING DATA. TEST IS DONE 256 TIMES.

8.4 PRG3 - READER TEST

THIS PROGRAM CONTAINS 3 ROUTINES NUMBERED FROM Ø TO 2.

RTNØ: READS 4095 CHARACTERS OF BINARY COUNT PATTERN. FULL SPEED.

RTN1: READS 2ØØØ CHARACTERS FO BINARY COUNT PATTERN WITH RANDOM STALLS BETWEEN CHARACTERS.

RTN2: READS 1ØØ RANDOM LENGTH CHARACTER BLOCKS, FIXED STALL BETWEEN CHARACTERS IN A BLOCK, THE STALL CHANGES FOR EACH BLOCK AND IS DETERMINED AT RANDOM.

8.5 PRG4 - PRINTER TEST

THIS PROGRAM CONTAINS 41 ROUTINES NUMBERED FROM Ø TO 5Ø (OCTAL).

RTNØ: 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.

(8,5 CONT'D)

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: YZØ "
RTN15: 123
RTN16: 456
RTN17: 789
RTN20: !"#
RTN21: $%&
RTN22: '()
RTN23: *+,
RTN24: -./
RTN25: :;<
RTN26: =>?
RTN27: @[\
RTN30:]↑ AND LEFT ARROW
RTN31: ABC (LOWER CASE) (KSR37 ONLY)
RTN32: DEF " "
RTN33: GHI " "
RTN34: JKL " "
RTN35: MNO " "
RTN36: PQR " "
RTN37: STU " "
RTN40: VWX " "
RTN41: YZ AND CODE 34Ø "

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 BETWEEN 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.

(8,5 CONT'D)

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 AST35 WORST CASE PATTERN USED IS '[?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 KSR 37 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 TELETYPE ONLY. THIS TEST IS RUN AFTER ROUTINE 47.

8.6 PRG5 - 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 AND CHECK DATA BLOCK
M) REPEAT. (GO TO STEP A)

8.7 PRG6 - 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. READED A RUBOUT ENDS THE TEST.

8.8 PRG7 - 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.

(8.8 CONT'D)

RTN0: PUNCH/PRINT AND READ CHECK BLOCK OF ABC
RTN1: PUNCH/PRINT AND READ CHECK BLOCK OF DEF
RTN2: PUNCH/PRINT AND READ CHECK BLOCK OF GHI
RTN3: PUNCH/PRINT AND READ CHECK BLOCK OF JKL
RTN4: PUNCH/PRINT AND READ CHECK BLOCK OF MNO
RTN5: PUNCH/PRINT AND READ CHECK BLOCK OF PQR
RTN6: PUNCH/PRINT AND READ CHECK BLOCK OF STU
RTN7: PUNCH/PRINT AND READ CHECK BLOCK OF VWX
RTN10: PUNCH/PRINT AND READ CHECK BLOCK OF YZ0
RTN11: PUNCH/PRINT AND READ CHECK BLOCK OF 123
RTN12: PUNCH/PRINT AND READ CHECK BLOCK OF 456
RTN13: PUNCH/PRINT AND READ CHECK BLOCK OF 789
RTN14: PUNCH/PRINT AND READ CHECK BLOCK OF !"#
RTN15: PUNCH/PRINT AND READ CHECK BLOCK OF $%&
RTN16: PUNCH/PRINT AND READ CHECK BLOCK OF '()
RTN17: PUNCH/PRINT AND READ CHECK BLOCK OF *+,
RTN20: PUNCH/PRINT AND READ CHECK BLOCK OF -./
RTN21: PUNCH/PRINT AND READ CHECK BLOCK OF :;<
RTN22: PUNCH/PRINT AND READ CHECK BLOCK OF =>?
RTN23: PUNCH/PRINT AND READ CHECK BLOCK OF @[\
RTN24: PUNCH/PRINT AND READ CHECK BLOCK OF]^_
RTN25: PUNCH/PRINT AND READ CHECK BLOCK OF ALL PRINTABLE CHARACTERS
RTN26: PUNCH/PRINT AND READ CHECK BLOCK OF ASR33 PRINTER
WORST CASE PATTERN (~W/)
RTN27: PUNCH/PRINT AND READ CHECK BLOCK OF ASR35 PRINTER
WORST CASE PATTERN, ([?C)
RTN30: PUNCH/PRINT AND READ CHECK BLOCK OF SPACE,
RUBOUT (DATA: ALL 1'S, ALL 1'S, ALL 0'S).

8.9 PRG7 - READER EXERCISER, BINARY COUNT PATTERN

THE PROGRAM READS AND CHECKS A BINARY COUNT PATTERN TEST TAPE.
WITH PROGRAM RUNNING SETTING 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.

8.10 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.

8.11 PRG11 - TAPE GENERATOR - BINARY COUNT PATTERN

PUNCHES BINARY COUNT PATTERN TEST TAPE.

```
                        /PDP-8/E TELETYPE CONTROL TEST, (KL8)

                        /COPYRIGHT 1971, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS. 01754
                        /
                        /PRG0-BASIC OUTPUT CONTROL LOGIC TEST
                        /PRG1-BASIC OUTPUT AND INPUT LOGIC TEST (LOOP AROUND)
                        /PRG2-BASIC INPUT CONTROL LOGIC TEST - (USES READER)
                        /PRG3-READER TEST
                        /PRG4-PRINTER TEST
                        /PRG5-PUNCH TEST
                        /PRG6-KEYBOARD TEST
                        /PRG7-COMBINED TEST
                        /PRG10-READER EXERCISER, BINARY COUNT PATTERN.
                        /PRG11-PRINTER EXERCISER,
                        /PRG12-TAPE GENERATOR, BINARY COUNT PATTERN.
                        /
                        /
                        /*********************************************************************
                        /BIT TIME TABLE:
                        /0110 BAUD      11 BITS @ 9.09 MSEC = 100 MSEC
                        /0150 BUAD      10 BITS @ 6.67 MSEC = 66.7 MSEC
                        /0300 BAUD      10 BITS @ 3.33 MSEC = 33.33 MSEC
                        /0600 BAUD      10 BITS @ 1.67 MSEC = 16.67 MSEC
                        /1200 BAUD      10 BITS @  .833 MSEC = 8.33 MSEC
                        /*********************************************************************
                        /
6001    ION=6001                        /TURN INTRRRUPT ON.
6002    IOF=6002                        /TURN INTERRUPT OFF.
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
6031    KSF=6031                        /SKIP IF KEYBOARD/READER FLAG = 1.
6032    KCC=6032                        /CLEAR AC AND KBRD/READER FLAG, SET READER RUN.
6034    KRS=6034                        /READ KEYBOARD/READER BUFFER STATIC
6035    KIE=6035                        /ENABLE TTY INTERRUPT WHEN AC11 EQUALS 1
6036    KRB=6036                        /CLEAR AC, READ KEYBOARD BUFFER, CLEAR
                                        /KEYBOARD FLAGS.
6040    SPF=6040                        /SET PRINTER FLAG
6041    TSF=6041                        /SKIP IF TELEPRINTER/PUNCH FLAG = 1.
6042    TCF=6042                        /CLEAR TELEPRINTER/PUNCH FLAG.
6044    TPC=6044                        /LOAD TELEPRINTER/PUNCH BUFFER
                                        /SELECT AND PRINT.
6045    SPI=6045                        /SKIP IF TTY INTERRUPT
6046    TLS=6046                        /LOAD TELEPRINTER/PUNCH BUFFER,
                                        /SELECT AND PRINT AND CLEAR
                                        /TELEPRINTER/PUNCH FLAG.

7002    BSW=7002                        /SWAP BYTES IN AC.
7421    MQL=7421                        /LOAD MQ FROM AC THEN CLEAR AC,
7621    CAM=7621                        /CLEAR AC AND MQ.
7701    ACL=7701                        /LOAD MQ INTO AC.

0000    OPEN=0                          /PROGRAM MODIFABLE.
```

```
                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    UTPC=JMS I [XTPC
                4563    UTLS=JMS I [XTLS
                4562    UKCR=JMS I [XKCR
                4561    UKIE=JMS I [XKIE
                4560    USPF=JMS I [XSPF
                4557    USPI=JMS I [XSPI
                4556    STALL=JMS I [STAL
                4555    CKSR37=JMS I [CK37
                4554    CKSR33=JMS I [CK33
                4553    CKSR35=JMS I [CK35
                6577    BLOCKA=END
                6601    BLOCK1=BLOCKA+2
                6711    BLOCKB=BLOCKA+112
                6722    BLKBB=BLOCKA+123
                6713    BLOCK2=BLOCKA+114
                6724    BLK2=BLOCKA+125
                7023    BLOCKC=BLOCKA+224
                7034    BLKCC=BLOCKA+235
                7577    DBLK=BLOCKA+1000
                7631    M147=-147                       /-103 DECIMAL.
                0304    RRPP=0304

                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
                0016    *16
0016    0000                    OPEN            /AUTO INDEX.
                0020    *20
0020    0000    TTYTYP, OPEN
0021    0304    TTYIOT, RRPP            /CONSTANT TO DETERMINE IOT CODE
                                        /PRESET FOR 03 READER AND 04 PUNCH.
                                        /TO CHANGE IOT CODE SET THIS LOCATION
                                        /TO: "RRPP"  WHERE RR IS FOR
                                        /THE READER AND PP IS FOR THE PUNCH.
0022    0110    BAUDRT, 110             /CONSTANT TO DETERMINE DELAY
                                        /PRESET FOR     BAUD.
```

```
                                    /TO SELECT BAUD RATE DEPOSIT THE FOLLOWING:
                                    /0110 FOR 110 BAUD.
                                    /0150 FOR 150 BAUD.
                                    /0300 FOR 300 BAUD.
                                    /0600 FOR 600 BAUD.
                                    /1200 FOR 1200 BAUD.
                                    /**THE ABOVE ARE THE ONLY LEGAL BAUD RATES**

0023  0000    KSTART, OPEN          /USER PROGRAM START.
0024  0000    DELAYM, OPEN
0025  0263    CHAIN,  CHAINN        /CHAIN RTN ENTRY.
0026  1365    KBFLAG, KFLAG
0027  0474    DLCNT1, DLCNT
0030  2012    $100,   $100I
0031  2000    $4000,  $4000I
0032  2005    $200,   $200I
0033  2126    TLCALL, TLCALI
0034  2134    TLC37,  TLC37I
0035  2144    FBF,    FBFI
0036  0000    PRGNUM, OPEN
0037  2200    PRGTAB, PRG0
0040  3000            PRG1
0041  3503            PRG2
0042  4307            PRG3
0043  4434            PRG4
0044  5274            PRG5
0045  5340            PRG6
0046  5465            PRG7
0047  5651            PRG10
0050  5722            PRG11
0051  5764            PRG12
0052  0000    TEMP,   OPEN          /WORK
0053  0000    TEMP1,  OPEN          /LOCATIONS
0054  0000    CURTST, OPEN          /FOR CURRENT TEST ADDRESS
0055  0000    RTNNO,  OPEN          /FOR CURRENT TEST NUMBER
0056  0000    NXTST,  OPEN          /FOR NEXT TEST ADDRESS
0057  0000    MSCTR,  OPEN          /MILLISECONDS COUNTER
0060  0000    MILCTR, OPEN
0061  0000    MIL1,   OPEN          /7372 FOR  110 BAUD.
                                    /7522 FOR  150 BAUD.
                                    /7652 FOR  300 BAUD.
                                    /7726 FOR  600 BAUD.
                                    /7754 FOR 1200 BAUD.
0062  0000    CTRA,   OPEN          /COUNTER A.
0063  0000    CTRB,   OPEN          /COUNTER B.
0064  0000    STLID,  OPEN
0065  0530    SYNC,   SYNK          /ENTRY TO SYNC TAPE RTN.
0066  0436    INPATT, IBIN          /ENTRY TO INITIATE PATTERN
0067  0444    GETPT,  GTBIN         /ENTRY TO GET PATTERN CHAR.
0070  0513    CHECK,  CHCK
0071  0000    PFLAG,  0
0072  1271    UOUT,   OUT
0073  1615    UTPLN3, TYPLN3
0074  2112    UPUNCH, PUNCH
0075  0600    UMOVE,  MOVVE
```

```
0076  0000    RBUSY,  0
0077  0000    AC,     0
0100  0000    LINK,   0
0101  0000    BLKCNT, 0
0102  0000    DELAYS, 0
0103  0000    ERRCR,  0
0104  0000    UTEMP,  0
0105  0000    UTEMP1, 0
0106  0000    UTEMP2, 0
0107  0215    CR,     215             /CARRIAGE RETURN
0110  0212    LF,     212             /LINE FEED
0111  0277    DLYMSK, 277
0112  0000    WTS6A,  OPEN


              /CONTROL ROUTINE
      0200    *200
0200  7610    START,  SKP CLA
0201  7402            HLT             /INCORRECT PROGRAM NUMBER
0202  7621            CAM             /CLEAR AC AND MQ.
0203  4777'           JMS SETRND      /SET UP RANDOM NUMBERS
0204  4776'           JMS STBAUD      /SET UP LOC MIL1 FOR SELECTED BAUD RATE.
0205  7604    BORET,  LAS             /READ SR
0206  0152            AND [17         /PROGRAM MASK = 17
0207  1151            TAD [-12        /PROGRAM LIMIT = -12
0210  7540            SMA SZA         /VALID PROGRAM NUMBER?
0211  5201            JMP START+1     /NO.
0212  7604            LAS             /YES, READ SR.
0213  0152            AND [17
0214  3036            DCA PRGNUM      /SAVE PROGRAM NUMBER.
0215  1036            TAD PRGNUM      /DEVELOP PROGRAM START
0216  1150            TAD [PRGTAB     /ADDRESS AND STORE AT
0217  3052            DCA TEMP        /PRGADR.
0220  1452            TAD I TEMP
0221  3235            DCA PRGADR
0222  4775'           JMS DVCSEL      /PERFORM IOT SELECTION
0223  7604    SLDC02, LAS             /SELECT DC02 UNIT
0224  0147            AND [7760
0225  6117            MTON
0226  7201            CLA IAC
0227  6115            MINT            /ENABLE DC02 INTERRUPT
0230  4475            JMS I UMOVE     /INITIALIZE
0231  0005            5               /INTERRUPT,
0232  0001            1               /AREA.
0233  7776            -2
0234  5635            JMP I .+1
0235  0000    PRGADR, OPEN
0236  7602    SRSET,  HLT CLA
0237  7200    GETRDY, CLA
0240  1023            TAD KSTART      /SET ADDRESS OF 1ST ROUTINE
0241  3056            DCA NXTST       /STORE AT NXTST
0242  4302            JMS FORWD
0243  7604            LAS             /READ SR
0244  7004            RAL
0245  7500            SMA             /ROUTINE SE[illegible]? (SR1)
```

```
0246  5454            JMP I CURTST    /NO.  START WITH 1ST RTN
0247  7604            LAS             /YES
0250  0146            AND [77         /SR 6-11 ENABLE MASK.
0251  7041            CIA
0252  1055            TAD RTNNO
0253  7650            SNA CLA         /IS IT THIS RTN?
0254  5454            JMP I CURTST    /YES.  GO DO IT
0255  1056            TAD NXTST       /NO
0256  7001            IAC             /IS THIS LAST TRN?
0257  7640            SZA CLA         /NO
0260  5242            JMP GETRDY+3
0261  7402  INCRTN,   HLT             /YES.  INCORRECT ROUTINE NO.
0262  5237            JMP GETRDY

0263  4317  CHAINN,   JMS SHALT       /HALT? (SR0)
0264  7604            LAS             /READ SR
0265  7006            RTL
0266  7630            SZL CLA         /SELECT ROUTINE? (SR1)
0267  5237            JMP GETRDY      /YES
0270  1056            TAD NXTST
0271  7001            IAC
0272  7640            SZA CLA         /LAST ROUTINE?
0273  5242            JMP GETRDY+3    /NO.
0274  7604            LAS
0275  7006            RTL
0276  7710            SPA CLA         /LOOP PROGRAM? (SR2)
0277  5237            JMP GETRDY      /YES
0300  7402  PRGEND,   HLT             /END OF PROGRAM HALT
0301  5263            JMP CHAINN

0302  0000  FORWD,    0
0303  7300            CLA CLL
0304  1456            TAD I NXTST     /GET NEXT RTN NO
0305  3055            DCA RTNNO       /STORE AT RTNNO
0306  2056            ISZ NXTST
0307  1056            TAD NXTST       /SET CURRENT
0310  3052            DCA TEMP        /RTN NUMBER
0311  2056            ISZ NXTST
0312  1056            TAD NXTST       /SET CURRENT
0313  3054            DCA CURTST      /RTN ADDR.
0314  1452            TAD I TEMP      /SET NEXT
0315  3056            DCA NXTST       /RTN ADDR.
0316  5702            JMP I FORWD     /EXIT

0317  0000  SHALT,    0
0320  7604            LAS             /READ SR
0321  7700            SMA CLA         /HALT? (SR0)
0322  5717            JMP I SHALT
0323  1055            TAD RTNNO
0324  7402            HLT             /UNCONDITIONAL HALT (SR0 = 1)
0325  5717            JMP I SHALT     /EXIT.

0326  0000  STCTR,    0
0327  7200            CLA
0330  1726            TAD I STCTR     /GET CTR ADDR
```

```
0331  3052            DCA TEMP          /AND SAVE AT TEMP
0332  2326            ISZ STCTR
0333  1726            TAD I STCTR       /GET COUNT AND
0334  3452            DCA I TEMP        /STORE PER C(TEMP)
0335  2326            ISZ STCTR
0336  5726            JMP I STCTR       /EXIT

0337  0000  DLYMS,    0
0340  7300            CLA CLL
0341  1024            TAD DELAYM        /GET MS COUNT
0342  3057            DCA MSCTR         /STORE IN MSCTR
0343  1061            TAD MIL1          /GET CONSTANT
0344  3060            DCA MILCTR        /STORE IN MILCTR
0345  2060            ISZ MILCTR        /DELAY FINISHED?
0346  5343            JMP .-1
0347  2057            ISZ MSCTR         /DONE DELAYING
0350  5343            JMP .-5
0351  5737            JMP I DLYMS       /EXIT
0352  0000  CK33,     OPEN              /SUB TO CHECK FOR 33 TTY
0353  7200            CLA
0354  1020            TAD TTYTYP        /GET TTY TYPE
0355  7650            SNA CLA           /33?
0356  2352            ISZ CK33          /YES.
0357  5752            JMP I CK33

0360  0000  CK35,     OPEN              /SUB TO CHECK FOR 35 TTY
0361  7240            CLA CMA
0362  1020            TAD TTYTYP        /GET TTY TYPE
0363  7650            SNA CLA           /35?
0364  2360            ISZ CK35          /YES.
0365  5760            JMP I CK35

0366  0000  CK37,     OPEN              /SUB TO CHECK FOR 37 TTY
0367  7344            CLA CLL CMA RAL   /-2
0370  1020            TAD TTYTYP        /GET TTY TYPE.
0371  7650            SNA CLA           /37?
0372  2366            ISZ CK37          /YES.
0373  5766            JMP I CK37
0375  0000
0376  0504
0377  1742
      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
1411  7006            RTL
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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  0145            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  0146            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  3052            DCA TEMP
0467  1273            TAD SCNT
0470  3452            DCA I TEMP      /STORE AT SPECIFIED ADDRESS
0471  2256            ISZ CHRCNT      /SET UP EXIT
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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  0111              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  3024              DCA DELAYM
0503  5674              JMP I DLCNT      /EXIT

                /SUBROUTINE TO ASSIST IN SETTING UP MIL1 FOR DELAYS.
0504  0000    STBAUD,   OPEN
0505  4777'             JMS SETBAU       /GO TO SETBAU
0506  7630              -150             / 150 BAUD,
0507  7500              -300             / 300 BAUD,
0510  7200              -600             / 600 BAUD,
0511  6600              -1200            /1200 BAUD,
0512  7670              -110             / 110 BAUD,

                /SUBROUTINE TO COMPARE C(AC) TO CONTENTS STORED AT CALL+1
0513  0000    CHCK,     0
0514  3327              DCA WCHK         /STORE AC AT WCHK
0515  1713              TAD I CHCK       /GET COMPARE DATA
0516  7041              CIA              /2'S COMPLEMENT IT
0517  1327              TAD WCHK         /ADD C(WCHK)
0520  2313              ISZ CHCK         /SET UP FOR UNEQUAL EXIT
0521  7640              SZA CLA          /EQUAL (AC = 0)
0522  5325              JMP .+3          /NO
0523  2313              ISZ CHCK         /YES,  SET UP FOR EQUAL EXIT
0524  5713              JMP I CHCK       /EQUAL EXIT
0525  1327              TAD WCHK         /RESTORE AC
0526  5713              JMP I CHCK       /UNEQUAL EXIT
0527  0000    WCHK,     0

                /SYNC ON TAPE SUBROUTINE
0530  0000    SYNK,     0
0531  4577              SETLOC           /SET COUNT OF
0532  0550              CTSK             /-256 (DEC) IN
0533  7400              -400             /CTSK
0534  4571    SYNKA,    UKCC             /CLEAR AC AND FLAG
0535  4572              UKSF             /READY?
0536  5335              JMP .-1          /NO, TEST AGAIN
0537  4570              UKRS             /YES, READ
0540  1144              TAD [-377
0541  7640              SZA CLA          /377?
0542  7410              SKP
0543  5730              JMP I SYNK       /YES,  EXIT
0544  2550              ISZ CTSK         /BUMP CHAR CTR +1
0545  5334              JMP SYNKA        /GO READ AGAIN
0546  7402              HLT              /256 CHARS READ,  CAN'T SYNC
0547  5331              JMP SYNK+1       /GO TO SRST
```

```
0550  0000    CTSK,   0               /CHAR COUNTER
0551  0000    STAL,   OPEN
0552  7200            CLA
0553  1064            TAD STLID
0554  7700            SMA CLA         /STALL?
0555  5751            JMP I STAL      /NO, EXIT
0556  4274            JMS DLCNT       /YES SET STALL COUNT
0557  4576            DELAY           /STALL
0560  5751            JMP I STAL      /EXIT
0561  0000    CRCTR,  OPEN

0562  0000    CRALF,  OPEN
0563  7200            CLA
0564  1762            TAD I CRALF
0565  3361            DCA CRCTR
0566  2362            ISZ CRALF
0567  4573            TYPE
0570  6250            CARLF
0571  2361            ISZ CRCTR
0572  5367            JMP .-3
0573  5762            JMP I CRALF
0577  1513
      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  3314            DCA TEMQ        /INITIAL ADDRESS
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0632  3316          DCA FLAG        /CLEAR FLAG,
0633  2226          ISZ TYPSTG      /SET UP EXIT
0634  1714  TSC1,   TAD I TEMQ      /PICK UP DATA
0635  7002          BSW
0636  4243          JMS TSC2        /GO TYPE 1ST CHARACTER
0637  1714          TAD I TEMQ      /PICK UP DATE
0640  4243          JMS TSC2        /GO TYPE 2ND CHARACTER
0641  2314          ISZ TEMQ        /EVEN STRING ADDRESS
0642  5234          JMP TSC1        /GO BACK FOR MORE
0643  0000  TSC2,   0
0644  0146          AND [77         /MASK OFF 6 BITS
0645  3315          DCA TEMR        /SAVE CHARACTER
0646  1316          TAD FLAG        /TEST "SPECIAL" FLAG.
0647  7640          SZA CLA
0650  5260          JMP TYPSP       /SET TYPE SPECIAL
0651  1315          TAD TEMR        /NO, REGULAR CHARACTER
0652  7450          SNA             /ZERO?
0653  5256          JMP .+3         /YES, SET FLAG,
0654  4271  TYPAT,  JMS PRINT       /NO, PRINT IT.
0655  5643          JMP I TSC2      /RETURN.
0656  2316          ISZ FLAG        /SET "SPECIAL" FLAG.
0657  5643          JMP I TSC2      /EXIT
0660  3316  TYPSP,  DCA FLAG        /CLEAR FLAG,
0661  1315          TAD TEMR        /TEST FOR 0,
0662  7450          SNA             /0?
0663  5643          JMP I TSC2      /IGNORE IT,
0664  1377          TAD (-77
0665  7650          SNA CLA         /77?
0666  5626          JMP I TYPSTG    /YES, EXIT CODE.
0667  1315          TAD TEMR
0670  5254          JMP TYPAT

0671  0000  PRINT,  OPEN
0672  1376          TAD (-45
0673  7640          SZA CLA         /IS IT 45?
0674  5300          JMP .+4         /NO.
0675  1107          TAD CR          /YES, PRINT CR
0676  4474          JMS I UPUNCH
0677  5671          JMP I PRINT
0700  1315          TAD TEMR
0701  1375          TAD (-43
0702  7640          SZA CLA         /IS IT 43?
0703  5306          JMP .+3         /NO.
0704  1110          TAD LF          /YES, TYPE LF
0705  5276          JMP PRINT+5
0706  1315          TAD TEMR
0707  1374          TAD (-40
0710  7510          SPA
0711  1143          TAD [100
0712  1142          TAD [240
0713  5276          JMP PRINT+5
0714  0000  TEMQ,   OPEN
0715  0000  TEMR,   OPEN
0716  0000  FLAG,   OPEN
```

```
0717  0000    XKSF,   OPEN            /SUB TO ISSUE KSF,
0720  6031            KSF             /KSF
0721  5717            JMP I XKSF      /NO SKIP
0722  2317            ISZ XKSF        /SKIP
0723  5717            JMP I XKSF

0724  0000    XKCC,   OPEN            /SUB TO ISSUE KCC,
0725  6032            KCC
0726  5724            JMP I XKCC      /EXIT
0727  7402            HLT             /KCC SKIPPED,

0730  0000    XKRS,   OPEN            /SUB TO ISSUE KRS,
0731  6034            KRS
0732  5730            JMP I XKRS      /EXIT
0733  7402            HLT             /KRS SKIPPED,

0734  0000    XKRB,   OPEN            /SUB TO ISSUE KRB,
0735  6036            KRB
0736  5734            JMP I XKRB      /EXIT
0737  7402            HLT             /KRB SKIPPED,

0740  0000    XTSF,   OPEN            /SUB TO ISSUE TSF,
0741  6041            TSF             /TSF
0742  5740            JMP I XTSF      /NO SKIP,
0743  2340            ISZ XTSF        /SKIP,
0744  5740            JMP I XTSF

0745  0000    XTCF,   OPEN            /SUB TO ISSUE TCF,
0746  6042            TCF
0747  5745            JMP I XTCF      /EXIT
0750  7402            HLT             /TCF SKIPPED,

0751  0000    XTLS,   OPEN            /SUB TO ISSUE TLS
0752  6046            TLS
0753  5751            JMP I XTLS      /EXIT
0754  7402            HLT             /TLS SKIPPED,

0755  0000    XKCR,   OPEN            /SUB TO ISSUE KCR,
0756  6030            KCR
0757  5755            JMP I XKCR      /EXIT
0760  7402            HLT             /KCR SKIPPED,

0761  0000    XKIE,   OPEN            /SUB TO ISSUE KIE,
0762  6035            KIE
0763  5761            JMP I XKIE      /EXIT,
0764  7402            HLT             /KIE SKIPPED,

0765  0000    XSPI,   OPEN            /SUB TO ISSUE SPI,
0766  6045            SPI             /
0767  5765            JMP I XSPI      /NO SKIP
0770  2365            ISZ XSPI
0771  5765            JMP I XSPI      /EXIT

0774  7740
0775  7735
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          0776  7733
          0777  7701
                1000            PAGE



                1000    PAGE
          1000  0000    STBF,   OPEN            /SUB TO SET UP BUFFER AREA.
          1001  4574            MOVE            /CRLF TO BLOCKA.
          1002  0107            CR
          1003  6577            BLOCKA
          1004  7776            -2
          1005  4555            CKSR37          /KSR37?
          1006  5220            JMP ST33B       /NO.
          1007  4574            MOVE            /CRLF TO BLKBB
          1010  0107            CR
          1011  6722            BLKBB
          1012  7776            -2
          1013  4574            MOVE            /CRLF TO BLKCC.
          1014  0107            CR
          1015  7034            BLKCC
          1016  7776            -2
          1017  5600            JMP I STBF      /EXIT STBF

          1020  4574    ST33B,  MOVE            /CRLF TO BLOCKB.
          1021  0107            CR
          1022  6711            BLOCKB
          1023  7776            -2
          1024  4574            MOVE            /CRLF TO BLOCKC.
          1025  0107            CR
          1026  7023            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  6601            BLOCK1
          1041  7775            -3
          1042  4555            CKSR37          /37?
          1043  5255            JMP FBF33       /NO.
          1044  4574            MOVE            /YES.
          1045  6601            BLOCK1
          1046  6604            BLOCK1+3
          1047  7662            -116
          1050  4574            MOVE
          1051  6601            BLOCK1
          1052  6724            BLK2
          1053  7657            -121
          1054  5631            JMP I FBF3      /EXIT FBF3.
          1055  4574    FBF33,  MOVE
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1056  6601            BLOCK1
1057  6604            BLOCK1+3
1060  7673            -125
1061  4574            MOVE
1062  6601            BLOCK1
1063  6713            BLOCK2
1064  7670            -110
1065  5631            JMP I FBF3      /EXIT FBF3.

1066  0000    FBALL,  OPEN            /FILL BUFFER WITH ALL CHARACTERS
1067  4555            CKSR37          /KSR37?
1070  5302            JMP FBA33       /NO.
1071  4574            MOVE            /YES.
1072  6107            A
1073  6601            BLOCK1
1074  7657            -121
1075  4574            MOVE
1076  6601            BLOCK1
1077  6724            BLK2
1100  7657            -121
1101  5666            JMP I FBALL     /EXIT FBALL.
1102  4574    FBA33,  MOVE
1103  6107            A
1104  6601            BLOCK1
1105  7701            -77
1106  4574            MOVE
1107  6107            A
1110  6700            BLOCK1+77
1111  7767            -11
1112  4574            MOVE
1113  6601            BLOCK1
1114  6713            BLOCK2
1115  7670            -110
1116  5666            JMP I FBALL     /EXIT FBALL

1117  0000    FW336,  0
1120  4574            MOVE            /MOVE 6 CHARACTERS ARS33 PRINTER
1121  6065            A33WP6          /WORST CASE PATTERN TO
1122  6601            BLOCK1          /BLOCK1
1123  7772            -6
1124  4574            MOVE            /FILL BLOCKS WITH PATTERN
1125  6601            BLOCK1
1126  6607            BLOCK1+6
1127  7676            -102
1130  4574            MOVE
1131  6601            BLOCK1
1132  6713            BLOCK2
1133  7670            -110
1134  5717            JMP I FW336     /EXIT

1135  0000    FW356,  0
1136  4574            MOVE            /MOVE 6 CHARACTER ASR35 PRINTER
1137  6073            A35WP6          /WORST CASE PATTERN TO BLOCK1
1140  6601            BLOCK1
1141  7772            -6
```

```
1142  4574            MOVE            /FILL BUFFER WITH PATTERN
1143  6601            BLOCK1
1144  6607            BLOCK1+6
1145  7676            -102
1146  4574            MOVE
1147  6601            BLOCK1
1150  6713            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  6101            A37WP6
1156  6601            BLOCK1
1157  7772            -6
1160  4574            MOVE            /FILL BUFFER WITH PATTERN
1161  6601            BLOCK1
1162  6607            BLOCK1+6
1163  7665            -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  7402            HLT             /SPF SKIPPED.

1171  0000  XTPC,     OPEN            /SUB TO ISSUE TPC
1172  6044            TPC
1173  5771            JMP I XTPC      /EXIT
1174  7402            HLT             /TPC SKIPPED.

      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  1377            TAD (376        /GET 376 CODE
1205  4474            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  4474            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  4343          JMS RRDY        /WAIT FOR READER NOT BUSY
1223  7240          CLA CMA         /READER NOT BUSY,
1224  3076          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  3076          DCA RBUSY       /YES, CLEAR READER BUSY,
1240  7300          CLA CLL
1241  1100          TAD LINK
1242  7004          RAL             /RESTORE LINK
1243  1077          TAD AC          /RESTORE AC
1244  5400          JMP I 0         /RETURN
1245  2232          ISZ RSCTR       /145 CHARACTER READ?
1246  5472          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  5472          JMP I UOUT      /RETURN

1254  3077  INTSVC, DCA AC          /SAVE AC
1255  7010          RAR
1256  3100          DCA LINK        /SAVE LINK
1257  6041  INTSF,  TSF             /PUNCH/PRINTER?
1260  5264          JMP .+4         /NO,
1261  6042  INTCF,  TCF             /YES, CLEAR FLAG,
1262  3071          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  1100          TAD LINK
1273  7004          RAL             /RESTORE LINK
1274  1077          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  1342          PADDR
```

```
1302  6577            BLOCKA
1303  4574            MOVE            /SET BLOCK LENGTH
1304  0101            BLKCNT
1305  1341            PCTR
1306  7777            -1
1307  5677            JMP I PSTUP     /EXIT

1310  0000  PDCR,     0               /PUNCH  DATA CHAR SUB.
1311  7200            CLA
1312  1742            TAD I PADDR     /GET DATA
1313  2342            ISZ PADDR       /UPDATE PADDR.
1314  4474            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  2341            ISZ 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  4776'           JMS RGNB        /GET A RANDOM NUMBER
1327  0111            AND DLYMSK      /REMOVE EXCESS BITS
1330  7450            SNA             /ZERO?
1331  5326            JMP .-3         /YES. GET ANOTHER NUMBER
1332  7041            CIA             /NO. 2'S COMPLEMENT IT.
1333  3024            DCA DELAYM      /PUT NUMBER IN DELAYM
1334  4576            DELAY           /DELAY.
1335  4310            JMS PDCR        /GO PUNCH CHARACTER
1336  2341            ISZ PCTR        /ALL CHARS PUNCHED?
1337  5326            JMP PBLKR+2     /NO. REPEAT
1340  5724            JMP I PBLKR     /YES. EXIT.
1341  0000  PCTR,     0
1342  0000  PADDR,    0

1343  0000  RRDY,     0               /WAIT FOR RDR NOT BUSY SUB.
1344  7200            CLA
1345  1076            TAD RBUSY       /FETCH RBUSY.
1346  7640            SZA CLA         /READER BUSY?
1347  5345            JMP .-2         /YES. TRY AGAIN
1350  5743            JMP I RRDY      /NO.EXIT

1351  0000  RSTUP,    0
1352  4343            JMS RRDY        /WAIT FOR RDR NOT BUSY
1353  2076            ISZ RBUSY       /SET RBUSY INDICATOR
1354  4577            SETLOC          /SET DATA ADDR
1355  1416            RADDR
1356  6577            BLOCKA
1357  4574            MOVE            /SET DATA BLOCK LENGTH
1360  0101            BLKCNT
1361  1417            RBCTR
1362  7777            -1
1363  3775'           DCA ERRCTR      /CLEAR ERRO.  OUNTER
```

```
1364  5751          JMP I RSTUP     /EXIT.

                /ROUTINE TO SET KEYBOARD FLAG.

1365  0000  KFLAG, OPEN
1366  4571          UKCC
1367  4572          UKSF
1370  5367          JMP .-1
1371  5765          JMP I KFLAG     /EXIT WITH KEYBOARD FLAG SET.

1375  5721
1376  0417
1377  0376
      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  1430          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  1420          RDRSRV
1414  6001          ION             /ENABLE INT,
1415  5607          JMP I RDBLKR    /EXIT
1416  0000  RADDR,  0
1417  0000  RBCTR,  0

                /READER SERVICE ROUTINES
1420  7200  RDRSRV, CLA
1421  4776' JMS RGNA              /GET A RANDOM NUMBER
1422  0111          AND DLYMSK      /REMOVE EXCESS BITS
1423  7450          SNA             /ZERO?
1424  5221          JMP .-3         /YES, GET ANOTHER NUMBER
1425  7041          CIA             /NO. 2'S COMPLEMENT IT.
1426  3102          DCA DELAYS      /STORE RANDOM NUMBER IN DELAYS.
1427  4274          JMS DLMSR       /STALL,
1430  1616  RDSRV,  TAD I RADDR     /GET EXPECTED CHARACTER
1431  3235          DCA SB          /STORE AT SB
1432  2216          ISZ RADDR       /UPDATE RADDR
1433  6036  IN0,    KRB             /READ CHARACTER
1434  4470          JMS I CHECK     /GO CHECK IT,
1435  0000  SB,     0
1436  5240          JMP ERROR       /ERROR
1437  5256          JMP RUDONE      /GOOD.

1440  3103  ERROR,  DCA ERRCR       /STORE BAD CHARACTER
```

```
1441  2775'           ISZ ERRCTR      /INCREMENT ERROR COUNTER
1442  5245            JMP .+3
1443  7240            CLA CMA         /OFLOW, 7777 TO AC
1444  3775'           DCA ERRCTR      /RESTORE TO 7777.
1445  7604            LAS             /READ SR
1446  0143            AND [100
1447  7650            SNA CLA         /HALT ON ERROR?(SR5)
1450  5256            JMP RUDONE      /NO.
1451  1103            TAD ERRCR       /YES, GET BAD CHARACTER
1452  7402            HLT             /ERROR HALT, BAD CHAR IN AC
1453  7200            CLA
1454  1235            TAD SB
1455  7402            HLT             /GOOD CHAR IN AC
1456  2217    RUDONE, ISZ RBCTR       /ALL DONE?
1457  5472            JMP I UOUT      /NO, TO MAINLINE
1460  7200            CLA             /YES.
1461  1775'           TAD ERRCTR      /GET C(ERRCTR)
1462  7650            SNA CLA         /ANY ERRORS?
1463  5266            JMP .+3         /NO.
1464  1775'           TAD ERRCTR      /YES.
1465  7402            HLT             /NUMBER OF ERRORS IN AC.
1466  7300            CLA CLL
1467  3076            DCA RBUSY       /CLEAR RBUSY INDICATOR
1470  1100            TAD LINK
1471  7004            RAL             /RESTORE LINK
1472  1077            TAD AC          /TO MAINLINE
1473  5400            JMP I 0

1474  0000    DLMSR,  0
1475  7300            CLA CLL
1476  1102            TAD DELAYS      /GET AND STORE MSEC
1477  3311            DCA RCTRA       /DELAY COUNT
1500  5701            JMP I .+1
1501  1502            .+1
1502  1061            TAD MIL1        /GET AND STORE
1503  3312            DCA RCTRB       /1MS CONSTANT
1504  2312            ISZ RCTRB       /DELAYED 1 MS?
1505  5304            JMP .-1         /NO,
1506  2311            ISZ RCTRA       /YES, DONE DELAYING?
1507  5300            JMP .-7         /NO,
1510  5674            JMP I DLMSR     /YES, EXIT
1511  0000    RCTRA,  0
1512  0000    RCTRB,  0

                /SUBROUTINE TO SET LOCATION FOR THE PARTICULAR SELECTED BAUD RATE.

1513  0000    SETBAU, OPEN            /
1514  1374            TAD (-5         /7773
1515  3052            DCA TEMP        /STORE IT IN TEMP,
1516  1022            TAD BAUDRT      /GET DEPOSITED BAUD RATE.
1517  1713            TAD I SETBAU    /GET A RATE FROM THE TABLE.
1520  7650            SNA CLA         /ARE THEY EQUAL?
1521  5327            JMP LDBAUD      /YES,  GO SET LOC MIL1 FOR THAT BAUD RATE.
1522  2052            ISZ TEMP        /NO,  *1 TO    P
1523  7610            SKP CLA         /SKIP
```

```
1524  7402            HLT             /ILLEGAL BAUD RATE. RESET BAUDRT AND RESTART
                                      /PROGRAM AT 0200.
1525  2313            ISZ SETBAU      /+1 TO SETBAU IN ORDER TO PULL NEXT BAUD RATE
                                      /FROM THE TABLE OF BAUD RATES.
1526  5316            JMP SETBAU+3    /SEE IF NEXT BAUD RATE IS THE ONE.
1527  1373    LDBAUD, TAD (-406       /110 BAUD CONSTANT FOR THE DELAY
1530  3061            DCA MIL1        /STORE IT.
1531  2052            ISZ TEMP        /+1 TO TEMP.  WAS THIS THE BAUD RATE?
1532  7610            SKP CLA         /SKIP
1533  5772'           JMP BDRET       /YES. EXIT WITH AC=0.
1534  1141            TAD (-24        /1200 BAUD CONSTANT FOR THE DELAY.
1535  3061            DCA MIL1        /STORE IT.
1536  2052            ISZ TEMP        /WAS THIS THE SELECTED RATE?
1537  7610            SKP CLA         /NO.
1540  5772'           JMP BDRET       /YES.  EXIT WITH MIL1 SET AND AC=0
1541  7240            CLA CMA         /AC = -1
1542  1061            TAD MIL1        /GET BACK MIL1.
1543  7104            CLL RAL         /MULTIPLY BY 2
1544  5335            JMP .-7         /SEE IF NEXT BAUD RATE IS THE ONE.

                /PUNCH TEST NORMAL TEST SEQUENCE ROUTINE
1545  0000    NTST,   0
1546  7200            CLA             /CLEAR RBUSY
1547  3076            DCA RBUSY
1550  1745            TAD I NTST      /SELECT PUNCH MODE
1551  3354            DCA NTSTA
1552  4771'           JMS PLTLR       /PUNCH LEADER
1553  4770'           JMS PSYNC       /PUNCH SYNC CHARACTER
1554  0000    NTSTA,  0
1555  4767'           JMS RSYNC       /SYNC READER
1556  4200            JMS RDBLK       /READ DATA BLOCK
1557  4771'           JMS PLTLR       /PUNCH TRAILER
1560  4766'           JMS RRDY        /WAIT FOR RDR NOT BUSY
1561  5425            JMP I CHAIN     /CHAIN

1562  5555    RM33A,  TEXT    '----I@?'
1563  5555
1564  1100
1565  7700


1566  1343
1567  1216
1570  1212
1571  1200
1572  0205
1573  7372
1574  7773
1575  5721
1576  0400
1577  1351
      1600            PAGE
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                1600            PAGE
                        /COMBINED TEST NORMAL TEST SEQUENCE
1600  0000      CNTST,  0
1601  7200              CLA               /CLEAR RBUSY
1602  3076              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  5425              JMP I CHAIN       /CHAIN

                        /TYPE LINE OF 3 CHARACTERS (NO DELAY)
1615  0000      TYPLN3, 0
1616  7200              CLA
1617  3064              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  4555              CKSR37            /KSR37?
1631  1140              TAD [11           /NO,
1632  1137              TAD [-125         /YES,
1633  3247              DCA TCTR          /-76, OR -85
1634  4577              SETLOC            /SET FETCH TO ADDRESS
1635  1646              FETCH             /OF BLOCKA,
1636  6577              BLOCKA
1637  4556      TYPEA,  STALL
1640  1646              TAD I FETCH       /YES, SET CHARACTER
1641  4474              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  1366              TAD (7700
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```
1660  0706          AND I WASC
1661  7112          RTR CLL
1662  7012          RTR
1663  7012          RTR
1664  4273          JMS CNV
1665  2307          ISZ SASC
1666  1366          TAD (7700
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  0365          AND (707
1701  1310          TAD ASCT
1702  0365          AND (707
1703  1364          TAD (6060
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  2320          ISZ 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  1145          TAD [377
1736  0316          AND SPT0
1737  3317          DCA SPT1
1740  1317          TAD SPT1
1741  5721          JMP I SGET              /EXIT SGET SUB.

              /SUBROUTINE TO INITIALIZE RANDOM NUMBER GENERATORS.

1742  0000  SETRND, OPEN
```

```
1743  1363          TAD (1233
1744  3762'         DCA RP1A
1745  1363          TAD (1233
1746  3761'         DCA RP1B
1747  1360          TAD (7622
1750  3757'         DCA RP2A
1751  1360          TAD (7622
1752  3756'         DCA RP2B
1753  5742          JMP I SETRND    /EXIT, AC=0

1756  0435
1757  0416
1760  7622
1761  0434
1762  0415
1763  1233
1764  6060
1765  0707
1766  7700
1767  1031
1770  1343
1771  1400
1772  1324
1773  1407
1774  1216
1775  1316
1776  1212
1777  1200
      2000          PAGE

                    /ROUTINE TO SET CTRA EQUAL TO -7640  (-4000 DECIMAL).

2000  0000    S4000I, OPEN
2001  4577          SETLOC          /SET COUNT OF
2002  0062          CTRA            /-4000 DECIMAL
2003  0140          -7640           /IN CTRA,
2004  5600          JMP I S4000I    /EXIT, AC=0,

                    /ROUTINE TO SET DELAYM TO -310,  (-200 DECIMAL).

2005  0000    S200I,  OPEN
2006  4577          SETLOC          /SET COUNT OF
2007  0024          DELAYM          /-200 DECIMAL
2010  7470          -310            /IN DELAYM,
2011  5605          JMP I S200I     /EXIT WITH AC=0.


                    /ROUTINE TO SET CTRA EQUAL TO -144  (-100 DECIMAL).

2012  0000    S100I,  OPEN
2013  4577          SETLOC          /SET COUNT OF
2014  0062          CTRA            /-100 DECI
2015  7634          -144            /IN CTRA,
```

```
2016  5612            JMP I S100I     /EXIT, AC=0.


                /ROUTINE TO DETERMINE DEVICE CAUSING UNEXPECTED INTERRUPT.
2017  0000    INTFND, OPEN
2020  7200            CLA
2021  6031    INTKSF, KSF                     /KEYBOARD/READER?
2022  7410            SKP                     /NO,
2023  4276            JMS     HLTD            /GO BOLT AND DISPLAY IOT
2024  6041    INTTSF, TSF                     /TTY PRINTER/PUNCH?
2025  7410            SKP                     /NO,
2026  4276            JMS     HLTD            /GO BOLT AND DISPLAY IOT
2027  6011            RSF                     /H.S. READER?
2030  7410            SKP                     /NO,
2031  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2032  6021            PSF                     /H.S. PUNCH?
2033  7410            SKP                     /NO,
2034  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2035  6401            6401                    /PT08/LT08 UNIT 1 IN?
2036  7410            SKP                     /NO,
2037  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2040  6411            6411                    /PT08/LT08 UNIT 1 OUT?
2041  7410            SKP                     /NO,
2042  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2043  6421            6421                    /PT08/LT08 UNIT 2 IN?
2044  7410            SKP                     /NO
2045  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2046  6431            6431                    /PT08/LT08 UNIT 2 OUT?
2047  7410            SKP                     /NO,
2050  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2051  6441            6441                    /PT08/LT08 UNIT 3 IN?
2052  7410            SKP                     /NO,
2053  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2054  6451            6451                    /PT08/LT08 UNIT 3 OUT?
2055  7410            SKP                     /NO,
2056  4276            JMS     HLTD            /HALT AND DISPLEY IOT
2057  6461            6461                    /PT08/LT08 UNIT 4 IN?
2060  7410            SKP                     /NO,
2061  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2062  6471            6471                    /PT08/LT08 UNIT 4 OUT?
2063  7410            SKP                     /NO,
2064  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2065  6111            6111                    /PT08/LT08 UNIT 5 OR DC02 IN?
2066  7410            SKP                     /NO,
2067  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2070  6121            6121                    /PT08/LT08 UNIT 5 OR DC02 OUT?
2071  5275            JMP     .+4             /NO,
2072  4276            JMS     HLTD            /HALT AND DISPLAY IOT
2073  7777            7777                    /DON'T KNOW WHAT DEVICE
2074  7777            7777                    /CAUSED THE INTERRUPT.
2075  4276            JMS     HLTD            /HALT AND DISPLAY ALL 1'S.
2076  0000    HLTD,   OPEN
2077  1276            TAD     HLTD
2100  1311            TAD     M3
2101  3276            DCA     HLTD
```

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2102  1676            TAD I   HLTD            /GET IOT THAT CAUSED SKIP
2103  7402            HLT                     /AND HALT. IOT IN AC.
2104  7001            IAC
2105  3306            DCA .+1
2106  0000            OPEN
2107  7200            CLA
2110  5617            JMP I   INTFND          /EXIT
2111  7775    M3,     -3

2112  0000    PUNCH,  OPEN
2113  2071            ISZ PFLAG       /SET PFLAG.
2114  6046    OUT0,   TLS             /PUNCH/PRINT.
2115  7200            CLA
2116  1071            TAD PFLAG       /GET C(PLFAG).
2117  7650            SNA CLA         /FLAG RESET?
2120  5323            JMP OUT2        /YES
2121  6041    OUT1,   TSF             /NO. FLAG UP?
2122  5316            JMP .-4         /NO.
2123  6042    OUT2,   TCF             /YES. CLEAR PRINTER FLAG.
2124  3071            DCA PFLAG       /CLEAR PFLAG.
2125  5712            JMP I PUNCH     /EXIT. AC=0.


                /ROUTINE TO CONTROL THE CHARACTERS TO BE TYPED ON ALL TTY'S.

2126  0000    TLCALI, OPEN
2127  1726            TAD I TLCALI            /GET FIRST LETTER TO BE TYPED
2130  3332            DCA .+2                 /SAVE IT.
2131  4473            JMS I UTPLN3            /GO TYPE SAVED LETTER + NEXT 2.
2132  0000            OPEN                    /FIRST LETTER TO BE TYPED.
2133  5425            JMP I CHAIN             /CHAIN

                /ROUTINE TO CONTROL THE CHARACTER TO BE TYPED ON A "37".

2134  0000    TLC37I, OPEN                    /GET FIRST LETTER TO BE TYPED
2135  1734            TAD I TLC37I
2136  3342            DCA .+4                 /SAVE IT.
2137  4555            CKSR37                  /IS IT A "37"?
2140  5425            JMP I CHAIN             /NO. CHAIN
2141  4473            JMS I UTPLN3            /YES. GO TYPE LETTER + NEXT 2
2142  0000            OPEN                    /FIRST LETTER TO BE TYPED.
2143  5425            JMP I CHAIN             /CHAIN

                /CONTROL ROUTINE TO FILL A BUFFER WITH CHARACTERS.

2144  0000    FBFI,   OPEN                    /GET DATA
2145  7300            CLA CLL
2146  1744            TAD I FBFI
2147  3351            DCA .+2                 /SAVE IT
2150  4777'           JMS FBF3                /GO FILL A BUFFER-
2151  0000            OPEN                    /WITH THIS +NEXT 2 CHAR
2152  4776'           JMS CNTST               /GO TO COMBINED TEST SEQUENCE

                /ROUTINE TO CONTROL TYPING A LINE W.  UT STALLS
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                    /AND THEN ONE WITH STALLS.

2153  0000  WOSWS,  OPEN
2154  3064          DCA STLID               /ZERO STALL INDICATOR.
2155  4775'         JMS TYPLN               /TYPE LINE WITHOUT STALLS
2156  7240          CLA CMA                 /7777
2157  3064          DCA STLID               /SET STALL INDICATOR
2160  4775'         JMS TYPLN               /TYPE LINE WITH STALLS
2161  5753          JMP I WOSWS             /EXIT.

                    /SUBROUTINE TO MARK TAB POSITIONS.

2162  0000  MTABP,  OPEN
2163  3062          DCA CTRA
2164  4573          TYPE            /MARK TAB POSITIONS
2165  6300          TBMRK
2166  4573          TYPE
2167  6306          TBMRK1
2170  2062          ISZ CTRA
2171  5366          JMP .-3
2172  5762          JMP I MTABP     /EXIT.


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2176  1600
2177  1031
      2200          PAGE



                    /PROGRAM 0.  BASIC TEST OF THE OUTPUT LOGIC.
                    /THE INSTRUCTIONS TESTED ARE:
                    / SPF   SET PRINTER FLAG,
                    / TSF   SKIP IF PRINTER FLAG IS SET,
                    / TCF   CLEAR PRINTER FLAG,
                    / CAF   CLEAR FLAGS, AC, LINK, AND ENABLE TTY INTERRUPT.
                    / TPC   CHECK THAT PRINTER FLAG WILL SET,
                    / TLS   CHECK THAT IT CLEARS PRINTER FLAG AND SETS PRINTER FLAG.

2200  4577  PRG0,   SETLOC                  /SET KSTART TO INITIAL
2201  0023          KSTART                  /ROUTINE ADDRESS.
2202  2205          P0TS0
2203  5604          JMP I   .+1             /GO START TEST
2204  0236          SRSET

                    /TEST 0 CHECKS THE ABILITY OF
                    /SPF TO SET THE PRINTER FLAG,
                    /TSF TO SKIP ON PRINTER FLAG SET,
                    /CAF TO CLEAR PRINTER FLAG, AC, AND LINK,
                    /TCF TO CLEAR PRINTER FLAG,
                    /TSF TO NOT SKIP ON PRINTER FLAG EQUAL TO ZERO.

2205  0000  P0TS0,  0
2206  2270          P0TS1
2207  4432          JMS I $200      /SET DELAYM TO DELAY TWICE
```

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                                    /10 BIT TIMES FOR AN NON 110
                                    /BAUD DEVICE AND TWICE 11 BIT
                                    /TIMES FOR AN 110 BAUD DEVICE.
                                    /SEE BIT TIME TABLE AT BEGINNING
                                    /OF PROGRAM,

2210  4430          JMS I S100              /SET UP TO DO TEST 100 TIMES.
2211  4560  P0TS0A, USPF                    /SET PRINTER FLAG
2212  4566          UTSF                    /FLAG SET?
2213  5237          JMP     P0E0A           /NO,  SPF OR TSF FAILED
2214  7360  P0TS0B, CLA CMA CLL CML         /AC AND LINK = 1
2215  6007          CAF                     /YES,  NOW CLEAR IT.
2216  4576          DELAY                   /GO DELAY
2217  4566          UTSF                    /FLAG SET?
2220  7410          SKP                     /NO,  CONTINUE TEST
2221  5244          JMP     P0E0B           /YES,  CAF OR TSF FAILED
2222  7420  P0TS0C, SNL                     /LINK SET?
2223  7440          SZA                     /NO,  AC SET?
2224  5253          JMP     P0E0C           /YES,  CAF FAILED TO CLEAR AC AND/OR LINK
2225  4560  P0TS0D, USPF                    /SET PRINTER FLAG
2226  4566          UTSF                    /PRINTER FLAG SET?
2227  5237          JMP     P0E0A           /NO,  SPF OR TSF FAILED
2230  4565  P0TS0E, UTCF                    /YES,  CLEAR PRINTER FLAG
2231  4566          UTSF                    /PRINTER FLAG SET?
2232  7610          SKP CLA                 /NO, OK.
2233  5262          JMP     P0E0E           /YES,  TCF FAILED TO CLEAR PRINTER FLAG.
2234  2062          ISZ     CTRA            /DONE TEST 100 TIMES?
2235  5211          JMP     P0TS0A          /NO,  REPEAT TEST
2236  5425          JMP I   CHAIN           /YES,  CHAIN NOW

              /ERROR HLTS FOR P0TS0.

2237  7402  P0E0A,  HLT                     /SPF FAILED TO SET PRINTER FLAG
                                            /OR TSF FAILED TO SKIP.
              /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
2240  4560          USPF                    /SET PRINTER FLAG
2241  4566          UTSF                    /IS IT SET?
2242  5240          JMP     P0E0A+1         /NO,  REPEAT.
2243  5240          JMP     P0E0A+1         /YES,  REPEAT.


2244  7402  P0E0B,  HLT                     /CAF FAILED TO CLEAR PRINTER FLAG
                                            /OR TSF SKIPPED.
              /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
2245  4560          USPF                    /SET PRINTER FLAG
2246  6007          CAF                     /CLEAR FLAGS
2247  4576          DELAY                   /DELAY
2250  4566          UTSF                    /FLAG SET?
2251  5245          JMP     P0E0B+1         /NO,  REPEAT.
2252  5245          JMP     P0E0B+1         /YES,  REPEAT.

2253  7402  P0E0C,  HLT                     /CAF FAILED TO CLEAR AC AND/OR LINK
              /SCOPE LOOP,  PRESS CONTINUE TO ENTER
2254  7360          CLA CMA CLL CML         /LI     NO AC SET
2255  6007          CAF                     /CLL
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2256  7420            SNL                     /LINK SET?
2257  7440            SZA                     /AC CLEAR
2260  5254            JMP     P0E0C+1         /AC OR LINK SET.  REPEAT
2261  5254            JMP     P0E0C+1         /REPEAT.

2262  7402  P0E0E,   HLT                     /TCF FAILED TO CLEAR PRINTER FLAG
                                              /OR TSF SKIPPED.
            /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2263  4560            USPF                    /SET PRINTER FLAG
2264  4565            UTCF                    /CLEAR PRINTER FLAG
2265  4566            UTSF                    /FLAG SET?
2266  5263            JMP     P0E0E+1         /NO,  REPEAT.
2267  5263            JMP     P0E0E+1         /YES,  REPEAT.



            /THIS ROUTINE CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT
            /AND THEN CHECKS THAT THE PUNCH/PRINTER FLAG CAN CAUSE AN INTERRUPT.

2270  0001  P0TS1,  1
2271  2327            P0TS2
2272  4577            SETLOC                  /SET INTERRUPT RETURN
2273  0002            2                       /TO P0E1A.
2274  2304            P0E1A
2275  6007  P0TS1A,  CAF                     /ATTEMPT TO CLEAR ALL FLAGS
2276  4560            USPF                    /SET PRINTER FLAG
2277  4565            UTCF                    /CLEAR PRINTER FLAG
2300  6001            ION                     /ENABLE INTERRUPT
2301  7000            NOP                     /
2302  6002            IOF                     /DISABLE INTERRUPT
2303  5306            JMP     .+3
2304  4777' P0E1A,  JMS     INTFND          /UNEXPECTED INTERRUPT
2305  5275            JMP     P0TS1A          /TRY AGAIN
2306  4431            JMS I S4000             /SET UP TO DO TEST 4000 TIMES.
2307  4577            SETLOC                  /SET INTERRUPT RETURN
2310  0002            2                       /TO P0TS1C
2311  2324            P0TS1C
2312  4560            USPF                    /SET PRINTER FLAG
2313  6001  P0TS1B,  ION                     /ENABLE INTERRUPT
2314  7000            NOP                     /NO INTERRUPT
2315  7402  P0E1B,   HLT                     /PRINTER FLAG FAILED TO INTERRUPT
                                              /OR INTERRUPT MALFUNCTION
2316  4577            SETLOC                  /SET INTERRUPT RETURN
2317  0002            2                       / TO P0TS1C-1
2320  2323            P0TS1C-1
2321  6001            ION                     /ENABLE INTERRUPT (SCOPE LOOP)
2322  7000            NOP                     /INTERRUPT
2323  5321            JMP     .-2
2324  2062  P0TS1C,  ISZ     CTRA            /DONE 4000 TIMES?
2325  5313            JMP     P0TS1B          /NO,  REPEAT TEST.
2326  5425            JMP I   CHAIN           /YES,  CHAIN
```

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                    /TEST 2 CHECKS THE ABILITY OF:
                    /KIE TO DISABLE TTY INTERRUPT ENABLE FLIP FLOP.
                    /SPI TO NOT SKIP WITH NO TTY INTERRUPT REQUEST.
                    /SRQ TO NOT SKIP WITH NO TTY INTERRUPT REQUEST.
                    /KIE TO ENABLE TTY INTERRUPT ENABLE FLIP FLOP.
                    /SPI TO SKIP ON A TTY INTERRUPT REQUEST.
                    /SRQ TO SKIP ON A TTY INTERRUPT REQUEST.
                    /CAF TO ENABLE TTY INTERRUPT ENABLE FLIP FLOP.

2327  0002  P0TS2,  2
2330  2504          P0TS3
2331  4431          JMS I $4000             /SET UP TO DO TEST 4000 TIMES.
2332  4577  P0TS2A, SETLOC                  /SET INTERRUPT RETURN
2333  0062          2                       /TO P0E2A
2334  2415          P0E2A
2335  6007          CAF                     /CLEAR EVERYTHING AND ENABLE INT ENABLE F.F.
2336  4561          UKIE                    /DISABLE INTERRUPT ENABLE FF
2337  4560          USPF                    /SET PRINTER FLAG.
2340  6001          ION                     /TURN INTERRUPT ON.
2341  7000          NOP                     /
2342  4557  P0TS2B, USPI                    /SKIP IF TTY INTERRUPT REQUEST
2343  7610          SKP     CLA             /
2344  5776'         JMP     P0E2B           /USPI SKIPPED
2345  6003  P0TS2C, SRQ                     /SKIP IF INTERRUPT REQUEST
2346  7610          SKP     CLA             /
2347  5775'         JMP     P0E2C           /SRQ SKIPPED
2350  4577  P0TS2D, SETLOC                  /SET INTERRUPT RETURN
2351  0002          2                       /TO P0TS2E.
2352  2400          P0TS2E
2353  4560          USPF                    /SET PRINTER FLAG
2354  7201          CLA IAC                 /AC11 = 1.
2355  4561          UKIE                    /ENABLE TTY INTERRUPT ENABLE F.F.
2356  6001          ION                     /TURN INTERRUPT ON.
2357  7000          NOP                     /INTERRUPT AT END OF THIS INSTRUCTION
2360  5774'         JMP     P0E2D           /KIE FAILED TO ENABLE TTY INTERRUPT F.F.

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2377  2017
      2400          PAGE

2400  4557  P0TS2E, USPI                    /TTY INTERRUPT REQUEST?
2401  5256          JMP     P0E2E           /NO,  SPI FAILED TO SKIP.
2402  6003  P0TS2F, SRQ                     /IS THERE AN INTERRUPT REQUEST?
2403  5265          JMP     P0E2F           /NO,  SRQ FAILED TO SKIP.
2404  7300  P0TS2G, CLA CLL                 /AC & LINK = 0
2405  4561          UKIE                    /DISABLE TTY INTERRUPT ENABLE F.F.
2406  6007          CAF                     /CLEAR EVERYTHING AND ENABLE TTY INTERRUPT F.F.
2407  4560          USPF                    /SET PRINTER FLAG.
2410  4557          USPI                    /SKIP IF INTERRUPT REQUEST
2411  5274          JMP     P0E2G           /CAF FAILED TO ENABLE TTY INTERRUPT ENABLE F.F.
2412  2062          ISZ     CTRA            /DONE 4000 TIMES?
2413  5777'         JMP     P0TS2A          /NO   REPEAT TEST .
2414  5425          JMP I   CHAIN           /CK   .
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                    /ERROR HLTS FOR P0TS2.

2415  7402    P0E2A,  HLT                     /KIE FAILED TO DISABLE TTY INTERRUPT
                                              /ENABLE FLIP-FLOP.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2416  4577            SETLOC                  /SET INTERRUPT RETURN
2417  0002            2                       /TO P0E2A+1
2420  2416            P0E2A+1
2421  6007            CAF                     /CLEAR
2422  4561            UKIE                    /DISABLE TTY INTERRUPT ENABLE F.F.
2423  4560            USPF                    /SET PRINTER FLAG
2424  6001            ION                     /TURN INTERRUPT ON.
2425  7000            NOP
2426  5216            JMP     P0E2A+1         /REPEAT TEST.

2427  7602    P0E2B,  HLT     CLA             /SPI SKIPPED WITH FLAG SET
                                              /AND INTERRUPT ENABLE DISABLED.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2430  4561            UKIE                    /DISABLE INTERRUPT ENABLE
2431  4560            USPF                    /SET PRINTER FLAG
2432  4557            USPI                    /SKIP IF TTY INT REQUEST.
2433  5230            JMP     P0E2B+1         /REPEAT.
2434  5230            JMP     P0E2B+1         /REPEAT.

2435  7602    P0E2C,  HLT     CLA             /SRQ SKIPPED WITH FLAG SET
                                              /AND INTERRUPT ENABLE DISABLED.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2436  4561            UKIE                    /DISABLE INTERRUPT ENABLE
2437  4560            USPF                    /SET PRINTER FLAG
2440  6003            SRQ                     /SKIP IF INTERRUPT REQUEST
2441  5236            JMP     P0E2C+1         /REPEAT.
2442  5236            JMP     P0E2C+1         /REPEAT.

2443  7402    P0E2D,  HLT                     /KIE FAILED TO ENABLE TTY INTERRUPT F.F.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2444  4577            SETLOC                  /SET INTERRUPT RETURN
2445  0002            2                       /TO P0E2D+4
2446  2447            P0E2D+4
2447  4561            UKIE                    /DISABLE TTY
2450  7201            CLA IAC                 /AC11 = 1
2451  4561            UKIE                    /ENABLE TTY
2452  4560            USPF                    /SET PRINTER FLAG
2453  6001            ION                     /TURN INTERRUPT ON
2454  7000            NOP
2455  5247            JMP     P0E2D+4         /REPEAT

2456  7402    P0E2E,  HLT                     /SPI FAILED TO SKIP.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2457  7201            CLA IAC                 /AC11 = 1
2460  4561            UKIE                    /ENABLE TTY
2461  4560            USPF                    /SET PRINTER FLAG
2462  4557            USPI                    /SKIP IF INTERRUPT REQUEST
2463  5257            JMP     P0E2E+1         /REPEAT.
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2464  5257          JMP     P0E2E+1         /REPEAT.


2465  7402  P0E2F,  HLT                     /SRQ FAILED TO SKIP.
              /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2466  7201          CLA IAC                 /AC11 = 1
2467  4561          UKIE                    /ENABLE TTY
2470  4560          USPF                    /SET PRINTER FLAG
2471  6003          SRQ                     /SKIP IF INTERRUPT REQUEST
2472  5266          JMP     P0E2F+1         /REPEAT.
2473  5266          JMP     P0E2F+1         /REPEAT.


2474  7402  P0E2G,  HLT                     /CAF FAILED TO ENABLE TTY INTERRUPT
                                            /ENABLE FLIP FLOP.
              /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2475  7300          CLA CLL                 /CLEAR
2476  4561          UKIE                    /DISABLE TTY.
2477  6007          CAF                     /ENABLE TTY INTERRUPT ENABLE F.F.
2500  4560          USPF                    /SET PRINTER FLAG
2501  4557          USPI                    /TTY INTERRUPT REQUEST?
2502  5275          JMP     P0E2G+1         /NO,  REPEAT.
2503  5275          JMP     P0E2G+1         /YES,  REPEAT.


              /TEST 3 CHECKS THE ABILITY OF
              /TPC TO SET THE PRINTER FLAG,
              /TLS TO CLEAR PRINTER FLAG,
              /TLS TO SET PRINTER FLAG.
2504  0003  P0TS3,  3
2505  2544          P0TS4
2506  4430          JMS I S100              /SET UP TO DO TEST 100 TIMES.
2507  4432          JMS I S200              /SET DELAYM TO DELAY TWICE
                                            /10 BIT TIMES FOR AN NON 110
                                            /BAUD DEVICE AND TWICE 11 BIT
                                            /TIMES FOR AN 110 BAUD DEVICE.
                                            /SEE BIT TIME TABLE AT BEGINNING
                                            /OF PROGRAM.
2510  4565  P0TS3A, UTCF                    /CLEAR PRINTER FLAG
2511  4564          UTPC                    /PRINT
2512  4576          DELAY                   /DELAY TWICE MAX TIME
2513  4566          UTSF                    /FLAG SET.  IT SHOULD BE.
2514  5327          JMP P0E3A               /FLAG NOT SET.
2515  4563  P0TS3B, UTLS                    /CLEAR + SET PRINTER FLAG.
2516  4566          UTSF                    /FLAG SET?
2517  7610          SKP CLA                 /NO,  OK
2520  5334          JMP     P0E3B           /YES
2521  4576  P0TS3C, DELAY                   /DELAY TWICE BAUD RATE.
2522  4566          UTSF                    /FLAG SET?
2523  5340          JMP     P0E3C           /NO
2524  2062          ISZ     CTRA            /YES,  DONE 100 TIMES
2525  5310          JMP     P0TS3A          /NO,  DO TEST AGAIN
2526  5425          JMP I   CHAIN           /EXIT


2527  7602  P0E3A,  HLT CLA                 /TPL  AILED TO SET PRINTER FLAG.
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                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
 2530  4565               UTCF                    /CLEAR PRINTER FLAG
 2531  4564               UTPC                    /SET FLAG BY BEGINNING OF 12TH BIT
 2532  4576               DELAY                   /WAIT
 2533  5330               JMP .-3                 /REPEAT.

 2534  7602     P0E3B,    HLT     CLA             /TLS FAILED TO CLEAR PRINTER FLAG.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
 2535  4560               USPF                    /SET PRINTER FLAG
 2536  4563               UTLS                    /CLEAR PRINTER FLAG AT TP3.
 2537  5335               JMP     .-2

 2540  7602     P0E3C,    HLT     CLA             /TLS FAILED TO SET PRINTER FLAG.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
 2541  4563               UTLS                    /PRINT
 2542  4576               DELAY                   /DELAY TWICE BAUD RATE.
 2543  5341               JMP     P0E3C+1         /REPEAT.


                    /PUNCH, PRINTER TIMING TEST.
 2544  0004     P0TS4,    4
 2545  2616               P0TS5
 2546  4430               JMS I S100              /SET UP TO DO TEST 100 TIMES.
 2547  4577     P0TS4A,   SETLOC                  /SET DELAYM
 2550  0024               DELAYM                  /TO -81 (DEC)
 2551  7657               -121
 2552  1022               TAD BAUDRT              /GET BAUD RATE.
 2553  1136               TAD [-110               /ADD A -110 TO IT.
 2554  7650               SNA CLA                 /IS IT 110 BAUD WE'RE WORKING WITH?
 2555  5360               JMP .+3                 /YES.  LEAVE DELAYM ALONE.
 2556  1135               TAD [-130               /NO, CHANGE DELAYM TO -88 (DEC).
 2557  3024               DCA DELAYM              /DELAYM NOW SET TO -88 DECIMAL.
 2560  4563               UTLS                    /PRINT
 2561  4576               DELAY                   /DELAY A LITTLE LESS THAN 9 BIT TIMES
 2562  4566               UTSF                    /FLAG SET
 2563  7410               SKP                     /NO,  OK
 2564  5776'              JMP     P0E4A           /YES.
 2565  4577     P0TS4B,   SETLOC                  /SET DELAYM
 2566  0024               DELAYM                  /TO -7 (DEC)
 2567  7771               -7                      /
 2570  4576               DELAY                   /DELAY SO WE'RE PAST THE 9.5 BIT TIME POINT
 2571  4566               UTSF                    /FLAG SET?
 2572  5775'              JMP     P0E4B           /NO
 2573  5774'              JMP     P0TS4C          /CROSS PAGE

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 2575  2614
 2576  2607
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       2600               PAGE

 2600  4577     P0TS4C,   SETLOC
 2601  0024               DELAYM
 2602  7761               -17
 2603  4576               DELAY                   /DELAY SO WE'RE PAST THE END.
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2604  2062            ISZ     CTRA            /DONE 100 TIMES?
2605  5777'           JMP     P0TS4A          /NO,  DO TEST AGAIN
2606  5425            JMP I   CHAIN           /CHAIN


2607  7602    P0E4A,  HLT     CLA             /PROCESSOR TIMING TOO SLOW OR FLAG
                                              /SETTING TOO SOON.  (IS THE SLOW CYCLE
                                              /JUMPER REMOVED FROM THE PROCESSOR
                                              /TIMING MODULE? IS THE WRONG BAUD RATE SELECTED?
              /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2610  4563            UTLS                    /START PRINTER
2611  4566            UTSF                    /FLAG SET
2612  5211            JMP     .-1             /NO,  CHECK AGAIN
2613  5210            JMP     .-3             /REPEAT

2614  7602    P0E4B,  HLT     CLA             /FLAG NOT SETTING IN REQUIRED TIME.
              /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2615  5210            JMP     P0E4A+1         /GO TO SCOPE LOOP.


              /TEST TO CHECK THAT THE PUNCH/PRINTER FLAG SETS AT THE PROPER TIME.

2616  0005    P0TS5,  5
2617  2654            P0T6
2620  4430            JMS I $100
2621  4563            UTLS
2622  4566            UTSF
2623  5222            JMP .-1         /FLAG SET?
2624  4577    P0TS5A, SETLOC          /SET DELAYM TO
2625  0024            DELAYM          /-98 DECIMAL.
2626  7636            -142            /
2627  4563            UTLS            /PRINT
2630  4576            DELAY           /DELAY
2631  4566            UTSF            /FLAG SET?
2632  7610            SKP CLA         /NO, OK.
2633  5250            JMP P0E5A       /YES, ERROR.
2634  4577    P0TS5B, SETLOC          /SET DELAYM TO
2635  0024            DELAYM          /-4 DECIMAL.
2636  7774            -4              /
2637  4576            DELAY           /DELAY
2640  4566            UTSF            /FLAG NOW SET?
2641  5252            JMP P0E5B       /NO. ERROR.
2642  4576            DELAY
2643  4576            DELAY
2644  4576            DELAY
2645  2062            ISZ CTRA        /TEST DONE?
2646  5221            JMP P0TS5A-3    /NO. REPEAT.
2647  5425            JMP I CHAIN     /YES. CHAIN.

2650  7402    P0E5A;  HLT             /FLAG SETTING TO SOON.
              /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
2651  5210            JMP P0E4A+1

2652  7402    P0E5B,  HLT             /FLAG NOT S     NG SOON ENOUGH.
              /SCOPE LOOP.  PRESS CONTINUE TO ENT
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2653  5251            JMP P0E5A+1



                      /TEST OF GTF, TEST IS DONE
                      /4000 TIMES.

2654  0006  P0T6,    6
2655  2732            P0T7
2656  4431            JMS I S4000       /SET UP TO DO TEST 4000 TIMES.
2657  6007  P0T6A,   CAF                /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY INTERRUPT.
2660  7040            CMA
2661  6004            GTF               /GET INTERRUPT FLAGS
2662  0331            AND K5200         /MASK.
2663  7440            SZA
2664  7402  P0E6A,   HLT               /GTF FAILED.
2665  7360  P0T6B,   CLA CMA CLL CML   /SET LINK AND AC.
2666  6004            GTF               /GET INTERRUPT FLAGS.  (AC SHOULD EQUAL 4000).
2667  0331            AND K5200         /MASK.
2670  7420            SNL
2671  7402  P0E6B,   HLT               /GTF CLEARED LINK.
2672  7104  P0T6C,   CLL RAL           /(AC SHOULD EQUAL ZERO, LINK SHOULD EQUAL 1).
2673  7430            SZL
2674  7440            SZA
2675  7402  P0E6C,   HLT               /GTF DID NOT GET LINK.
2676  6007  P0T6D,   CAF                /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY INTERRUPT.
2677  4560            USPF              /SET PRINTER FLAG.
2700  6004            GTF               /GET INTERRUPT FLAGS.
2701  0331            AND K5200         /MASK.
2702  7006            RTL               /PUT INTERRUPT BUS = (AC SHOULD EQUAL 1000)
2703  7004            RAL               /=FLAG INTO LINK, (AC SHOULD EQUAL ZERO).
2704  7430            SZL               /IS LINK 1?
2705  7440            SZA               /IS AC ZERO?
2706  7402  P0E6D,   HLT               /GTF FAILED TO GET INTERRUPT BUS.
2707  4577  P0T6E,   SETLOC            /SET INTERRUPT RETURN LOCATION
2710  0002            2                 /TO P0T6F.
2711  2721            P0T6F
2712  6007            CAF               /CLEAR ALL FLAGS.
2713  6001            ION               /TURN INTERRUPT ON
2714  6004            GTF               /GET INTERRUPT FLAGS.
2715  0331            AND K5200
2716  4560            USPF              /SET PRINTER FLAG.
2717  7000            NOP               /(INTERRUPT).
2720  7402  P0E6E,   HLT               /GTF CLEARED ION.
2721  7102  P0T6F,   CLL BSW           /PUT ION = (AC SHOULD EQUAL 2002).
2722  7012            RTR               /FLAG INTO LINK, (AC SHOULD EQUAL 0020).
2723  7430            SZL               /LINK 1?
2724  7440            SZA               /AC ZERO?
2725  7402  P0E6F,   HLT               /GTF FAILED TO GET ION.
2726  2062            ISZ CTRA          /TEST DONE?
2727  5257            JMP P0T6A         /NO.  REPEAT.
2730  5425            JMP I CHAIN
2731  5200  K5200,   5200
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                    /TEST OF RTF. TEST IS DONE
                    /4000 TIMES.

2732  0007  P0T7,   7
2733  7777          7777
2734  4431          JMS I $4000       /SET UP TO DO TEST 4000 TIMES.
2735  4577          SETLOC            /SET INTERRUPT RETURN
2736  0002          2                 /TO P0T7C+3,
2737  2754          P0T7C+3
2740  7320  P0T7A,  CLA CLL CML       /AC EQUALS ZERO, LINK EQUALS 1.
2741  6005          RTF               /RESTORE FLAGS.
2742  7420          SNL               /LINK SET?
2743  7440          SZA               /AC ZERO?
2744  7402  P0E7A,  HLT               /RTF FAILED TO RESTORE LINK.
2745  7330  P0T7B,  CLA CLL CML RAR   /AC EQUALS 4000
2746  6005          RTF               /RESTORE FLAGS,  (LINK).
2747  7420          SNL               /LINK RESTORED?
2750  7402  P0E7B,  HLT               /RTF FAILED TO RESTORE LINK.
2751  4560  P0T7C,  USPF              /SET PRINTER FLAG.
2752  7000          NOP               /(INTERRUPT).
2753  7402  P0E7C,  HLT               /RTF DID NOT SET ION.
2754  2062          ISZ CTRA          /TEST DONE?
2755  5340          JMP P0T7A         /NO, REPEAT.
2756  5425          JMP I   CHAIN


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                    /PROGRAM 1,  LOOP AROUND INPUT TEST,  OUTPUT MUST
                    /BE CONNECTED TO INPUT.
                    /PROGRAM CHECKS INPUT AND OUTPUT IOT'S, INTERRUPT AND TIMING.

3000  4577  PRG1,   SETLOC
3001  0023          KSTART
3002  3005          P1TS0
3003  5604          JMP I   .+1
3004  0236          SRSET

                    /ISSUE KCC WITH AC=7777, AC SHOUD GO TO 0.
                    /AC NOT 0 INDICATES KCC FAILURE, TEST IS
                    /DONE 4000 TIMES.

3005  0000  P1TS0,  0
3006  3010          P1TS1
3007  4777'         JMS     P2TS0A

                    /ISSUE TLS AND THEN KCC.  WAIT TWICE     OR 11 BIT TIMES
                    /(SEE TABLE AT BEGINNING OF PROGRAM,  JR FLAG TO SET.
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                    /SKIP ON FLAG.  FAILURE TO SKIP INDICATES THE THE
                    /FLAG IS NOT SET, OR KSF FAILURE.  TEST IS DONE 100
                    /TIMES.

3010  0001  P1TS1,  1
3011  3034          P1TS2
3012  4430          JMS I S100        /SET UP TO DO TEST 100 TIMES.
3013  4432          JMS I S200        /SET DELAYM TO DELAY TWICE
                                      /10 BIT TIMES FOR AN NON 110
                                      /BAUD DEVICE AND TWICE 11 BIT
                                      /TIMES FOR AN 110 BAUD DEVICE.
                                      /SEE BIT TIME TABLE AT BEGINNING
                                      /OF PROGRAM.

3014  4571  P1TS1A, UKCC              /CLEAR AC AND KBRD FLFAG.
3015  4563          UTLS              /SEND.
3016  4576          DELAY             /DELAY TWICE 10 OR 11 BIT TIMES.
3017  4572          UKSF              /FLAG SET?
3020  5225          JMP     P1E1A     /NO.
3021  2062          ISZ     CTRA      /YES, TEST DONE 100 TIMES?
3022  5214          JMP P1TS1A        /NO, REPEAT.
3023  6007          CAF               /CLEAR
3024  5425          JMP I   CHAIN     /CHAIN.

3025  7602  P1E1A,  HLT CLA           /FLAG NOT SET OR KSF FAILURE.
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3026  4571          UKCC
3027  4563          UTLS
3030  4576          DELAY             /DELAY TWICE 10 OR 11 BIT TIMES
3031  4572          UKSF              /FLAG SET?
3032  5226          JMP     .-4       /NO, REPEAT
3033  5226          JMP     .-5       /YES, REPEAT.

                    /ISSUE TLS AND THEN KCC.  WAIT TWICE 10 OR 11 BIT TIMES
                    /(SEE TABLE AT BEGINNING OF PROGRAM) FOR FLAG TO SET.
                    /SKIP ON FLAG 4000 TIMES TO VERIFY CONSISTENT SKIPPING.

3034  0002  P1TS2,  2
3035  3066          P1TS3
3036  4432          JMS I S200        /SET DELAYM TO DELAY TWICE
                                      /10 BIT TIMES FOR AN NON 110
                                      /BAUD DEVICE AND TWICE 11 BIT
                                      /TIMES FOR AN 110 BAUD DEVICE.
                                      /SEE BIT TIME TABLE AT BEGINNING
                                      /OF PROGRAM.

3037  4431          JMS I S4000       /SET UP TO DO TEST 4000 TIMES.
3040  4571  P1TS2A, UKCC              /CLEAR AC AND KBRD FLAG.
3041  4563          UTLS              /SEND.
3042  4576          DELAY             /DELAY TWICE 10 OR 11 BIT TIMES.
3043  4565          UTCF              /CLEAR TELEPRINTER FLAG.
3044  4572          UKSF              /KEYBOARD FLAG SET?
3045  5253          JMP     P1E2A     /NO.
3046  4572  P1TS2B, UKSF              /YES, KEYBOARD FLAG SET?
3047  5262          JMP     P1E2B     /NO.
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3050  2062            ISZ CTRA        /YES, DONE 4000 TIMES?
3051  5246            JMP     P1TS2B  /NO, REPEAT
3052  5425            JMP I CHAIN     /CHAIN



3053  7602    P1E2A,  HLT CLA         /FLAG NOT SET OR KSF FAILED TO SKIP,
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3054  4571            UKCC
3055  4563            UTLS
3056  4572            UKSF
3057  4576            DELAY
3060  5254            JMP     .-4
3061  5260            JMP     .-1

3062  7602    P1E2B,  HLT CLA         /KSF FAILED TO SKIP.
                /SCOPE LOOP, PRESS CONTIUE TO ENTER.
3063  4572            UKSF
3064  5263            JMP     .-1
3065  5263            JMP     .-2



                /ISSUE TLS AND THEN KCC,  WAIT TWICE MAXIMUM BIT RATE FOR
                /FLAG TO SET,  RESET FLAG (TLS AND THEN KCC) AND SKIP ON FLAG
                /500 TIMES TO VERIFY NO SKIP OCCURS WITH FLAG = 2.

3066  0003    P1TS3,  3
3067  3126            P1TS4
3070  4577            SETLOC          /SET COUNT OF
3071  0062            CTRA            /-500 (DEC)
3072  7014            -764            /IN CTRA,
3073  4432            JMS I S200      /SET DELAYM TO DELAY TWICE
                                      /10 BIT TIMES FOR AN NON 110
                                      /BAUD DEVICE AND TWICE 11 BIT
                                      /TIMES FOR AN 110 BAUD DEVICE.
                                      /SEE BIT TIME TABLE AT BEGINNING
                                      /OF PROGRAM,
3074  4571    P1TS3A, UKCC            /CLEAR AC AND KBRD FLAG.
3075  4563            UTLS            /SEND,
3076  4576            DELAY           /DELAY TWICE 10 OR 11 BIT TIMES
3077  4572            UKSF            /FLAG SET,
3100  5313            JMP P1E3A       /NO,
3101  4571            UKCC            /CLEAR AND AND KBRD FLAG,
3102  4563            UTLS            /YES, SEND DATA,
3103  4572            UKSF            /FLAG SET
3104  5306            JMP .+2         /NO, OK
3105  5322            JMP P1E3B       /YES,
3106  4566            UTSF            /PRINTER FLAG SET?
3107  5306            JMP .-1         /NO, WAIT TO CONTINUE TEST,
3110  2062            ISZ CTRA        /DONE 500 TIMES?
3111  5301            JMP .-10        /NO REPEAT TEST
3112  5425            JMP I CHAIN     /CHAIN,

3113  7602    P1E3A,  HLT CLA         /FLAG NOT SE  /R KSF FAILED,
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                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3114  4563          UTLS              /SEND
3115  4571          UKCC              /CLEAR AC AND KBRD FLAG
3116  4576          DELAY
3117  4572          UKSF
3120  5314          JMP .-4
3121  5320          JMP .-1

3122  7602    P1E3B, HLT CLA          /KSF SKIPPED ON NO FLAG.
                    /SCOPE LOOP. PRESS CONTINUE TO ENTER.
3123  4563          UTLS
3124  4426          JMS I KBFLAG
3125  5323          JMP P1E3B+1

                    /THIS ROUTINE CHECKS THAT NO OTHER DEVICE CAN CAUSE AN INTERRUPT.
                    /AND THEN CHECKS THAT THE READER FLAG IS CAPABLE OF INTERRUPTING.

3126  0004    P1TS4, 4
3127  3200          P1TS5
3130  4577          SETLOC            /SET INTERRUPT RETURN
3131  0002          2                 /TO P1E4A
3132  3143          P1E4A             /
3133  4563    P1TS4A, UTLS            /SEND
3134  4426          JMS I KBFLAG
3135  4565          UTCF              /CLEAR PRINTER FLAG.
3136  4571          UKCC              /CLEAR READER FLAG
3137  6001          ION               /TURN INTERRUPT ON.
3140  7000          NOP               /
3141  6002          IOF               /TURN INTERRUPT OFF.
3142  5345          JMP .+3           /SKIP OVER.
3143  4776'   P1E4A, JMS INTFND       /UNEXPECTED INTERRUPT.
3144  5333          JMP P1TS4A        /TRY AGAIN.
3145  4577          SETLOC            /SET COUNT OF
3146  0062          CTRA              /-1000 (DEC)
3147  6030          -1750             /IN CTRA.
3150  4577          SETLOC            /SET INTERRUPT RETURN
3151  0002          2
3152  3167          P1TS4C
3153  4563    P1TS4B, UTLS            /SEND
3154  4426          JMS I KBFLAG
3155  4565          UTCF              /CLEAR PRINTER FLAG.
3156  6001          ION               /INTERRUPT ON.
3157  7000          NOP               /SHOULD INTERRUPT
3160  7402          HLT               /READER FLAG FAILED TO INTERRUPT OR
                                      /INTERRUPT SYSTEM MALFUNCTION.
3161  4577          SETLOC            /SET INTERRUPT RETURN
3162  0002          2
3163  3166          P1TS4C-1
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3164  6001          ION
3165  7000          NOP
3166  5364          JMP .-2

3167  2062    P1TS4C, ISZ CTRA        /DONE 1000 TIMES YET?
3170  5353          JMP P1TS4B        /NO. REPEAT
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3171  6007            CAF             /EXIT
3172  5425            JMP I CHAIN     /EXIT.

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                /TEST 5 CHECKS THE ABILITY OF:
                /SRQ TO SKIP ON AN INTERRUPT REQUEST.
                /SPI TO SKIP ON A TTY INTERRUPT REQUEST.
                /CAF TO CLEAR KBRD/READER FLAG.
                /SRQ TO NOT SKIP ON NO INTERRUPT REQUEST.
                /SPI TO NOT SKIP ON NO TTY INTERRUPT REQUEST.

3200  0005    P1TS5,  5
3201  3271            P1TS6
3202  4430            JMS I $100      /SET UP TO DO TEST 100 TIMES.
3203  6007            CAF             /CLEAR AND ENABLE INTERRUPT ENABLE FF
3204  4563    P1TS5A, UTLS            /SEND
3205  4426            JMS I KBFLAG
3206  4565            UTCF            /CLEAR PRINTER FLAG.
3207  6003            SRQ             /INTERRUPT REQUEST?
3210  5230            JMP P1E5A       /NO.
3211  4557    P1TS5B, USPI            /YES. TTY INTERRUPT REQUEST?
3212  5235            JMP P1E5B       /NO.
3213  6007    P1TS5C, CAF             /YES. CLEAR FLAG.
3214  4572            UKSF            /FLAG SET?
3215  7610            SKP CLA         /NO. OK
3216  5242            JMP P1E5C       /FLAG SET FOR SOME REASON.
3217  6003    P1TS5D, SRQ             /INTERRUPT REQUEST?
3220  7610            SKP CLA         /NO. OK
3221  5257            JMP P1E5D       /
3222  4557    P1TS5E, USPI            /TTY INTERRUPT REQUEST PRESENT?
3223  7610            SKP CLA         /NO. OK
3224  5264            JMP P1E5E       /
3225  2062            ISZ CTRA        /TEST DONE 100 TIMES?
3226  5204            JMP P1TS5A      /NO. REPEAT.
3227  5425            JMP I CHAIN     /CHAIN.

3230  7602    P1E5A,  HLT CLA         /SRQ FAILED TO SKIP ON KBRD. FLAG.
                /SCOPE LOOP.  PRESS CONTINE TO ENTER.
3231  4250            JMS P1E5
3232  6003            SRQ
3233  5231            JMP .-2
3234  5233            JMP .-1


3235  7602    P1E5B,  HLT CLA         /SPI FAILED TO SKIP ON KBRD FLAG.
                /SCOPE LOOP. PRESS CONTINUE TO ENTER.
3236  4250            JMS P1E5
3237  4557            USPI
3240  5236            JMP .-2
3241  5240            JMP .-1
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3242  7602    P1E5C,  HLT CLA          /CAF FAILED TO CLEAR KBRD FLAG.
                /SCOPE LOOP, PRESS CONTINUE TO ENTER.
3243  4250            JMS P1E5
3244  6007            CAF
3245  4566            UTSF
3246  5243            JMP P1E5C+1
3247  5243            JMP P1E5C+1

3250  0000    P1E5,   OPEN             /ROUTINE TO SET KBRD FLAG.
3251  7201            CLA IAC
3252  4561            UKIE
3253  4563            UTLS
3254  4426            JMS I KBFLAG
3255  4565            UTCF
3256  5650            JMP I P1E5       /EXIT

3257  7602    P1E5D,  HLT CLA          /SRQ SKIPPED WITH NO FLAG.
                /SCOPE LOOP, PRESS CONTINUE TO ENTER.
3260  6007            CAF
3261  6003            SRQ
3262  5260            JMP P1E5D+1
3263  5260            JMP P1E5D+1

3264  7602    P1E5E,  HLT CLA          /SPI SKIPPED WITH NO FLAG.
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER.
3265  6007            CAF
3266  4557            USPI
3267  5265            JMP P1E5E+1
3270  5265            JMP P1E5E+1



                /READER TIMING TEST,  CHECKS THAT READER FLAG IS = 1 NO
                /LATER THAN THE TIME FOR THE FLAG TO SET.

3271  0006    P1TS6,  6
3272  3314            P1TS7
3273  4430            JMS I S100       /SET UP TO DO TEST 100 TIMES.
3274  4577            SETLOC           /SET DELAYM
3275  0024            DELAYM           /TO -103 DECIMAL
3276  7631            M147             /
3277  4563    P1TS6A, UTLS             /SEND
3300  4571            UKCC             /RECEIVE
3301  4576            DELAY            /DELAY 10-11 BIT TIMES
3302  4565            UTCF             /CLEAR TELEPRINTER FLAG
3303  4572            UKSF             /KBRD FLAG SET?
3304  5310            JMP P1E6A        /FLAG NOT SET
3305  2062            ISZ CTRA         /DONE 100 TIMES YET?
3306  5277            JMP P1TS6A
3307  5425            JMP I CHAIN      /CHAIN.


3310  7602    P1E6A,  HLT CLA          /FLAG NOT SETTING IN REQUIRED TIME.
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```
                    /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3311  4563          P1E6A,  UTLS
3312  4426                  JMS I KBFLAG
3313  5311                  JMP P1E6A+1

                    /TEST OF KEYBOARD AND PUNCH BUFFER USING
                    /KRS AND KCC TO RECEIVE AND TPC AND TCF
                    /TO SEND.  A SPECIAL BINARY COUNT PATTERN
                    /IS USED.

3314  0007          P1TS7,  7
3315  3325                  P1T10
3316  4577                  SETLOC          /SET COUNT OF
3317  0062                  CTRA            /-512 (DEC)
3320  7000                  -1000           /IN CTRA,
3321  4777'                 JMS SINPT       /INITIALIZE SPECIAL BIN COUNT.
3322  4776'   P1TS7A, JMS SGET             /GET A NUMBER
3323  4337                  JMS TRDATA      /TRANSFER DATA AND CHECK.
3324  5322                  JMP P1TS7A      /REPEAT


                    /TEST OF KEYBOARD AND PUNCH BUFFERS USING RANDOM DATA.

3325  0010          P1T10,  10
3326  3400                  P1T11
3327  4577                  SETLOC          /SET COUNT OF
3330  0062                  CTRA            /-512 (DEC)
3331  7000                  -1000           /IN CTRA,
3332  4775'                 JMS SETRND      /INITIALIZE RANDOM NUMBER GENERATOR,
3333  4774'   P1T10A, JMS RGNB             /GET A RANDOM NUMBER.
3334  0145                  AND [377        /MASK,
3335  4337                  JMS TRDATA      /TRANSFER DATA AND CHECK.
3336  5333                  JMP P1T10A      /REPEAT

                    /SUBROUTINE USED BY P1TS7 AND P1T10

3337  0000          TRDATA, OPEN
3340  3346                  DCA HOLD1
3341  1346                  TAD HOLD1
3342  7421                  MQL             /STORE GOOD DATA IN MQ.
3343  7701                  ACL             /RELOAD AC WITH THE GOOD
3344  4353                  JMS SNDREC      /TRANSMIT AND RECEIVE
3345  4470                  JMS I CHECK     /DID I RECEIVE WHAT I SENT?
3346  0000          HOLD1,  OPEN            /WHAT I SENT,
3347  5366                  JMP P1E710      /RECEIVED NOT SAME AS SENT.
3350  2062                  ISZ CTRA        /DONE?
3351  5737                  JMP I TRDATA    /NO.
3352  5425                  JMP I CHAIN     /YES, CHAIN,

                    /ROUTINE TO SEND AND RECEIVE DATA.

3353  0000          SNDREC, OPEN
3354  4565                  UTCF
3355  4564                  UTPC
3356  4571                  UKCC
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3357  4572            UKSF
3360  5357            JMP .-1
3361  7200            CLA             /JUST IN CASE
3362  4570            UKRS
3363  4566            UTSF
3364  5363            JMP .-1
3365  5753            JMP I SNDREC    /EXIT WITH RECEIVED DATA IN AC.


                /COMMON HLT FOR P1TS7 AND P1T10.

3366  7402    P1E710, HLT             /DATA RECEIVED DOES NOT
                                      /AGREE WITH DATA SENT.
                                      /MQ CONTAINS DATA THAT WAS SENT.
                                      /AC CONTAINS DATA THAT WAS RECEIVED.
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3367  7701              ACL
3370  4353              JMS SNDREC
3371  5367              JMP P1E710+1    /STAY IN LOOP.

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                /TEST OF KRS TO DO AN "OR" BY READING
                /RANDOM DATA FROM KBRD BUFFER INTO AC
                /EQUAL TO 7777.  TEST IS DONE 500 TIMES.

3400  0011    P1T11,  11
3401  3435            P1T12
3402  4577            SETLOC          /SET COUNT OF
3403  0062            CTRA            /-500 (DEC)
3404  7014            -764            /IN CTRA.
3405  6007    P1T11A, CAF             /CLEAR THE WORLD.
3406  4777'           JMS RGNB        /GET A RANDOM NUMBER
3407  7421            MQL             /STORE IT IN MQ
3410  7701            ACL             /RELOAD AC
3411  4563            UTLS            /
3412  4566            UTSF            /FLAG SET YET?
3413  5212            JMP .-1         /NO, WAIT.
3414  7240            CLA CMA         /7777 TO AC
3415  4570            UKRS            /READ KBRD BUFFER.
3416  7040            CMA             /AC SHOULD NOW EQUAL 0
3417  7440            SZA             /DOES IT = 0?
3420  5224            JMP P1E11A      /NO.
3421  2062            ISZ CTRA        /DONE 500 TIMES YET?
3422  5205            JMP P1T11A      /NO, REPEAT
3423  5425            JMP I CHAIN     /YES CHAIN.
```

```
3424  7402    P1E11A, HLT             /KRS FAILED TO "OR" KBRD WITH AC
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3425  6007            CAF
3426  7701            ACL             /MQ TO AC
3427  4563            UTLS
3430  4566            UTSF
3431  5230            JMP .-1
3432  7240            CLA CMA
3433  4570            UKRS
3434  5225            JMP P1E11A+1

                /TEST OF KRB

3435  0012    P1T12,  12
3436  7777            7777
3437  4430            JMS I $100
3440  4577            SETLOC          /SET DELAYM
3441  0024            DELAYM          /TO -103 DEC.
3442  7631            M147
3443  6007    P1T12A, CAF             /CLEAR THE WORLD.
3444  1134            TAD [252        /AC =252
3445  4563            UTLS            /SEND
3446  4566            UTSF            /DONE SENDING YET?
3447  5246            JMP .-1         /NO
3450  7240            CLA CMA         /7777
3451  4567            UKRB            /CLEAR AC, FLAG AND READ BUFFER.
3452  7041            CMA IAC         /CHANGE TO A NEGATIVE NUMBER
3453  1134            TAD [252        /ADD SENT DATA TO AC
3454  7440            SZA             /WERE THEY EQUAL?
3455  5264            JMP P1E12A      /NO
3456  4572    P1T12B, UKSF            /FLAG CLEAR?
3457  7610            SKP CLA         /YES
3460  5274            JMP P1E12B      /NO.
3461  2062            ISZ CTRA        /DONE TEST YET?
3462  5243            JMP P1T12A      /NO, REPEAT
3463  5425            JMP I CHAIN     /YES, CHAIN.

3464  7402    P1E12A, HLT             /KRB FAILED TO JAM READER BUFFER TO AC.
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3465  6007            CAF             /CLEAR THE WORLD.
3466  1134            TAD [252
3467  4563            UTLS
3470  4566            UTSF
3471  5270            JMP .-1
3472  4567            UKRB
3473  5265            JMP P1E12A+1

3474  7402    P1E12B, HLT             /KRB FAILED TO CLEAR READER FLAG.
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3475  6007            CAF
3476  4563            UTLS
3477  4566            UTSF
3500  5277            JMP .-1
3501  4567            UKRB
3502  5275            JMP P1E12B+1
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                        /PROGRAM 2, ASR 33/35 TELETYPE BASIC INPUT TESTS.
                        /PROGRAM CHECKS INPUT IOT'S, INTERRUPT, AND READER TIMING

3503  4577    PRG2,   SETLOC          /SET KSTART TO INITIAL
3504  0023            KSTART          /ROUTINE ADDRESS.
3505  3510            P2TS0
3506  5707            JMP I .+1       /GO START TEST
3507  0236            SRSET

                        /ISSUE KCC WITH AC=7777.  AC SHOULD GO TO 0.
                        /AC NOT 0 INDICATES KCC FAILURE.  TEST IS DONE 100 TIMES.

3510  0000    P2TS0,  0
3511  3530            P2TS1
3512  4313            JMS P2TS0A
3513  0000    P2TS0A, OPEN
3514  4431            JMS I S4000     /SET UP TO DO TEST 4000 TIMES.
3515  7240            CLA CMA         /SET AC TO 7777
3516  4571            UKCC            /CLEAR AC AND FLAG
3517  7440            SZA             /IS AC = 0?
3520  5324            JMP P2E0        /NO,  ERROR,  GO TO P2E0
3521  2062            ISZ CTRA        /DONE?
3522  5315            JMP .-5         /NO,  REPEAT
3523  5425            JMP I CHAIN     /CHAIN
3524  7402    P2E0,   HLT             /TST0 ERR HALT,  KCC DID
                                      /NOT RESULT IN AC = 0
3525  7240            CLA CMA         /SET A TO 7777
3526  4571            UKCC            /CLEAR AC AND FLAG
3527  5325            JMP .-2         /RPEAT

                        /ISSUE KCC, WAIT TWICE 10-11 BIT TIMES FOR FLAG TO SET.
                        /SKIP ON FLAG,  FAILURE TO SKIP INDICATES
                        /THAT FLAG IS NOT SET, OR KSF FAILURE.
                        /TEST IS DONE 100 TIMES.
3530  0001    P2TS1,  1
3531  3545            P2TS2
3532  4432            JMS I S200      /SET DELAYM TO DELAY TWICE
                                      /10 BIT TIMES FOR AN NON 110
                                      /BAUD DEVICE AND TWICE 11 BIT
                                      /TIMES FOR AN 110 BAUD DEVICE.
                                      /SEE BIT TIME TABLE AT BEGINNING
                                      /OF PROGRAM.

3533  4430    P2TS1A, JMS I S100      /SET UP TO DO TEST 100 TIMES.
3534  4571    P2TS1B, UKCC            /CLEAR AC AND FLAG
3535  4576            DELAY           /GO DELAY
3536  4572            UKSF            /SKIP ON FLAG = 1
3537  5343            JMP P2E1        /ERROR, GO TO E1
3540  2062            ISZ CTRA        /ALL DONE?
3541  5334            JMP P2TS1B      /NO, REPEAT
3542  5425            JMP I CHAIN     /CHAIN
3543  7402    P2E1,   HLT             /TST1 ERROR HALT, FLAG IS NOT
                                      /SET, OR KSF FAILED
```

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3544  5333            JMP P2TS1A      /RESTARTING TEST,


                  /ISSUE KCC, WAIT TWICE 10-11 BIT TIMES FOR FLAG TO BE SET,
                  /SKIP ON FLAG 1000 TIMES TO VERIFY CONSISTENT SKIPPING.
3545  0002  P2TS2, 2
3546  3600            P2TS3
3547  4432            JMS I $200      /SET DELAYM TO DELAY TWICE
                                      /10 BIT TIMES FOR AN NON 110
                                      /BAUD DEVICE AND TWICE 11 BIT
                                      /TIMES FOR AN 110 BAUD DEVICE.
                                      /SEE BIT TIME TABLE AT BEGINNING
                                      /OF PROGRAM,

3550  4431            JMS I $4000     /SET UP TO DO TEST 4000 TIMES.
3551  4571  P2TS2A, UKCC              /CLEAR AC AND FLAG
3552  4576            DELAY           /GO DELAY
3553  4572            UKSF            /SKIP ON FLAG = 1
3554  5362            JMP P2E2A       /DID NOT SKIP, GO TO E2A
3555  4572            UKSF            /SKIP ON FLAG = 1
3556  5364            JMP P2E2B       /DID NOT SKIP, GO TO E2B
3557  2062            ISZ CTRA        /ALL DONE?
3560  5355            JMP .-3         /NO,  REPEAT
3561  5425            JMP I CHAIN     /CHAIN
3562  7402  P2E2A,  HLT               /TST2 ERROR HALT, FLAG
                                      /NOT SET OR KSF FAILURE,
3563  5351            JMP P2TS2A
3564  7402  P2E2B,  HLT               /TST2 ERR HALT B,
                                      /KSF FAILURE
3565  4572            UKSF            /SKIP ON FLAG = 1
3566  5365            JMP .-1         /REPEAT
3567  5365            JMP .-2         /REPEAT

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                  /ISSUE KCC,  WAIT TWICE 10-11 BIT TIMES  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,
3600  0003  P2TS3, 3
3601  3630            P2TS4
3602  4432            JMS I $200      /SET DELAYM TO DELAY TWICE
                                      /10 BIT TIMES FOR AN NON 110
                                      /BAUD DEVICE AND TWICE 11 BIT
                                      /TIMES FOR AN 110 BAUD DEVICE.
                                      /SEE BIT TIME TABLE AT BEGINNING
                                      /OF PROGRAM,

3603  4577            SETLOC          /SET COUNT
3604  0062            CTRA            /-500 (DEC)
```

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3005  7014              -764              /CTRA
3006  4571    P2TS3A,   UKCC              /CLEAR FLAG
3007  4576              DELAY             /GO DELAY
3010  4572              UKSF              /READY?
3011  5221              JMP P2E3A         /NO,  ERROR
3012  4571              UKCC              /YES,  RESET FLAG
3013  4572              UKSF              /READY?
3014  5216              JMP .+2           /NO,  OK
3015  5223              JMP P2E3B         /YES,  ERROR
3016  2062              ISZ CTRA          /ALL DONE TESTING?
3017  5213              JMP .-4           /NO,  REPEAT
3020  5425              JMP I CHAIN       /YES,  CHAIN
3021  7402    P2E3A,    HLT               /TST3 ERR HALT A,  FLAG
                                          /NOT SET OR KSF FAILURE
3022  5206              JMP P2TS3A        /TRY AGAIN
3023  7402    P2E3B,    HLT               /TST3 ERR HALT B,  FLAG
                                          /FAILED TO RESET, OR KSF
                                          /SKIPPED ERRONEOUSLY.

                /TURN OFF READER BEFORE ENTERING
                /SCOPE LOOP.
3024  4571              UKCC              /CLEAR FLAG AND AC
3025  4572              UKSF              /SKIP ON FLAG = 1
3026  5224              JMP .-2           /REPEAT
3027  5224              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.
3030  0004    P2TS4,    4
3031  3671              P2TS5
3032  4577              SETLOC            /SET INTERRUPT RETURN
3033  0002              2                 /TO P2E4A,
3034  3644              P2E4A
3035  4565    P2TS4A,   UTCF              /CLEAR PUNCH/PRINTER FLAG
3036  4426              JMS I KBFLAG
3037  4571              UKCC              /CLEAR READER FLAG
3040  6001              ION               /ENABLE INTERRUPT
3041  7000              NOP
3042  6002              IOF               /TURN OFF INTERRUPT
3043  5246              JMP .+3
3044  4777'   P2E4A,    JMS INTFND        /UNEXPECTED INTERRUPT
3045  5235              JMP P2TS4A        /TRY AGAIN
3046  4431              JMS I S4000       /SET UP TO DO TEST 4000 TIMES,
3047  4577              SETLOC            /SET INTERRUPT RETURN
3050  0002              2                 /TO P2TS4C,
3051  3666              P2TS4C
3052  4571              UKCC
3053  4572              UKSF              /WAIT FOR READER FLAG
3054  5253              JMP .-1           /TO SET
3055  6001    P2TS4B,   ION               /ENABLE INTERRUPT
3056  7000              NOP
3057  7402    P2E4B,    HLT               /READER FLAG FAILED TO INTERRUPT,
                                          /OR INTERRUPT SYSTEM MALFUNCTION
3060  4577              SETLOC            /SET INTERRUPT RETURN
```

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3661  0002            2               /TO P2TS4C-1,
3662  3665            P2TS4C-1
                /SCOPE LOOP
3663  6001            ION
3664  7000            NOP
3665  5263            JMP .-2
                /
3666  2062    P2TS4C, ISZ CTRA        /DONE?
3667  5255            JMP P2TS4B      /NO,REPEAT
3670  5425            JMP I CHAIN



                /READER TIMING TEST, CHECKS THAT READER FLAG IS -1 NO
                /LATER THAN 103 MILLISECONDS AFTER KCC INSTRUCTION IS ISSUED.
                /
3671  0005    P2TS5,  5
3672  3711            P2TS6
3673  4577            SETLOC          /SET DELAYM
3674  0024            DELAYM          /TO -103
3675  7631            M147
3676  4430            JMS I $100      /SET UP TO DO TEST 100 TIMES.
3677  4571    P2TS5A, UKCC            /START READER, CLEAR PC FLAG
3700  4576            DELAY           /GO DELAY 103 MILLISECS
3701  4572            UKSF
3702  5306            JMP P2E5
3703  2062            ISZ CTRA
3704  5277            JMP P2TS5A
3705  5425            JMP I CHAIN
3706  7402    P2E5,   HLT             /TST5 ERR HALT, FLAG NOT=1
                                      /103 MSECS AFTER KCC INSTRUCTION.
3707  4426            JMS I KBFLAG
3710  5305            JMP .-3         /YES, REPEAT.



                /READ 256 DIFFERENT CHARACTERS, EACH CHARACTER IS READ 1000 TIMES
                /TO VERIFY CONSISTENCY OF READING FROM TTI.
                /
3711  0006    P2TS6,  6
3712  3762            P2TS7
3713  4577            SETLOC          /SET COUNT OF
3714  0062            CTRA            /-256(DEC)
3715  7400            -400            /IN CTRA
3716  4426    P2TS6A, JMS I KBFLAG
3717  4570            UKRS            /READ CHARACTER.
3720  3112            DCA WTS6A       /SAVE AT WTS6A.
3721  4577            SETLOC          /SET COUNT OF
3722  0063            CTRB            /CTRB
3723  6030            -1750           /-1000 (DEC) IN
3724  7200    P2TS6B, CLA
3725  4570            UKRS            /READ CHARACTER.
3726  7421            MQL             /STORE IN MQ
3727  7701            ACL             /GET IT BAC    ITO THE AC.
3730  7041            CIA             /2'S COMPLE    F IT
```

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3731  1112            TAD WTS6A       /ADD EXPECTED CHAR.
3732  7640            SZA CLA         /RESULT 0?
3733  5346            JMP P2E6A       /NO. ERROR, GO TO E6A.
3734  7240  P2TS6C,   CLA CMA
3735  4570            UKRS            /READ CHARACTER
3736  7040            CMA
3737  7440            SZA             /AC STILL 7777
3740  5356            JMP P2E6C       /NO. ERROR GO TO P2E6C.
3741  2063            ISZ CTRB        /READ CHAR 100 TIMES?
3742  5324            JMP P2TS6B      /NO. GO READ IT AGAIN.
3743  2062            ISZ CTRA        /YES, READ 256 DIFF. CHARS?
3744  5316            JMP P2TS6A      /NO.
3745  5425            JMP I CHAIN     /YES, CHAIN

3746  7701  P2E6A,   ACL             /MQ TO AC.
3747  7402            HLT             /TST6 ERR HALT A, AC DISPLAYS
                                      /INCORRECTLY READ CHAR. DEPRESS
                                      /KEY CONTINUE
3750  7200            CLA
3751  1112            TAD WTS6A
3752  7402  P2E6B,   HLT             /TST6 ERR HALT B, AC DISPLAYS
                                      /WHAT THE CORRECT CHAR SHOULD
                                      /BE.
3753  7200            CLA
3754  4570            UKRS            /READ CHARACTER
3755  5353            JMP .-2         /LOOP BACK

3756  7402  P2E6C,   HLT             /KRS FAILED TO "OR" KBRD BUFFER WITH AC.
      /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
3757  7240            CLA CMA
3760  4570            UKRS
3761  5357            JMP P2E6C+1



      /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.

3762  0007  P2TS7,   7
3763  4030            P2T10
3764  4430            JMS I $100      /SET UP TO DO TEST 100 TIMES.
3765  4432            JMS I $200      /SET DELAYM TO DELAY TWICE
                                      /10 BIT TIMES FOR AN NON 110
                                      /BAUD DEVICE AND TWICE 11 BIT
                                      /TIMES FOR AN 110 BAUD DEVICE.
                                      /SEE BIT TIME TABLE AT BEGINNING
                                      /OF PROGRAM.

3766  5776'           JMP P2TS7A

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4000  4426    P2TS7A, JMS I KBFLAG
4001  7240            CLA CMA          /AC=7777,
4002  4562            UKCR             /CLEAR READER FLAG,
4003  7040            CMA              /AC SHOULD EQUAL ZERO NOW,
4004  7440            SZA              /RESULT 0?
4005  5215            JMP P2E7A        /NO, ERROR, GO TO P2E7A,
4006  4576    P2TS7B, DELAY            /GO DELAY 200 MILLISECS,
4007  4572            UKSF             /READER FLAG SET?
4010  7410            SKP              /NO,
4011  5221            JMP P2E7B        /YES, READER FLAG SET.  ERROR, GO TO P2E7B,
4012  2062            ISZ CTRA         /TEST DONE?
4013  5200            JMP P2TS7A       /NO, REPEAT,
4014  5425            JMP I CHAIN

4015  7402    P2E7A,  HLT              /KCR CLEARED AC,
              /SCOPE LOOP,  PRESS CONTINUE TO ENTER,
4016  7240            CLA CMA          /AC=7777,  (SCOPE LOOP),
4017  4562            UKCR             /CLEAR READER RUN,  SHOULD NOT CLEAR AC,
4020  5216            JMP .-2          /REPEAT,

4021  7402    P2E7B,  HLT              /KCR DID NOT CLEAR READER FLAG
              /SCOPE LOOP,  PRESS CONTINUE TO ENTER,
4022  4426            JMS I KBFLAG
4023  4562            UKCR             /CLEAR READER RUN,
4024  4576            DELAY            /GO DELAY 200 MILLISECS
4025  4572            UKSF
4026  5222            JMP P2E7B+1      /REPEAT,
4027  5222            JMP P2E7B+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 4000 TIMES,

4030  0010    P2T10,  10
4031  4153            P2T11
4032  4431            JMS I S4000      /SET UP TO DO TEST 4000 TIMES,
4033  4426            JMS I KBFLAG
4034  4577    P2T10A, SETLOC           /SET INTERRUPT RETURN LOCATION
4035  0002            2                /TO P2E10A,
4036  4073            P2E10A
4037  4572            UKSF
4040  5233            JMP P2T10A+1
4041  7200            CLA              /AC=0
4042  4561            UKIE             /DISABLE TTY INTERRUPT
4043  6001            ION              /TURN INTERRUPT ON
4044  7000            NOP
4045  6002    P2T10B, IOF              /TURN INTERRUPT OFF,
4046  6003            SRQ              /SKIP IF INTERRUPT REQUEST,
4047  7410            SKP
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4050  5307            JMP P2E10B      /ERROR, SRQ FAILED, GO TO P2E10B.
4051  4557  P2T10C,   USPI            /SKIP IF TTY INTERRUPT.
4052  7410            SKP
4053  5315            JMP P2E10C      /ERROR,  SPI FAILED, GO TO P2E10C.
4054  4577  P2T10D,   SETLOC          /SET INTERRUPT RETURN LOCATION
4055  0002            2               /TO P2T10E
4056  4064            P2T10E
4057  7201            CLA IAC         /AC11=1
4060  4561            UKIE            /ENABLE TTY INTERRUPT.
4061  6001            ION             /TURN INTERRUPT ON.
4062  7000            NOP             /(SHOULD INTERRUPT).
4063  5323            JMP P2E10D      /ERROR, GO TO P2E10D.
4064  6003  P2T10E,   SRQ             /SKIP IF INTERRUPT REQUEST.
4065  5335            JMP P2E10E      /ERROR, GO TO P2E10E.
4066  4557  P2T10F,   USPI            /SKIP IF TTY INTERRUPT.
4067  5344            JMP P2E10F      /ERROR,  GO TO P2E10F.
4070  2062            ISZ CTRA        /DONE?
4071  5234            JMP P2T10A      /NO, REPEAT.
4072  5425            JMP I CHAIN


4073  7402  P2E10A,   HLT             /KIE FAILED TO DISABLE TTY.
                      /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
4074  4572            UKSF            /IS READER FLAG SET?
4075  4777'           JMS INTFND      /NO,  UNEXPECTED INTERRUPT.
4076  4577            SETLOC          /SET INTERRUPT RETURN LOCATION
4077  0002            2               /TO P2E10A+1.
4100  4074            P2E10A+1
4101  4426            JMS I KBFLAG            /(SCOPE LOOP).
4102  7200            CLA
4103  4561            UKIE            /DISABLE TTY INTERRUPT.
4104  6001            ION             /INTERRUPT ON.
4105  7000            NOP
4106  5274            JMP P2E10A+1    /REPEAT.


4107  7602  P2E10B,   HLT CLA         /SRQ SKIPPED WITH TTY DISABLED.
                      /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
4110  4426            JMS I KBFLAG
4111  4561            UKIE
4112  6003            SRQ             /SKIP IF INTERRUPT, (AC11=0). REQUEST.  (SHOULD NOT SKIP)
4113  5310            JMP P2E10B+1    /REPEAT
4114  5310            JMP P2E10B+1    /REPEAT

4115  7602  P2E10C,   HLT CLA         /SPI SKIPPED WITH TTY DISABLED.
                      /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
4116  4426            JMS I KBFLAG
4117  4561            UKIE            /DISABLE TTY INTERRUPT, (AC11=0).
4120  4557            USPI            /SKIP IF TTY INTERRUPT REQUEST  (SHOULD NOT SKIP).
4121  5316            JMP P2E10C+1    /REPEAT.
4122  5316            JMP P2E10C+1    /REPEAT.

4123  7402  P2E10D,   HLT             /KIE FAILED TO ENABLE TTY INTERRUPT WITH AC11=1.
                      /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
4124  4577            SETLOC          /SET INTERRUPT RETURN LOCATION
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4125  0002            2                   /TO P2E10D+4,
4126  4127            P2E10D+4
4127  7201            CLA IAC             /(SCOPE LOOP).
4130  4561            UKIE                /ENABLE TTY INTERRUPT.
4131  4426            JMS I KBFLAG
4132  6001            ION                 /TURN INTERRUPT ON.
4133  7000            NOP
4134  5327            JMP P2E10D+4        /REPEAT.


4135  7402    P2E10E, HLT                 /SRQ FAILED TO SKIP.
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
4136  7201            CLA IAC             /(SCOPE LOOP).
4137  4561            UKIE                /ENABLE TTY INTERRUPT.
4140  4426            JMS I KBFLAG
4141  6003            SRQ                 /SKIP IF INTERRUPT REQUEST.
4142  5336            JMP P2E10E+1        /REPEAT.
4143  5336            JMP P2E10E+1        /REPEAT.


4144  7402    P2E10F, HLT                 /SPI FAILED TO SKIP.
                /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
4145  7201            CLA IAC             /(SCOPE LOOP).
4146  4561            UKIE                /ENABLE TTY INTERRUPT.
4147  4426            JMS I KBFLAG
4150  4557            USPI                /SKIP IF TTY INTERRUPT.
4151  5345            JMP P2E10F+1        /REPEAT.
4152  5351            JMP .-1             /REPEAT.


                /ISSUE KIE WITH AC11=0 TO DISABLE TTY.
                /ISSUE CAF WITH AC, LINK, AND READER FLAG SET.
                /TTY NOT ENABLED, OR AC AND LINK NOT
                /ZERO INICATES A FAILURE.  TEST IS DONE 100 TIMES.

4153  0011    P2T11,  11
4154  4233            P2T12
4155  4430            JMS I $100          /SET UP TO DO TEST 100 TIMES.
4156  4432            JMS I $200          /SET DELAYM TO DELAY TWICE
                                          /10 BIT TIMES FOR AN NON 110
                                          /BAUD DEVICE AND TWICE 11 BIT
                                          /TIMES FOR AN 110 BAUD DEVICE.
                                          /SEE BIT TIME TABLE AT BEGINNING
                                          /OF PROGRAM.

4157  4561    P2T11A, UKIE                /DISABLE TTY (AC 11=0).
4160  4426            JMS I KBFLAG
4161  7360            CLA CMA CLL CML     /AC AND LINK SET,
4162  6007            CAF                 /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY.
4163  7420            SNL
4164  7440            SZA
4165  5776'           JMP P2E11A          /ERROR, GO TO P2E11A.
4166  4576    P2T11B, DELAY               /GO DELAY 200 MILLI SEC.
4167  4572            UKSF                /DID FLAG C    UP?
4170  7610            SKP CLA
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4171  5775'          JMP P2E11B      /YES, ERROR, GO TO P2E11B.
4172  5774'          JMP P2T11C      /CROSS PAGE

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4200  4426  P2T11C, JMS I KBFLAG
4201  4557          USPI            /SKIP IF TTY INTERRUPT REQUEST.
4202  5224          JMP P2E11C      /ERROR, GO TO P2E11C.


4203  2062          ISZ CTRA        /TEST DONE?
4204  5777'         JMP P2T11A      /NO, REPEAT.
4205  5425          JMP I CHAIN

4206  7402  P2E11A, HLT             /CAF FAILED TO CLEAR AC AND LINK.
            /SCOPE LOOP. PRESS CONTINUE TO ENTER.
4207  7360          CLA CMA CLL CML /(SCOPE LOOP).
4210  6007          CAF             /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY.
4211  7420          SNL
4212  7440          SZA
4213  5207          JMP P2E11A+1    /REPEAT.
4214  5207          JMP P2E11A+1    /REPEAT.

4215  7402  P2E11B, HLT             /CAF DID NOT CLEAR FLAG OR FLAG SET AFTER BEING CLEARED.
            /SCOPE LOOP. PRESS CONTINUE TO ENTER.
4216  4426          JMS I KBFLAG
4217  6007          CAF             /CLEAR THE FLAG.
4220  4576          DELAY           /GO DELAY 200 MILLISEC.
4221  4572          UKSF            /FLAG SET?
4222  5216          JMP P2E11B+1    /REPEAT
4223  5216          JMP P2E11B+1    /REPEAT


4224  7602  P2E11C, HLT CLA         /CAF FAILED TO ENABLE TTY.
            /SCOPE LOOP. PRESS CONTINUE TO ENTER.
4225  4561          UKIE            /DISABLE TTY,  (AC11=0)
4226  6007          CAF             /ENABLE TTY,
4227  4426          JMS I KBFLAG
4230  4557          USPI            /SKIP IF INT REQUEST FROM TTY.
4231  5225          JMP P2E11C+1    /REPEAT
4232  5225          JMP P2E11C+1    /REPEAT.


            /TEST OF KRB INSTRUCTION.

4233  0012  P2T12,  12
4234  7777          7777
4235  4577          SETLOC          /SET COUNT OF
4236  0062          CTRA            /-256 DECIMAL
4237  7400          -400            /IN CTRA
4240  4577          SETLOC          /SET DELAYM
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```
4241  0024            DELAYM          /TO -103
4242  7631            M147            /DECIMAL.
4243  4426            JMS I KBFLAG
4244  4570            UKRS            /GET THE CHARACTER.
4245  3112            DCA WTS6A       /SAVE IT
4246  4426            JMS I KBFLAG    /ADVANCE TAPE AND BRING NEW CHARACTER INTO BUFFER.
4247  1145  P2T12A,   TAD [377
4250  4567            UKRB            /READ BUFFER,CLEAR FLAG, ADVANCE TAPE
4251  4572            UKSF            /FLAG CLEAR?
4252  7410            SKP             /YES, OK.
4253  5276            JMP P2E12A      /NO, ERROR.
4254  3104            DCA UTEMP
4255  4576  P2T12B,   DELAY           /DELAY 10 OR 11 BIT TIMES
4256  4572            UKSF            /FLAG NOW SET?
4257  5303            JMP P2E12B      /NO, ERROR.
4260  1112  P2T12C,   TAD WTS6A       /GET GOOD.
4261  7421            MQL             /MQ CONTAINS GOOD DATA
4262  7701            ACL             /RELOAD AC WITH GOOD FROM MQ.
4263  7001            IAC             /ADD ONE TO IT.
4264  3112            DCA WTS6A       /SAVE IT
4265  1112            TAD WTS6A       /GET IT BACK.
4266  0145            AND [377        /KEEP DESIRED DATA.
4267  7041            CMA IAC         /NEGATE IT.
4270  1104            TAD UTEMP       /ADD LAST READ CHARACTER TO IT.
4271  7640            SZA CLA         /ARE THEY EQUAL.
4272  5305            JMP P2E12C      /NO, ERROR
4273  2062            ISZ CTRA        /DONE?
4274  5247            JMP P2T12A      /NO, REPEAT.
4275  5425            JMP I CHAIN     /YES, CHAIN.

4276  7402  P2E12A,   HLT             /KRB FAILED TO CLEAR READER FLAG.
                      /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
4277  4426            JMS I KBFLAG
4300  4567            UKRB
4301  4576            DELAY
4302  5277            JMP P2E12A+1

4303  7402  P2E12B,   HLT             /KRB FAILED TO SET FLAG.
                      /SCOPE LOOP.  PRESS CONTINUE TO ENTER.
4304  5277            JMP P2E12A+1

4305  7402  P2E12C,   HLT             /KRB FAILED TO READ CORRECT DATA.
                      /PRESS CONTINUE TO TRY TEST AGAIN.
4306  5235            JMP P2T12+2     /TRY TEST AGAIN.



                      /PROGRAM 3, ASR33/35 TELETYPE READER TEST, CHECKS ABILITY OF READER
                      /TO CORRECTLY READ AT FULL SPEED AND WITH RANDOM STALLS.
4307  4577  PRG3,     SETLOC          /SET KSTART TO INITIAL
4310  0023            KSTART          /ROUTINE ADDRESS.
4311  4314            P3TS0
4312  5713            JMP I .+1       /GO START
4313  0236            SRSET
```

```
                    /READ 4095 CHARACTERS, AT FULL SPEED, MATCHING EACH CHARACTER
                    /READ AGAINST COUNT PATTERN
                    /
4314  0000    P3TS0,  0
4315  4344            P3TS1
4316  4465            JMS I SYNC          /GO SYNC TAPE
4317  4577            SETLOC              /SET COUNT OF
4320  0062            CTRA                /-4095(DEC) IN
4321  0001            -7777               /CTRA
4322  4571            UKCC                /START READER
4323  4466            JMS I INPATT        /GO INITIALIZE PATTERN
4324  4467    P3TS0A, JMS I GETPT         /GET PATTERN CHARACTER
4325  3332            DCA SB0             /STORE AT SB0
4326  4572            UKSF                /READY?
4327  5326            JMP .-1             /NO,  TEST AGAIN
4330  4567            UKRB                /YES,  READ CHARACTER
4331  4470            JMS I CHECK         /GO CHECK FOR CORRECT MATCH
4332  0000    SB0,    0                   /CORRECT CHAR HERE
4333  5337            JMP P3E0            /ERROR,  GO TO P3E0
4334  2062    P3T0B,  ISZ CTRA            /OK,  ALL DONE?
4335  5324            JMP P3TS0A          /NO,  REPEAT
4336  5425            JMP I CHAIN         /YES,  CHAIN
4337  7402    P3E0,   HLT                 /TST10 ERR HALT,  AC CONTAINS
                                          /CHAR THAT DID NOT MATCH
                                          /AGAINST PATTERN,  EPRESS
                                          /KEY CONTINUE
4340  7200            CLA
4341  1332            TAD SB0             /GET CORRECT CHARACTER
4342  7402            HLT                 /AC CONTAINS THE EXPECTED CHARACTER
4343  5334            JMP P3T0B



                    /READ 2000 CHARACTERS WITH RANDOM DELAY BETWEEN CHARACTERS,
                    /MATCH EACH CHARACTER READ AGAINST COUNT PATTERN
                    /
4344  0001    P3TS1,  1
4345  4400            P3TS2
4346  4465            JMS I SYNC          /TO SYNC TAPE
4347  4577            SETLOC              /SET COUNT OF
4350  0062            CTRA                /-2000 (DEC) IN
4351  4060            -3720               /CTRA
4352  4571            UKCC                /START READER
4353  4466            JMS I INPATT        /INITIALIZE PATTERN
4354  4467    P3TS1A, JMS I GETPT         /GET PATTERN CHARACTER
4355  3364            DCA SB1             /STORE AT SB1
4356  4427            JMS I DLCNT1        /GENERATE RANDOM DELAY
4357  4576            DELAY               /DELAY
4360  4572            UKSF                /READY?
4361  5360            JMP .-1             /NO,  TEST AGAIN
4362  4567            UKRB                /YES,  READ CHARACTER
4363  4470            JMS I CHECK         /GO CHECK FOR CORRECT MATCH

4364  0000    SB1,    0                   /CORRECT CHAR HERE
```

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4365  5371            JMP P3E1          /ERROR,  GO TO P3E1
4366  2062  P3T1B,    ISZ CTRA          /OK,  ALL DONE?
4367  5354            JMP P3TS1A        /NO,
4370  5425            JMP I CHAIN       /YES,  CHAIN
4371  7402  P3E1,     HLT               /TST1 ERR HALT,  AC CONTAINS
                                        /CHARACTER THAT DID NOT MATCH
                                        /AGAINST PATTERN,  DEPRESS
                                        /KEYCONTINUE
4372  7200            CLA
4373  1364            TAD SB1           /GET CORRECT CHARACTER
4374  7402            HLT               /AC CONTAINS THE EXPECTED
                                        /CHARACTER
4375  5366            JMP P3T1B

4377  4157
      4400            PAGE


                /READ WITH RANDOM STALL BETWEEN RANDOM CHARACTER GROUPS
                /100 GROUPS READ,
                /
4400  0002  P3TS2,   2
4401  7777            7777
4402  4465            JMS I SYNC        /GO SYNC TAPE
4403  4430            JMS I S100        /SET UP TO DO TEST 100 TIMES.
4404  4571            UKCC              /START READER
4405  4466            JMS I INPATT      /INITIALIZE PATTERN
4406  4427  P3TS2A,   JMS I DLCNT1      /SET RANDOM DELAY
4407  4777'           JMS CHRCNT        /SET RANDOM CHARACTER
4410  0063            CTRB              /COUNT IN CTRB
4411  4467  P3TS2B,   JMS I GETPT       /GET PATTERN CHARACTER
4412  3220            DCA SB2           /AND STORE AT SB2
4413  4576            DELAY             /GO DELAY NO OF
4414  4572            UKSF              /READY?
4415  5214            JMP .-1           /NO, TEST AGAIN
4416  4567            UKRB              /READ CHARACTER
4417  4470            JMS I CHECK       /CHECK FOR CORRECT MATCH
4420  0000  SB2,      0                 /AGAINST SB2 CONTENTS
4421  5227            JMP P3E2          /ERROR,  GO TO P3E2
4422  2063            ISZ CTRB          /OK,  ALL CHARS FOR GROUP DONE?
4423  5211            JMP P3TS2B        /NO
4424  2062  P3T2C,    ISZ CTRA          /YES,  ALL GROUPS DONE?
4425  5206            JMP P3TS2A        /NO
4426  5425            JMP I CHAIN       /YES,  CHAIN


4427  7402  P3E2,     HLT               /TST2 ERROR HALT,  AC CONTAINS CHAR THAT
                                        /DID NOT MATCH AGAINST PATTERN,  DEPRESS KEY
                                        /CONTINUE
4430  7200            CLA
4431  1220            TAD SB2           /GET CORRECT CHARACTER
4432  7402            HLT               /AC CONTAINS THE EXPTECTED CHARACTER
4433  5224            JMP P3T2C
```

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                    /PROGRAM 4,


4434  4776'   PRG4,   JMS STBF          /SET UP BUFFER AREA
4435  4577           SETLOC            /SET KSTART TO INITIAL
4436  0023           KSTART            /ROUTINE ADDRESS
4437  4442           P4TS0
4440  5641           JMP I .+1         /GO START PROGRAM
4441  0236           SRSET
                    /CARRIAGE RETURN TEST
4442  0000   P4TS0,  0
4443  4475           P4TS1
4444  4555           CKSR37            /KSR37?
4445  1140           TAD [11           /NO,
4446  1375           TAD (-122         /YES
4447  7421           MQL               /STORE IN MQ,
4450  4573           TYPE              /PRINT TEST TITLE
4451  6327           CRTST
4452  1133           TAD [334          /GET "\" CODE
4453  4474           JMS I UPUNCH      /PRINT IT
4454  7701           ACL               /MQ TO AC.
4455  3104           DCA UTEMP
4456  2104   CRTSTA, ISZ UTEMP         /ALL DONE?
4457  7410           SKP               /NO
4460  5425           JMP I CHAIN       /YES, CHAIN
4461  1104   CRTSTB, TAD UTEMP
4462  3105           DCA UTEMP1        /UTEMP TO UTEMP1
4463  1142           TAD [240          /GET "SPACE" CODE
4464  4474           JMS I UPUNCH      /PRINT IT
4465  2105           ISZ UTEMP1        /SPACED NO, OF TIMES IN UTEMP1?
4466  5263           JMP .-3           /NO, SO SPACE AGAIN
4467  1107           TAD CR            /YES, GET "CR" CODE,
4470  4474           JMS I UPUNCH      /PRINT IT,
4471  4474           JMS I UPUNCH      /DUMMY CYCLE,
4472  1132           TAD [257          /SET "/" CODE
4473  4474           JMS I UPUNCH      /PRINT IT
4474  5256           JMP CRTSTA        /GO TO CRTSTA


                    /RIGHT MARGIN TEST
4475  0001   P4TS1,  1
4476  4525           P4TS2
4477  7200           CLA
4500  1131           TAD [-16
4501  7421           MQL
4502  1130           TAD [RM33B
4503  3323           DCA RMB
4504  4555           CKSR37            /KSR37?
4505  5312           JMP .+5           /NO,
4506  1127           TAD [-17          /YES,
4507  7421           MQL
4510  1126           TAD [RM37A
4511  3323           DCA RMB
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4512  4573            TYPE            /PRINT TEST TITLE
4513  6337            RMTST
4514  7701            ACL
4515  3104            DCA UTEMP
4516  4573    RMTSTA, TYPE            /PRINT ---- I
4517  1562            RM33A
4520  2104            ISZ UTEMP       /DONE TIMES?
4521  5316            JMP RMTSTA      /NO, SO DO IT AGAIN
4522  4573            TYPE            /YES, PRINT  -I-
4523  0000    RMB,    OPEN
4524  5425            JMP I CHAIN     /CHAIN


                /SPACE TEST
4525  0002    P4TS2,  2
4526  4600            P4TS3
4527  4573            TYPE            /PRINT TEST TITLE
4530  6354            SPTST
4531  4555            CKSR37          /KSR37?
4532  1125            TAD [5          /NO
4533  1124            TAD [-51        /YES
4534  3104            DCA UTEMP       /-36 TO UTEMP
4535  4573    SPTSTA, TYPE            /PRINT \, SPACE
4536  6324            SPTSTC
4537  2104            ISZ UTEMP       /DONE 36 TIMES?
4540  5335            JMP SPTSTA      /NO, SO DO IT AGAIN.
4541  4555            CKSR37          /KSR37?
4542  1123            TAD [4          /NO
4543  1122            TAD [-30        /YES
4544  3104            DCA UTEMP       /-36 TO UTEMP
4545  1374            TAD (-1         /GET -1
4546  3105    SPTSTB, DCA UTEMP1      /AC TO UTEMP1
4547  1105            TAD UTEMP1      /UTEMP1
4550  3106            DCA UTEMP2      /TO UTEMP2
4551  1107            TAD CR          /GET "CR" CODE
4552  4474            JMS I UPUNCH    /PRINT IT
4553  4474            JMS I UPUNCH    /DUMMY CYCLE
4554  1142            TAD [240        /GET "SPACE" CODE
4555  4474            JMS I UPUNCH    /PRINT IT
4556  2106            ISZ UTEMP2      /DONE SPACING?
4557  5354            JMP .-3         /NO,
4560  1132            TAD [257        /GET "/" CODE
4561  4474            JMS I UPUNCH    /PRINT IT
4562  2104            ISZ UTEMP       /DONE 36 TIMES?
4563  7410            SKP             /NO,
4564  5425            JMP I CHAIN     /YES, CHAIN
4565  7344            CLA CLL CMA RAL /-2 TO AC
4566  1105            TAD UTEMP1      /ADD C(UTEMP1)
4567  5346            JMP SPTSTB      /GO TO SPTSTB

4574  7777
4575  7656
4576  1000
4577  0456
      4600            PAGE
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                        /LINE FEED TEST
4600  0003      P4TS3,  3
4601  5122              P4TS47
4602  7240              CLA CMA           /SET STALL
4603  3064              DCA STLID         /INDICATOR
4604  4573              TYPE              /PRINT TEST TITLE
4605  6366              LFTST
4606  4555              CKSR37            /KSR37?
4607  1140              TAD [11           /NO,
4610  1377              TAD (-121         /YES,

4611  3104              DCA UTEMP
4612  1133      LFTSTA, TAD [334          /GET "\" CODE
4613  4474              JMS I UPUNCH      /PRINT IT
4614  1110              TAD LF            /GET "LF" CODE
4615  4474              JMS I UPUNCH      /PRINT IT
4616  2104              ISZ UTEMP         /DONE?
4617  7410              SKP               /NO,
4620  5425              JMP I CHAIN       /YES, CHAIN
4621  4556              STALL
4622  5212              JMP LFTSTA        /GO TO LFTSTA


                        /TYPE LINE OF CHARACTERS ABC
4623  0004      P4TS4,  4
4624  4631              P4TS5
4625  4573              TYPE              /PRINT TITLE
4626  6376              CHRTST
4627  4433              JMS I TLCALL      /PRINT LINE
4630  6107              A


                        /TYPE LINE OF CHARACTERS DEF
4631  0005      P4TS5,  5
4632  4635              P4TS6
4633  4433              JMS I TLCALL
4634  6112              D


                        /TYPE LINE OF CHARACTERS GHI
4635  0006      P4TS6,  6
4636  4641              P4TS7
4637  4433              JMS I TLCALL
4640  6115              G
                        /TYPE LINE OF CHARACTERS JKL
4641  0007      P4TS7,  7
4642  4645              P4TS10
4643  4433              JMS I TLCALL
4644  6120              J
                        /TYPE LINE OF CHARACTERS MNO
4645  0010      P4TS10, 10
4646  4651              P4TS11
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4647  4433            JMS I TLCALL
4650  6123            M
                    /TYPE LINE OF CHARACTERS PQR
4651  0011    P4TS11, 11
4652  4655            P4TS12
4653  4433            JMS I TLCALL
4654  6126            P
                    /TYPE LINE OF CHARACTERS STU
4655  0012    P4TS12, 12
4656  4661            P4TS13
4657  4433            JMS I TLCALL
4660  6131            S
                    /TYPE LINE OF CHARACTERS VWX
4661  0013    P4TS13, 13
4662  4665            P4TS14
4663  4433            JMS I TLCALL
4664  6134            V
                    /TYPE LINE OF CHARACTERS YZ0
4665  0014    P4TS14, 14
4666  4671            P4TS15
4667  4433            JMS I TLCALL
4670  6137            Y
                    /TYPE LINE OF CHARACTERS 123
4671  0015    P4TS15, 15
4672  4675            P4TS16
4673  4433            JMS I TLCALL
4674  6142            ONE
                    /TYPE LINE OF CHARACTERS 456
4675  0016    P4TS16, 16
4676  4701            P4TS17
4677  4433            JMS I TLCALL
4700  6145            FOUR
                    /TYPE LINE OF CHARACTERS 789
4701  0017    P4TS17, 17
4702  4705            P4TS20
4703  4433            JMS I TLCALL
4704  6150            SEVEN
                    /TYPE LINE OF CHARACTERS !"#
4705  0020    P4TS20, 20
4706  4711            P4TS21
4707  4433            JMS I TLCALL
4710  6153            C241
                    /TYPE LINE OF CHARACTERS $%&
4711  0021    P4TS21, 21
4712  4715            P4TS22
4713  4433            JMS I TLCALL
4714  6156            C244
                    /TYPE LINE OF CHARACTERS '()
4715  0022    P4TS22, 22
4716  4721            P4TS23
4717  4433            JMS I TLCALL
4720  6161            C247
                    /TYPE LINE OF CHARACTERS *+,
4721  0023    P4TS23, 23
4722  4725            P4TS24
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4723  4433            JMS I TLCALL
4724  6164            C252
                  /TYPE LINE OF CHARACTERS =.(
4725  0024      P4TS24, 24
4726  4731            P4TS25
4727  4433            JMS I TLCALL
4730  6167            C255
                  /TYPE LINE OF CHARACTERS !;<
4731  0025      P4TS25, 25
4732  4735            P4TS26
4733  4433            JMS I TLCALL
4734  6172            C272
                  /TYPE LINE OF CHARACTERS =>?
4735  0026      P4TS26, 26
4736  4741            P4TS27
4737  4433            JMS I TLCALL
4740  6175            C275
                  /TYPE LINE OF CHARACTERS @ [\
4741  0027      P4TS27, 27
4742  4745            P4TS30
4743  4433            JMS I TLCALL
4744  6200            C300
                  /TYPE LINE OF CHARACTERS ]↑ AND LEFT ARROW
4745  0030      P4TS30, 30
4746  4751            P4TS31
4747  4433            JMS I TLCALL
4750  6203            C335

                  /TYPE LINE OF SMALL A, B, AND C
4751  0031      P4TS31, 31
4752  4755            P4TS32
4753  4434            JMS I TLC37
4754  6206            SA
                  /TYPE LINE OF SMALL D, E, AND F
4755  0032      P4TS32, 32
4756  4761            P4TS33
4757  4434            JMS I TLC37
4760  6211            SD


                  /TYPE LINE OF SMALL G, H, AND I
4761  0033      P4TS33, 33
4762  5000            P4TS34
4763  4434            JMS I TLC37
4764  6214            SG

4777  7657
      5000            PAGE


                  /TYPE LINE OF SMALL J, K, AND L
5000  0034      P4TS34, 34
5001  5004            P4TS35
5002  4434            JMS I TLC37
5003  6217            SJ
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                        /TYPE LINE OF SMALL M, N, AND O
5004  0035              P4TS35, 35
5005  5010                      P4TS36
5006  4434                      JMS I TLC37
5007  6222                      SM
                        /TYPE LINE OF SMALL P, Q, AND R
5010  0036              P4TS36, 36
5011  5014                      P4TS37
5012  4434                      JMS I TLC37
5013  6225                      SP
                        /TYPE LINE OF SMALL S, T, AND U
5014  0037              P4TS37, 37
5015  5020                      P4TS40
5016  4434                      JMS I TLC37
5017  6230                      SS
                        /TYPE LINE OF SMALL V, W, AND X
5020  0040              P4TS40, 40
5021  5024                      P4TS41
5022  4434                      JMS I TLC37
5023  6233                      SV
                        /TYPE LINE OF SMALL Y, AND Z, AND CODE 340 CHARACTER.
5024  0041              P4TS41, 41
5025  5030                      P4TS42
5026  4434                      JMS I TLC37
5027  6236                      SY
                        /TYPE LINE OF CHARACTERS WHOSE CODE IS 373, 374, 375, 376.
5030  0042              P4TS42, 42
5031  5047                      P4TS43
5032  4555                      CKSR37              /KSR37?
5033  5425                      JMP I CHAIN         /NO, BYPASS TEST
5034  4574                      MOVE
5035  6241                      C373
5036  6601                      BLOCK1
5037  7774                      -4
5040  4574                      MOVE
5041  6601                      BLOCK1
5042  6605                      BLOCK1+4
5043  7663                      -115
5044  3064                      DCA STLID
5045  4777'                     JMS TYPLN
5046  5425                      JMP I CHAIN

                        /TYPE 2 LINES OF ALL CHARACTERS, 1ST LINE NO DELAY, 2ND LINE WITH STALLS.
5047  0043              P4TS43, 43
5050  5054                      P4TS44
5051  4776'                     JMS FBALL           /FILL BUFFER WITH ALL CHARS.
5052  4775'                     JMS WOSWS
5053  5425                      JMP I CHAIN         /CHAIN

                        /TYPE 12 LINES OF ASR33 WORST CASE PATTERN, ALTERNATE LINES WITH STALLS.
5054  0044              P4TS44, 44
5055  5072                      P4TS45
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5056  4573            TYPE            /PRINT TITLE
5057  6412            WCPTST
5060  4554            CKSR33          /33?
5061  5425            JMP I CHAIN     /NO
5062  4774'           JMS FW336       /PATTERN TO BUFFER
5063  4577            SETLOC          /-6 TO CTRA
5064  0062            CTRA
5065  7772            -6
5066  4775'   P4T44A, JMS WOSWS
5067  2062            ISZ CTRA
5070  5266            JMP P4T44A      /NO, REPEAT
5071  5425            JMP I CHAIN     /YES, CHAIN

                /TYPE 12 LINES OF ASR35 WORST CASE PATTERN, ALTERNATE LINES WITH STALLS.
5072  0045    P4TS45, 45
5073  5106            P4TS46
5074  4553            CKSR35          /35?
5075  5425            JMP I CHAIN     /NO,
5076  4773'           JMS FW356       /PATTERN TO BUFFER
5077  4577            SETLOC          /-6 TO CTRA
5100  0062            CTRA
5101  7772            -6
5102  4775'   P4T45A, JMS WOSWS
5103  2062            ISZ CTRA        /ALL LINES TYPED?
5104  5302            JMP P4T45A      /NO, REPEAT
5105  5425            JMP I CHAIN     /YES, CHAIN

                /TYPE 12 LINES OF KSR37 WORST CASE PATTERN, ALTERNATE LINES WITH STALLS.
5106  0046    P4TS46, 46
5107  7777            7777
5110  4555            CKSR37          /37?
5111  5425            JMP I CHAIN     /NO, BYPASS TEST,
5112  4772'           JMS FW376       /YES, PATTERN TO BUFFER
5113  4577            SETLOC          /-6 TO CTRA
5114  0062            CTRA
5115  7772            -6
5116  4775'   P4T46A, JMS WOSWS
5117  2062            ISZ CTRA        /ALL LINES TYPED?
5120  5316            JMP P4T46A      /NO, REPEAT
5121  5425            JMP I CHAIN     /YES, CHAIN


                /KSR37, KSR35, OR ASR35 TAB TEST
5122  0047    P4TS47, 47
5123  5231            P4TS50
5124  4555            CKSR37          /KSR37?
5125  5346            JMP TBTB        /NO,
5126  4573            TYPE            /YES, TYPE TITLE
5127  6267            TBTST
5130  1121            TAD [-11        /-9 TO CTRA
5131  4771'           JMS MTABP       /GO TO SUB TO MARK TAB POSITIONS,
5132  1370            TAD (-12        /SET TAB COUNT
5133  3340            DCA TBCNT       /TO -10
5134  1367    TBTA,   TAD (-7         /YES, -7 TO CTRA
5135  3062            DCA CTRA
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5136  3361            DCA SPCNT       /0 TO SPACE COUNT
5137  4766'           JMS TABP        /GO TAB AND PRINT SLASH 9 TIMES.
5140  0000    TBCNT,  OPEN            /TAB COUNT,
5141  2062            ISZ CTRA        /DONE?
5142  7410            SKP             /NO,
5143  5425            JMP I CHAIN     /YES, CHAIN
5144  2361            ISZ SPCNT       /INCREMENT SPACE COUNT
5145  5337            JMP TBTA+3      /REPEAT
5146  4553    TBTB,   CKSR35          /KSR, ASR35?
5147  5425            JMP I CHAIN     /NO, BYPASS TEST
5150  4573            TYPE            /YES, TYPE TITLE
5151  6267            TBTST
5152  1367            TAD (-7         /-7 TO CTRA
5153  4771'           JMS MTABP       /GO TO SUB TO MARK TAB POSITIONS.
5154  4573            TYPE            /YES,
5155  6301            TBMRK+1
5156  1121            TAD [-11        /SET TAB COUNT
5157  3340            DCA TBCNT       /TO -9
5160  5334            JMP TBTA
5161  0000    SPCNT,  OPEN
5162  0000    SPCTR,  OPEN

5166  5201
5167  7771
5170  7766
5171  2162
5172  1153
5173  1135
5174  1117
5175  2153
5176  1066
5177  1627
      5200            PAGE


5200  0000    TABCTR, OPEN
5201  0000    TABP,   OPEN
5202  1601            TAD I TABP      /SET TABCTR
5203  3200            DCA TABCTR
5204  2201            ISZ TABP
5205  4575            CRLF            /CRLF ONCE
5206  7777            -1
5207  1777'   SPAC,   TAD SPCNT       /GET SPACE COUNT
5210  7450            SNA             /0?
5211  5220            JMP TABPA       /YES, DON'T SPACE
5212  7041            CIA             /NO, NEGATE COUNT
5213  3776'           DCA SPCTR
5214  1142            TAD [240        /SPACE
5215  4474            JMS I UPUNCH
5216  2776'           ISZ SPCTR       /DONE SPACING?
5217  5214            JMP .-3         /NO, SPACE AGAIN
5220  1140    TABPA,  TAD [11         /GET TAB CODE
5221  4474            JMS I UPUNCH    /OUTPUT TO TELEPRINTER
5222  4474            JMS I UPUNCH    /DUMMY CYC
5223  4474            JMS I UPUNCH    /DUMMY CYC
```

```
5224  1132            TAD C257        /GET "/" CODE
5225  4474            JMS I UPUNCH    /AND TYPE IT
5226  2200            ISZ TABCTR      /DONE?
5227  5207            JMP SPAC        /NO, REPEAT
5230  5601            JMP I TABP      /YES, EXIT


                /KSR37 BACKSPACE TEST.
5231  0050    P4TS50, 50
5232  4623            P4TS4
5233  4555            CKSR37          /KSR37?
5234  5425            JMP I CHAIN     /NO
5235  4573            TYPE            /YES, TYPE TITLE
5236  6253            BKSPT
5237  1124            TAD C-51        /-41 TO CTRA
5240  3062            DCA CTRA
5241  4573            TYPE            /TYPE ALTERNATE U'S.
5242  6574            BKSU
5243  2062            ISZ CTRA        /DONE?
5244  5241            JMP .-3         /NO,
5245  1375            TAD (-47        /-39 TO CTRA
5246  3062            DCA CTRA
5247  4263            JMS BKSPC       /BACKSPACE TWICE
5250  7776            -2
5251  1774'           TAD C252        /TYPE "*"
5252  4474            JMS I UPUNCH
5253  4263            JMS BKSPC       /BACKSPACE THRICE
5254  7775            -3
5255  1774'           TAD C252        /TYPE "*"
5256  4474            JMS I UPUNCH
5257  2062            ISZ CTRA        /DONE 39 TIMES?
5260  5253            JMP .-5         /NO,
5261  5425            JMP I CHAIN     /YES, CHAIN
5262  0000    BKSCTR, OPEN

5263  0000    BKSPC,  OPEN
5264  1663            TAD I BKSPC     /GET BACKSPACE COUNT
5265  3262            DCA BKSCTR      /AND STORE AT BKSCTR
5266  2263            ISZ BKSPC       /SET UP EXIT
5267  1373            TAD (210        /GET BACKSPACE CODE
5270  4474            JMS I UPUNCH    /OUTPUT TO TELEPRINTER
5271  2262            ISZ BKSCTR      /DONE BACKSPACING?
5272  5267            JMP .-3         /NO, REPEAT
5273  5663            JMP I BKSPC     /YES, EXIT


                /PROGRAM 5, PUNCH TEST
5274  4577    PRG5,   SETLOC          /SET INTERRUPT SERVICE ADDRESS
5275  0002            2               /TO INTSVC
5276  1254            INTSVC
5277  4577            SETLOC          /SET DATA BLOCK
5300  0101            BLKCNT          /LENGTH TO
5301  7000            -1000           /-512
5302  4571            UKCC
```

```
5303  1372            TAD (BLOCKA     /SET UP ADDRESS TO
5304  3104            DCA UTEMP       /STORE DATA,
5305  1371            TAD (-1000      /-512 TO CTRA
5306  3062            DCA CTRA
5307  4770'           JMS SINPT       /INITIALIZE SPECIAL COUNT PATTERN
5310  4767'           JMS SGET        /GET CHARACTER
5311  3504            DCA I UTEMP     /STORE IT
5312  2104            ISZ UTEMP       /INCREMENT POINTER,
5313  2062            ISZ CTRA        /DONE 512 CHARACTERS?
5314  5310            JMP .-4         /NO, REPEAT
5315  4572            UKSF
5316  5315            JMP .-1
5317  7200    PRG5A,  CLA             /YES, CLEAR READY BUSY
5320  3076            DCA RBUSY
5321  4766'           JMS PLTLR       /PUNCH LEADER
5322  4765'           JMS PSYNC       /PUNCH SYNC CHARACTER
5323  4764'           JMS PBLK        /PUNCH DATA BLOCK FULL SPEED.
5324  4766'           JMS PLTLR       /PUNCH TRAILER
5325  4763'           JMS RSYNC       /SYNC READER
5326  4762'           JMS RDBLK       /READ DATA BLOCK
5327  4761'           JMS RRDY        /WAIT FOR READER NOT BUSY
5330  4766'           JMS PLTLR       /PUNCH LEADER
5331  4765'           JMS PSYNC       /PUNCH SYNC CHARACTER
5332  4760'           JMS PBLKR       /PUNCH DATA BLOCK (WITH STALLS).
5333  4766'           JMS PLTLR       /PUNCH TRAILER
5334  4763'           JMS RSYNC       /SYNC READER
5335  4762'           JMS RDBLK       /READ DATA BLOCK
5336  4761'           JMS RRDY        /WAIT FOR READER NOT BUSY
5337  5317            JMP PRG5A       /REPEAT.


                /PROGRAM 6, KEYBOARD TEST
5340  4577    PRG6,   SETLOC          /SET KSTART TO INITIAL
5341  0023            KSTART          /ROUTINE ADDRESS
5342  5400            P6T0
5343  4573            TYPE            /PRINT
5344  6432            KMSG1
5345  5746            JMP I .+1
5346  0236            SRSET

5360  1324
5361  1343
5362  1400
5363  1216
5364  1316
5365  1212
5366  1200
5367  1721
5370  1711
5371  7000
5372  6577
5373  0210
5374  6164
5375  7731
5376  5162
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```
5377  5161
      5400            PAGE


                /CLEAR AC AND FLAG (KCC), WAIT FOR FLAG TO SET, WITH FLAG SET, SKIP
                /ON FLAG 4000 TIMES, KSF SHOULD SKIP EVERY TIME.
5400  0000      P6T0,   0
5401  5421              P6T1
5402  4431              JMS I $4000
5403  4571              UKCC            /CLEAR AC AND FLAG
5404  4573              TYPE
5405  6443              KMSG2
5406  4572              UKSF            /READY?
5407  5206              JMP .-1         /WAIT
5410  4572              UKSF            /READY, SKIP ON FLAG
5411  5215              JMP P6E0        /NO SKIP, ERROR
5412  2060              ISZ CTRA        /ALL DONE?
5413  5210              JMP .-3         /NO, REPEAT
5414  5425              JMP I CHAIN     /YES, CHAIN

5415  7600      P6E0,   NL7 CLA         /KSF FAILURE
5416  4572              UKSF            /SCOPE LOOP
5417  5216              JMP .-1         /SKIPS ON FLAG
5420  5216              JMP .-2         /CONTINUOUSLY

                /ECHO TEST CHARACTER RECEIVED FROM KEYBOARD IS TYPED, THE
                /CHARACTER TYPED SHOULD MATCH CHARACTER KEYED, RUBOUT CHARCTER
                /ENDS ROUTINE.
5421  0001      P6T1,   1
5422  5440              P6T2
5423  4571              UKCC            /CLEAR AC AND FLAG
5424  4573              TYPE
5425  6454              KMSG3
5426  4572      P6T1A,  UKSF            /READY?
5427  5226              JMP .-1         /WAIT
5430  4567              UKRB            /READ CHARACTER
5431  4563              UTLS            /PRINT IT
5432  4566              UTSF            /PRINTER READY?
5433  5232              JMP .-1         /NO, WAIT
5434  1144              TAD C-377
5435  7440              SZA             /IS IT RUBOUT?
5436  5226              JMP P6T1A       /NO
5437  5425              JMP I CHAIN     /YES, CHAIN



                /OCTAL EQUIVALENT TEST, THE OCTAL EQUIVALENT OF ANY
                /CHARACTER KEYED IS PRINTED, RUBOUT ENDS ROUTINE.
5440  0002      P6T2,   2
5441  7777              7777
5442  4571              UKCC            /CLEAR AC AND FLAG
5443  4573              TYPE            /PRINT TITLE AND
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5444  6521            KMSG4           /INSTRUCTION
5445  4573            TYPE
5446  6462            KMSG3A
5447  4572    P6T2A,  UKSF            /FLAG 1?
5450  5247            JMP .-1         /NO, WAIT
5451  4567            UKRB            /YES, READ KEYBOARD
5452  3112            DCA WTS6A       /STORE CHARACTER
5453  4777'           JMS ASCCN       /CONVERT CHARACTER
5454  0112            WTS6A           /TO PRINTABLE OCTAL.
5455  6541            OCTEQV
5456  4573            TYPE            /PRINT CHARACTER
5457  6537            KMSG5
5460  1112            TAD WTS6A
5461  1144            TAD [-377
5462  7640            SZA CLA         /WAS IT A RUBOUT
5463  5247            JMP P6T2A       /NO.
5464  5425            JMP I CHAIN     /YES, CHAIN


                /PROGRAM 7, COMBINED READER, PRINTER, PUNCH TEST.
5465  4577    PRG7,   SETLOC          /SET INTERRUPT SERVICE
5466  0002            2               /ADDRESS TO INTSVC
5467  1234            INTSVC
5470  4577            SETLOC          /SET DATA BLOCK LENGTH
5471  0101            BLKCNT          /TO -150
5472  7552            -226
5473  4426            JMS I KBFLAG
5474  4776'           JMS STBF        /SET UP BUFFER AREA
5475  4577            SETLOC          /SET KSTART TO INITIAL
5476  0023            KSTART          /ROUTINE ADDRESS
5477  5502            P7T0
5500  5701            JMP I .+1       /START PROGRAM
5501  0236            SRSET

5502  0000    P7T0,   0
5503  5506            P7T1
5504  4435            JMS I FBF       /DATA: ABC
5505  6107            A
5506  0001    P7T1,   1
5507  5512            P7T2
5510  4435            JMS I FBF       /DATA: DEF
5511  6112            D
5512  0002    P7T2,   2
5513  5516            P7T3
5514  4435            JMS I FBF       /DATA: GHI
5515  6115            G
5516  0003    P7T3,   3
5517  5522            P7T4
5520  4435            JMS I FBF       /DATA: JKL
5521  6120            J
5522  0004    P7T4,   4
5523  5526            P7T5
5524  4435            JMS I FBF       /DATA: MNO
5525  6123            M
5526  0005    P7T5,   5
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5527  5532            P7T6
5530  4435            JMS I FBF       /DATA: PQR
5531  6126            P
5532  0006    P7T6,   6
5533  5536            P7T7
5534  4435            JMS I FBF       /DATA: STU
5535  6131            S
5536  0007    P7T7,   7
5537  5542            P7T10
5540  4435            JMS I FBF       /DATA: VWX
5541  6134            V
5542  0010    P7T10,  10
5543  5546            P7T11
5544  4435            JMS I FBF       /DATA: YZ0
5545  6137            Y
5546  0011    P7T11,  11
5547  5552            P7T12
5550  4435            JMS I FBF       /DATA: 123
5551  6142            ONE
5552  0012    P7T12,  12
5553  5556            P7T13
5554  4435            JMS I FBF       /DATA: 456
5555  6145            FOUR
5556  0013    P7T13,  13
5557  5562            P7T14
5560  4435            JMS I FBF       /DATA: 789
5561  6150            SEVEN
5562  0014    P7T14,  14
5563  5566            P7T15
5564  4435            JMS I FBF       /DATA: !"#
5565  6153            C241
5566  0015    P7T15,  15
5567  5572            P7T16
5570  4435            JMS I FBF       /DATA: $%&
5571  6156            C244
5572  0016    P7T16,  16
5573  5600            P7T17
5574  4435            JMS I FBF       /DATA: '()
5575  6161            C247

5576  1000
5577  1650
      5600            PAGE

5600  0017    P7T17,  17
5601  5604            P7T20
5602  4435            JMS I FBF       /DATA: **,
5603  6164            C252
5604  0020    P7T20,  20
5605  5610            P7T21
5606  4435            JMS I FBF       /DATA: -./
5607  6167            C255

5610  0021    P7T21,  21
5611  5614            P7T22
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```
5612  4435           JMS I FBF       /DATA: :;<
5613  6172           C272
5614  0022  P7T22,  22
5615  5620           P7T23
5616  4435           JMS I FBF       /DATA: =>?
5617  6175           C275
5620  0023  P7T23,  23
5621  5624           P7T24
5622  4435           JMS I FBF       /DATA: @[\
5623  6200           C300
5624  0024  P7T24,  24
5625  5630           P7T25
5626  4435           JMS I FBF       /DATA: ]↑ AND LEFT ARROW
5627  6203           C335
5630  0025  P7T25,  25
5631  5634           P7T26
5632  4777'          JMS FBALL       /DATA: ALL PRINTABLE ASCII
5633  4776'          JMS CNTST



5634  0026  P7T26,  26
5635  5640           P7T27
5636  4775'          JMS FW336       /DATA: ASR33 PRINTER WORST CASE
5637  4776'          JMS CNTST       /PATTERN
5640  0027  P7T27,  27
5641  5644           P7T30
5642  4774'          JMS FW356       /DATA: ASR35 PRINTER WORST CASE
5643  4776'          JMS CNTST       /PATTERN
5644  0030  P7T30,  30
5645  7777           7777
5646  4773'          JMS FBF3        /DATA: 1'S AND 0'S
5647  6245           C377
5650  4776'          JMS CNTST

                /PROGRAM 10.  READS COUNT PATTERN.

5651  4465  PRG10,  JMS I SYNC      /SYNC TAPE
5652  3321           DCA ERRCTR      /CLEAR ERROR COUNTER
5653  4466           JMS I INPATT    /INITIALIZE PATTERN.
5654  4571           UKCC            /START READER
5655  7604  SRT0A,   LAS            /READ SR
5656  0120           AND [400
5657  7650           SNA CLA         /STALL? (SR3=0)
5660  7040           CMA             /YES
5661  3064           DCA STLID       /NO

5662  4467  SRT0B,   JMS I GETPT     /GET PATTERN CHAR.
5663  3273           DCA SBSP        /STORE AT SBSP.
5664  4556           STALL           /STALL
5665  4572           UKSF            /READY?
5666  5265           JMP .-1         /TEST AGAIN.
5667  4567           UKRB            /READ, CLEAR AC AND FLAG.
5670  3103           DCA ERRCR
5671  1103           TAD ERRCR
```

```
5672  4470            JMS I CHECK     /GO CHECK CHARACTER WORD.
5673  0000  SBSP,      0               /
5674  7410            SKP             /ERROR, NO MATCH, GO INC. ERRCNT
5675  5313            JMP HLTTST      /OK,
5676  2321  ERRCNT,   ISZ ERRCTR      /INCREMENT ERROR COUNTER
5677  5302            JMP .+3
5700  7240            CLA CMA         /OFLOW, RESET TO 7777.
5701  3321            DCA ERRCTR
5702  7604            LAS             /READ SR,
5703  0143            AND [100
5704  7650            SNA CLA         /HALT ON ERROR? (SR5)
5705  5313            JMP HLTTST      /NO,
5706  1103            TAD ERRCR       /YES, GET BAD CHAR,
5707  7402            HLT
5710  7200            CLA
5711  1273            TAD SBSP        /GET GOOD CHARACTER
5712  7402            HLT
5713  7604  HLTTST,   LAS             /READ SR
5714  7700            SMA CLA         /HALT? (SR0)
5715  5255            JMP SRT0A       /NO,
5716  1321            TAD ERRCTR      /GET ERROR COUNT
5717  7402            HLT             /HALT, ERROR COUNT IN AC
5720  5255            JMP SRT0A
5721  0000  ERRCTR,   0               /ERROR COUNTER

                      /PROGRAM 11, PRINTER EXERCISER, TYPES LINES OF ANY 3 CHARACTERS
                      /WITH STALLS, OR FULL SPEED, KEYBOARD CONTROLLED.

5722  4772'  PRG11,   JMS STBF
5723  4573            TYPE
5724  6546            P11MG1
5725  1371  PRG11A,   TAD (BLOCK1-1
5726  3016            DCA 16
5727  4573            TYPE
5730  6562            P11MG2
5731  4353            JMS GKBCR
5732  3416            DCA I 16
5733  4353            JMS GKBCR
5734  3416            DCA I 16
5735  4353            JMS GKBCR
5736  3416            DCA I 16
5737  4353            JMS GKBCR
5740  1144            TAD [-377
5741  7640            SZA CLA                 /STALL?
5742  7240            CLA CMA                 /YES,
5743  3064            DCA STLIO               /NO,
5744  4773'           JMS FBF3                /SET UP LINE.
5745  6601            BLOCK1
5746  4770'           JMS TYPLN               /TYPE LINE OF CHARACTERS
5747  7604            LAS                     /READ SR,
5750  7700            SMA CLA                 /CHANGE DATA? (SR0=1)
5751  5346            JMP .-3                 /NO,
5752  5325            JMP PRG11A              /YES,
5753  0000  GKBCR,    OPEN                    /SUB TO GET KEYBOARD CHARACTER,
5754  4572            UKSF                    /WAIT FOR FLAG.
```

```
5755  5354            JMP .-1
5756  4567            UKRB                    /READ CHARACTER.
5757  7421            MQL                     /STORE CHARACTER.
5760  7701            ACL                     /GET IT BACK.
5761  4474            JMS I UPUNCH            /ECHO IT.
5762  7701            ACL                     /GET CHARACTER AGAIN.
5763  5733            JMP I GKBCR             /EXIT

                /PROGRAM 12. PUNCHES BINARY COUNT PATTERN.

5764  4466    PRG12,  JMS I INPATT    /INITIALIZE BINARY COUNT PATTERN
5765  4467            JMS I GETPT     /GET BINARY COUNT CHARACTER.
5766  4474            JMS I UPUNCH    /PUNCH CHARACTER
5767  5365            JMP .-2         /REPEAT.

5770  1627
5771  6600
5772  1000
5773  1031
5774  1135
5775  1117
5776  1600
5777  1066
      6000          PAGE

6000  0000    DVCSEL, OPEN                    /DEVICE CODE SELECT ROUTINE.
6001  1117            TAD [INTAB              /GET START ADDR OF INPUT IOT TABLE.
6002  3052            DCA TEMP                /AND SAVE AT TEMP.
6003  1021            TAD TTYIOT              /OBTAIN NEW INPUT IOT AND
6004  7012            RTR                     /STORE AT UTEMP.
6005  7010            RAR
6006  0116            AND [0770
6007  3104            DCA UTEMP
6010  4222            JMS DVCOM               /PERFORM INPUT IOT SELECTION.
6011  1115            TAD [OUTTAB             /GET START ADDR OF OUTPUT IOT TABLE.
6012  3052            DCA TEMP                /AND OBTAIN NEW OUTPUT IOT AND
6013  1021            TAD TTYIOT              /OBTAIN NEW OUTPUT IOT AND
6014  7006            RTL                     /STORE AT UTEMP.
6015  7004            RAL
6016  0116            AND [0770
6017  3104            DCA UTEMP
6020  4222            JMS DVCOM               /PERFORM OUTPUT IOT SELECTION.
6021  5600            JMP I DVCSEL            /EXIT DVCSEL.
6022  0000    DVCOM,  OPEN                    /COMMON SUB TO SELECT IOT'S.
6023  1452            TAD I TEMP
6024  7450            SNA                     /0?
6025  5622            JMP I DVCOM             /YES, EXIT
6026  3105            DCA UTEMP1
6027  1505            TAD I UTEMP1
6030  0114            AND [7007               /REMOVE OLD DEVICE CODE.
6031  1104            TAD UTEMP               /INSERT NEW DEVICE CODE.
6032  3505            DCA I UTEMP1            /PUT BACK NEW IOT CODE.
6033  2052            ISZ TEMP                /SE   P FOR NEXT IOT CODE.
6034  5223            JMP DVCOM+1
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```
6035  0720    INTAB,  XKSF+1
6036  0725            XKCC+1
6037  0731            XKRS+1
6040  0735            XKRB+1
6041  0756            XKCR+1
6042  0762            XKIE+1
6043  2021            INTKSF
6044  1233            RSSERV
6045  1264            INKSF
6046  1433            IN0
6047  0000            0
6050  0741    OUTTAB, XTSF+1
6051  0746            XTCF+1
6052  1172            XTPC+1
6053  0752            XTLS+1
6054  1166            XSPF+1
6055  0766            XSPI+1
6056  1261            INTCF
6057  1257            INTSF
6060  2024            INTTSF
6061  2114            OUT0
6062  2121            OUT1
6063  2123            OUT2
6064  0000            0
6065  0247    A33WP6, 0247            /"'"
6066  0337            0337            /LEFT ARROW
6067  0327            0327            /"W"
6070  0257            0257            /"/"
6071  0327            0327            /"W"
6072  0337            0337            /LEFT ARROW
6073  0247    A35WP6, 0247            /"'"
6074  0333            0333            /"["
6075  0277            0277            /"?"
6076  0303            0303            /"C"
6077  0277            0277            /"?"
6100  0333            0333            /"["
6101  0316    A37WP6, 0316            /BIG N
6102  0361            0361            /SMALL Q
6103  0301            0301            /BIG A
6104  0376            0376            /SWUNG DASH
6105  0301            0301            /BIG A
6106  0361            0361            /SMALL Q

6107  0301    A,      301
6110  0302            302
6111  0303            303
6112  0304    D,      304
6113  0305            305
6114  0306            306
6115  0307    G,      307
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6116  0310                310
6117  0311                311
6120  0312     J,         312
6121  0313                313
6122  0314                314
6123  0315     M,         315
6124  0316                316
6125  0317                317
6126  0320     P,         320
6127  0321                321
6130  0322                322
6131  0323     S,         323
6132  0324                324
6133  0325                325
6134  0326     V,         326
6135  0327                327
6136  0330                330
6137  0331     Y,         331
6140  0332                332
6141  0260                260
6142  0261     ONE,       261
6143  0262                262
6144  0263                263
6145  0264     FOUR,      264
6146  0265                265
6147  0266                266

6150  0267     SEVEN,     267
6151  0270                270
6152  0271                271
6153  0241     C241,      241
6154  0242                242
6155  0243                243
6156  0244     C244,      244
6157  0245                245
6160  0246                246
6161  0247     C247,      247
6162  0250                250
6163  0251                251
6164  0252     C252,      252
6165  0253                253
6166  0254                254
6167  0255     C255,      255
6170  0256                256
6171  0257                257
6172  0272     C272,      272
6173  0273                273
6174  0274                274
6175  0275     C275,      275
6176  0276                276
6177  0277                277
6200  0300     C300,      300
6201  0333                333
6202  0334                334
6203  0335     C335,      335
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6204  0336                336
6205  0337                337
6206  2341     SA,        341
6207  0342                342
6210  0343                343
6211  0344     SD,        344
6212  0345                345
6213  0346                346
6214  0347     SG,        347
6215  0350                350
6216  0351                351
6217  0352     SJ,        352
6220  0353                353
6221  0354                354
6222  0355     SM,        355
6223  0356                356
6224  0357                357
6225  0360     SP,        360
6226  0361                361
6227  0362                362
6230  0363     SS,        363
6231  0364                364
6232  0365                365
6233  0366     SV,        366
6234  0367                367
6235  0370                370
6236  0371     SY,        371
6237  0372                372
6240  0340                340
6241  0373     C373,      373
6242  0374                374
6243  0375                375
6244  0376                376
6245  0377     C377,      377
6246  0000                000
6247  0377                377

6250  4543     CARLF,     TEXT    '%#@?'
6251  0077
6252  0000
6253  4543     BKSPT,     TEXT    '%##BACKSPACE TEST%##@?'
6254  4302
6255  0103
6256  1323
6257  2001
6260  0305
6261  4024
6262  0523
6263  2445
6264  4343
6265  0077
6266  0000
6267  4543     TBTST,     TEXT    '%##TAB TEST%##@?'
6270  4324
6271  0102
```

```
6272  4024
6273  0523
6274  2445
6275  4343
6276  0077
6277  2000
6300  4040    TBMRK,  TEXT    '         /@?'
6301  4040
6302  4040
6303  4040
6304  5700
6305  7700
6306  4040    TBMRK1, TEXT    '         /@?'
6307  4040
6310  4040
6311  4057
6312  0077
6313  0000
6314  5511    RM33B,  TEXT    '-I-@?'
6315  5500
6316  7700
6317  5555    RM37A,  TEXT    '----I-I@?'
6320  5555
6321  1155
6322  1100
6323  7700
6324  3440    SPTSTC, TEXT    '\ @?'
6325  0077
6326  0000
6327  4543    CRTST,  TEXT    '%##CR TEST%##@?'
6330  4303
6331  2240
6332  2405
6333  2324
6334  4543
6335  4300
6336  7700
6337  4543    RMTST,  TEXT    '%##RIGHT MARGIN TEST%##@?'
6340  4322
6341  1107
6342  1024
6343  4015
6344  0122
6345  0711
6346  1640
6347  2405
6350  2324
6351  4543
6352  4300
6353  7700
6354  4543    SPTST,  TEXT    '%##SPACE TEST%##@?'
6355  4323
6356  2001
6357  0305
6360  4024
```

```
6361  0523
6362  2445
6363  4343
6364  2077
6365  2000
6366  4543    LFTST,  TEXT    '%##LF TEST%##@?'
6367  4314
6370  0640
6371  2405
6372  2324
6373  4543
6374  4300
6375  7700
6376  4543    CHRTST, TEXT    '%##CHARACTER TESTS%##@?'
6377  4303
6400  1001
6401  2201
6402  0324
6403  0522
6404  4024
6405  0523
6406  2423
6407  4543
6410  4300
6411  7700
6412  4543    WCPTST, TEXT    '%##WORST CASE PATTERN TEST%##@?'
6413  4327
6414  1722
6415  2324
6416  4003
6417  0123
6420  0540
6421  2001
6422  2424
6423  0522
6424  1640
6425  2405
6426  2324
6427  4543
6430  4300
6431  7700
6432  4543    KMSG1,  TEXT    '%##KYBD TEST%#@?'
6433  4313
6434  3102
6435  0440
6436  2405
6437  2324
6440  4543
6441  0077
6442  0000
6443  4543    KMSG2,  TEXT    '%#PRESS A KEY%#@?'
6444  2022
6445  2523
6446  2340
6447  0140
```

```
6450  1305
6451  3145
6452  4300
6453  7700
6454  4543    KMSG3,  TEXT    '%#ECHO TEST'
6455  0503
6456  1017
6457  4024
6460  0523
6461  2400
6462  4543    KMSG3A, TEXT    '%#CHARACTER KEYED WILL BE TYPED.'
6463  0310
6464  0122
6465  0103
6466  2405
6467  2240
6470  1305
6471  3105
6472  0440
6473  2711
6474  1414
6475  4002
6476  0540
6477  2431
6500  2005
6501  0456
6502  0000
6503  4543            TEXT    '%#RUBOUT ENDS ROUTINE.%##@?'
6504  2225
6505  0217
6506  2524
6507  4005
6510  1604
6511  2340
6512  2217
6513  2524
6514  1116
6515  0556
6516  4543
6517  4300
6520  7700
6521  4543    KMSG4,  TEXT    '%##OCTAL EQUIVALENT TEST@?'
6522  4317
6523  0324
6524  2114
6525  4005
6526  2125
6527  1126
6530  0114
6531  0516
6532  2440
6533  2405
6534  2324
6535  0077
6536  2000
```

```
6537  4543    KMSG5,  TEXT    '%#'
6540  2000
6541  4040    OCTEQV, TEXT    '    %#@?'
6542  4040
6543  4543
6544  0077
6545  0000
6546  4543    P11MG1, TEXT    '%#PRINTER EXERCISER%#@?'
6547  2022
6550  1116
6551  2405
6552  2240
6553  0530
6554  0522
6555  0311
6556  2305
6557  2245
6560  4300
6561  7700
6562  4543    P11MG2, TEXT    '%#TYPE IN DATA !@?'
6563  2431
6564  2005
6565  4011
6566  1640
6567  0401
6570  2401
6571  4072
6572  0077
6573  0000
6574  2540    BKSU,   TEXT    'U @?'
6575  0077
6576  0000
6577  0000    END,    0               /BEG OF 100 WORD BUFFER

                      $

0114  7007
0115  6050
0116  0770
0117  6035
0120  0400
0121  7767
0122  7730
0123  0004
0124  7727
0125  0005
0126  6317
0127  7761
0130  6314
0131  7762
0132  7257
0133  0334
0134  0252
0135  7650
0136  7670
0137  7653
```

```
0140  0011
0141  7754
0142  0240
0143  0100
0144  7401
0145  0377
0146  0077
0147  7760
0150  0037
0151  7766
0152  0017
0153  0360
0154  0352
0155  0366
0156  0551
0157  0765
0160  1165
0161  0761
0162  0755
0163  0751
0164  1171
0165  0745
0166  0740
0167  0734
0170  0730
0171  0724
0172  0717
0173  0626
0174  0600
0175  0562
0176  0337
0177  0326
```

```
0000  11110110  00000010  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11101111  11111111  11111111  11111111  11111111  11111111  11111111

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110001

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11001111

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  11111111  11000111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11110011  11111111  11111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00001111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111110  00000000  00000001

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100011

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11001111

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000001

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111111  11111111  11111111  11111110  00000011
```

```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11101111

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111101

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00001111

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  11111000  00000001


5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11100011  11111111

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111110  00000000  11111111  11111111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


6000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6600
6700


7000
7100

7200
7300

7400
7500

7600
7700
```

```
P0TS0B  2214    P1T12B  3456    P2T10C  4051    P4TS12  4645
P0TS0C  2222    P1TS0   3005    P2T10D  4054    P4TS11  4651
P0TS0D  2225    P1TS1   3010    P2T10E  4064    P4TS12  4655
P0TS0E  2230    P1TS1A  3014    P2T10F  4066    P4TS13  4661
P0TS1   2270    P1TS2   3034    P2T11   4153    P4TS14  4665
P0TS1A  2275    P1TS2A  3040    P2T11A  4157    P4TS15  4671
P0TS1B  2313    P1TS2B  3046    P2T11B  4166    P4TS16  4675
P0TS1C  2324    P1TS3   3066    P2T11C  4200    P4TS17  4701
P0TS2   2327    P1TS3A  3074    P2T12   4233    P4TS2   4525
P0TS2A  2332    P1TS4   3126    P2T12A  4247    P4TS20  4705
P0TS2B  2342    P1TS4A  3133    P2T12B  4255    P4TS21  4711
P0TS2C  2345    P1TS4B  3153    P2T12C  4260    P4TS22  4715
P0TS2D  2350    P1TS4C  3167    P2TS0   3510    P4TS23  4721
P0TS2E  2400    P1TS5   3200    P2TS0A  3513    P4TS24  4725
P0TS2F  2402    P1TS5A  3204    P2TS1   3530    P4TS25  4731
P0TS2G  2404    P1TS5B  3211    P2TS1A  3533    P4TS26  4735
P0TS3   2504    P1TS5C  3213    P2TS1B  3534    P4TS27  4741
P0TS3A  2510    P1TS5D  3217    P2TS2   3545    P4TS3   4600
P0TS3B  2515    P1TS5E  3222    P2TS2A  3551    P4TS30  4745
P0TS3C  2521    P1TS6   3271    P2TS3   3600    P4TS31  4751
P0TS4   2544    P1TS6A  3277    P2TS3A  3606    P4TS32  4755
P0TS4A  2547    P1TS7   3314    P2TS4   3630    P4TS33  4761
P0TS4B  2565    P1TS7A  3322    P2TS4A  3635    P4TS34  5000
P0TS4C  2600    P2E0    3524    P2TS4B  3655    P4TS35  5004
P0TS5   2616    P2E1    3543    P2TS4C  3666    P4TS36  5010
P0TS5A  2624    P2E10A  4073    P2TS5   3671    P4TS37  5014
P0TS5B  2634    P2E10B  4107    P2TS5A  3677    P4TS4   4623
P11MG1  6546    P2E10C  4115    P2TS6   3711    P4TS40  5020
P11MG2  6562    P2E10D  4123    P2TS6A  3716    P4TS41  5024
P1E11A  3424    P2E10E  4135    P2TS6B  3724    P4TS42  5030
P1E12A  3464    P2E10F  4144    P2TS6C  3734    P4TS43  5047
P1E12B  3474    P2E11A  4206    P2TS7   3762    P4TS44  5054
P1E1A   3025    P2E11B  4215    P2TS7A  4000    P4TS45  5072
P1E2A   3053    P2E11C  4224    P2TS7B  4006    P4TS46  5106
P1E2B   3062    P2E12A  4276    P3E0    4337    P4TS47  5122
P1E3A   3113    P2E12B  4303    P3E1    4371    P4TS5   4631
P1E3B   3122    P2E12C  4305    P3E2    4427    P4TS50  5231
P1E4A   3143    P2E2A   3562    P3T0B   4334    P4TS6   4635
P1E5    3250    P2E2B   3564    P3T1B   4366    P4TS7   4641
P1E5A   3230    P2E3A   3621    P3T2C   4424    P6E3    5415
P1E5B   3235    P2E3B   3623    P3TS0   4314    P6T0    5400
P1E5C   3242    P2E4A   3644    P3TS0A  4324    P6T1    5421
P1E5D   3257    P2E4B   3657    P3TS1   4344    P6T1A   5426
P1E5E   3264    P2E5    3706    P3TS1A  4354    P6T2    5442
P1E6A   3310    P2E6A   3746    P3TS2   4400    P6T2A   5447
P1E710  3366    P2E6B   3752    P3TS2A  4406    P7CCTR  1211
P1T10   3325    P2E6C   3756    P3TS2B  4411    P7T0    5502
P1T10A  3333    P2E7A   4015    P4T44A  5066    P7T1    5506
P1T11   3400    P2E7B   4021    P4T45A  5102    P7T10   5542
P1T11A  3405    P2T10   4030    P4T46A  5116    P7T11   5546
P1T12   3435    P2T10A  4034    P4TS0   4442    P7T12   5552
P1T12A  3443    P2T10B  4045    P4TS1   4475    P7T13   5556
```

```
P7T14   5562        RCTRA   1511        SLOCO2  3223        TLCALI  2126
P7T15   5566        RCTRB   1512        SM      6222        TLCALL  2233
P7T16   5572        RDBLK   1402        SNDREC  3353        TLS     6246
P7T17   5600        RDBLKR  1407        SP      6225        TPC     6244
P7T2    5512        RDRSRV  1422        SPAC    5207        TRDATA  3337
P7T20   5604        RDSRV   1430        SPCNT   5161        TSC1    2634
P7T21   5610        RGNA    0400        SPCTR   5162        TSC2    2643
P7T22   5614        RGNB    0417        SPF     6040        TSF     6041
P7T23   5620        RM33A   1562        SPI     6045        TTYIOT  2021
P7T24   5624        RM33B   6314        SPIND   1720        TTYTYP  2022
P7T25   5630        RM37A   6317        SPT0    1716        TYPAT   2654
P7T26   5634        RMB     4523        SPT1    1717        TYPE    4573
P7T27   5640        RMTST   6337        SPTST   6354        TYPEA   1637
P7T3    5516        RMTSTA  4516        SPTSTA  4535        TYPLN   1627
P7T30   5644        RP1A    0415        SPTSTB  4546        TYPLN3  1615
P7T4    5522        RP1B    0434        SPTSTC  6324        TYPSP   0667
P7T5    5526        RP2A    0416        SRQ     6003        TYPSTG  2626
P7T6    5532        RP2B    0435        SRSET   0236        UKCC    4571
P7T7    5536        RRDY    1343        SRT0A   5655        UKCR    4562
PADDR   1342        RRPP    0304        SRT0B   5662        UKIE    4561
PBLK    1316        RSCTR   1232        SS      6230        UKRB    4567
PBLKR   1324        RSSERV  1233        ST33B   1020        UKRS    4570
PCTR    1341        RSTUP   1351        STAL    0551        UKSF    4572
PDCR    1310        RSYNC   1216        STALL   4556        UMOVE   0075
PFLAG   0071        RTF     6005        START   0200        UOUT    0072
PLTLR   1200        RTNNO   0055        STBAUD  0504        UPUNCH  0074
PRG0    2200        RUDONE  1456        STBF    1002        USPF    4560
PRG1    3000        S       6131        STCTR   0326        USPI    4557
PRG10   5651        S100    0030        STLIO   0064        UTCF    4565
PRG11   5722        S100I   2012        SV      6233        UTEMP   0104
PRG11A  5725        S200    0032        SY      6236        UTEMP1  0105
PRG12   5764        S200I   2005        SYNC    0065        UTEMP2  0106
PRG2    3503        S4000   0031        SYNK    0530        UTLS    4563
PRG3    4307        S4000I  2000        SYNKA   0534        UTPC    4564
PRG4    4434        SA      6206        TABCTR  5200        UTPLN3  2073
PRG5    5274        SASC    1707        TABP    5201        UTSF    4566
PRG5A   5317        SB      1435        TABPA   5220        V       6134
PRG6    5340        SB0     4332        TADDR   0624        VCTR    1267
PRG7    5465        SB1     4364        TBCNT   5140        WASC    1706
PRGADR  0235        SB2     4420        TBMRK   6300        WCHK    2527
PRGEND  0300        SBSP    5673        TBMRK1  6306        WCPTST  6412
PRGNUM  0036        SCNT    0473        TBTA    5134        WOSWS   2153
PRGTAB  0037        SD      6211        TBTB    5146        WTS6A   2112
PRINT   0671        SETBAU  1513        TBTST   6267        XKCC    2724
PSTUP   1277        SETLOC  4577        TCF     6042        XKCR    2755
PSYNC   1212        SETRND  1742        TCTR    1647        XKIE    2751
PT0     0442        SEVEN   6152        TEMP    0052        XKRB    2734
PT1     0443        SG      6214        TEMP1   0053        XKRS    2730
PUNCH   2112        SGET    1721        TEMQ    0714        XKSF    2717
RADDR   1416        SHALT   0317        TEMR    0715        XSPF    1165
RBCTR   1417        SINPT   1711        TLC37   0034        XSPI    2765
RBUSY   0076        SJ      6217        TLC37I  2134        XTCF    2745
```

```
        XTLS    0751
        XTPC    1171
        XTSF    0740
        Y       6137


ERRORS DETECTED: 0

LINKS GENERATED: 109

RUN-TIME:  34 SECONDS

3K CORE USED
```