IDENTIFICATION

PRODUCT CODE:	MAINDEC-08-DHKLD-A-D (FORMERLY MAINDEC-8E-D2AC)
PRODUCT TEST:	PDP-8/E TELETYPE AND KL8 ASYNCHRONOUS DATA CONTROL TESTS
DATE:	APRIL 6, 1972
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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 AND EIA)
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 33
2. DEVICE CODES ASSIGNED.
3. BAUD RATE OF DEVICE 110

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 KEYBOARD/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, OR
      2400 FOR 2400 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 Ø236 TO PERMIT SETTING OF SR OPTIONS', SET ANY DESIRED OPTIONS, NORMAL RUN IS WITH SR=ØØØØ, PRESS CONTINUE'.

PRG4 SR OPTIONS:

SRØ=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 Ø3ØØ, 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 Ø2ØØ',

G', SET SR TO ØØØ5',

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 Ø 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 1526 — AN ILLEGAL BAUD RATE WAS SELECTED, RESELECT THE BAUD RATE AND RESTART PROGRAM.

LOC 2103 — PRGØ, 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 — PRGØ, ROUTINE Ø, 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 — PRGØ, ROUTINE Ø, 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 — PRGØ, ROUTINE Ø, 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 — PRGØ, ROUTINE Ø, 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 — PRGØ, 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 — PRGØ, 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=Ø. MANUAL RESTART.

LOC 2427 — PRGØ, 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

PRGØ, ROUTINE 4, ERROR HALT A, PRINTER FLAG SET PRIOR TO 9 BIT TIMES, (EG, 110 BAUD: 9X9.Ø9 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

PRGØ, ROUTINE 4, ERROR HALT B, PRINTER FLAG NOT SET AFTER 9.55 BIT TIMES, (EG. 110 BAUD 9.55X9.Ø9 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 2654

PRGØ, 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 2656

PRGØ, 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 2670

PRGØ, 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 2675

PRGØ, ROUTINE 6, ERROR HALT B, GTF INSTRUCTION CLEARED THE LINK, NO SCOPE LOOP, MANUAL RESTART,

LOC 2701

PRGØ, ROUTINE 6, ERROR HALT C, GTF INSTRUCTION FAILED TO BRING LINK INTO AC Ø, NO SCOPE LOOP, MANUAL RESTART,

LOC 2712

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

LOC 2724

PRGØ, ROUTINE 6, ERROR HALT E, GTF INSTRUCTION CLEARED ION, NO SCOPE LOOP, MANUAL RESTART,

LOC 2731

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

LOC 2750

PRGØ, ROUTINE 7, ERROR HALT A, RTF INSTRUCTION FAILED TO RESET LINK WITH AC Ø=Ø, NO SCOPE LOOP, MANUAL RESTART,

(6,1 CONT'D)

LOC 2754 — PRGØ, ROUTINE 7, ERROR HALT B, RTF INSTRUCTION FAILED TO SET LINK WITH ACØ=1, NO SCOPE LOOP, MANUAL RESTART,

LOC 2757 — PRGØ, 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 RESTART,

(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=1 100 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 4107	PRG2, ROUTINE 10, ERROR HALT B, SRQ INSTRUCTION SKIPPED WITH THE TELETYPE INTERRUPT ENABLE FLIP-FLOP DISABLED AND READER FLAG SET, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES SRQ CONTINUOUSLY WITH READER FLAG SET AND TTY DISABLED, MANUAL RESTART;
LOC 4115	PRG2, ROUTINE 10, ERROR HALT C, SPI INSTRUCTION SKIPPED WITH THE TELETYPE INTERRUPT ENABLE FLIP-FLOP DISABLED AND READER FLAG SET, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES SPI CONTINUOUSLY WITH READER FLAG SET AND TTY DISABLED, MANUAL RESTART;
LOC 4123	PRG2, ROUTINE 10, ERROR HALT D, KIE INSTRUCTION FAILED TO ENABLE THE TELETYPE INTERRUPT ENABLE FLIP-FLOP WITH AC11=1, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES KIE WITH AC11=1 CONTINUOUSLY, MANUAL RESTART;
LOC 4135	PRG2, ROUTINE 10, ERROR HALT E, SRQ INSTRUCTION FAILED TO SKIP WITH THE READER FLAG SET AND TTY INTERRUPT ENABLED, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES SRQ WITH READER FLAG SET AND TTY ENABLED, MANUAL RESTART,
LOC 4144	PRG2, ROUTINE 10, ERROR HALT F, SPI INSTRUCTION FAILED TO SKIP WITH THE READER FLAG SET AND TTY INTERRUPT ENABLED, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES SPI WITH READER FLAG SET AND TTY ENABLED, MANUAL RESTART;
LOC 4206	PRG2, ROUTINE 11, ERROR HALT A, CAF INSTRUCTION FAILED TO CLEAR AC AND/OR LINK, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES CAF CONTINUOUSLY WITH AC AND LINK SET, MANUAL RESTART,
LOC 4215	PRG2, ROUTINE 11, ERROR HALT B, CAF INSTRUCTION FAILED TO CLEAR THE READER FLAG, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES CAF CONTINUOUSLY WITH READER FLAG SET, MANUAL RESTART;
LOC 4224	PRG2, ROUTINE 11, ERROR HALT C, CAF INSTRUCTION FAILED TO ENABLE THE TELETYPE INTERRUPT ENABLE FLIP-FLOP, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES CAF CONTINUOUSLY, MANUAL RESTART;
LOC 4276	PRG2, ROUTINE 12, ERROR HALT A, KRB INSTRUCTION FAILED TO CLEAR THE READER FLAG, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES KRB CONTINUOUSLY WITH READER FLAG SET, MANUAL RESTART,
LOC 4303	PRG2, ROUTINE 12, ERROR HALT B, KRB INSTRUCTION FAILED SET READER FLAG BY 103 MSEC AFTER KRB WAS ISSUED, PRESSING CONTINUE ENTERS A SCOPE LOOP THAT ISSUES KRB CONTINUOUSLY, MANUAL R \RT;

(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	2400 EIA
PRG0:	1:32	1:32	1:03	0:32	0:17	09	0:5
PRG1:	N/A	4:30	3:25	1:28	0:44	0:23	0:12
PRG2:	2:47	N/A	N/A	N/A	N/A	N/A	N/A
PRG3:	18:00	N/A	N/A	N/A	N/A	N/A	N/A
PRG4:	20:00	N/A	N/A	N/A	N/A	N/A	N/A
PRG5:	CONTINUOUS	N/A	N/A	N/A	N/A	N/A	N/A
PRG6:	USER DEP.	N/A	N/A	N/A	N/A	N/A	N/A
PRG7:	40:00	N/A	N/A	N/A	N/A	N/A	N/A
PRG10:	CONTINUOUS	N/A	N/A	N/A	N/A	N/A	N/A
PRG11:	USER DEP.	N/A	N/A	N/A	N/A	N/A	N/A
PRG12:	CONTINUOUS	N/A	N/A	N/A	N/A	N/A	N/A

7.2 TEST TAPES

IF A BINARY COUNT TEST TAPE IS NOT AVAILABLE ON SITE, USE PRG12 TO GENERATE A BINARY COUNT TEST TAPE.
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 (EIA AND CURRENT)

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,
2400 BAUD = 4.16 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 (CURRENT)

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: YZ0 "
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 340 "

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

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

RTNØ: CHECKS THAT KSF COMMAND SKIPS WHEN FLAG=1. TEST IS DONE 1ØØØ 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 Ø 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 YZ@
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 BLOCKS OF SPACE,
RUBOUT (DATA: ALL 1'S, ALL 1'S, ALL 0'S),

8',9 PRG10 = 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 PRG11 = 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 PRG12 = TAPE GENERATOR = BINARY COUNT PATTERN

PUNCHES BINARY COUNT PATTERN TEST TAPE,

```
                        /PDP-8/E TELETYPE CONTROL TEST, MAINDEC-08-DHKLD-A-L
                        /
                        /COPYRIGHT 1971,1972 DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS, 01754
                        /
                        /PROGRAMMER: ED FORTMILLER
                        /
                        /PRG0=BASIC OUTPUT CONTROL LOGIC TEST (CURRENT AND EIA)
                        /PRG1=BASIC OUTPUT AND INPUT LOGIC TEST (EIA = 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
                        /2400 BAUD      10 BITS @  ,416 MSEC = 4,167 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,
  7200    CLA=7200
  7402    HLT=7402
```

```
                7604    LAS=7604
                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
                4577    SETLOC=JMS I [STCTR             /PROGRAM MODIFABLE,
                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 110 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,
                                    /2400 FOR 2400 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    S100,   S100I
0031  2000    S4000,  S4000I
0032  2005    S200,   S200I
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,
                                    /7767 FOR 2400 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    BDRET,  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  7700            SMA CLA         /ROUTINE SELECT? (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 RTNNC
0324  7402            HLT
0325  5717            JMP I SHALT     /UNCONDITIONAL HALT (SR0 = 1)
                                      /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  5345            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  6000
0376  1513
0377  1740
      0400            PAGE


      0400            PAGE
0400  0000  RGNA,     OPEN            /RANDOM NUMBER SUB A,
0401  7300            CLA CLL
```

```
0402  1215          TAD RP1A
0403  7006          RTL
0404  1216          TAD RP2A
0405  3215          DCA RP1A
0406  1215          TAD RP1A
0407  7006          RTL
0410  1216          TAD RP2A
0411  7006          RTL
0412  3216          DCA RP2A
0413  1215          TAD RP1A
0414  5600          JMP I RGNA      /EXIT RGNA SUB,
0415  1233  RP1A,   1233
0416  7622  RP2A,   7622

0417  0000  RGNB,   OPEN            /RANDOM NUMBER SUB B',
0420  7300          CLA CLL
0421  1234          TAD RP1B
0422  7006          RTL
0423  1235          TAD RP2B
0424  3234          DCA RP1B
0425  1234          TAD RP1B
0426  7006          RTL
0427  1235          TAD RP2B
0430  7006          RTL
0431  3235          DCA RP2B
0432  1234          TAD RP1B
0433  5617          JMP I RGNB      /EXIT RGNB SUB
0434  1233  RP1B,   1233
0435  7622  RP2B,   7622

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

              /SUBROUTINE TO PROVIDE NEXT BINARY COUNT PATTERN CHARACTER (IN AC)
0444  0000  GTBIN,  0
0445  7200          CLA
0446  1242          TAD PT0         /GET PT0
0447  3243          DCA PT1         /STORE AT PT1
0450  1243          TAD PT1         /GET PT1
0451  7001          IAC             /INCREMENT ACCUMULATOR
0452  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
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

              /TABLE FOR BAUD RATES'

0504  7670    BAUTAB, -110
0505  7630          -150
0506  7500          -300
0507  7200          -600
0510  6600          -1200
0511  5400          -2400
0512  0000          OPEN                /FUTURE,

              /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 @ND 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  2350          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
      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
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
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
1056  6601            BLOCK1
1057  6604            BLOCK1+3
1060  7673            -105
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 ERROR COUNTER
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' ERRCTR,   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 C100
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
1456  2217  RUDONE,   ISZ RBCTR       /GOOD CHAR IN AC
1457  5472            JMP I UOUT      /ALL DONE?
1460  7200            CLA             /NO, TO MAINLINE
1461  1775'           TAD ERRCTR      /YES,
1462  7650            SNA CLA         /GET C(ERRCTR)
1463  5266            JMP .+3         /ANY ERRORS?
1464  1775'           TAD ERRCTR      /NO,
1465  7402            HLT             /YES,
1466  7300            CLA CLL         /NUMBER OF ERRORS IN AC,
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  STBAUD,   OPEN
```

```
1514  1141            TAD     [-6
1515  3346            DCA     NTST
1516  1374            TAD     (BAUTAB-1
1517  3010            DCA     10
1520  1022            TAD     BAUDRT          /GET USER DEFINED BAUD RATE,
1521  1410            TAD I   10              /GET A RATE FROM TABLE,
1522  7650            SNA CLA                 /DO THEY MATCH?
1523  5330            JMP     .+5             /YES, GO SET DELAY ROUTINE,
1524  2346            ISZ     NTST            /NO, KEEP A COUNT,
1525  5320            JMP     .-5             /NOW TRY NEXT ONE,
1526  7602            HLT CLA                 /ILLEGAL BAUD RATE, RESET BAUDRT AND
                                              /RESTART PROGRAM AT 0200,
1527  5326            JMP     .-1             /NO CONTINUE ALLOWED,
1530  1346            TAD     NTST            /GET COUNT AND
1531  7040            CMA                     /COMPLEMENT IT,
1532  1373            TAD     (BAUCON         /ADD TABLE ADDRESS
1533  3061            DCA     MIL1            /
1534  1461            TAD I   MIL1            /
1535  3061            DCA     MIL1            /
1536  5713            JMP I   STBAUD          /EXIT,


                /TABLE OF CONSTANTS FOR THE BAUD RATE,

1537  7767    BAUCON, 7767                    /2400
1540  7754            7754                    /1200
1541  7726            7726                    /600
1542  7652            7652                    /300
1543  7522            7522                    /150
1544  7372            7372                    /110
1545  0000            OPEN                    /FUTURE

                /PUNCH TEST NORMAL TEST SEQUENCE ROUTINE
1546  0000    NTST,   0
1547  7200            CLA             /CLEAR RBUSY
1550  3076            DCA RBUSY
1551  1746            TAD I NTST      /SELECT PUNCH MODE
1552  3355            DCA NTSTA
1553  4772'           JMS PLTLR       /PUNCH LEADER
1554  4771'           JMS PSYNC       /PUNCH SYNC CHARACTER
1555  0000    NTSTA,  0
1556  4770'           JMS RSYNC       /SYNC READER
1557  4200            JMS RDBLK       /READ DATA BLOCK
1560  4772'           JMS PLTLR       /PUNCH TRAILER
1561  4767'           JMS RRDY        /WAIT FOR RDR NOT BUSY
1562  5425            JMP I CHAIN     /CHAIN

1563  5555    RM33A,  TEXT    '----I@?'
1564  5555
1565  1100
1566  7700


1567  1343
1570  1216
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1571  1212
1572  1200
1573  1537
1574  0503
1575  5721
1576  0400
1577  1351
      1600                PAGE


      1600          PAGE
            /COMBINED TEST NORMAL TEST SEQUENCE
1600  0000  CNTST,  0
1601  7200          CLA                 /CLEAR RBUSY
1602  3076          DCA RBUSY
1603  4777I         JMS PLTLR           /PUNCH LEADER
1604  4776I         JMS PSYNC           /PUNCH SYNC CHARACTER
1605  4775I         JMS PBLK            /PUNCH DATA BLOCK (NO STALLS)
1606  4774I         JMS RSYNC           /SYNC READER
1607  4773I         JMS RDBLKR          /READ DATA BLOCK (STALLS)
1610  4772I         JMS PBLKR           /PUNCH DATA BLOCK (STALLS)
1611  4771I         JMS RDBLK           /READ DATA BLOCK (NO STALLS)
1612  4777I         JMS PLTLR           /PUNCH TRAILER
1613  4770I         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  4767I         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  3304        DCA WASC
1653  2250        ISZ ASCCN
1654  1650        TAD I ASCCN
1655  3305        DCA SASC
1656  2250        ISZ ASCCN
1657  1366        TAD (7700
1660  0704        AND I WASC
1661  7102        BSW CLL
1662  4271        JMS CNV
1663  2305        ISZ SASC
1664  1366        TAD (7700
1665  7040        CMA
1666  0704        AND I WASC
1667  4271        JMS CNV
1670  5650        JMP I ASCCN
1671  0000  CNV,   0
1672  3306        DCA ASCT
1673  1306        TAD ASCT
1674  7006        RTL
1675  7004        RAL
1676  0365        AND (707
1677  1306        TAD ASCT
1700  0365        AND (707
1701  1364        TAD (6060
1702  3705        DCA I SASC
1703  5671        JMP I CNV
1704  0000  WASC,  0
1705  0000  SASC,  0
1706  0000  ASCT,  0

1707  0000  SINPT, OPEN                    /SUB TO INITIALIZE SGET SUB,
1710  7200        CLA
1711  3314        DCA SPT0                 /ZERO SPT0
1712  3316        DCA SPIND                /ZERO SPIND
1713  5707        JMP I SINPT              /EXIT
1714  0000  SPT0,  OPEN
1715  0000  SPT1,  OPEN
1716  0000  SPIND, OPEN
1717  0000  SGET,  OPEN                    /"SPECIAL" BINARY COUNT
1720  7320        CLA STL                  /PATTERN SUBROUTINE,
1721  2316        ISZ SPIND
1722  7340        CLA CMA CLL
1723  3316        DCA SPIND
1724  1314        TAD SPT0
1725  7420        SNL
1726  5331        JMP .+3
1727  7041        CIA
1730  7410        SKP
1731  7040        CMA
1732  3314        DCA SPT0
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1733  1145          TAD [377
1734  0314          AND SPT0
1735  3315          DCA SPT1
1736  1315          TAD SPT1
1737  5717          JMP I SGET              /EXIT SGET SUB;

                /SUBROUTINE TO INITIALIZE RANDOM NUMBER GENERATORS;

1740  0000    SETRND, OPEN
1741  1363          TAD (1233
1742  3762/         DCA RP1A
1743  1363          TAD (1233
1744  3761/         DCA RP1B
1745  1360          TAD (7622
1746  3757/         DCA RP2A
1747  1360          TAD (7622
1750  3756/         DCA RP2B
1751  5740          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 DECIMAL
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 I/S,
2076  0000  HLTD,     OPEN
2077  1276            TAD     HLTD
2100  1311            TAD     M3
2101  3276            DCA     HLTD
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 WITHOUT STALLS
                /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 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,

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
```

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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         /LINK AND AC SET
2255  6007            CAF                     /CLEAR
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
```

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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


                /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 S4000             /SET UP TO DO TEST 4000 TIMES,
2332  4577  P0TS2A,  SETLOC                   /SET INTERRUPT RETURN
2333  0002            2                       /TO P0E2A
2334  2415            P0E2A
2335  6007            CAF                     /CLEAR EVERYTHING AND ENABLE INT ENABLE F'S,
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'S,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'S,F,

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      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,
```

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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             /CHAIN


                  /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
```

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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,
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
```

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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                     /TPC FAILED TO SET PRINTER FLAG,
                /SCOPE LOOP,  PRESS CONTINUE TO ENTER,
2530  4565              UTCF                    /CLEAR PRINTER FLAG
2531  4564              UTPC                    /SET FLAG BY BEGINNING OF 10TH 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

2574  2600
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2575  2614
2576  2607
2577  2332
      2600              PAGE

2600  4577  P0TS4C, SETLOC
2601  0024             DELAYM
2602  7761             -17
2603  4576             DELAY
2604  2062             ISZ     CTRA          /DELAY SO WE'RE PAST THE END,
2605  5777             JMP     P0TS4A        /DONE 100 TIMES?
2606  5425             JMP I   CHAIN         /NO,  DO TEST AGAIN
                                             /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  2660             P0T6
2620  4430             JMS I S100
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  1022             TAD     BAUDRT        /GET BAUD RATE,
2630  7104             RAL CLL               /MOVE INTO POSITION TO DETERMINE IF 2400,
2631  7710             SPA CLA               /IS IT 2400?
2632  2024             ISZ     DELAYM        /YES, INCREMENT DELAYM SO AS TO DELAY LESS;
2633  4563             UTLS                  /PRINT
2634  4576             DELAY                 /DELAY
2635  4566             UTSF                  /FLAG SET?
2636  7610             SKP CLA               /NO, OK,
2637  5254             JMP P0E5A             /YES, ERROR,
2640  4577  P0TS5B, SETLOC                  /SET DELAYM TO
2641  0024             DELAYM                /-4 DECIMAL,
2642  7774             -4                    /
2643  4576             DELAY                 /DELAY
2644  4566             UTSF                  /FLAG NOW SET?
2645  5256             JMP P0E5B             /NO, ERROR,
```

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2646  4576          DELAY
2647  4576          DELAY
2650  4576          DELAY
2651  2062          ISZ CTRA          /TEST DONE?
2652  5221          JMP P0TS5A-3      /NO, REPEAT,
2653  5425          JMP I CHAIN       /YES, CHAIN,

2654  7402  P0E5A,  HLT               /FLAG SETTING TO SOON,
              /SCOPE LOOP,  PRESS CONTINUE TO ENTER,
2655  5210          JMP P0E4A+1

2656  7402  P0E5B,  HLT               /FLAG NOT SETTING SOON ENOUGH,
              /SCOPE LOOP,  PRESS CONTINUE TO ENTER,
2657  5255          JMP P0E5A+1



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

2660  0006  P0T6,   6
2661  2736          P0T7
2662  4431          JMS I S4000       /SET UP TO DO TEST 4000 TIMES,
2663  6007  P0T6A,  CAF               /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY INTERRUPT,
2664  7040          CMA
2665  6004          GTF               /GET INTERRUPT FLAGS
2666  0335          AND K5200         /MASK,
2667  7440          SZA
2670  7402  P0E6A,  HLT               /GTF FAILED,
2671  7360  P0T6B,  CLA CMA CLL CML   /SET LINK AND AC,
2672  6004          GTF               /GET INTERRUPT FLAGS,  (AC SHOULD EQUAL 4000),
2673  0335          AND K5200         /MASK,
2674  7420          SNL
2675  7402  P0E6B,  HLT               /GTF CLEARED LINK,
2676  7104  P0T6C,  CLL RAL           /(AC SHOULD EQUAL ZERO, LINK SHOULD EQUAL 1),
2677  7430          SZL
2700  7440          SZA
2701  7402  P0E6C,  HLT               /GTF DID NOT GET LINK,
2702  6007  P0T6D,  CAF               /CLEAR ALL FLAGS, AC, LINK, AND ENABLE TTY INTERRUPT,
2703  4560          USPF              /SET PRINTER FLAG,
2704  6004          GTF               /GET INTERRUPT FLAGS,
2705  0335          AND K5200         /MASK,
2706  7006          RTL               /PUT INTERRUPT BUS = (AC SHOULD EQUAL 1000)
2707  7004          RAL               /=FLAG INTO LINK, (AC SHOULD EQUAL ZERO),
2710  7430          SZL               /IS LINK 1?
2711  7440          SZA               /IS AC ZERO?
2712  7402  P0E6D,  HLT               /GTF FAILED TO GET INTERRUPT BUS,
2713  4577  P0T6E,  SETLOC           /SET INTERRUPT RETURN LOCATION
2714  0002          2                 /TO P0T6F,
2715  2725          P0T6F
2716  6007          CAF               /CLEAR ALL FLAGS,
2717  6001          ION               /TURN INTERRUPT ON
2720  6004          GTF               /GET INTERRUPT FLAGS,
2721  0335          AND K5200
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2722  4560            USPF            /SET PRINTER FLAG,
2723  7000            NOP             /(INTERRUPT),
2724  7402  P0E6E,     HLT             /GTF CLEARED ION,
2725  7102  P0T6F,     CLL BSW         /PUT ION = (AC SHOULD EQUAL 0002),
2726  7012            RTR             /FLAG INTO LINK, (AC SHOULD EQUAL 0000).
2727  7430            SZL             /LINK 1?
2730  7440            SZA             /AC ZERO?
2731  7402  P0E6F,     HLT             /GTF FAILED TO GET ION,
2732  2062            ISZ CTRA        /TEST DONE?
2733  5263            JMP P0T6A       /NO,  REPEAT,
2734  5425            JMP I CHAIN
2735  5200  K5200,     5200


                      /TEST OF RTF, TEST IS DONE
                      /4000 TIMES,

2736  0007  P0T7,     7
2737  7777            7777
2740  4431            JMS I S4000     /SET UP TO DO TEST 4000 TIMES,
2741  4577            SETLOC          /SET INTERRUPT RETURN
2742  0002            2               /TO P0T7C+3,
2743  2760            P0T7C+3
2744  7320  P0T7A,     CLA CLL CML     /AC EQUALS ZERO, LINK EQUALS 1,
2745  6005            RTF             /RESTORE FLAGS,
2746  7420            SNL             /LINK SET?
2747  7440            SZA             /AC ZERO?
2750  7402  P0E7A,     HLT             /RTF FAILED TO RESTORE LINK,
2751  7330  P0T7B,     CLA CLL CML RAR /AC EQUALS 4000
2752  6005            RTF             /RESTORE FLAGS,  (LINK),
2753  7420            SNL             /LINK RESTORED?
2754  7402  P0E7B,     HLT             /RTF FAILED TO RESTORE LINK,
2755  4560  P0T7C,     USPF            /SET PRINTER FLAG,
2756  7000            NOP             /(INTERRUPT),
2757  7402  P0E7C,     HLT             /RTF DID NOT SET ION,
2760  2062            ISZ CTRA        /TEST DONE?
2761  5344            JMP P0T7A       /NO, REPEAT,
2762  5425            JMP I   CHAIN


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      3000            PAGE



                      /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
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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 10 OR 11 BIT TIMES
                    /(SEE TABLE AT BEGINNING OF PROGRAM) FOR FLAG TO SET',
                    /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
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                                    /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,
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 = 0,

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,
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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 SET OR KSF FAILED,
              /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',
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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
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 S100      /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',
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                    /SCOPE LOOP,  PRESS CONTINE TO ENTER,
3231  4250          P1E5,   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


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
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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,
            /SCOPE LOOP,  PRESS CONTINUE TO ENTER,
3311  4563            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' P1TS7A,   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' P1T10A,   JMS SETRND      /INITIALIZE RANDOM NUMBER GENERATOR,
3333  4774' P1T10A,   JMS RGNB        /GET A RANDOM NUMBER,
3334  0145            AND C377        /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  'E GOOD
   1  4353            JMS SNDREC      /TRANSMIT AND F   IVE
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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
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 S100
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
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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


            /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 1000 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',
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                                    /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
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 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.

3550  4431          JMS I S4000       /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
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                    /SKIP ON FLAG 500 TIMES TO VERIFY THAT NO
                    /SKIP OCCURS WITH FLAG = 0,
3600  3003  P2TS3,   3
3601  3630          P2TS4
3602  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,

3603  4577          SETLOC            /SET COUNT OF
3604  0062          CTRA              /-500 (DEC) IN
3605  7014          -764              /CTRA
3606  4571  P2TS3A, UKCC              /CLEAR FLAG
3607  4576          DELAY             /GO DELAY
3610  4572          UKSF              /READY?
3611  5221          JMP P2E3A         /NO,  ERROR
3612  4571          UKCC              /YES,  RESET FLAG
3613  4572          UKSF              /READY?
3614  5216          JMP .+2           /NO,  OK
3615  5223          JMP P2E3B         /YES,  ERROR
3616  2062          ISZ CTRA          /ALL DONE TESTING?
3617  5213          JMP .-4           /NO,  REPEAT
3620  5425          JMP I CHAIN       /YES,  CHAIN
3621  7402  P2E3A,  HLT               /TST3 ERR HALT A,  FLAG
                                      /NOT SET OR KSF FAILURE
3622  5206          JMP P2TS3A        /TRY AGAIN
3623  7402  P2E3B,  HLT               /TST3 ERR HALT B,  FLAG
                                      /FAILED TO RESET, OR KSF
                                      /SKIPPED ERRONEOUSLY,

                    /TURN OFF READER BEFORE ENTERING
                    /SCOPE LOOP,
3624  4571          UKCC              /CLEAR FLAG AND AC
3625  4572          UKSF              /SKIP ON FLAG = 1
3626  5224          JMP .-2           /REPEAT
3627  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,
3630  0004  P2TS4,   4
3631  3671          P2TS5
3632  4577          SETLOC            /SET INTERRUPT RETURN
3633  0002          2                 /TO P2E4A,
3634  3644          P2E4A
3635  4565  P2TS4A, UTCF              /CLEAR PUNCH/PRINTER FLAG
3636  4426          JMS I KBFLAG
3637  4571          UKCC              /CLEAR READER FLAG
3640  6001          ION               /ENABLE INTERRUPT
3641  7000          NOP
3642  6002          IOF               /TURN OFF INTERRUPT
3643  5246          JMP .+3
3644  4777  P2E4A,  JMS INTFND        /UNEXPECTED INTERRUPT
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3645  5235            JMP P2TS4A      /TRY AGAIN
3646  4431            JMS I S4000     /SET UP TO DO TEST 4000 TIMES,
3647  4577            SETLOC          /SET INTERRUPT RETURN
3650  0002            2               /TO P2TS4C,
3651  3666            P2TS4C
3652  4571            UKCC
3653  4572            UKSF            /WAIT FOR READER FLAG
3654  5253            JMP .-1         /TO SET
3655  6001  P2TS4B,   ION             /ENABLE INTERRUPT
3656  7000            NOP
3657  7402  P2E4B,    HLT             /READER FLAG FAILED TO INTERRUPT,
                                      /OR INTERRUPT SYSTEM MALFUNCTION
3660  4577            SETLOC          /SET INTERRUPT RETURN
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 S100      /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
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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 BACK INTO THE AC',
3730  7041            CIA             /2'S COMPLEMENT IT
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 1000 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
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3764  4430            JMS I S100      /SET UP TO DO TEST 100 TIMES,
3765  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,

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,
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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
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
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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
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 S100      /SET UP TO DO TEST 100 TIMES',
4156  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',
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                                    /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 COME UP?
4170  7610            SKP CLA
4171  5775'           JMP P2E11B    /YES, ERROR, GO TO P2E11B.
4172  5774'           JMP P2T11C    /CROSS PAGE

4174  4200
4175  4215
4176  4206
4177  2017
      4200            PAGE

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
```

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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
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 C377
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 C377        /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,
```

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                    /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 TEST
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
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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
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

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                      /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
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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
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

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                      /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
```

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4424  2062  P3T2C,  ISZ CTPA        /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


                     /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
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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
4512  4573            TYPE            /PRINT TEST TITLE
4513  6337            RMTST
4514  7701            ACL
4515  3104            DCA UTEMP
4516  4573    RMTSTA, TYPE            /PRINT ---- I
4517  1563            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 [-50        /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



                /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
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                    /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
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
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                        /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
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
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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



                      /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
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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
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
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
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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 CYCLE,
5223  4474           JMS I UPUNCH    /DUMMY CYCLE
5224  1132           TAD [257        /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 [-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
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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
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5362  1400
5363  1216
5364  1316
5365  1212
5366  1200
5367  1717
5370  1707
5371  7000
5372  6577
5373  0210
5374  6164
5375  7731
5376  5162
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 S4000
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  2062        ISZ CTRA        /ALL DONE?
5413  5210        JMP .-3         /NO, REPEAT
5414  5425        JMP I CHAIN     /YES, CHAIN

5415  7602  P6E0,   HLT 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 [-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
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  1254          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
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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
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
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                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
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
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5656  0120            AND C400
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 C100
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
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5740  1144            TAD [-377
5741  7640            SZA CLA                 /STALL?
5742  7240            CLA CMA                 /YES,
5743  3064            DCA STLID               /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? (SP0=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  5753            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                /SET UP FOR NEXT IOT CODE',
6034  5223            JMP DVCOM+1



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
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
6204  0336            336
6205  0337            337
6206  0341    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  0000
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    /-!-@?/
6315  5500
6316  7700
6317  5555    RM37A,  TEXT    /-...!-!@?/
6320  5555
6321  1155
6322  1100
6323  7700
6324  3440    SPTST0, 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  0077
6365  0000
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
   2  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  0523
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  0114
6525  4005
6526  2125
6527  1126
6530  0114
6531  0516
6532  2440
6533  2405
6534  2324
6535  0077
6536  0000
6537  4543    KMSG9,  TEXT    /%#/
6540  0000
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 1000 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  0257
0133  0334
0134  0252
0135  7650
0136  7670
0137  7653
0140  0011
0141  7772
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  11110000

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  11000011  11111111  11111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100111

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  11111111  11100000  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
```

```
A         6107
A33WP6    6065
A35WP6    6073
A37WP6    6101
AC        0077
ACL       7701
ASCCN     1650
ASCT      1706
BAUCON    1537
BAUDRT    0022
BAUTAB    0504
BDRET     0205
BKSCTR    5262
BKSPC     5263
BKSPT     6253
BKSU      6574
BLK2      6724
BLKBB     6722
BLKCC     7034
BLKCNT    0101
BLOCK1    6601
BLOCK2    6713
BLOCKA    6577
BLOCKB    6711
BLOCKC    7023
BSW       7002
C241      6153
C244      6156
C247      6161
C252      6164
C255      6167
C272      6172
C275      6175
C300      6200
C335      6203
C373      6241
C377      6245
CAF       6007
CAM       7621
CARLF     6250
CHAIN     0025
CHAINN    0263
CHCK      0513
CHECK     0070
CHRCNT    0456
CHRTST    6376
CK33      0352
CK35      0360
CK37      0366
CKSR33    4554
CKSR35    4557
CKSR37    4553
CLA       7200
CNTST     1600
CNV       1671
CR        0107
CRALF     0562
CRCTR     0561
CRLF      4575
CRTST     6327
CRTSTA    4456
CRTSTB    4461
CTRA      0062
CTRB      0063
CTSK      0550
CURTST    0054
D         6112
DBLK      7577
DELAY     4576
DELAYM    0024
DELAYS    0102
DLCNT     0474
DLCNT1    0027
DLMSR     1474
DLYMS     0337
DLYMSK    0111
DVCOM     6022
DVCSEL    6000
END       6577
ERRCNT    5676
ERRCR     0103
ERRCTR    5721
ERROR     1440
FADDR     0623
FBA33     1102
FBALL     1066
FBF       0035
FBF3      1031
FBF33     1055
FBFI      2144
FETCH     1646
FLAG      0716
FORWD     0302
FOUR      6145
FW336     1117
FW356     1135
FW376     1153
G         6115
GETPT     0067
GETRDY    0237
GKBCR     5753
GTBIN     0444
GTF       6004
HLT       7402
HLTD      2076
HLTTST    5713
HOLD1     3346
IBIN      0436
INØ       1433
INCRTN    0261
INKSF     1264
INPATT    0066
INTAB     6035
INTCF     1261
INTFND    2017
INTKSF    2021
INTSF     1257
INTSVC    1254
INTTSF    2024
IOF       6002
ION       6001
J         6120
K5200     2735
KBFLAG    0026
KCC       6032
KCR       6030
KFLAG     1365
KIE       6035
KMSG1     6432
KMSG2     6443
KMSG3     6454
KMSG3A    6462
KMSG4     6521
KMSG5     6537
KRB       6036
KRS       6034
KSF       6031
KSTART    0023
LAS       7604
LF        0110
LFTST     6366
LFTSTA    4612
LINK      0100
M         6123
M147      7631
M3        2111
MCTR      0625
MIL1      0061
MILCTR    0060
MINT      6115
MOVE      4574
MOVEA     0613
MOVVE     0600
MQL       7421
MSCTR     0057
MTABP     2162
MTON      6117
MTRS      6127
NTST      1546
NTSTA     1555
NXTST     0056
OCTEQV    6541
ONE       6142
OPEN      0000
OUT       1271
OUTØ      2114
OUT1      2121
OUT2      2123
OUTTAB    6050
P         6126
PØE0A     2237
PØE0B     2244
PØE0C     2253
PØE0E     2262
PØE1A     2304
PØE1B     2315
PØE2A     2415
PØE2B     2427
PØE2C     2435
PØE2D     2443
PØE2E     2456
PØE2F     2465
PØE2G     2474
PØE3A     2527
PØE3B     2534
PØE3C     2540
PØE4A     2607
PØE4B     2614
PØE5A     2654
PØE5B     2656
PØE6A     2670
PØE6B     2675
PØE6C     2701
PØE6D     2712
PØE6E     2724
PØE6F     2731
PØE7A     2750
PØE7B     2754
PØE7C     2757
PØT6      2660
PØT6A     2663
PØT6B     2671
PØT6C     2676
PØT6D     2702
PØT6E     2713
PØT6F     2725
PØT7      2736
PØT7A     2744
```

```
P0T7B   2751
P0T7C   2755
P0TS0   2205
P0TS0A  2211
P0TS0B  2214
P0TS0C  2222
P0TS0D  2225
P0TS0E  2230
P0TS1   2270
P0TS1A  2275
P0TS1B  2313
P0TS1C  2324
P0TS2   2327
P0TS2A  2332
P0TS2B  2342
P0TS2C  2345
P0TS2D  2350
P0TS2E  2400
P0TS2F  2402
P0TS2G  2404
P0TS3   2504
P0TS3A  2510
P0TS3B  2515
P0TS3C  2521
P0TS4   2544
P0TS4A  2547
P0TS4B  2565
P0TS4C  2600
P0TS5   2616
P0TS5A  2624
P0TS5B  2640
P11MG1  6546
P11MG2  6562
P1E11A  3424
P1E12A  3464
P1E12B  3474
P1E1A   3025
P1E2A   3053
P1E2B   3062
P1E3A   3113
P1E3B   3122
P1E4A   3143
P1E5    3250
P1E5A   3230
P1E5B   3235
P1E5C   3242
P1E5D   3257
P1E5E   3264
P1E6A   3310
P1E710  3366
P1T10   3325
P1T10A  3333
P1T11   3400
P1T11A  3405
P1T12   3435
P1T12A  3443
P1T12B  3456
P1TS0   3005
P1TS1   3010
P1TS1A  3014
P1TS2   3034
P1TS2A  3040
P1TS2B  3046
P1TS3   3066
P1TS3A  3074
P1TS4   3126
P1TS4A  3133
P1TS4B  3153
P1TS4C  3167
P1TS5   3200
P1TS5A  3204
P1TS5B  3211
P1TS5C  3213
P1TS5D  3217
P1TS5E  3222
P1TS6   3271
P1TS6A  3277
P1TS7   3314
P1TS7A  3322
P2E0    3524
P2E1    3543
P2E10A  4073
P2E10B  4107
P2E10C  4115
P2E10D  4123
P2E10E  4135
P2E10F  4144
P2E11A  4206
P2E11B  4215
P2E11C  4224
P2E12A  4276
P2E12B  4303
P2E12C  4305
P2E2A   3562
P2E2B   3564
P2E3A   3621
P2E3B   3623
P2E4A   3644
P2E4B   3657
P2E5    3706
P2E6A   3746
P2E6B   3752
P2E6C   3756
P2E7A   4015
P2E7B   4021
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P2T10A  4034
P2T10B  4045
P2T10C  4051
P2T10D  4054
P2T10E  4064
P2T10F  4066
P2T11   4153
P2T11A  4157
P2T11B  4166
P2T11C  4200
P2T12   4233
P2T12A  4247
P2T12B  4255
P2T12C  4260
P2TS0   3510
P2TS0A  3513
P2TS1   3530
P2TS1A  3533
P2TS1B  3534
P2TS2   3545
P2TS2A  3551
P2TS3   3600
P2TS3A  3606
P2TS4   3630
P2TS4A  3635
P2TS4B  3655
P2TS4C  3666
P2TS5   3671
P2TS5A  3677
P2TS6   3711
P2TS6A  3716
P2TS6B  3724
P2TS6C  3734
P2TS7   3762
P2TS7A  4000
P2TS7B  4006
P3E0    4337
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P3E2    4427
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P3T1B   4366
P3T2C   4424
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P3TS0A  4324
P3TS1   4344
P3TS1A  4354
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P3TS2A  4406
P3TS2B  4411
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P4T46A  5116
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P4TS13  4661
P4TS14  4665
P4TS15  4671
P4TS16  4675
P4TS17  4701
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P4TS22  4715
P4TS23  4721
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P4TS25  4731
P4TS26  4735
P4TS27  4741
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P4TS31  4751
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P4TS33  4761
P4TS34  5000
P4TS35  5004
P4TS36  5010
P4TS37  5014
P4TS4   4623
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P4TS41  5024
P4TS42  5030
P4TS43  5047
P4TS44  5054
P4TS45  5072
P4TS46  5106
P4TS47  5122
P4TS5   4631
P4TS50  5231
P4TS6   4635
P4TS7   4641
P6E0    5415
P6T0    5400
P6T1    5421
P6T1A   5426
P6T2    5440
P6T2A   5447
P70CTR  1211
P7T0    5502
P7T1    5506
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P7T12   5552
P7T13   5556
P7T14   5562
P7T15   5566
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P7T17   5600
P7T2    5512
P7T20   5604
P7T21   5610
P7T22   5614
P7T23   5620
P7T24   5624
P7T25   5630
P7T26   5634
P7T27   5640
P7T3    5516
P7T30   5644
P7T4    5522
P7T5    5526
P7T6    5532
P7T7    5536
PADDR   1342
PBLK    1316
PBLKR   1324
PCTR    1341
PDCR    1310
PFLAG   0071
PLTLR   1200
PRG0    2200
PRG1    3000
PRG10   5651
PRG11   5722
PRG11A  5725
PRG12   5764
PRG2    3503
PRG3    4307
PRG4    4434
PRG5    5274
PRG5A   5317
PRG6    5340
PRG7    5465
PRGADR  0235
PRGEND  0300
PRGNUM  0036
PRGTAB  0037
PRINT   0671
PSTUP   1277
PSYNC   1212
PT0     0442
PT1     0443
PUNCH   2112
RADDR   1416
RBCTR   1417
RBUSY   0076
RCTRA   1511
RCTRB   1512
RDBLK   1400
RDBLKR  1407
RDRSRV  1420
RDSRV   1430
RGNA    0400
RGNB    0417
RM33A   1563
RM33B   6314
RM37A   6317
RMB     4523
RMTST   6337
RMTSTA  4516
RP1A    0415
RP1B    0434
RP2A    0416
RP2B    0435
RRDY    1343
RRPP    0304
RSCTR   1232
RSSERV  1233
RSTUP   1351
RSYNC   1216
RTF     6005
RTNNO   0055
RUDONE  1496
S       6131
S100    0030
S100I   2012
S200    0032
S200I   2005
S4000   0031
S4000I  2000
SA      6206
SASC    1705
SB      1435
SB0     4332
SB1     4364
SB2     4420
SBSP    5673
SCNT    0473
SD      6211
SETLOC  4577
SETRND  1740
SEVEN   6150
SG      6214
SGET    1717
SHALT   0317
SINPT   1707
SJ      6217
SLDC02  0223
SM      6222
SNDREC  3353
SP      6225
SPAC    5207
SPCNT   5161
SPCTR   5162
SPF     6040
SPI     6045
SPIND   1716
SPT0    1714
SPT1    1715
SPTST   6354
SPTSTA  4535
SPTSTB  4546
SPTSTC  6324
SRQ     6003
SRSET   0236
SRT0A   5655
SRT0B   5662
SS      6230
ST33B   1020
STAL    0551
STALL   4556
START   0200
STBAUD  1513
STBF    1000
STCTR   0326
STLID   0064
SV      6233
SY      6236
SYNC    0065
SYNK    0530
SYNKA   0534
TABCTR  5200
TABP    5201
TABPA   5220
TADDR   0624
TBCNT   5140
TBMRK   6300
TBMRK1  6306
TBTA    5134
TBTB    5146
TBTST   6267
TCF     6042
TCTR    1647
TEMP    0052
TEMP1   0053
TEMQ    0714
TEMR    0715
TLC37   0034
TLC37I  2134
TLCALI  2126
TLCALL  0033
TLS     6046
TPC     6044
TRDATA  3337
TSC1    0634
TSC2    0643
TSF     6041
TTYIOT  0021
TTYTYP  0020
TYPAT   0654
TYPE    4573
TYPEA   1637
TYPLN   1627
TYPLN3  1615
TYPSP   0660
TYPSTG  0626
UKCC    4571
UKCR    4562
UKIE    4561
UKRB    4567
UKRS    4570
UKSF    4572
UMOVE   0075
UOUT    0072
UPUNCH  0074
USPF    4560
USPI    4557
UTCF    4565
UTEMP   0104
UTEMP1  0105
UTEMP2  0106
UTLS    4563
UTPC    4564
UTPLN3  0073
UTSF    4566
V       6134
VCTR    1267
WASC    1704
WCHK    0527
WCPTST  6412
WOSWS   2153
WTS6A   0112
XKCC    0724
XKCR    0755
XKIE    0761
XKRB    0734
XKRS    0730
XKSF    0717
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XSPF    1165
XSPI    0765
XTCF    0745
XTLS    0751
XTPC    1171
XTSF    0740
Y       6137
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ERRORS DETECTED: 0

LINKS GENERATED: 106

RUN-TIME: 32 SECONDS

3K CORE USED