

IDENTIFICATION

PRODUCT NAME: HIGH-SPEED READER/PUNCH TESTS
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MAINTAINER: DIAGNOSTIC ENGINEERING
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HIGH SPEED READER/PUNCH TESTS
DHPCA VER A MARCH 1977

SEQ 0002

1.0 ABSTRACT

THE PCB-E HIGH-SPEED READER AND PUNCH TESTS ARE A TEST PACKAGE USED TO TEST THE TYPE PCB-E AND PCB-E HIGH-SPEED READER-PUNCH WHEN ATTACHED TO A PDP8/E SYSTEMS. THE TESTS PERFORM BASIC INPUT AND OUTPUT CONTROL LOGIC TESTS, READER AND PUNCH TESTS, READER AND PUNCH SPEED PRINTOUTS, AND PROVIDE MAINTENANCE LOOPS USEFUL IN ADJUSTING THE READER AND PUNCH.

THE AVAILABLE TEST PROGRAMS ARE:

PRG0 - BASIC READER AND READER CONTROL LOGIC TEST.
PRG1 - BASIC PUNCH AND PUNCH CONTROL LOGIC TEST.
PRG2 - READER TEST, SPECIAL BINARY COUNT PATTERN.
PRG3 - PUNCH TEST, SPECIAL BINARY COUNT PATTERN.
PRG4 - PUNCH VERIFY, SPECIAL BINARY COUNT PATTERN.
PRG5 - PUNCH TEST, RANDOM CHARACTERS.
PRG6 - PUNCH VERIFY, RANDOM CHARACTERS.
PRG7 - COMBINED READER-PUNCH TEST, SPECIAL BINARY COUNT PATTERN.
PRG10 - READ AMPLIFIER ADJUSTMENT LOOP, 1'S AND 0'S TAPE.
PRG11 - PUNCH ANY CHARACTER IN SR LOOP.
PRG12 - 1'S AND 0'S PUNCH LOOP.
PRG13 - READER SPEED PRINT LOOP.
PRG14 - PUNCH SPEED PRINT LOOP.
PRG15 - READ X CHARACTERS, STALL Y MS LOOP.

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP8/E WITH ASR33/35 TELETYPE, PRB-E READER, OR PRB-E PUNCH, OR PUB-E READER/PUNCH. THE FOLLOWING TAPES ARE REQUIRED IN CONJUNCTION WITH THIS TEST:

MAINDEC-GB-D261-PT
MAINDEC-GB-D262-PT
MAINDEC-GB-D264-PT

2.2 STORAGE

LOCATIONS 0000 THROUGH 4377 ARE USED.

2.3 PRELIMINARY PROGRAMS

ALL BASIC CPU AND TELETYPE MAINDEC'S MUST HAVE BEEN RUN SUCCESSFULLY.

3.0 LOADING PROCEDURE

THE BINARY LOADER IS USED TO LOAD THE PROGRAM.

4.0 USE PROCEDURES

THE FOLLOWING PAGES EXPLAIN IN DETAIL THE STEPS NECESSARY TO

RUN EACH PROGRAM.

4.1 PRG0 USE PROCEDURE

- A. INSURE THAT THE TELETYPE IS ON-LINE.
- B. LOAD READER WITH ALL 0'S TEST TAPE, PREFERABLY THE TAPE SHOULD BE SPLICED INTO A LOOP.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0000. PRESS START.
- E. PROGRAM HALTS AT LOC 0242 TO PERMIT SETTING OF SR OPTIONS. SET DESIRED OPTIONS AND PRESS CONTINUE.

PRG0 SR OPTIONS

SR0 HALT AT ROUTINE END. ROUTINE NUMBER IN AC.
 SR1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR8-SR11.
 SR2 LOOP PROGRAM.
 SR3 0=HALT ON ERROR. 1=DO NOT HALT ON ERROR.
 SR4 SKIP TEST AFTER ERROR.
 SR5 ENTER SCOPE LOOP AFTER ERROR.
 SR6 THROUGH ROUTINE NUMBER TO BE SELECTED.
 SR11

- F. THE PROGRAM RUNS AND HALTS AT PROGRAM END HALT. AT LOC 0305 UNLESS PREVENTED FROM ENDING BY ERRORS, OR SR OPTIONS.

4.2 PRG1 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. MAKE PUNCH READY, INSURING THAT THERE ARE SEVERAL INCHES OF BLANK LEADER.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0001. PRESS START.
- E. PROGRAM HALTS AT LOC 0242 TO PERMIT SETTING OF SR OPTIONS. SET DESIRED OPTIONS AND PRESS CONTINUE.

PRG1 SR OPTIONS

SR0 HALT AT ROUTINE END. ROUTINE NUMBER IN AC.
 SR1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR8-SR11.
 SR2 LOOP PROGRAM.
 SR3 0=HALT ON ERROR. 1=DO NOT HALT ON ERROR.
 SR4 SKIP TEST AFTER ERROR.
 SR5 ENTER SCOPE LOOP AFTER ERROR.
 SR6 THROUGH ROUTINE NUMBER TO BE SELECTED.
 SR11

- F. THE PROGRAM RUNS TO COMPLETION AND HALTS AT PROGRAM END HALT AT LOC 0305, UNLESS PREVENTED FROM ENDING BY ERRORS, OR SR OPTIONS.

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NOTE

THE RESULTING PUNCHED TAPE MUST BE INSPECTED VISUALLY, EXCEPT FOR TWO 500 CHARACTER BLOCKS CONTAINING PUNCHES IN ALTERNATE CHANNELS. THE REMAINDER OF THE TAPE SHOULD BE BLANK.

4.3 PRG2 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. LOAD READER WITH SPECIAL BINARY COUNT PATTERN TEST LOOP.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0002. PRESS START.
- E. THE PROGRAM RUNS CONTINUOUSLY UNLESS ERRORS OCCUR.

PRG2 SR OPTIONS

SR3 0=HALT ON ERROR. SR3=1=NO HALT ON ERROR.
 SR6 0=STALL (RANDOM). SR6=1=RUN FULL SPEED.
 SR7 LOCK IN CURRENT STALL (SR6 MUST BE 0).

4.4 PRG3 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. MAKE PUNCH READY.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0003. PRESS START.
- E. THE PROGRAM PUNCHES SPECIAL BINARY COUNT PATTERN CONTINUOUSLY UNTIL STOPPED BY USER.

PRG3 SR OPTIONS

SR6 0=STALL (RANDOM). SR6=1=RUN FULL SPEED.
 SR7 LOCK ON STALL (SR6 MUST BE 0).

4.5 PRG4 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. LOAD READER WITH TAPE PUNCHED BY PRG3. BLANK LEADER SHOULD BE UNDER READ STATION, WITH "UP" MARKER TO THE LEFT.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0004. PRESS START.
- E. THE PROGRAM READS CONTINUOUSLY UNTIL ERRORS OCCUR, OR UNTIL THE READER RUNS OUT OF TAPE.

PRG4 SR OPTIONS

SR3 0=HALT ON ERROR. SR3=1=NO HALT ON ERROR.

DISREGARD ERRORS THAT OCCUR WHEN THE END OF SPECIAL BINARY COUNT PATTERN IS REACHED.

4.6 PRG5 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. MAKE PUNCH READY.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0006. PRESS START.
- E. THE PROGRAM PUNCHES RANDOM CHARACTERS CONTINUOUSLY UNTIL STOPPED BY USER.

PRG5 SR OPTIONS

SR6 =0-STALL (RANDOM), SR6=1-RUN FULL SPEED.
SR7 LOCK ON STALL (SR6 MUST BE 0).

4.7 PRG6 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. LOAD READER WITH TAPE PUNCHED BY PRG5. BLANK LEADER SHOULD BE UNDER READ STATION, WITH "UP" MARKER TO THE LEFT.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0006. PRESS START.
- E. THE PROGRAM READS CONTINUOUSLY UNTIL ERRORS OCCUR, OR UNTIL THE READER RUNS OUT OF TAPE.

PRG6 SR OPTIONS

SR3 =0-HALT ON ERROR. SR3=1-NO HALT ON ERROR.

NOTE

DISREGARD ERRORS THAT OCCUR WHEN THE END OF RANDOM CHARACTER DATA IS REACHED.

4.8 PRG7 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. MAKE PUNCH READY, PUNCH ABOUT 20 INCHES (MAXIMUM) OF BLANK LEADER, AND LOAD READER WITH THE BLANK LEADER. THE PUNCH TO READER SLACK SHOULD NOT BE EXCESSIVE.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0007. PRESS START.
- E. THE PROGRAM PUNCHES AND READ CHECKS SPECIAL BINARY COUNT PATTERN CONTINUOUSLY UNTIL ERROR OCCURS, OR SUPPLY OF TAPE IS EXHAUSTED.

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PRG7 SR OPTIONS

SR3 =0-HALT ON ERROR. SR3=1-NO HALT ON ERROR.
SR6 =0-STALL (RANDOM), SR6=1-FULL SPEED RUN.
SR7 LOCK ON CURRENT STALL (SR6 MUST BE 0).

4.9 PRG10 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. LOAD READER WITH 1'S AND 0'S TEST TAPE LOOP.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0010. PRESS START.
- E. THE PROGRAM RUNS CONTINUOUSLY UNTIL STOPPED BY USER. WITH THE PROGRAM RUNNING, THE USER CAN ADJUST THE READ STATION.
- F. A READ ERROR IS INDICATED BY AN ERROR PRINTOUT. DROPPING OF READER FLAG IS INDICATED BY 3 BELLS.

4.10 PRG11 USE PROCEDURE

- A. INSURE THAT TELETYPE IS ON-LINE.
- B. MAKE PUNCH READY.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0011. PRESS START.
- E. PROGRAM PUNCHES CONTINUOUSLY THE CODE SET IN SR SWITCHES 4 TO 11. THE SWITCHES MAY BE CHANGED BY THE USER.

4.11 PRG12 USE PROCEDURE

- A. INSURE TELETYPE IS ON-LINE.
- B. MAKE PUNCH READY.
- C. LOAD ADDRESS 0200.
- D. SET SR TO 0012. PRESS START.
- E. PROGRAM PUNCHES 1'S AND 0'S TAPE CONTINUOUSLY.

PRG12 SR OPTIONS

SR6 =0-STALL (RANDOM), SR6=1-RUN FULL SPEED.
SR7 LOCK ON STALL (SR6 MUST BE 0).

4.12 PRG13 USE PROCEDURE

PRG13 IS USED TO TIME THE HIGH SPEED READER WITH THE AID OF A WATCH WITH SWEEP SECOND HAND. THE READER CAN BE TIMED IN 2 WAYS:

- A. 30 SECOND TIMING. USED FOR APPROXIMATE SPEED SETTINGS.
- B. 300 SECOND TIMING (5 MINUTES) FOR ACCURATE AND FINAL VERIFICATION OF READER SPEED.

TO TIME THE READER PROCEED AS FOLLOWS:

- A. INSURE TELETYPE IS ON-LINE
- B. LOAD ANY TAPE IN READER
- C. LOAD ADDRESS 0200
- D. SET SR TO 0013
- E. FOR 30 SECOND TIMING, LEAVE SRI=0, FOR 300 SECOND TIMING, SET SRI TO A 1.
- F. PRESS START. READER WILL RUN CONTINUOUSLY.
- G. WHEN THE 30 OR 300 SECOND TIME IS UP, TURN ON SRC, AND THEN THEN TURN IT OFF. THE PROGRAM WILL TYPE OUT THE READER SPEED IN CHARACTERS PER SECOND (CPS)
- H. PROGRAM HALTS AT LOC 4230 AFTER PRINTOUT.
- I. TO RETIME THE READER, PRESS CONTINUE AFTER MAKING SURE THAT SRC IS OFF, AND THAT SRI IS SET TO THE CORRECT TIME BASE.

NOTE

ACCURATE READER SPEED MEASUREMENT DEPENDS ON THE USER'S ATTENTION TO THE STARTING AND STOPPING TIMES.

4.13 PRG14 USE PROCEDURE

PRG14 IS USED TO TIME THE HIGH SPEED PUNCH WITH THE AID OF A WATCH WITH SWEEP SECOND HAND. THE PUNCH IS TIMED OVER A PERIOD OF 60 SECONDS. TO TIME THE PUNCH, PROCEED AS FOLLOWS:

- A. INSURE TELETYPE IS ON-LINE
- B. MAKE PUNCH READY
- C. LOAD ADDRESS 0200
- D. SET SR TO 0014
- E. PRESS START. PUNCH RUNS CONTINUOUSLY.
- F. AFTER 60 SECONDS TURN ON SRC, AND THEN TURN IT OFF. THE PROGRAM WILL TYPE OUT THE PUNCH SPEED IN CHARACTERS PER SECOND (CPS).

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- G. PROGRAM HALTS AT LOC 4255 AFTER PRINTOUT.
- H. TO RETIME THE PUNCH, PRESS CONTINUE AFTER MAKING SURE THAT SRC IS OFF.

NOTE

ACCURATE PUNCH SPEED MEASUREMENT DEPENDS ON THE USER'S ATTENTION TO THE STARTING AND STOPPING TIMES.

4.14 PRG15 USE PROCEDURE

- A. LOAD ANY TAPE IN READER.
- B. LOAD ADDRESS 0200.
- C. SET SR TO 0015. PRESS START.
- D. PROGRAM HALTS AT LOC 4332.
- E. SET SR SWITCHES 0 THROUGH 4 TO NUMBER OF CHARACTERS TO READ (1 TO 37 OCTAL).
- F. SET SR SWITCHES 5 THROUGH 11 TO NUMBER OF MILLISECONDS TO STALL AFTER READING CHARACTERS (1 TO 177 OCTAL).
- G. PRESS CONTINUE
- H. PROGRAM RUNS CONTINUOUSLY, READING THE SPECIFIED NUMBER OF CHARACTERS, AND THEN STALLING FOR THE SPECIFIED NUMBER OF MILLISECONDS.

NOTE

THE NUMBER OF CHARACTERS READ AND/OR THE STALL COUNT MAY BE CHANGED AT ANY TIME. THIS PROGRAM DOES NOT CHECK FOR CORRECT DATA. IT IS INTENDED PRIMARILY AS AN AID IN ADJUSTING READER TIMINGS.

5. OPERATING PROCEDURES

5.1 PROGRAM AND/OR OPERATOR ACTION

5.1.1 NORMAL HALTS

- LOC 0242 SR OPTIONS HALT. THIS HALT OCCURS DURING EXECUTION OF PRGO AND PRG1 TO PERMIT SETTING OF DESIRED OPTIONS. PRESS CONTINUE TO PROCEED.
- LOC 0305 PROGRAM END HALT. OCCURS AT END OF PRGO AND PRG1 IF "LOOP PROGRAM" OPTION IS NOT SET. SET DESIRED OPTION(S) AND PRESS CONTINUE. IF NO OPTIONS ARE SET, THIS HALT REOCCURS.

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- LOC 0340 ROUTINE END HALT. OCCURS DURING EXECUTION OF PRGO AND PRG1 IF SRO IS 1.
- LOC 4230 THIS HALT OCCURS IN PRG13 AFTER PROGRAM TYPES THE READER SPEED IN CHARACTERS PER SECOND. TO RETIME THE READER, PRESS CONTINUE AFTER MAKING SURE THAT SRO IS OFF AND THAT SRI IS SET TO THE CORRECT TIME BASE.
- LOC 4255 THIS HALT OCCURS IN PRG14 AFTER PROGRAM TYPES THE PUNCH SPEED IN CHARACTERS PER SECOND. TO RETIME THE PUNCH, PRESS CONTINUE AFTER MAKING SURE THAT SRO IS OFF.
- LOC 4332 PRG15 SR SET HALT. OCCURS TO PERMIT SETTING OF DESIRED CHARACTER AND STALL COUNT. SET SRO-4 TO NUMBER OF CHARACTERS TO BE READ. SET SR5-11 TO NUMBER OF MILLISECONDS TO STALL AFTER READING CHARACTERS, PRESS CONTINUE.

5.2 ERRORS

ERROR PRINTOUTS AND ERROR HALTS ARE USED IN THIS PROGRAM.

5.2.1 ERROR PRINTOUTS

ERROR PRINTOUTS ARE IDENTIFIED BY AN ASTERISK(*) PRECEDING THE PRINTOUT. MOST ERROR PRINTOUTS TAKE THE FORM:

*P00XX R00YY ZZZZZZZZZ

WHERE,

P00XX=PROGRAM NUMBER
R00XX=ROUTINE NUMBER IN THE PROGRAM
Y=A LETTER, INDICATES WHICH ERROR OCCURED WITHIN A ROUTINE. IF NO LETTER IS PRINTED, ONLY ONE ERROR IS POSSIBLE IN THE ROUTINE
ZZZZZZ=ADDITIONAL INFORMATION PRINTOUT.

FOLLOWING AN ERROR PRINTOUT THE PROGRAM HALTS IF SR3 (HALT-ON-ERROR OPTION) IS OFF, AND THE OPTION APPLIES TO THE PROGRAM.

*P0000 R0000

250 MS AFTER ISSUING RFC COMMAND (IOTC14) RSF DID NOT SKIP. FLAG IS NOT SET, OR RSF COMMAND FAILED TO SKIP.

*P0000 R0001

WITH READ FLAG = 1, RSF (IOT011) COMMAND FAILED TO SKIP.

*P0000 R0002

RRB(IOT012) FAILED TO CLEAR FLAG. OR RSF(IOT011) SKIPPED WITH FLAG = 0.

*P0000 R0003

SKIP NOT GENERATED WITH INTERRUPT OFF. OP 6010 (APE) MALFUNCTION.

*P0000 R0004

PCE (6020) MALFUNCTION. INTERRUPT ENABLE NOT CLEARED.

*P0000 R0005

RRB(IOT012) COMMAND FAILED TO CLEAR FLAG.

*R0000 R0006

RFC(IOT014) FAILED TO CLEAR FLAG.

*P0000 R0007

RRB(IOT012) COMMAND RESULTED IN NON-ZERO CHARACTER SET INTO AC. SHOULD BE ALL 0'S. AN ALL 0'S TEST TAPE SHOULD BE IN THE READER.

*P0000 R00010A

UNEXPECTED INTERRUPT AFTER CLEARING READER PUNCH, TTY PUNCH, AND TTY READER. TURN OFF INTERRUPTING DEVICE.

*P0000 R00010B

WITH READER FLAG SET, READER FAILED TO INTERRUPT.

*P0000 R00011A

"STOP DELAY" NOT FIRING OR SET FOR TOO SHORT A DURATION, REFER TO SECTION 9 FOR TEST DESCRIPTION.

*P0000 R00011B

"STOP DELAY" TIME OUT IS TOO LONG. REFER TO SECTION 9 FOR TEST DESCRIPTION.

*P0001 R0000

PSF(IOT021) COMMAND SKIPPED WITH FLAG = 0. OR, LESS LIKELY.

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PCF(IOT022) FAILED TO CLEAR FLAG.

*P0001 R0001

PSF(IOT021) FAILED TO SKIP WITH FLAG = 1. OR FLAG IS NOT SET.

*P0001 R0002

PCF(IOT022) FAILED TO CLEAR FLAG.

*P0001 R00010A

UNEXPECTED INTERRUPT AFTER CLEARING PUNCH, READER, TTY PUNCH, AND TTY READER. TURN OFF INTERRUPTING DEVICE.

*P0001 R00010B

WITH PUNCH FLAG SET, PUNCH FAILED TO INTERRUPT

*P0002 R0000	S/B	XXXX	WAS	YYYY
*P0004 R0000	S/B	XXXX	WAS	YYYY
*P0006 R0000	S/B	XXXX	WAS	YYYY
*P0007 R0000	S/B	XXXX	WAS	YYYY
*P0010 R0000	S/B	XXXX	WAS	YYYY

ONE OF THE ABOVE PRINTOUTS OCCURS DURING ITS RESPECTIVE PROGRAM WHEN THE DATA READ FROM PAPER TAPE AND THE EXPECTED DATA DO NOT MATCH. S/B XXXX REPRESENTS THE EXPECTED CHARACTER. WAS YYYY REPRESENTS THE CHARACTER READ.

PCF(IOT022) FAILED TO CLEAR FLAG.

*P0001 R0001

PSF(IOT021) FAILED TO SKIP WITH FLAG = 1. OR FLAG IS NOT SET.

*P0001 R0002

PCF(IOT022) FAILED TO CLEAR FLAG.

*P0001 R00010A

UNEXPECTED INTERRUPT AFTER CLEARING PUNCH, READER, TTY PUNCH,
AND TTY READER. TURN OFF INTERRUPTING DEVICE.

*P0001 R00010B

WITH PUNCH FLAG SET, PUNCH FAILED TO INTERRUPT.

*P0002 R0000	S/B	XXXX	WAS	YYYY
*P0004 R0000	S/B	XXXX	WAS	YYYY
*P0006 R0000	S/B	XXXX	WAS	YYYY
*P0007 R0000	S/B	XXXX	WAS	YYYY
*P0010 R0000	S/B	XXXX	WAS	YYYY

ONE OF THE ABOVE PRINTOUTS OCCURS DURING ITS RESPECTIVE PROGRAM
WHEN THE DATA READ FROM PAPER TAPE AND THE EXPECTED DATA DO NOT
MATCH. S/B XXXX REPRESENTS THE EXPECTED CHARACTER, WAS YYYY
REP- REPRESENTS THE CHARACTER READ.

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INCORRECT RTN SELECTED

THIS PRINTOUT OCCURS DURING EXECUTION OF PRG0 AND PRG1 IF A
NONEXISTENT ROUTINE IS SELECTED. THE PROGRAM HALTS, SET CORRECT
ROUTINE NUMBER IN SR AND PRESS CONTINUE.

UNEXPECTED INTERRUPT

THIS PRINTOUT OCCURS DURING PRG7 EXECUTION. PROGRAM HALTS,
TURN OFF INTERRUPTING DEVICE. PRESS CONTINUE.

6.2 ERROR HALTS

LOC 0201	INCORRECT PROGRAM NUMBER SELECTED. SET SR TO CORRECT NUMBER AND PRESS CONTINUE.
LOC 0266	INCORRECT ROUTINE NUMBER SELECTED. PRECEDED BY PRINTOUT. SET CORRECT ROUTINE NUMBER IN SR AND PRESS CONTINUE.
LOC 0732	UNEXPECTED INTERRUPT. PRECEDED BY PRINTOUT. OCCURS DURING PRG7 EXECUTION. TURN OFF INTER- RUPTING DEVICE. PRESS CONTINUE.
LOC 1347	SYNC ERROR. OCCURS DURING PRG2 AND PRG7. IF PROGRAM IS UNABLE TO SYNC. PRESS CONTINUE TO RETRY.
LOC 1075	COMMON ERROR HALT. OCCURS AFTER ERROR PRINTOUT IF SR=0 AND OPTION APPLIES TO PROGRAM BEING RUN. PRESS CONTINUE.
LOC 3631	PRG7. PUNCH COUNT HAS EXCEEDED 100. READER IS PROBABLY NOT RUNNING. RESTART PROGRAM.

7.0 RESTRICTIONS

7.1 STARTING RESTRICTIONS

THIS PROGRAM MUST BE STARTED AT LOC 0200.

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

PRG0 1 MINUTE 50 SECONDS
PRG1 45 SECONDS
PRG2 THROUGH PRG16 ARE CONTINUOUS RUNNING PROGRAMS.

8.2 TEST TAPES

MAINDEC-00-0204-PT SPECIAL BINARY COUNT PATTERN TEST TAPE IS PROVIDED WITH THIS PROGRAM. FOR EASE OF USE, THE TAPE SHOULD BE SPLICED INTO A LOOP INSURING THAT THE PATTERN IS MATCHED AT THE SPICE POINT. THE END OF A PATTERN IS INDICATED BY THE CHARACTERS: RUBOUT, ALL 0'S CHARACTER, ALL 0'S CHARACTER, AND THEN ANOTHER RUBOUT.

IT IS DESIRABLE TO SPLICE INTO LOOPS. MAINDEC-00-0201-PT AND MAINDEC-00-0202-PT TO FACILITATE TESTING.

9.0 PROGRAM DESCRIPTION

THIS PROGRAM CONSISTS OF 14 INDIVIDUAL PROGRAMS NUMBERED FROM 00 TO 15 (OCTAL). PROGRAMS ARE SELECTED BY MEANS OF THE SWITCH REGISTER (SR).

9.1 PRG0 - BASIC READER AND READER CONTROL LOGIC TEST

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

- RTN0 CHECKS THAT FLAG IS SET 250 MS AFTER ISSUING RFC COMMAND (IOT014). FAILURE TO SKIP ON FLAG COULD BE CAUSED BY FLAG NOT SET, OR PSF FAILURE TO SKIP. TEST IS DONE 200 TIMES.
- RTN1 CHECKS THAT RSF COMMAND (IOT011) SKIPS WITH FLAG = 1. TEST IS DONE 4095 TIMES.
- RTN2 CHECKS THAT RSF COMMAND (IOT011) DOES NOT SKIP WITH FLAG = 0. DONE 4095 TIMES.
- RTN3 CHECKS FOR SKIP WITH INTERRUPT OFF. (DONE 2047 TIMES)
- RTN4 CHECKS THAT INTERRUPT ENABLE CAN BE CLEARED FOR READER. (DONE 4095 TIMES)
- RTN5 CHECKS THAT RRB COMMAND (IOT012) CLEARS THE FLAG. DONE 500 TIMES.
- RTN6 CHECKS THAT RFC COMMAND (IOT014) CLEARS THE FLAG. DONE 500 TIMES.
- RTN7 CHECKS ABILITY TO READ ALL 0'S CHARACTER. DONE 500 TIMES.
- RTN10 CHECKS FOR UNEXPECTED INTERRUPTS, AND THEN CHECKS THAT READER IS ABLE TO INTERRUPT.
- RTN11 THIS ROUTINE CHECKS THAT THE "STOP DELAY" IS NOT LESS THAN 10 MS. OR MORE THAN 250 MS. THE TEST SEQUENCE IS:

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- A. RFC (FETCH CHARACTER)
- B. WAIT FOR FLAG 1 (SHOULD BE SET IMMEDIATELY)
- C. DELAY 19 MS. (STOP DELAY SHOULD FIRE 6 MS AFTER STEP A.)
- D. RFC (FETCH CHARACTER. CLEAR FLAG.)
- E. DELAY 19 MS.
- F. SKIP ON FLAG. (IF SKIP OCCURS, THE "STOP DELAY" DID NOT FIRE, OR IS TOO SHORT).
- G. DELAY ADDITIONAL 212 MILLISECONDS.
- H. SKIP ON FLAG. (IF NO SKIP OCCURS, THE "STOP DELAY" IS TOO LONG.) TEST IS DONE 200 TIMES.

9.2 PRG1 - BASIC PUNCH AND PUNCH CONTROL LOGIC TEST

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

- RTN0 CHECKS THAT PSF COMMAND (IOT021) DOES NOT SKIP WITH FLAG = 0.
- RTN1 CHECKS THAT PSF COMMAND (IOT021) SKIPS WITH FLAG = 1. DONE 4095 TIMES.
- RTN2 CHECKS THAT PCF COMMAND (IOT022) IS ABLE TO CLEAR THE FLAG. DONE 500 TIMES.
- RTN3 CHECKS FOR SKIP WITH INTERRUPT OFF. (DONE 2047 TIMES)
- RTN4 CHECKS THAT INTERRUPT ENABLE CAN BE CLEARED FOR PUNCH. (DONE 4095 TIMES)
- RTN5 TEST DONE 500 TIMES. VISUAL CHECK OF TAPE REQUIRED. CHECKS THAT PCF COMMAND (IOT022) IS ABLE TO CLEAR THE PUNCH BUFFER. THE TEST SEQUENCE IS:
 - A. ALL 1'S TO PUNCH BUFFER, AND PUNCH (PLS).
 - B. IMMEDIATELY CLEAR THE PUNCH BUFFER BY ISSUING PCF COMMAND. NO HOLES SHOULD BE PUNCHED EXCEPT FOR FEED-HOLE.
- RTN6 TEST IS DONE 500 TIMES. VISUAL CHECK OF TAPE REQUIRED. ROUTINE LOADS PUNCH BUFFER WITH 125 (8) AND PUNCHES. ALTERNATE HOLES SHOULD BE PUNCHED.
- RTN7 TEST IS DONE 500 TIMES. VISUAL CHECK OF TAPE REQUIRED. ROUTINE LOADS PUNCH BUFFER WITH 252 (8) AND PUNCHES. ALTERNATE HOLES SHOULD BE PUNCHED.

- RTN10 CHECKS FOR UNEXPECTED INTERRUPTS, AND THEN CHECKS THAT PUNCH IS ABLE TO INTERRUPT.
- 9.3 PRG2 - READER TEST
- THE READER IS TESTED USING A SPECIAL BINARY COUNT PATTERN TEST TAPE. THE PROGRAM IS CONTINUOUS RUNNING. ERRORS ARE INDICATED BY PRINTOUTS. NORMAL TEST MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER GROUP READ. SR6 = 1 GIVES FULL SPEED TESTING. SR7 = 1 LOCKS PROGRAM ON CURRENT STALL. (SR6 MUST BE 0). PROGRAM RESYNCS AFTER 5 ERRORS. THE LENGTH OF A CHARACTER GROUP IS RANDOM, BUT DOES NOT EXCEED 15 CHARACTERS.
- 9.4 PRG3 - PUNCH TEST, SPECIAL BINARY COUNT PATTERN
- THIS CONTINUOUS RUNNING PROGRAM PUNCHES SPECIAL BINARY COUNT PATTERN. NORMAL TEST MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER PUNCHED. SR6 = 1 GIVES FULL SPEED PUNCHING. SR7 = 1 LOCKS PROGRAM ON THE CURRENT STALL. (SR6 MUST BE 0).
- 9.5 PRG4 - PUNCH VERIFY, BINARY COUNT PATTERN
- THIS PROGRAM READS AND CHECKS THE TAPE PUNCHED DURING EXECUTION OF PRG3. ERRORS ARE INDICATED BY ERROR PRINTOUTS.
- 9.6 PRG5 - PUNCH TEST, RANDOM CHARACTERS
- THIS CONTINUOUS RUNNING PROGRAM PUNCHES RANDOM CHARACTERS. NORMAL TEST MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER PUNCHED. SR6 = 1 GIVES FULL SPEED PUNCHING. SR7 = 1 LOCKS PROGRAM ON THE CURRENT STALL. (SR6 MUST BE 0).
- 9.7 PRG6 - PUNCH VERIFY, RANDOM CHARACTERS
- THIS CONTINUOUS RUNNING PROGRAM READS AND CHECKS THE TAPE PUNCHED DURING EXECUTION OF PRG5. ERRORS ARE INDICATED BY ERROR PRINTOUTS.
- 9.8 PRG7 - COMBINED READER - PUNCH TEST
- THIS CONTINUOUS RUNNING PROGRAM PUNCHES AND READ - CHECKS SPECIAL BINARY COUNT PATTERN. THE READER AND PUNCH WORK IN THE INTERRUPT MODE. NORMAL TEST MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER PUNCHED. SR6 = 1 GIVES FULL SPEED PUNCHING AND READING. SR7 = 1 LOCKS PROGRAM ON THE CURRENT STALL. (SR6 MUST BE 0.) THE READER RESYNCS ITSELF AUTOMATICALLY AFTER 5 ERRORS.
- 9.9 PRG10 - READ AMPLIFIER ADJUSTMENT LOOP
- THIS CONTINUOUS RUNNING PROGRAM USES A 1'S AND 0'S TEST TAPE LOOP, AND PROVIDES A MEANS OF DETERMINING THE UPPER AND LOWER LIMITS OF CORRECT OPERATION OF THE READ AMPLIFIER OF THE PAPER TAPE READER. AFTER OBTAINING THE LIMITS THE POT CAN BE SET TO THE MIDDLE POSITION. READ ERRORS ARE INDICATED BY ERROR PRINT-

E02

- OUTS. DROPPING OF THE READER FLAG BY OVERDRIVING OF THE FEED-HOLE AMPLIFIER IS INDICATED BY 3 BELLS FROM THE TELETYPE. THE READER IS THEN RESTARTED.
- 9.10 PRG11 - PUNCH ANY CHARACTER IN SR LOOP
- THIS PROGRAM LOOP CONTINUOUSLY PUNCHES THE CODE SET IN SR4 THROUGH SR11. SR SWITCHES MAY BE CHANGED WHILE RUNNING.
- 9.11 PRG12 - ONES AND ZEROS PUNCH LOOP
- THIS PROGRAM PUNCHES 1'S AND 0'S CONTINUOUSLY. NORMAL MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER PUNCHED. SR6 = 1 GIVES FULL SPEED PUNCHING. SR7 = 1 LOCKS PROGRAM ON CURRENT STALL. (SR6 MUST BE 0).
- 9.12 PRG13 - READER SPEED PRINT LOOP
- THIS PROGRAM TYPES THE READER SPEED MEASURED OVER A 30 OR 300 SECOND PERIOD. THE USER CONTROLS THE MEASURING TIME WITH THE AID OF A WATCH WITH SWEEP SECOND HAND.
- 9.13 PRG14 - PUNCH SPEED PRINT LOOP
- THIS PROGRAM TYPES THE PUNCH SPEED MEASURED OVER A 60 SECOND PERIOD. THE USER CONTROLS THE MEASURING TIME WITH THE AID OF A WATCH WITH SWEEP SECOND HAND.
- 9.14 PRG15 - READ X, STALL Y MS LOOP
- THIS PROGRAM LOOP IS INTENDED AS AN AID IN ADJUSTING THE PAPER TAPE READER. THE USER SETS IN SR0 THROUGH SR4 THE NUMBER OF CHARACTERS TO BE READ (RANGE: 1 TO 37 OCTAL) AND IN SR5 THROUGH SR11 THE NUMBER OF MS TO STALL AFTER READING THE CHARACTERS (RANGE: 1 TO 177 OCTAL). THIS LOOP IS USEFUL IN ADJUSTING CLOCK TIMING, STROBE, ETC.
- 10.0 LISTING

/PCB-E HIGH SPEED READER AND PUNCH TESTS.
 /MINDOC-08-DMPCA-A-0
 /DATE: MARCH 1977
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 /AUTHORS: BOB KOLLER/MATT TAFFEL/MARK SANDLER/STEVE JENSEN
 /
 /PRG0-BASIC READER AND READER CONTROL LOGIC TEST. ALL O'S TAPE
 /PRG1-BASIC PUNCH AND PUNCH CONTROL LOGIC TEST
 /PRG2-READER TEST. BINARY COUNT PATTERN
 /PRG3-PUNCH TEST. BINARY COUNT PATTERN
 /PRG4-PUNCH VERIFY. BINARY COUNT PATTERN
 /PRG5-PUNCH TEST. RANDOM CHARACTERS
 /PRG6-PUNCH VERIFY. RANDOM CHARACTERS
 /PRG7-COMBINED READER-PUNCH TEST. BINARY COUNT PATTERN
 /PRG10-READ AMPLIFIER ADJUSTMENT LOOP. ONES AND ZEROS TAPE.
 /PRG11-PUNCH ANY CHARACTER OR SR LOOP.
 /PRG12-ONES AND ZEROS PUNCH LOOP.
 /PRG13-READER SPEED PRINT LOOP
 /PRG14-PUNCH SPEED PRINT LOOP
 /PRG15-READ X, STALL Y MSEC LOOP.

0000 SKON=6000
 0001 SRQ=6003
 0002 CAP=6007
 0003 RPE=6010
 0004 RCE=6020
 0005 RCH=6014
 0006 RRC=6024
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0272 7006 RTL
 0273 7530 SZL CLA
 0274 5242 JMS GETROY /ROUTINE SELECT? (SR1)
 0275 1117 JMS GETROY /YES
 0276 7001 JMS NEXTST
 0277 7540 JMS CLA
 0278 5242 JMS GETROY+3 /LAST ROUTINE?
 0279 1117 JMS GETROY+3 /NO
 0280 7001 JMS GETROY+3
 0281 7540 RTL
 0282 5242 SPB CLA /LOOP PROGRAM? (SR2)
 0283 1117 JMS GETROY /YES
 0284 7001 JMS GETROY /END OF PROGRAM HALT
 0285 7540 PRGEND. HLT
 0286 5242 JMS CHAINN
 0287 1117 JMS CHAINN
 0288 7001 CLA CLL
 0289 7540 TAO I NXTST /GET NEXT PTN NO
 0290 5242 DCA RTNNO /STORE AT RTNNO
 0291 1117 ISZ NXTST
 0292 7001 TAO NXTST
 0293 7540 DCA TEMP /SET CURRENT
 0294 5242 ISZ NXTST /RTN NUMBER
 0295 1117 TAO NXTST
 0296 7001 DCA CURTST /SET CURRENT
 0297 7540 TAO I TEMP /RTN ADDR.
 0298 5242 DCA NXTST /SET NEXT
 0299 1117 JMS I FORMD /RTN ADDR.
 0300 7001 JMS I FORMD /EXIT
 0301 7540 CHRCNT, 0
 0302 5242 JMS I RANDNO /SET RANDOM NUMBER
 0303 1117 AND I17 /REMOVE EXCESS BITS
 0304 7001 JMS CHRCNT+1 /O?
 0305 7540 C74 /YES, REPEAT
 0306 5242 JMS I CHRCNT /COMPLEMENT
 0307 1117 SHALT, 0 /EXIT
 0308 7001 JMS CHRCNT
 0309 7540 READSR /READ SR
 0310 5242 JMS CLA /HALT? (SRD)
 0311 1117 JMS I SHALT
 0312 7001 TAO RTNNO
 0313 7540 JMS I SHALT
 0314 5242 JMS I SHALT /UNCONDITIONAL HALT (SR) = 1
 0315 1117 PAGE /EXIT.S7-10L
 0316 7001 STCTR, 0
 0317 7540 CLA I STCTR
 0318 5242 TAO I STCTR /GET CTR ADDR
 0319 1117 DCA TEMP /AND SAVE AT TEMP
 0320 7001 ISZ STCTR
 0321 7540 TAO I STCTR
 0322 5242 DCA I TEMP /GET COUNT AND
 0323 1117 ISZ STCTR /STORE PER C(TEMP)
 0324 7001 JMS I STCTR
 0325 7540 DLYMS, 0
 0326 5242 CLA CLL
 0327 1117 TAO DELAYM /GET MS COUNT
 0328 7001 DCA MSCTR /STORE IN MSCTR
 0329 7540 JMS I MSCTR

K02

0276 0416 0417 +1
 0277 0417 1106 TAO M1L1 /GET 1 MS CONSTANT
 0278 0420 3121 DCA M1LCTR /STORE IN M1LCTR
 0279 0421 0417 ISZ M1LCTR /DELAYED 1 MSEC?
 0280 0422 0421 JMS -1
 0281 0423 0420 ISZ MSCTR /DONE DELAYING?
 0282 0424 0423 JMS -5
 0283 0425 0424 JMS I DLYMS /EXIT
 0284 0426 0425 /PUNCH/PRINT ONE CHARACTER SUBROUTINE (CHAR IN AC).
 0285 0427 0426 PUNCH, 0
 0286 0428 0427 ISZ PFLAG /SET PFLAG
 0287 0429 0428 TIS /PUNCH PRINT
 0288 0430 0429 CLA
 0289 0431 0430 TAO PFLAG
 0290 0432 0431 SZA CLA /FLAG RESET?
 0291 0433 0432 SKP /NO
 0292 0434 0433 JMS +3 /YES
 0293 0435 0434 TCF /DONE PRINTING
 0294 0436 0435 JMS -5 /NO
 0295 0437 0436 TCF /YES, RESET PUNCH-PRINTER FLAG
 0296 0438 0437 DCA PFLAG /RESET FLAG
 0297 0439 0438 JMS I PUNCH /EXIT
 0298 0440 0439 RDSR, 0
 0299 0441 0440 LAS
 0300 0442 0441 AND SRMSK
 0301 0443 0442 JMS I RDSR
 0302 0444 0443 /RANDOM NUMBER GENERATOR SUBROUTINE
 0303 0445 0444 RANGEN, 0
 0304 0446 0445 CLA
 0305 0447 0446 TAO RANTNO
 0306 0448 0447 TAO RANDEX
 0307 0449 0448 SZA CLA
 0308 0450 0449 JMS RANTAD
 0309 0451 0450 TAO RANTBL
 0310 0452 0451 DCA RANDEX
 0311 0453 0452 TAO RANCON
 0312 0454 0453 CLL RAL
 0313 0455 0454 ISZ
 0314 0456 0455 DCA RANCON
 0315 0457 0456 TAO RANCON
 0316 0458 0457 JMS I RANCON
 0317 0459 0458 RANTAD, 0
 0318 0460 0459 TAO RANCON
 0319 0461 0460 TAO I RANDEX
 0320 0462 0461 DCA I RANDEX
 0321 0463 0462 TAO RANSAY
 0322 0464 0463 RAR
 0323 0465 0464 TAO I RANDEX
 0324 0466 0465 ISZ RANDEX
 0325 0467 0466 DCA RANSAY
 0326 0468 0467 TAO RANSAY
 0327 0469 0468 JMS I RANGEN
 0328 0470 0469 RANDEX, RANTNO
 0329 0471 0470 RANCON, 6543
 0330 0472 0471 RANTBL, +1
 0331 0473 0472 6543

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331 0502 3210 3210
332 0503 0765 0765
333 0504 5432 5432
334 0505 2107 2107
335 0506 7654 7654
336 0507 4321 4321
337 0510 1076 1076
338 0511 7257 7257
339 0512 0000 0000
340
341
342
343
344
345
346
347
348
349
350
351
352 0521 0000
353 0522 3335
354 0523 1721
355 0524 7041
356 0525 1335
357 0526 2321
358 0527 7640
359 0530 5333
360 0531 2321
361 0532 5721
362 0533 1335
363 0534 5721
364 0535 0000
365
366
367 0536 0000
368 0537 7200
369 0540 1736
370 0541 3361
371 0542 2336
372 0543 1736
373 0544 3362
374 0545 2336
375 0546 1736
376 0547 3363
377 0550 2336
378 0551 7200
379 0552 1761
380 0553 3762
381 0554 2361
382 0555 2362
383 0556 2363
384 0557 3351
385 0560 6736

```

/SUBROUTINE TO GENERATE RANDOM DELAY COUNT
 /GO GENERATE RANDOM NUMBER
 /MASK OUT UNDESIRED BITS.
 /2'S COMPLEMENT IT
 /EXIT

/SUBROUTINE TO COMPARE C(AC) TO CONTENTS STORED AT CALL+1
 /STORE AC AT WCHK
 /GET COMPARE DATA
 /2'S COMPLEMENT IT
 /ADD C(WCHK)
 /SET UP FOR UNEQUAL EXIT
 /EQUAL (AC = 0)
 /NO
 /YES, SET UP FOR EQUAL EXIT
 /EQUAL EXIT
 /RESTORE AC
 /UNEQUAL EXIT

/SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
 /GET "FROM ADDR" AND
 /STORE AT FADDR
 /GET "TO ADDR" AND
 /STORE AT TADDR.
 /GET "MOVE COUNT" AND
 /STORE AT MCTR.
 /SET UP FOR EXIT.
 /GET "FROM" WORD
 /STORE AT "TO" LOCATION
 /+1 TO "FROM" ADDR
 /+1 TO "TO" ADDR
 /ALL WORDS MOVED?
 /NO, GO MOVE AGAIN
 /YES, EXIT

M02

```

386 0561 0000 FADDR, 0
387 0562 0000 TADDR, 0
388 0563 0000 MCTR, 0
389
390 0600 PAGE
391 0600 CRLF,
392 0600
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497 0600
498 0600
499 0600
500 0600

```

/CRLF SUBROUTINE
 /GET NUMBER OF CRLF'S
 /AND SAVE
 /GO CRLF
 /ALL DONE?
 /NO
 /YES, EXIT.
 /OR
 /LF
 /END CODE

/GET AND STORE
 /INITIAL ADDRESS
 /CLEAR FLAG
 /SET DATA
 /ROTATE RIGHT 5.

/GO TYPE CHARACTER
 /GET DATA
 /GO TYPE CHARACTER
 /INCR STRING ADDR
 /GO BACK FOR MAKE

/MASK OFF 5 BITS
 /SAVE CHARACTER
 /TEST FLAG
 /SET
 /NOT SET
 /ZERO?
 /YES, SET FLAG
 /NO, PRINT IT.
 /RETURN
 /SET FLAG
 /EXIT
 /CLEAR FLAG

/ZERO?
 /YES, TYPE "S"
 /IS IT 0?
 /YES, EXIT CODE

```

/CRFLF SUBROUTINE
/SET NUMBER OF CRFLF'S
AND SAVE

/GO CRFLF

/ALL DONE?
/NO
/YES, EXIT.
/CR
/CLF
/END CODE

/GET AND STORE
/INITIAL ADDRESS
/CLEAR FLAG

/SET DATA
/ROTATE RIGHT 6.

/GO TYPE CHARACTER
/GET DATA
/GO TYPE CHARACTER
/INCR STRING ADDR
/GO BACK FOR M4CE

/MASK OFF 6 BITS
/SAVE CHARACTER

/TEST FLAG
/SET
/NOT SET
/ZERO?
/YES, SET FLAG
/NO, PRINT IT.
/RETURN
/SET FLAG
/EXIT
/CLEAR FLAG

/ZERO?
/YES, TYPE "0"

/IS IT 01?
/YES, EXIT CODE

```

441	0662	1170	TAD	ISMA
442	0663	1171	OCA	SWITCH
443	0664	1172	TAD	TEAR
444	0665	1173	JMS	PRINT
445	0666	1174	TAD	ISPA
446	0667	1175	OCA	SWITCH
447	0670	1176	JMP	I 1502
448	0671	1177	PRINT	
449	0672	1178	TAD	I 40
450	0673	1179	JMS	END
451	0674	1180	TAD	I 100
452	0675	1181	TAD	I 200
453	0676	1182	JMS	END
454	0677	1183	JMS	END
455	0678	1184	JMS	END
456	0679	1185	JMS	END
457	0680	1186	JMS	END
458	0681	1187	JMS	END
459	0682	1188	JMS	END
460	0683	1189	JMS	END
461	0684	1190	JMS	END
462	0685	1191	JMS	END
463	0686	1192	JMS	END
464	0687	1193	JMS	END
465	0688	1194	JMS	END
466	0689	1195	JMS	END
467	0690	1196	JMS	END
468	0691	1197	JMS	END
469	0692	1198	JMS	END
470	0693	1199	JMS	END
471	0694	1200	JMS	END
472	0695	1201	JMS	END
473	0696	1202	JMS	END
474	0697	1203	JMS	END
475	0698	1204	JMS	END
476	0699	1205	JMS	END
477	0700	1206	JMS	END
478	0701	1207	JMS	END
479	0702	1208	JMS	END
480	0703	1209	JMS	END
481	0704	1210	JMS	END
482	0705	1211	JMS	END
483	0706	1212	JMS	END
484	0707	1213	JMS	END
485	0708	1214	JMS	END
486	0709	1215	JMS	END
487	0710	1216	JMS	END
488	0711	1217	JMS	END
489	0712	1218	JMS	END
490	0713	1219	JMS	END
491	0714	1220	JMS	END
492	0715	1221	JMS	END
493	0716	1222	JMS	END
494	0717	1223	JMS	END
495	0718	1224	JMS	END
496	0719	1225	JMS	END
497	0720	1226	JMS	END
498	0721	1227	JMS	END
499	0722	1228	JMS	END
500	0723	1229	JMS	END
501	0724	1230	JMS	END
502	0725	1231	JMS	END
503	0726	1232	JMS	END
504	0727	1233	JMS	END
505	0728	1234	JMS	END
506	0729	1235	JMS	END
507	0730	1236	JMS	END
508	0731	1237	JMS	END
509	0732	1238	JMS	END
510	0733	1239	JMS	END
511	0734	1240	JMS	END
512	0735	1241	JMS	END
513	0736	1242	JMS	END
514	0737	1243	JMS	END
515	0738	1244	JMS	END
516	0739	1245	JMS	END
517	0740	1246	JMS	END
518	0741	1247	JMS	END
519	0742	1248	JMS	END
520	0743	1249	JMS	END
521	0744	1250	JMS	END
522	0745	1251	JMS	END
523	0746	1252	JMS	END
524	0747	1253	JMS	END
525	0748	1254	JMS	END
526	0749	1255	JMS	END
527	0750	1256	JMS	END
528	0751	1257	JMS	END
529	0752	1258	JMS	END
530	0753	1259	JMS	END
531	0754	1260	JMS	END
532	0755	1261	JMS	END
533	0756	1262	JMS	END
534	0757	1263	JMS	END
535	0758	1264	J	

```

/SMA TO SWITCH
/GET CHARACTER
/PRINT IT

/SPA TO SWITCH
/RETURN

/SAVE AC
/SAVE LINK
/READER?
/NO.
/YES

/PUNCH?
/NO
STALL IF DESIRED.
/YES.

TTY READER /KYBD?
/NO.
YES.
TO MAINLINE
TTY PRINTER/PUNCH?
/NO.
YES.

TO MAINLINE
PRINT ERROR MESSAGE

HALT, UNEXPECTED INTERRUPT

/RESTORE LINK
/RESTORE AC

/EXIT INTERRUPT

```

B03

```

PAGE 0000
ASCCN, 0
SUBROUTINE TO CONVERT
A WORD TO PRINTABLE ASCII

1000 0000
1001 7200
1002 1600
1003 3237
1004 2200
1005 1600
1006 3240
1007 2200
1008 1163
1009 0637
1010 7112
1011 7012
1012 7012
1013 7012
1014 7012
1015 4224
1016 2240
1017 1163
1018 7040
1019 0637
1020 4224
1021 5500
1022 0000
1023 3241
1024 1241
1025 7006
1026 7004
1027 0161
1028 1241
1029 0161
1030 1150
1031 3640
1032 5524
1033 0000
1034 0000
1035 0000
1036 0000
1037 0000
1038 0000
1039 0000
1040 0000
1041 0000

CNV,
DCA ASCT
TAD ASCT
RTR
RTR
AND (707
TAD ASCT
AND (707
TAD 16060
DCA 1 SASC
JMP 1 CNV

WASC,
SASC,
ASCT,
/

1042 0000
1043 7200
1044 1642
1045 3021
1046 2242
1047 5542
1048 0000
1049 4452
1050 0030
1051 1471
1052 4452
1053 0116
1054 1474
1055 1650
1056 3710
1057 4447
1058 1466
1059 2250
1060 1650

STOLYM,
DCA
TAD 1 STOLYM
DCA DELAYM
162 STOLYM
JMP 1 STOLYM

ERROR,
JMS 1 UASCCN
PUSHM
PUSHB
JMS 1 UASCCN
RTNNO
ENUMB
TAD 1 ERROR
DCA 1 SFAOR
JMS 1 XTYPST
ENUMB
162 ERROR
TAD 1 ERROR

/SET DELAYM SUB.
/SET DELAYM TO
NUMBER SPECIFIED
/AT CALL+1
/EXIT
/CONVERT PROGRAM
NUMBER TO PRINTABLE
/OCTAL
/CONVERT ROUTINE
NUMBER TO PRINTABLE
/OCTAL
/GET ERROR SUFFIX AND
STORE AT SUFF
/PRINT ERROR NUMBER
/GET ADDRESS OF ADDITIONAL

```

C03

```

1065 7450
1066 5272
1067 3271
1068 4447
1069 0000
1070 4475
1071 0157
1072 7650
1073 7402
1074 4475
1075 0156
1076 7650
1077 5425
1078 4475
1079 0156
1080 7650
1081 5425
1082 4475
1083 0156
1084 7650
1085 2251
1086 2250
1087 2250
1088 5650
1089 1476
1090 0000
1091 0000
1092 7200
1093 1711
1094 3122
1095 6211
1096 5711
1097 0000
1098 7200
1099 1717
1100 3122
1101 6211
1102 5717
1103 0000
1104 4475
1105 0156
1106 7640
1107 5225
1108 4475
1109 0154
1110 7640
1111 7410
1112 4475
1113 1021
1114 7440
1115 5725
1116 0000
1117 0000
1118 4471
1119 0000
1120 5355
1121 2343
1122 5743
1123 3131
1124 4452
1125 1145

SMA
JMS +4
DCA +2
JMS 1 XTYPST
D
READSR
AND (SR3MSK
SMA CLA
HIT
READSR
AND (SR4MSK
SZA CLA
JMP 1 CHAIN
READSR
AND (SR5MSK
SZA CLA
162 ERROR
162 ERROR
JMP 1 ERROR
SFAOR,
SUFFX
STCTA,
DCA
TAD 1 STCTA
DCA CTBA
162 STCTA
JMP 1 STCTA
STCTB,
DCA
TAD 1 STCTB
DCA CTBB
162 STCTB
JMP 1 STCTB
STALL,
D
READSR
AND (SR6MSK
SZA CLA
JMP 1 STALL
READSR
AND (SR7MSK
SZA CLA
SKP
JMS 1 DLYCNT
TAD DELAYM
SZA
DELAY
JMP 1 STALL
TCHK,
D
JMS 1 CHECK
TSB,
JMP +3
162 TCHK
JMP 1 TCHK
DCA TCHKW
JMS 1 UASCCN
TSB

```



```

1349 0111 AND CHR2
1350 7450 /SAME AS CHR2?
1351 7450 /YES
1352 7450 /NO, 512 TIMES?
1353 7450 /NO
1354 7450 /YES, SYNC ERROR.
1355 7450 /TRY AGAIN.
1356 7450 /GET LINE CHARACTER.
1357 7450
1358 7450
1359 7450
1360 7450
1361 7450
1362 7450
1363 7450
1364 7450
1365 7450
1366 7450
1367 7450
1368 7450
1369 7450
1370 7450
1371 7450
1372 7450
1373 7450
1374 7450
1375 7450
1376 7450
1377 7450
1378 7450
1379 7450
1380 7450
1381 7450
1382 7450
1383 7450
1384 7450
1385 7450
1386 7450
1387 7450
1388 7450
1389 7450
1390 7450
1391 7450
1392 7450
1393 7450
1394 7450
1395 7450
1396 7450
1397 7450
1398 7450
1399 7450
1400 1400
1401 0000 PAGE
1402 7201 INITPT,
1403 4280
1404 4474
1405 1460
1406 1461
1407 7777
1408 0000
1409 0000
1410 0000
1411 0000
1412 0000
1413 0000
1414 0000
1415 0000
1416 0000
1417 0000
1418 0000
1419 0000
1420 0000
1421 0000
1422 0000
1423 0000
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1471 0000
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1498 0000
1499 0000
1500 0000

```

```

/INITIALIZE BINARY
/PATTERN ROUTINES

```

```

/BINARY COUNT PATTERN
/ROUTINE (SPECIAL)

```

```

/BINARY COUNT PATTERN
/ROUTINE

```

G03

```

1501 0000
1502 0000
1503 0000
1504 0000
1505 0000
1506 0000
1507 0000
1508 0000
1509 0000
1510 0000
1511 0000
1512 0000
1513 0000
1514 0000
1515 0000
1516 0000
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1598 0000
1599 0000
1600 0000

```

[illegible]

NO CODE
END CODE
SPC ELL

[illegible][illegible]

PAGE 3
PROGRAM 2 BASIC READER AND READER LOGIC CONTROL TEST

```

/SET KSTART TO
/INITIAL ROUTINE
/ADDRESS
/SET SR MASK

```

SET STARTED.

936 2011 2036 POT1
 937 /CHECKS THAT FLAG=1 250MS. AFTER RFC (IOT014), INDICATING THAT
 938 /READER IS ADVANCING.
 939 SETA /-200 TO CTRA
 940 -310
 941 SETDLM /-250 TO DELAY
 942 -372
 943 POT0A, RFC /CLEAR FLAG, FETCH CHAR (IOT014)
 944 DELAY /DELAY 75 MS
 945 RSE /SKIP IF FLAG=1 (IOT011)
 946 JMP POE0
 947 ISZ CTRA /DONE?
 948 JMP POT0A /NO, REPEAT
 949 JMP I CHAIN /YES, CHAIN
 950 POE0, JMS I UERROR /GO TO ERROR SUBROUTINE
 951 NOSUF /NO PRINTOUT SUFFIX
 952 NONE /NO PRINTOUT
 953 JMP POT0A+4 /CONTINUE TEST
 954 POT0S, SETDLM /SCOPE LOOP
 955 -14
 956 RFC /FETCH CHAR (IOT014)
 957 DELAY /DELAY 12 MS.
 958 JMP -2
 959 POT1, 1
 960 POT2
 961 /WITH FLAG=1, SKIP ON FLAG 4095 TIMES TO CHECK FOR RELIABLE SKIPPING
 962 SETA /-4095 TO CTRA
 963 -7777
 964 RFC /FETCH CHAR (IOT014)
 965 RSE /SKIP ON FLAG (IOT011)
 966 JMP -1 /REPEAT
 967 RSE /SKIP ON FLAG (IOT011)
 968 JMP POE1 /ERROR
 969 ISZ CTRA /DONE 4095 TIMES?
 970 JMP POT1A /NO, REPEAT TEST
 971 JMP I CHAIN /YES, CHAIN
 972 POE1, JMS I UERROR /GO TO ERROR SUBROUTINE
 973 NOSUF /NO PRINTOUT SUFFIX
 974 NONE /NO PRINTOUT
 975 JMP POT1A+2 /CONTINUE TEST

K03

976 2055 6014 POT15, RFC /START SCOPE LOOP, FETCH CHAR (IOT014)
 977 RSE /SKIP ON FLAG (IOT011)
 978 JMP -1 /REPEAT
 979 RSE /SKIP ON FLAG (IOT011)
 980 JMP -1 /REPEAT
 981 JMP -2 /REPEAT
 982 POT2, 3
 983 POT3
 984 /CHECKS THAT IOT011 DOES NOT SKIP WITH FLAG=0.
 985 SETA /-4095 TO CTRA
 986 -7777
 987 RSE /CLEAR FLAG
 988 RSE /SKIP ON FLAG=1 (IOT011)
 989 JMP POT2OK /OK
 990 JMS I UERROR /ERROR, GO TO ERROR SUB
 991 NOSUF /NO PRINTOUT SUFFIX
 992 NONE /NO PRINTOUT
 993 JMP POT2OK /CONTINUE TEST
 994 POT25, RSE /START SCOPE LOOP, SKIP ON FLAG
 995 JMP -1 /REPEAT
 996 JMP -2 /REPEAT
 997 POT2OK, ISZ CTRA /DONE 4095 TIMES?
 998 JMP POT2A /NO, REPEAT
 999 JMP I CHAIN /YES, CHAIN
 1000 /ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED
 1001 POT3, 3
 1002 POT4
 1003 TAD (4000
 1004 CCA COUNT
 1005 TAD (7773
 1006 CCA CTR
 1007 JOR
 1008 CLA
 1009 CCA MILLI
 1010 ISZ MILLI
 1011 JMS I UERROR /-1
 1012 ISZ CTR
 1013 JMP -3
 1014 TAD (2260 /4.55 MS CONSTANT
 1015 CCA DELTIM
 1016 CCA
 1017 RSE
 1018 RSE TIM
 1019 RSE
 1020 POT3A, JMP POE3 /SKIP IF READER FLAG SET
 1021 RPE /FLAG DID NOT SET
 1022 RSE
 1023 JMP POE3 /SHOULD SKIP HERE IF INT REQ
 1024 ISZ COUNT /REPORT ERROR
 1025 JMP POT3+4
 1026 JMP I CHAIN
 1027 JMS I UERROR
 1028 NOSUF
 1029 NONE

```

1031 2142 5311 JMP POT3+4
1032 2143 6002 POT3S, IOF
1033 2144 6011 RSF
1034 2145 5344 JMP -1
1035 2146 6011 RSF
1036 2147 5346 JMP -1
1037 2148 5346 JMP -2
1038 2149 0000 TIM, 0
1039 2150 2134 ISZ DELTIM
1040 2151 5352 JMP -1
1041 2152 5751 JMP I TIM
1042
1043 2175 2260
1044 2176 7773
1045 2177 4000
1046 2200 PAGE
1047 2201 0004 /ROUTINE TO CHECK THAT INTERRUPT ENABE CAN BE CLEARED FOR READER.
1048 2202 2400 POT4, 4
1049 2203 6002 POT5 IOF
1050 2204 1234 TAD R7770
1051 2205 3235 OCA RCNT2 /INIT. # OF ITERATIONS
1052 2206 6007 ALOOP, CAF /ENABLE INTERRUPT
1053 2207 6010 RPE
1054 2208 6020 PCE
1055 2209 6001 ION
1056 2210 6014 RCF /READ
1057 2211 6000 SKON
1058 2212 5224 JMP POE4 /INTERRUPT NOT ON
1059 2213 6003 SRQ /SKIP IF INT REQ GENERATED
1060 2214 7410 SKP /NO INT REQ
1061 2215 5224 JMP POE4 /INT REQ GENERATED
1062 2216 2022 ISZ COUNT /RELIABILITY SETUP
1063 2217 2022 POT4A, JMP ALOOP /CONTINUE
1064 2218 5225 ISZ RCNT2
1065 2219 5225 JMP ALOOP
1066 2220 5425 JMP I CHAIN
1067 2221 4451 POE4, JMS I UERROR
1068 2222 4040 NOSUF
1069 2223 0000 NONE
1070 2224 5425 JMP I CHAIN
1071 2225 6010 POT4S, PPE
1072 2226 4502 DELAY
1073 2227 6020 PCE
1074 2228 5230 JMP -3
1075
1076 2234 7770 R7770, 7770
1077 2235 7770 RCNT2, 7770
1078
1079 2400 PAGE
1080 2401 0005 POT5, 5
1081 2402 2430 POT6, 6
1082 2403 /CHECKS 10T012 (RRB) FOR ABILITY TO CLEAR FLAG.
1083 2404 4477 SETA /-500 TO CTRA
1084 2405 7014 -764

```

M03

```

1085 2404 6014 POT5A, RFC /FETCH CHAR (10T014)
1086 2405 6014 RSF /WAIT FOR FLAG=1
1087 2406 6014 JMP -1
1088 2407 6014 RRB /CLEAR FLAG (10T012)
1089 2408 6014 RSF /SKIP ON FLAG=1
1090 2409 6014 JMP POT5B /OK
1091 2410 6014 POE5, JMS I UERROR /ERROR, GO TO ERROR SUB.
1092 2411 6014 NOSUF /NO PRINTOUT SUFFIX
1093 2412 6014 NONE /NO PRINTOUT
1094 2413 6014 JMP POT5B /CONTINUE TEST
1095 2414 6014 POT5S, RFC /START SCOPE LOOP, FETCH CHAR
1096 2415 6014 RSF /WAIT FOR FLAG=1
1097 2416 6014 JMP -1
1098 2417 6014 RRB /CLEAR FLAG (10T012)
1099 2418 6014 RSF /SKIP IF FLAG=1
1100 2419 6014 JMP -5 /NO, 10T012 CLEARED IT, READ AGAIN
1101 2420 6014 JMP -3 /10T012 FAILED, REPEAT 10T012.
1102 2421 6014 POT5B, ISZ CTRA /DONE?
1103 2422 6014 JMS POT5A /NO, REPEAT
1104 2423 6014 JMP I CHAIN /YES, CHAIN
1105 2424 6014 POT6, 6
1106 2425 6014 POT7
1107 2426 6014 /CHECKS THAT 10T014 CLEARS FLAG.
1108 2427 4477 SETA /-500 TO CTRA.
1109 2428 7014 -764
1110 2429 6014 POT6A, RFC /FETCH CLEAR (10T014)
1111 2430 6014 RSF /WAIT FOR FLAG=1
1112 2431 6014 JMP -1
1113 2432 6014 RFB /CLEAR FLAG WITH 10T014
1114 2433 6014 RSF /SKIP IN FLAG=1.
1115 2434 6014 JMP POT6B /OK FLAG IS 0.
1116 2435 6014 POE6, JMS I UERROR /ERROR FLAG=1, GO TO ERROR SUB.
1117 2436 6014 NOSUF /NO PRINTOUT SUFFIX
1118 2437 6014 NONE /NO PRINTOUT
1119 2438 6014 JMP POT6B /CONTINUE TEST
1120 2439 6014 POT6S, DELAY /START SCOPE LOOP, DELAY 20 MS.
1121 2440 6014 RSF /FETCH CHAR (10T014)
1122 2441 6014 RSF /WAIT FOR FLAG=1
1123 2442 6014 JMP -1
1124 2443 6014 JMP -3 /GO CLEAR FLAG AND FETCH CHAR.
1125 2444 6014 POT6B, ISZ CTRA /DONE?
1126 2445 6014 JMS POT6A /NO, REPEAT
1127 2446 6014 JMP I CHAIN /YES, CHAIN
1128
1129 2500 PAGE
1130 2501 0007 POT7, 7
1131 2502 2430 POT10
1132 2503 4477 /CHECKS ABILITY TO READ ALL D'S CHARACTERS
1133 2504 7014 SETA /-500 TO CTRA
1134 2505 7014 -764
1135 2506 6014 POT7A, RFC /FETCH CHAR (10T014)
1136 2507 6014 RSF /WAIT FOR FLAG=1
1137 2508 6014 JMP -1
1138 2509 6014 JMS CTRA
1139 2510 6014 RRB /READ BUFFER

```

SEQ 0039

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140 2511 3236 DCA POT74B /SAVE
141 2512 3237 TAO POT74B /RESULT 0?
142 2513 3238 SZA CLA /ERROR, DID NOT READ C'S CHAR.
143 2514 3239 JNP POE7 /DONE?
144 2515 3240 ISZ CTRA /NO, REPEAT
145 2516 3241 JNP POT74 /YES CHAIN
146 2517 3242 JMS I CHAIN
147 2518 3243 POE7, JMS I USCCCN
148 2519 3244 POT74A
149 2520 3245 S3
150 2521 3246 JMS I USCCCN
151 2522 3247 POT74B
152 2523 3248 JMS I
153 2524 3249 JMS I ERROR
154 2525 3250 NOSUF /GO TO ERROR SUBROUTINE
155 2526 3251 S3B4 /NO SUFFIX
156 2527 3252 JNP POT7B /PRINT S/B AND N/S.
157 2528 3253 CLA /CONTINUE TEST
158 2529 3254 ARB
159 2530 3255 JNP, -2 /READ BUFFER, AC S/B 7400
160 2531 3256 POT74A, GOO /REPEAT
161 2532 3257 POT74B, GOO
162 2533 3258 POT10, TO
163 2534 3259 POT11
164 2540 3260 /CHECKS ACTIVITY OF READER FLAG TO CAUSE AN INTERRUPT.
165 2541 3261 SETLCC /SET INTERRUPT RETURN TO
166 2542 3262 POE10A /POE10A
167 2543 3263 POE10A
168 2544 3264 ACC /CLEAR TTY READER FLAG.
169 2545 3265 TCF /CLEAR TTY PRINTER FLAG.
170 2546 3266 PCF /CLEAR PUNCH FLAG.
171 2547 3267 ARB /CLEAR READER FLAG.
172 2548 3268 JCN /ENABLE INTERRUPT
173 2549 3269 NOP /NO OP.
174 2550 3270 TCF /TURN OFF INTERRUPT
175 2551 3271 JNP POT10B
176 2552 3272 POE10A, JMS I ERROR /GO TO ERROR SUB.
177 2553 3273 H /SUFFIX A
178 2554 3274 NONE /NO PRINTOUT.
179 2555 3275 JNP POT10A /REPEAT TEST.
180 2556 3276 JNP POT10A /REPEAT TEST.
181 2557 3277 SETA /-4095 TO CTRA
182 2558 3278 -7777
183 2559 3279 SETLCC /SET INTERRUPT RETURN
184 2560 3280 POT10E, /POT10E.
185 2561 3281 POT10E
186 2562 3282 RPE /SET INTERRUPT, ENABLE
187 2563 3283 RAC /FETCH CHAR (POT10A)
188 2564 3284 RAC /WAIT FOR FLAG=1.
189 2565 3285 JNP, -1
190 2566 3286 POT10C, /ENABLE INTERRUPT
191 2567 3287 NOP
192 2568 3288 JCN /TURN OFF INTERRUPT
193 2569 3289 JMS I ERROR /GO TO ERROR SUB
194 2570 3290 /SUFFIX B.

```

JNCH TESTS.

NONE
JMP POT10E
SETLOC
POT100
RSC
RSC
JMP -1
ION
NOB
JMP -2
JMP -3
DE
ISZ CTRA
JMP POT10C
PCF
JMP I CHAIN
OP DELAY TEST
11, 11
7777
SETA
-310
J11A. JMS DLY250
SETDLM
-324
RSC
RSC
JMP -1
DELAY
RSC
DELAY
RSC
JMP POT11B
JMS I UERROR
A
NONE
JMP POT11A
JMP POT11S
JMS DLY212
POT11B, JMS DLY212
RSC
JMP +4
JMP CTRA
ISZ CTRA
JMP POT11A
JMP I CHAIN
JMS I UERROR
B
NONE
JMP POT11C
SETDLM
-372
RSC
JMP -1
DELAY
RSC
JMP -1
JMP -1

/CONTINUE TEST
/SET INTERRUPT RETURN TO
/POT100.
/FETCH CLEAR
/WAIT FOR FLAG=1
/ENABLE INTERRUPT
/DONE?
/NO, REPEAT.
/CLEAR INTERRUPT ENABLE
/YES, CHAIN.
/TEST 8
/LAST TEST
/-200 TO CTRA
/INITIAL DELAY.
/-19 TO DELAYM
/FETCH CHAR.
/WAIT FOR FLAG.
/DELAY 19 MSECS TO CAUSE
/STOP DELAY TO FIRE. FETCH CHAR.
/DELAY 19 MORE MSECS.
/CHECK FLAG. OK
/FLAG NOT UP. OK
/ERROR. FLAG SHOULD NOT BE UP
/30 MSECS AFTER "STOP DELAY"
/FIRE.
/CONTINUE TEST.
/GO TO SCOPE LOOP.
/DELAY ADDITIONAL 212 MSECS.
/FLAG UP?
/NO, ERROR.
/DONE 500
/NO, REPEAT.
/YES, CHAIN.
/ERROR. FLAG NOT UP 250 MSECS
/AFTER "STOP DELAY" FIRED.
/SET DELAYM FOR 15 MSECS.
/FETCH CHAR.
/FLAG 1?
/YES, DELAY 15 MSECS.
/FETCH CHAR.
/WAIT FOR FLAG.

ED READER AND PUNCH TESTS.

5361 DLY212. JMS -4
0000 SETDLM
4501 -324
7454 DELAY
4502 JMS I DLY212
5755 DLY250. JMS
0000 SETDLM
4501 -372
7406 DELAY
4502 JMS I DLY250
5773

/REPEAT.
/-212 TO DELAYM
/DELAY 212 MSECS.
/EXIT.
/DELAY 250 MSECS.
/EXIT.

PAGE PROGRAM 1. BASIC PUNCH AND CONTROL LOGIC TEST

PRG1. SETLOC
KSTART
PIT0
SETLOC
SRMSK
7717
JMP I +1
SRSET
PIT0. PIT1
THAT PSF (IOT021) DOES NOT SKIP WITH FLAG = 1
/CHECKS SETA
-7777
PIT0A. PCF
PSF
JMP PIT0B
JMS I UERROR
PIED. NOSUF
NONE
JMS PIT0B
PCF
PIT0S. PCF
PSF
JMP -1
JMP -2
PIT0B. ISZ CTRA
JMS PIT0A
JMP I CHAIN
PIT1. PIT2
THAT PSF (IOT021) SKIPS WITH FLAG=1 IF FLAG=1.
/CHECKS SETA
-7777
SETDLM
-7777
CLA CLL
PCF
PPC
DELAY
PIT1A. PSF
JMP PIED

/SET KSTART TO
/INITIAL ROUTINE
/ADDRESS
/SET SR MASK
/GET STARTED
/CLEAR FLAG
/SKIP IF FLAG=1 (IOT021)
/NO SKIP. OK
/SKIP. ERROR, GO TO ERROR SUB
/NO SUFFIX
/NO PRINTOUT
/CONTINUE TEST.
/CLEAR FLAG
/SKIP IF FLAG=1
/DONE?
/NO, REPEAT
/YES, CHAIN
/CLEAR PUNCH FLAG. LOAD BUFFER
/LOAD BUFFER AND PUNCH
/DELAY 4095 MILLISECONDS
/SKIP IF FLAG=1. SHOULD BE 1
/NO, SKIP. ERROR.

SEQ 0041

PCB

0000
0100
0200
0300
0400
0500
0600
0700
1000
1100
1200
1300
1400
1500
1600
1700
2000
2100
2200
2300
2400
2500
2600
2700
3000
3100
3200
3300
3400
3500
3600

2122	ISZ CTRA	/DONE?	
2124	JMP PIT1A	/NO REPEAT	
2126	JMP I CHAIN	/YES CHAIN	
4451	JMS I UERROR	/GO TO ERROR SUBROUTINE	4000
4040	NOSUF	/NO SUFFIX	4100
0030	NONE	/NO PRINTOUT	
5246	JMP PIT19	/CONTINUE TEST	4200
7200	CLA		4300
6022	PCF	/CLEAR FLAG AND BUFFER	
6024	PPC	/SKIP IF FLAG 1	4400
6021	PCF	/LOAD AND PUNCH	4500
50260	JMP -1	/REPEAT	
50260	JMP -2	/REPEAT	4600
50260	JMP -3		4700
3115	PIT2		
4477	PIT3		
7014	/CHECKS THAT PCF (IOT022) IS ABLE TO CLEAR THE FLAG		5000
7200	SETA	/-500 TO CTRA	5100
6026	PIT2A		
6027	PLS	/CLEAR LOAD AND PUNCH	5200
6021	PSF	/WAIT FOR FLAG-1	5300
6021	JMP -1		
6022	PCF	/CLEAR FLAG (IOT022)	5400
6021	PSF	/SKIP IF FLAG=1	5500
5312	JMP PIT2B	/NO SKIP OK	
4451	JMS I UERROR	/SKIP ERROR GO TO ERROR SUB	5600
4040	NOSUF		5700
0000	NONE		
5312	JMP PIT2B	/CONTINUE TEST	
7200	PIT2S		6000
6026	PLS	/CLEAR LOAD AND PUNCH	6100
6021	PSF	/WAIT FOR FLAG	
5304	JMP -1		6200
6022	PCF	/CLEAR FLAG	6300
6021	PSF	/SKIP IF FLAG=1	
5302	JMP -5	/CLEARED	6400
5302	JMP -3	/NOT CLEAR	6500
5306	ISZ CTRA	/SAVE?	
5122	JMP PIT2A	/NO REPEAT	6600
5267	JMS I CHAIN	/YES CHAIN	6700
5425	JMP I CHAIN		
0003	/ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED		
3200	PIT3		
3200	PIT4		7000
3200	TAD (4000		7100
3200	DCA COUNT		
3200	TAD (7773		7200
3200	DCA CTR		7300
3200	FOR		
3200	CLA		7400
3200	DCA MILLI		7500
3200	ISZ MILLI		7600
3200	JMP -1		
3200	JMP -3		
3200	JMP -3		
3200	TAD (0001	/16 MS CONSTANT	

E04

IGH SPEED READER AND PUNCH TESTS. PALIO. V142A 4-FEB-77 10:03 PAGE 2-7 SEC 0043 /PCB

3133	3134	DCA DELTIM	
3134	6007	CAF	
3135	6024	PPC	/PUNCH
3136	4361	JMS TIM1	
3137	6021	PSF	/SKIP IF PUNCH FLAG SET
3140	5347	JMP PIE3	
3141	6010	RPE	
3142	6003	SRG	/SHOULD SKIP HERE FOR INT REQ
3143	534	JMP PIE3	/REPORT ERROR
3144	534	ISZ COUNT	
3145	534	JMP PIT3+4	
3146	534	JMP I CHAIN	
3147	534	JMS I UERROR	
3150	534	NOSUF	
3151	534	NONE	
3152	534	JMP PIT3+4	
3153	534	PSF	
3154	534	PSF	
3155	534	PSF	
3156	534	PSF	
3157	534	PSF	
3160	5356	JMP -1	
3161	0000	JMP -1	
3162	2134	JMP -2	
3163	5362	ISZ DELTIM	/44 MILLISEC TIME OUT
3164	1374	JMP -1	
3165	3134	TAD (0500	
3166	2134	DCA DELTIM	
3167	5366	ISZ DELTIM	
3170	5367	JMP -1	
3171	5370	ISZ DELTIM	
3172	5761	JMP -1	
		JMP I TIM1	/RETURN
3174	0500		
3175	0001		
3176	7773		
3177	4000		
	3200		
3200	0004	PAGE	
3201	3234	/ROUTINE TO CHECK THAT INTERRUPT ENABLE CAN BE CLEARED FOR PUNCH.	
3202	6002	PIT4	
3203	1302	IOF	
3204	3201	TAD	P7770
3205	6007	DCA	P0072
3206	5010	CAF	/INIT. COUNTER
3207	6020	RPE	/ENABLE INTERRUPT
3210	6001	PCE	
3211	6024	ICN	
3212	6000	PPC	
3213	6024	SKON	/PUNCH
3214	6024	JMP PIE4	/ERROR -- NO ION
3215	6024	SRG	/SKIP IF INT REQ GENERATED
3216	6024	SKP	/NO INT REQ
3217	6024	JMP PIE4	/ERROR -- INT REQ GENERATED
3218	6024	ISZ COUNT	/RELIABILITY SETUP

P174A. JMP PLOOP
ISZ PCNT2
JMP PLOOP
P1E4. JMP I CHAIN
JMS I UERRR
NOSUP
NONE
JMP I CHAIN
P174S. RPE
RPE
DELAY
PCE
JMP .-3
P175. S
P176
/USED TO CHECK ABILITY OF 107022 TO CLEAR BUFFER. VISUAL CHECK
SETA -500 TO CTRA
-764
P175A. CLA CMA /7777 TO AC
PLS /CLEAR, LOAD, AND PUNCH
CLA /CLEAR BUFFER CONTENTS PRIOR
PLS /TO PUNCHING
PSF
JMP .-1
ISZ CTRA /DONE?
JMP P175A /NO, REPEAT
JMP I CHAIN /YES, CHAIN
P176. S
P177
/CHECKS ABILITY OF 107024 TO SET BUFFER TO 125 AND PUNCH IT
SETA -500 TO CTRA
-764
P176A. CLA
TAD 125
PLS /CLEAR, LOAD AND PUNCH
PSF /WAIT FOR FLAG 1
JMP .-1
ISZ CTRA /DONE?
JMP P176A /NO, REPEAT
JMP I CHAIN /YES, CHAIN
P177. S
P178
/CHECKS ABILITY OF 107024 TO SET BUFFER TO 252 AND PUNCH IT
SETA -500 TO CTRA
-764
P177A. CLA
TAD 252
PLS /CLEAR LOAD AND PUNCH.
PSF /WAIT FOR FLAG 1
JMP .-1
ISZ CTRA /DONE?
JMP P177A /NO, REPEAT
JMP I CHAIN /YES, CHAIN
P177S. 7770

7770 P7770. 7770
PAGE
P1710. 10
7777
/CHECKS ABILITY OF PUNCH FLAG TO CAUSE AN INTERRUPT
SETLOC /SET INTERRUPT RETURN
TO P1E10A.
P1E10A. KCC
/CLEAR ITTY READER
/CLEAR READER
/CLEAR READER
/CLEAR PUNCH FLAG
/ENABLE INTERRUPT
NOP
/TURN OFF INTERRUPT
JMP P1710B
P1E10A. JMS I UERRR
NONE
JMP P1710A
JMP P1710A
P1710B. SETA -4095 TO CTRA
-7777
SETLOC /SET INTERRUPT RETURN
TO P1710C
P1710C. RPE
CLA /SET INTERRUPT ENABLE
RPE /CLEAR, LOAD AND PUNCH
PLS /WAIT FOR FLAG 1
JMP .-1
P1710D. /ION
NOP
/ION
P1E10B. JMS I UERRR
NONE
JMP P1710C
P1710D. SETLOC /SET INTERRUPT
RETURN TO P1710D
P1710D. RPE
CLA /CLEAR, LOAD AND PUNCH
RPE /WAIT FOR FLAG 1
PLS /ENABLE INTERRUPT
JMP .-1
/ION
JMP .-2
/ION
JMP P1710D
JMP P1710D
JMP I CHAIN /YES, CHAIN

PCB-E

ERRORS

LINKS

PLY-T

3-100

PROGRAM 2, READER TEST, SPECIAL BINARY COUNT PATTERN

```

P29.  LDR R0, CTRB      ; GET COUNT IN CTRB
      ORMSK             ; MASK TO
      ORG60             ; 0460
P2A.  JMS I SYNC        ; SYNC READER
      SETA             ;
      LDR R0, CTRB      ; GET COUNT IN CTRB
      ORMSK             ; MASK TO
      ORG60             ; 0460
P2B.  JMS I CRCNT        ; GET RANDOM CHARACTER
      LDR R0, CTRB      ; COUNT IN CTRB
P2C.  JMS I CTRBPT       ; GET BINARY CHARACTER
      LDR R0, CTRB      ; STORE IT
      JMS I LUTREAD     ; GO READ CHARACTER
      JMS I LUTCHK      ; GO CHECK IT
      JMS I P2E         ; ERROR
P2D.  ISZ CTRB           ; GROUP DONE?
      JMP P2C           ; NO
      JMS I STALL       ; YES, STALL
      JMS P2B           ; REPEAT
      ISZ CTRB          ; 5 ERRORS?
      JMS P2D           ; NO CONTINUE
      JMP P2A           ; RESYNC

```

```

/PROGRAM 3. PUNCH TEST. SPECIAL BINARY COUNT PATTERN
PRG3.   JMS I UMARK /MARK TAPE
        JMS I UPLDR /PUNCH LEADER
        JMS I INPATT /INITIALIZE BINARY PATTERN

```

```

P3A.      TAD I60
           DCA SAMSX
           JMS I GETPT      /GET BINARY CHARACTER
           JMS I UTPCH      /PUNCH IT
           JMS I (STALL
           IMP P3A          /REPEAT.

```

```

PAGE.  JMS I INPAT  /INITIALIZE BINARY PATTERN
        SETLOC      /400 TO
        SRMSK       /SR MASK

```

```

B400
JMS I GETPT      /GET BINARY CHARACTER
DCA I UTSE      /STORE IT
JMS I UTRD      /READ CHARACTER
SZA             /ZERO?

```

```

      JMP PAB
      JMP -3
      JMS I GETPT
      DCR I UTSP
      JMS I UTREAD
      /NO.
      /YES, REPEAT READ.
      /GET BINARY CHARACTER
      /STORE IT
      /READ CHARACTER

```

```

FLY.      JMS I UYCRK      /GO CHECK IT
          NOP              /ERROR
          JMP P4A          /REPEAT.

```

```
PROGRAM S PUNCH TEST, RANDOM CHARACTER PATTERN.
PAGE.      JMS I UMARK          /MARK TAPE
           JMS I UPLDR          /PUNCH LEADER
           JMS I UMOVE         /INITIALIZE RANDOM
           JMS I UMOVE         /CHARACTER ROUTINE
           JMS I UMOVE         /CHARACTER ROUTINE
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READER AND PUNCH TESTS.

PRALC 6142A 4-FEB-77

10:03 PAGE 2-11

33 33

ERUNMB
ERROR
ERRORA
FADDR
FLAG
FORMC
GETPT
GETPTR
GETPTI
GETRCD
GTPTR
INCRTN
INIT
INITPT
INPATT
INTSVC
IOUT
KSTART
LINK
LPAGN
LRAGN
MARK
MARKAD
MARKER
MCTR
MILL
MILCTR
MILLI
MOVE
MOVEA
MSECT
NONE

NOSE
YKST
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1301      RANP1
1302      -4
1303      TAD L60
1304      DCR SANSK
1305      LDR PRGN
1306      LDR UTPCH
1307      LDR ISTALL
1308      LDR PER
1309      GET RANDOM CHARACTER
1310      PUNCH IT
1311      REPEAT

```

[illegible]

3600 0000
4475 0000

```

INITIALIZE BINARY PATTERN
SET ACTIVE INDICATOR
SET INTERRUPT
SERVICE ADDRESS
SET PUNCH SERVICE ADDRESS
SET READER SERVICE ADDRESS
PUNCH CHAR
ENABLE INTERRUPT
IDLE
INCREMENT PUNCH COUNT
DECREMENT PUNCH COUNT

```



```

3292 JMP RAMPO /NO ERROR.
3293 JMP RAMPB /YES, REPEAT
3294 JMS I UASCCN /CONVERT EXPECTED CHARACTER
3295 RAMPF /TO PRINTABLE ASCII
3296 SB
3297 JMS I UASCCN /CONVERT BAD CHARACTER TO
3298 RAMPA
3299 WAS
3300 JMP RAMPE
3301 JMS I UASCCN /CONVERT EXPECTED CHARACTER TO
3302 RAMPB /PRINTABLE ASCII
3303 SB
3304 JMP RAMPD-4
3305 JMS I UERROR /GO PRINT ERROR.
3306 NOSUF
3307 SBWAS
3308 JMP RAMPA /TRY AGAIN.
3309 RAMPF, 377
3310 AMPRD, 0
3311 SETDLM /-75 TO DELAY
3312 -113
3313 RFC /FETCH CHARACTER
3314 ION /ENABLE INTERRUPT
3315 DELAY /DELAY 75 USEC.
3316 IOF
3317 RSF /FLAG 1?
3318 SKP /NO, FLAG DROPPED
3319 JMP AMPRDA /YES.
3320 JMS I XTYPST /RING BELL 3 TIMES
3321 BELL3
3322 JMP RAMPA /TRY AGAIN
3323 AMPRDA, RRB
3324 OCA RAMPA
3325 TAD RAMPA
3326 JMP I AMPRD
3327 RAMPA, 0
3328 RAMPB, 0
3329 BELL3, 0007 /BELL
3330 0007 /BELL
3331 0007 /BELL
3332 0001 /END CODE.
3333
3334 /PROGRAM 11, PUNCH ANY CHARACTER IN SR, CONTINUOUSLY
3335 PRG11, LAS /READ SR
3336 AND IPTMSK
3337 PLS /PUNCH CHARACTER
3338 PSF /FLAG 1?
3339 JMP -1 /NO
3340 JMP -5 /YES, REPEAT
3341
3342 /PROGRAM 12, PUNCH 1'S AND 0'S LOOP
3343 PRG12, SETLOC
3344 SRMSK
3345 0075
3346 PRG12A, CLA CMA

```

M04

HIGH SPEED READER AND PUNCH TESTS. PAL10 V142A 4-FEB-77 10:03 PAGE 2-15 SEQ 0051

```

4114 0153 AND IPTMSK
4115 4456 JMS I UTPCH /PUNCH ALL 1'S
4116 4563 JMS I ISTALL
4117 7200 CLA
4118 4456 JMS I UTPCH /PUNCH ALL 0'S
4119 4563 JMS I ISTALL
4120 5313 JMP PRG12A /REPEAT.
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1899 4114 0153 AND (PTMSK
1900 4115 4456 JMS I UTPCH
1901 4116 4563 JMS I (STALL
1902 4117 7200 CLA
1903 4120 4456 JMS I UTPCH
1904 4121 4563 JMS I (STALL
1905 4122 5313 JMP PRG12A
1906
1907 4200 PAGE
1908 4201 PRG13, CLA
1909 4202 3123 DCA CTRB
1910 4203 7534 LAS
1911 4204 7104 CIL RAL
1912 4205 7710 SPA CLA
1913 4206 1143 TAD (-416
1914 4207 1143 TAD (-36
1915 4208 3231 DCA TKN
1916 4209 5220 JMS TSTAL
1917 4210 6014 TSTRD,
1918 4211 6011 RSC
1919 4212 6011 RSC
1920 4213 -1 JMS
1921 4214 CTRA
1922 4215 ISZ CTRA
1923 4216 TSTRC
1924 4217 ISZ CTRB
1925 4218 7000 NOP
1926 4219 1232 TSTRL,
1927 4220 3123 TAD TKN
1928 4221 7534 DCA CTRA
1929 4222 7534 LAS
1930 4223 7700 TSTRC,
1931 4224 5211 SPA CLA
1932 4225 4447 JMS TSTRD
1933 4226 1532 JMS I XTYPST
1934 4227 4257 RSPD
1935 4228 7402 JMS TSTRPC
1936 4229 5200 HLT
1937 4230 0000 JMP PRG13
1938 4231 TKN, OPEN
1939
1940 4233 7200 PRG14, CLA
1941 4234 3123 DCA CTRB
1942 4235 7534 JMS TSTPL
1943 4236 7534 LAS
1944 4237 7000 TSTPP,
1945 4238 -1 JMS
1946 4239 CTRA
1947 4240 ISZ CTRA
1948 4241 TSTPC
1949 4242 ISZ CTRB
1950 4243 7000 NOP
1951 4244 1141 TSTPL TAD (-74
1952 4245 1123 DCA CTRA
1953 4246 7534 LAS
1954 4247 7700 TSTPC,
1955 4248 5235 SPA CLA
1956 4249 4447 JMS TSTPP
1957 4250 1543 JMS I XTYPST
1958 4251 RSPD
1959 4252 JMS TSTRPC

```

/PUNCH ALL 1'S

/PUNCH ALL 0'S

/REPEAT.

/CLEAR CTRB

/READ SR

/LONG OR SHORT?

/LONG

/SHORT

/STORE AT TKN

/START READER

/WAIT FOR

/FLAG

/INCREMENT CTRA.

/NO.

/YES, INCREMENT CTRB

/LOAD CTRA

/READ SR

/PRINT SPEED?

/NO, CONTINUE READING

/YES.

/CLEAR CTRB

/60?

/NO.

/YES, INCREMENT CTRB

/LOAD -60 IN CTRA

/READ SR

/PRINT SPEED? (AFTER 60 SECONDS)

/NO, CONTINUE

/YES.

```

1854 4255 7402 HLT
1855 4256 5233 JMP PRG14
1856
1857 4257 0000 TSTRPC, 0
1858 4260 4265 JMS BDCNV
1859 4261 0123 CTRB
1860 4262 4147 JMS I XTYPST
1861 4263 1534 CPS
1862 4264 0000 JMP I TSTRPC
1863 4265 0000 BDCNV, 0
1864 4266 0000 SETLOC
1865 4267 0000 CNVCTR
1866 4270 -4
1867 4271 1023 TAD ADDRZA
1868 4272 1023 DCA ARROW
1869 4273 1023 TAD I BDCNV
1870 4274 1023 ISZ BDCNV
1871 4275 1023 DCA DIGIT
1872 4276 1023 TAD I DIGIT
1873 4277 0000 DCA VALUE
1874 4280 0000 DCA DIGIT
1875 4301 0000 CIL
1876 4302 1023 TAD VALUE
1877 4303 1023 ARROW, TAD TENPWR
1878 4304 7402 SNL
1879 4305 0000 JMP +4
1880 4306 0000 ISZ DIGIT
1881 4307 0000 DCA VALUE
1882 4310 0000 JMP ARROW-2
1883 4311 7200 CLA
1884 4312 1023 TAD DIGIT
1885 4313 1143 TAD 260
1886 4314 4473 JMS I UPUNCH
1887 4315 7300 CLA CIL
1888 4316 0000 ISZ ARROW
1889 4317 0000 ISZ CNVCTR
1890 4320 0000 JMP ARROW-3
1891 4321 0000 JMP I BDCNV
1892 4322 1023 ADDRZA, TAD TENPWR
1893 4323 0000 TENPWR, -1750
1894 4324 7534 -144
1895 4325 7534 -12
1896 4326 7534 -1
1897 4327 0000 VALUE, 0
1898 4330 0000 DIGIT, 0
1899 4331 0000 CNVCTR, 0
1900
1901 4332 7534 /PROGRAM 15, READ X CHARACTERS, STALL Y MS, LOOP (TO ADJUST TIMINGS)
1902 4333 0000 PRG15, HLT CLA
1903 4334 0000 LAS
1904 4335 0177 AND (177
1905 4336 7534 CIL
1906 4337 0000 DCA DELAYM
1907 4340 7534 LAS
1908 4341 0177 AND (7680

```

/TYPE C(CTRB) IN DECIMAL

/TYPE "CPS"

/EXIT.

/BINARY TO DECIMAL CONVERT

/AND PRINT SUBROUTINE

/INITIALIZE ARROW.

/GET AND STORE BINARY

/NUMBER. STORE IT AT VALUE.

/0 TO DIGIT.

[illegible]

.V04
.V05
.V07
.V11
.V11
.V22
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1. The first step in the process of identifying a problem is to recognize that a problem exists. This involves gathering information about the situation and identifying the specific issue that needs to be addressed.

SEC 0056

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