

IDENTIFICATION

PRODUCT NAME: HIGH-SPEED READER/PUNCH TESTS  
 PRODUCT CODE: MAINDEC-08-DMPCA-A-D  
 PRODUCT DATE: MARCH 1977  
 MAINTAINER: DIAGNOSTIC ENGINEERING  
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1.0 ABSTRACT

THE PCB-E HIGH-SPEED READER AND PUNCH TESTS ARE A TEST PACKAGE USED TO TEST THE TYPE 0000 AND 0005 HIGH-SPEED READER/PUNCH WHEN ATTACHED TO A PDP8/E SYSTEMS. THE TESTS REPAIR 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 MSR33/35 TELETYPE, PRB-E READER, OR PRB-E PUNCH, OR PUB-E READER/PUNCH. THE FOLLOWING TAPES ARE REQUIRED IN CONJUNCTION WITH THIS TEST:

- MAINDEC-08-D2G1-PT
- MAINDEC-08-D2G2-PT
- MAINDEC-08-D2G4-PT

2.2 STORAGE

LOCATIONS 0000 THROUGH 4377 ARE USED.

2.3 PRELIMINARY PROGRAMS

ALL BASIC CPU AND TELETYPE MAINDECS 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 SR0-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 SR0-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.

E01

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SEC 0004

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.

NOTE

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 0005. 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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SEG 0006

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 11'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 AND WRITE SPEEDS.
- F. A READ ERROR IS INDICATED BY AN ERROR PRINTOUT, CROPPING 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 WHILE RUNNING.

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 11'S AND 0'S TAPE CONTINUOUSLY.

PRG12 SR OPTIONS

SR6 =0-STALL (RANDOM), SR6=1-RUN FULL SPEED.  
 SR7 LOCK ON CURRENT 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 PRG0 AND PRG1 TO PERMIT SETTING OF DESIRED OPTIONS. PRESS CONTINUE TO PROCEED.
- LOC 0305 PROGRAM END HALT. OCCURS AT END OF PRG0 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 PRG0 AND PRG1 IF SR0 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 SR0 IS OFF, AND THAT SR1 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 SR0 IS OFF.
- LOC 4332 PRG15 SR SET HALT. OCCURS TO PERMIT SETTING OF DESIRED CHARACTER AND STALL COUNT. SET SR0-4 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 ZZZZZZZZ

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.  
ZZZZZ=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

SEC MS AFTER ISSUING PFC COMMAND (NOTCH) RSF DID NOT SKIP. FLAG IS NOT SET. OR RSF COMMAND FAILED TO SKIP.

\*P0000 R0001

WITH READ FLAG = 1, RSF (IOTD11) COMMAND FAILED TO SKIP.

\*P0000 R0002

RRB(IOTD12) FAILED TO CLEAR FLAG. OR RSF(IOTD11) SKIPPED WITH FLAG = 0.

\*P0000 R0003

SKIP NOT GENERATED WITH INTERRUPT OFF. OP 6D10 (RPE) MALFUNCTION.

\*P0000 R0004

PCE (6U20) MALFUNCTION. INTERRUPT ENABLE NOT CLEARED.

\*P0000 R0005

RRB(IOTD12) COMMAND FAILED TO CLEAR FLAG.

\*R0000 R0006

RFC(IOTD14) FAILED TO CLEAR FLAG.

\*P0000 R0007

RRB(IOTD12) 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(IOTD21) COMMAND SKIPPED WITH FLAG = 0. OR, LESS LIKELY.

PCF(IOTD22) FAILED TO CLEAR FLAG.

\*P0001 R0001

PSF(IOTD21) FAILED TO SKIP WITH FLAG = 1. OR FLAG IS NOT SET.

\*P0001 R0002

PCF(IOTD22) 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 REPRESENTS THE CHARACTER READ.

# NO1

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SEQ 0013

## 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

- L00 0201 INCORRECT PROGRAM NUMBER SELECTED. SET SR TO CORRECT NUMBER AND PRESS CONTINUE.
- L00 0266 INCORRECT ROUTINE NUMBER SELECTED. PRECEDED BY PRINTOUT. SET CORRECT ROUTINE NUMBER IN SR AND PRESS CONTINUE.
- L00 0732 UNEXPECTED INTERRUPT. PRECEDED BY PRINTOUT. OCCURS DURING PRG7 EXECUTION. TURN OFF INTERRUPTING DEVICE. PRESS CONTINUE.
- L00 1347 SYNC ERROR. OCCURS DURING PRG2 AND PRG7. IF PROGRAM IS UNABLE TO SYNC. PRESS CONTINUE TO RETRY.
- L00 1075 COMMON ERROR HALT. OCCURS AFTER ERROR PRINTOUT IF SR=0 AND OPTION APPLIES TO PROGRAM BEING RUN. PRESS CONTINUE.
- L00 3831 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 L00 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-00-02G4-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 SPlice 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-00-02G1-PT AND MAINDEC-00-02G2-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 (I0T014). 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 (I0T011) SKIPS WITH FLAG = 1. TEST IS DONE 4095 TIMES.
- RTN2 CHECK THAT RSF COMMAND (I0T011) 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 (I0T012) CLEARS THE FLAG. DONE 500 TIMES.
- RTN6 CHECKS THAT RFC COMMAND (I0T014) 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 (I0T021) DOES NOT SKIP WITH FLAG = 0.
- RTN1 CHECKS THAT PSF COMMAND (I0T021) SKIPS WITH FLAG = 1. DONE 4095 TIMES.
- RTN2 CHECKS THAT PCF COMMAND (I0T022) 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 (I0T022) 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.  
 /INDEC-08-DMPCA-A-0  
 /DATE: MARCH 1977  
 /COPYRIGHT 1977 DIGITAL EQUIPMENT CORP. MAYNARD, MASS. 01754  
 /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 ZEROES TAPE.  
 /PRG11-PUNCH ANY CHARACTER OR SR LOOP.  
 /PRG12-ONES AND ZEROES PUNCH LOOP.  
 /PRG13-READER SPEED PRINT LOOP  
 /PRG14-PUNCH SPEED PRINT LOOP  
 /PRG15-READ X, STALL Y MSEC LOOP.

0000	5000	SKON=6000
0001	5003	SR0=6003
0002	5007	CAF=6007
0003	5010	RPE=6010
0004	5020	PCE=6020
0005	5014	RCF=6014
0006	5024	PPC=6024
0007	0000	*0
0008	0000	0000
0009	5001	IMP 1
0010	0002	IMP 1
0011	0003	IMP 1
0012	0005	*5
0013	5402	IMP I 2
0014	0006	0
0015	0020	*20
0016	0000	KSTART, 0000
0017	0000	DELAY, 0000
0018	0000	COUNT, 0000
0019	0000	AC, 0
0020	0000	LINK, 0
0021	0270	CHAIN, CHAIN
0022	0333	SHLT, SHALT
0023	0447	RANNO, RANGEN
0024	0000	PRGNUM, 0
0025	0000	PRGTAB, PRG0
0026	0000	PRG1
0027	0000	PRG2
0028	0000	PRG3
0029	0000	PRG4
0030	0000	PRG5
0031	0000	PRG6
0032	0000	PRG7
0033	0000	PRG10
0034	0000	PRG11
0035	0000	PRG12
0036	0000	PRG13
0037	0000	PRG14
0038	0000	PRG15
0039	0000	PRG16
0040	0000	PRG17
0041	0000	PRG18

USER PROGRAM START.

0042	4102	PRG11
0043	4110	PRG12
0044	4200	PRG13
0045	4233	PRG14
0046	4332	PRG15
0047	0516	XTYPST, TYPSTG
0048	0600	LCRLF, CRLF
0049	0600	ERRR, ERRR
0050	0600	LASCCN, LASCCN
0051	0600	LPRGN, LPRGN
0052	0600	LRRGN, LRRGN
0053	0600	LRERD, LRERD
0054	0600	LPCH, LPCH
0055	0600	PLDR, PLDR
0056	0600	MARK, MARK
0057	0600	CHK, CHK
0058	0600	TSB, TSB
0059	0600	ORCNT, ORCNT
0060	0600	LYNCA, LYNCA
0061	0600	YNCA, YNCA
0062	0600	NPATT, NPATT
0063	0600	GETPT, GETPT
0064	0600	GETPTR, GETPTR
0065	0600	CHECK, CHECK
0066	0600	LYCNT, LYCNT
0067	0600	PUNCH, PUNCH
0068	0600	MOVE, MOVE
0069	0600	USTCTR, USTCTR
0070	0600	URDSR, URDSR
0071	0600	USTCTA, USTCTA
0072	0600	USTCTB, USTCTB
0073	0600	USTDLM, USTDLM
0074	0600	UDLYMS, UDLYMS
0075	0600	LIOUT, LIOUT
0076	0600	LYMSR, LYMSR
0077	0600	SPMSK, SPMSK
0078	0600	HILL, HILL
0079	0600	CPIC, CPIC
0080	0600	CHR1, CHR1
0081	0600	CHR2, CHR2
0082	0600	CHR3, CHR3
0083	0600	CHR4, CHR4
0084	0600	CHR5, CHR5
0085	0600	CHR6, CHR6
0086	0600	CHR7, CHR7
0087	0600	CHR8, CHR8
0088	0600	CHR9, CHR9
0089	0600	CHR10, CHR10
0090	0600	CHR11, CHR11
0091	0600	CHR12, CHR12
0092	0600	CHR13, CHR13
0093	0600	CHR14, CHR14
0094	0600	CHR15, CHR15
0095	0600	CHR16, CHR16
0096	0600	CHR17, CHR17
0097	0600	CHR18, CHR18
0098	0600	CHR19, CHR19
0099	0600	CHR20, CHR20

CONSTANT FOR MILLISECOND CTR

SYMBOL NUMBER OF MILLISECOND TO BE COUNTED





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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
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344 0513 0000 /SUBROUTINE TO GENERATE RANDOM DELAY COUNT
345 0514 4427 DLCNT, 0
346 0515 0174 JMS I RANDNO /GO GENERATE RANDOM NUMBER
347 0516 7041 AND I177 /MASK OUT UNDESIED BITS.
348 0517 3021 CIA /2'S COMPLEMENT IT
349 0520 5713 DCA DELAYM /EXIT
350
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353 0521 0000 /SUBROUTINE TO COMPARE C(AC) TO CONTENTS STORED AT CALL+1
354 0522 3335 CHCK, 0
355 0523 1721 DCA WCHK /STORE AC AT WCHK
356 0524 7041 TAD I CHCK /GET COMPARE DATA
357 0525 1335 CIA /2'S COMPLEMENT IT
358 0526 2321 TAD WCHK /ADD C(WCHK)
359 0527 7640 ISZ CHCK /SET UP FOR UNEQUAL EXIT
360 0530 5333 SZA CLA /EQUAL (AC = 0)
361 0531 2321 JMP +3 /NO
362 0532 5721 ISZ CHCK /YES, SET UP FOR EQUAL EXIT
363 0533 1335 JMP I CHCK /EQUAL EXIT
364 0534 5721 TAD WCHK /RESTORE AC
365 0535 0000 JMP I CHCK /UNEQUAL EXIT
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0536 0000 /SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
0537 7200 MOVE, 0
0540 1736 CLA /GET "FROM ADDR" AND
0541 3361 DCA FADDR /STORE AT FADDR
0542 2336 ISZ MOVE
0543 1736 TAD I MOVE /GET "TO ADDR" AND
0544 3362 DCA TADDR /STORE AT TADDR.
0545 2336 ISZ MOVE
0546 1736 TAD I MOVE /GET "MOVE COUNT" AND
0547 3363 DCA MCTR /STORE AT MCTR.
0550 2336 ISZ MOVE /SET UP FOR EXIT.
0551 7200 MOVEA, CLA
0552 1761 TAD I FADDR /GET "FROM" WORD
0553 3762 DCA I TADDR /STORE AT "TO" LOCATION
0554 2361 ISZ FADDR /+1 TO "FROM" ADDR
0555 2362 ISZ TADDR /+1 TO "TO" ADDR
0556 2363 ISZ MCTR /ALL WORDS MOVED?
0557 5351 JMP MOVEA /NO, GO MOVE AGAIN
0560 5736 JMP I MOVE /YES, EXIT

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386 0561 0000 FADDR, 0
387 0562 0000 TADDR, 0
388 0563 0000 MCTR, 0
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0561 0000 FADDR, 0
0562 0000 TADDR, 0
0563 0000 MCTR, 0

PAGE 0
CRLF, 0
CLA
TAD I CRLF /CRLF SUBROUTINE
DCA CRCTR /GET NUMBER OF CRLF'S
ISZ CRLF AND SAVE
JMS I XTYPST /GO CRLF
+4
ISZ CRCTR /ALL DONE?
JMP -3 /NO
JMP I CRLF /YES, EXIT.
0015 /CR
0013 /LF
0001 /END CODE

CRCTR, 0
TYPSTG, 0
CLA
TAD I TYPSTG /GET AND STORE
DCA TEMO /INITIAL ADDRESS
DCA FLAG /CLEAR FLAG
ISZ TYPSTG
TSC1, TAD I TEMO /SET DATA
RTR /ROTATE RIGHT 6.
RTR
JMS TSC2 /GO TYPE CHARACTER
TAD I TEMO /GET DATA
JMS TSC2 /GO TYPE CHARACTER
ISZ TEMO /INCR STRING ADDR
JMP TSC1 /GO BACK FOR M4CE

TSC2, 0
AND I77 /MASK OFF 6 BITS
DCA TEMR /SAVE CHARACTER
TAD FLAG
SZA CLA /TEST FLAG
JMP TYPSP /SET
TAD TEMR /NOT SET
SMA /ZERO?
JMP +3 /YES, SET FLAG
TYPAT, JMS PRINT /NO, PRINT IT.
JMS I TSC2 /RETURN
JMS FLAG /SET FLAG
JMS I TSC2 /EXIT
TYPSP, DCA FLAG /CLEAR FLAG
TAD TEMR
CIA /ZERO?
SMA /YES, TYPE "B"
IAC
SMA CLA /IS IT 0?
JMP I TYPSTG /YES, EXIT CODE

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N02

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0564 1170 TAD (SMA /SMA TO SWITCH
0565 3275 DCA SWITCH /GET CHARACTER
0566 1361 TAD TEMR /PRINT IT
0567 4271 TMS PRINT
0568 1170 TAD (SPA /SPA TO SWITCH
0569 3275 DCA SWITCH /RETURN
0570 1361 JMP I TSC2

PRINT, TAD I-40
SWITCH, TAD I130
TAD I130
TAD I240
JMS I TYPSTG /PUNCH
JMS I TYPSTG /STALL
JMS I TYPSTG /YES.

INTSVC, DCA AC /SAVE AC
RARR /SAVE LINK
DCA LINK /READER?
RSP /NO
JMP +3 /YES
RVCTR, 0
PSF /PUNCH?
JMP +4 /NO
JMS I1+1 /STALL
JMS I+1 /YES.

RVCTR, KSF /TTY READER /KYBD?
JMP +3 /NO
KCC /YES
TSP /TO MAINLINE
TSP /TTY PRINTER /PUNCH?
JMP +4 /NO
TCP /YES.

UNEXIT, JMS I XTYPST /TO MAINLINE
UNINT, HALT, UNEXPECTED INTERRUPT
IOUT, HLT CLA
CLA CLL
TAD LINK
RTR
TAD AC
TAD I C
JMP I C

PCOCLR, PCF
PCOCLR, CCF
PCOCLR, CCF

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936	2011	2036	POT1		
937			/CHECKS	THAT FLAG=1 250MS. AFTER RFC (IOT014), INDICATING THAT	
938			/READER	IS ADVANCING.	
939	80112	4477	SETA		/-200 TO CTRA
940	80113	7470	-310		
941	80114	4501	SETDLM		/-250 TO DELAY
942	80115	7406	-372		
943	80116	6014	POT0A,	RFC	/CLEAR FLAG, FETCH CHAR (IOT014)
944	80117	4502	DELAY		/DELAY 75 MS
945	8020	6011	RSF		/SKIP IF FLAG=1 (IOT011)
946	80201	5225	JMP POE0		
947	80202	2122	ISZ CTRA		/DON?
948	80203	5216	JMP POT0A		/NO, REPEAT
949	80204	5225	JMP I CHAIN		/YES, CHAIN
950	80205	4451	JMS I UERROR		/GO TO ERROR SUBROUTINE
951	80206	4040	NOSUF		/NO PRINTOUT SUFFIX
952	80207	0000	NONE		/NO PRINTOUT
953	80208	5222	JMP POT0A+4		/CONTINUE TEST
954	80209	4501	SETDLM		/SCOPE LOOP
955	8021	7764	-14		
956	80212	6014	RFC		/FETCH CHAR (IOT014)
957	80213	4502	DELAY		/DELAY 12 MS.
958	80214	5233	JMP .-2		
959	8036	0001	POT1,	1	
960	8037	2064			
961			POT2		
962	8040	4477	/WITH FLAG=1, SKIP ON FLAG 4095 TIMES TO CHECK FOR RELIABLE SKIPPING		
963	8041	0001	SETA		/-4095 TO CTRA
964	8042	6014	RFC		/FETCH CHAR (IOT014)
965	8043	6011	RSF		/SKIP ON FLAG (IOT011)
966	8044	5243	JMP .-1		/REPEAT
967	8045	6011	POT1A,	RSF	/SKIP ON FLAG (IOT011)
968	8046	5252	JMP POE1		/ERROR
969	8047	2122	ISZ CTRA		/DONE 4095 TIMES?
970	8050	5245	JMP POT1A		/NO, REPEAT TEST
971	8051	5425	JMP I CHAIN		/YES, CHAIN
972	8052	4451	JMS I UERROR		/GO TO ERROR SUBROUTINE
973	8053	4040	NOSUF		/NO PRINTOUT SUFFIX
974	8054	0000	NONE		/NO PRINTOUT
975	8055	0000	JMP POT1A+2		/CONTINUE TEST

976	8056	6014	POT15,	RFC	/START SCOPE LOOP, FETCH CHAR (IOT014)
977	8057	6011	RSF		/SKIP ON FLAG (IOT011)
978	8058	5257	JMP .-1		/REPEAT
979	8059	5011	RSF		/SKIP ON FLAG (IOT011)
980	8060	5251	JMP .-1		/REPEAT
981	8061	5251	JMP .-2		/REPEAT
982	8062	0002	POT2,	0	
983	8063	2105			
984			POT3		
985	8064	4477	/CHECKS THAT IOT011 DOES NOT SKIP WITH FLAG=0.		
986	8065	0001	SETA		/-4095 TO CTRA
987	8066	0000	-7777		
988	8067	0000	RFB		/CLEAR FLAG
989	8068	0000	REF		/SKIP ON FLAG=1(IOT011)
990	8069	0000	JMP POT20K		/OK
991	8070	0000	JMS I UERROR		/ERROR, GO TO ERROR SUB
992	8071	0000	NOSUF		/NO PRINTOUT SUFFIX
993	8072	0000	NONE		/NO PRINTOUT
994	8073	0000	JMP POT20K		/CONTINUE TEST
995	8074	0000	RSF		/START SCOPE LOOP, SKIP ON FLAG
996	8075	0000	JMP .-1		/REPEAT
997	8076	0000	JMP .-2		/REPEAT
998	8077	0000	ISZ CTRA		/DONE 4095 TIMES?
999	8078	0000	JMP POT2A		/NO, REPEAT
1000	8079	0000	JMP I CHAIN		/YES, CHAIN
1001					
1002			/ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED		
1003			POT3,	3	
1004			POT4		
1005			TAD (4000		
1006			CCA COUNT		
1007			TAD (7773		
1008			CCA CTR		
1009			TOP		
1010			CLR		
1011			DCR MILLI		
1012			ISZ MILLI		
1013			JMP .-1		
1014			ISZ CTR		
1015			JMP .-3		
1016			TAD (2260		/4.56 MS CONSTANT
1017			CCA DELTIM		
1018			CAF		
1019			JMP REAG		/REAG
1020			JMS TIM		
1021			RSF		/SKIP IF READER FLAG SET
1022			JMP POE3		/FLAG DID NOT SET
1023			RPE		
1024			SRA		/SHOULD SKIP HERE IF INT REQ
1025			JMP POE3		/REPORT ERROR
1026			ISZ COUNT		
1027			JMP POT3+4		
1028			JMP I CHAIN		
1029			JMS I UERROR		
1030			NOSUF		
1031			NONE		

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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 0134 ISZ DELTIM
1040 2151 5352 JMP -1
1041 2154 5751 JMP I TIM
1042
1043 2175 2260
1044 2176 7773
1045 2177 4000
1046 2200
PAGE
/Routine to check that interrupt enable can be cleared for reader.
POT4, 4
POTS
IOF
TAD R7770
OCA RCNT2 /INIT. # OF ITERATIONS
ALOOP, CAF
RPE /ENABLE INTERRUPT
PCE
ION
RCF /READ
SKON
JMP PDE4 /INTERRUPT NOT ON
SRQ /SKIP IF INT REQ GENERATED
SKP /NO INT REQ
JMP PDE4 /INT REQ GENERATED
ISZ COUNT /RELIABILITY SETUP
POT4A, JMP ALOOP /CONTINUE
ISZ RCNT2
JMP ALOOP
JMP I CHAIN
JMS I UERROR
NOSUF
NONE
JMP I CHAIN
POT4S, RPE
DELAY
PCE
JMP -3
1076 2234 7770 R7770, 7770
1077 2235 7770 RCNT2, 7770
1078
1079 PAGE
1080 2400 0005 POTS, 5
1081 2401 8430 POTS
1082 /CHECKS IOTD12 (RRB) FOR ABILITY TO CLEAR FLAG.
1083 2402 4477 SETA /-500 TO CTRA
1084 2403 7014 -764

```

M03

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1085 2404 6014 POT5A, RFC /FETCH CHAR (IOTD14)
1086 2405 6014 RSF /WAIT FOR FLAG=1
1087 2406 6014 JMP -1
1088 2407 6014 RRB /CLEAR FLAG (IOTD12)
1089 2408 6014 RSF /SKIP ON FLAG=1
1090 2409 6014 JMP POT5B /OK
1091 2410 6014 PDES, 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 (IOTD12)
1099 2418 6014 RSF /SKIP IF FLAG=1
1100 2419 6014 JMP -5 /NO IOTD12 CLEARED IT, READ AGAIN
1101 2420 6014 JMP -3 /IOTD12 FAILED, REPEAT IOTD12.
1102 2421 6014 POT5B, ISZ CTRA /DONE?
1103 2422 6014 JMS POT5A /NO, REPEAT
1104 2423 6014 JMP I CHAIN /YES, CHAIN
1105
1106 2424 6014 POT6, 6
1107 2425 6014 POT7
1108 /CHECKS THAT IOTD14 CLEARS FLAG.
1109 2426 4477 SETA /-500 TO CTRA.
1110 2427 7014 -764
1111 2428 6014 POT6A, RFB /FETCH CLEAR (IOTD14)
1112 2429 6014 RSF /WAIT FOR FLAG=1
1113 2430 6014 JMP -1
1114 2431 6014 RFB /CLEAR FLAG WITH IOTD14
1115 2432 6014 RSF /SKIP IN FLAG=1.
1116 2433 6014 JMP POT6B /OK FLAG IS 0.
1117 2434 6014 PDES, JMS I UERROR /ERROR, FLAG=1, GO TO ERROR SUB.
1118 2435 6014 NOSUF /NO PRINTOUT SUFFIX
1119 2436 6014 NONE /NO PRINTOUT
1120 2437 6014 JMP POT6B /CONTINUE TEST
1121 2438 6014 DELAY /START SCOPE LOOP, DELAY 20 MS.
1122 2439 6014 RFB /FETCH CHAR (IOTD14)
1123 2440 6014 RSF /WAIT FOR FLAG=1
1124 2441 6014 JMP -1
1125 2442 6014 JMP -3 /GO CLEAR FLAG AND FETCH CHAR.
1126 2443 6014 POT6B, ISZ CTRA /DONE?
1127 2444 6014 JMS POT6A /NO, REPEAT
1128 2445 6014 JMP I CHAIN /YES, CHAIN
1129
1130 2600 PAGE
1131 2601 6014 POT7, 7
1132 /CHECKS ABILITY TO READ ALL D'S CHARACTERS
1133 2602 4477 SETA /-500 TO CTRA
1134 2603 7014 -764
1135 2604 6014 POT7A, RFB /FETCH CHAR (IOTD14)
1136 2605 6014 RSF /WAIT FOR FLAG=1
1137 2606 6014 JMP -1
1138 2607 6014 CLD
1139 2608 6014 RRB /READ BUFFER

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1086 02404 6014 POT5A, RFC /FETCH CHAR (IOT014)
1087 02405 6011 RSP /WAIT FOR FLAG=1
1088 02406 5205 JMP -1
1089 02407 6012 /CLEAR FLAG (IOT012)
1090 02408 6011 RRB /SKIP ON FLAG=1
1091 02409 6011 JMP POTE8 /OK
1092 02410 4451 POTE5, JMS I UERROR /ERROR, GO TO ERROR SUB.
1093 02411 4440 NOSUF /NO PRINTOUT SUFFIX
1094 02412 4440 NOSUF /NO PRINTOUT
1095 02413 6014 JMP POTE8 /CONTINUE TEST
1096 02414 6014 POT5S, RFC /START SCOPE LOOP. FETCH CHAR
1097 02415 6011 RSP /WAIT FOR FLAG=1
1098 02416 6017 JMP -1
1099 02417 6012 /CLEAR FLAG (IOT012)
1100 02418 6011 RRB /SKIP IF FLAG=1
1101 02419 6016 JMP -1 /NO IOT012 CLEARED IT. READ AGAIN
1102 02420 6011 JMS I UERROR /IOT012 FAILED, REPEAT IOT012.
1103 02421 4440 NOSUF /DONE
1104 02422 4440 JMS I UERROR /NO, REPEAT
1105 02423 6014 JMS I UERROR /YES, CHAIN
1106 02424 6006 POT6, JMS I UERROR
1107 02425 2600 POT7, JMS I UERROR
1108 02426 4477 /CHECKS THAT IOT014 CLEARS FLAG. /-500 TO CTRA.
1109 02427 7014 SETA
1110 02428 6014 RFB /FETCH CLEAR (IOT014)
1111 02429 6011 RSP /WAIT FOR FLAG=1.
1112 02430 5235 JMP -1
1113 02431 6014 /CLEAR FLAG WITH IOT014
1114 02432 6011 RFB /SKIP IN FLAG=1.
1115 02433 4440 JMS I UERROR /OK FLAG IS 0.
1116 02434 4440 POTE6, JMS I UERROR /ERROR FLAG=1. GO TO ERROR SUB.
1117 02435 4440 NOSUF /NO PRINTOUT SUFFIX
1118 02436 4440 NOSUF /NO PRINTOUT
1119 02437 6014 JMS I UERROR /CONTINUE TEST
1120 02438 4502 POT6S, DELAY /START SCOPE LOOP. DELAY 20 MS.
1121 02439 6014 RFB /FETCH CHAR (IOT014)
1122 02440 6011 RSP /WAIT FOR FLAG=1.
1123 02441 6017 JMS I UERROR
1124 02442 6017 JMS I UERROR /GO CLEAR FLAG AND FETCH CHAR.
1125 02443 4440 JMS I UERROR /DONE
1126 02444 4440 JMS I UERROR /NO, REPEAT
1127 02445 5425 JMS I UERROR /YES, CHAIN
1128 02446 2600 PAGE
1129 02447 0007 POT7, 7
1130 02448 2637 POT10
1131 02449 4477 /CHECKS ABILITY TO READ ALL 0'S CHARACTERS
1132 02450 7014 SETA /-500 TO CTRA
1133 02451 6014 RFB /FETCH CHAR (IOT014)
1134 02452 6011 RSP /WAIT FOR FLAG=1.
1135 02453 7205 JMS I UERROR
1136 02454 6012 RRB /READ BUFFER

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N03

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1140 2511 3236 DCA POT74B /SAVE
1141 2512 3236 TRD POT74B
1142 2513 7640 SZR CLA /RESULT 0?
1143 2514 5220 JMS I UERROR /ERROR, DID NOT READ 0'S CHAR.
1144 2515 6012 JMS I UERROR /DONE?
1145 2516 6012 JMS I UERROR /NO, REPEAT
1146 2517 4440 JMS I UERROR /YES CHAIN
1147 2518 6014 JMS I UERROR
1148 2519 6014 JMS I UERROR
1149 2520 6014 JMS I UERROR
1150 2521 6014 JMS I UERROR
1151 2522 6014 JMS I UERROR
1152 2523 6014 JMS I UERROR
1153 2524 6014 JMS I UERROR
1154 2525 6014 JMS I UERROR
1155 2526 6014 JMS I UERROR
1156 2527 6014 JMS I UERROR
1157 2528 6014 JMS I UERROR
1158 2529 6014 JMS I UERROR
1159 2530 6014 JMS I UERROR
1160 2531 6014 JMS I UERROR
1161 2532 6014 JMS I UERROR
1162 2533 6014 JMS I UERROR
1163 2534 6014 JMS I UERROR
1164 2535 6014 JMS I UERROR
1165 2536 6014 JMS I UERROR
1166 2537 6014 JMS I UERROR
1167 2538 6014 JMS I UERROR
1168 2539 6014 JMS I UERROR
1169 2540 6014 JMS I UERROR
1170 2541 6014 JMS I UERROR
1171 2542 6014 JMS I UERROR
1172 2543 6014 JMS I UERROR
1173 2544 6014 JMS I UERROR
1174 2545 6014 JMS I UERROR
1175 2546 6014 JMS I UERROR
1176 2547 6014 JMS I UERROR
1177 2548 6014 JMS I UERROR
1178 2549 6014 JMS I UERROR
1179 2550 6014 JMS I UERROR
1180 2551 6014 JMS I UERROR
1181 2552 6014 JMS I UERROR
1182 2553 6014 JMS I UERROR
1183 2554 6014 JMS I UERROR
1184 2555 6014 JMS I UERROR
1185 2556 6014 JMS I UERROR
1186 2557 6014 JMS I UERROR
1187 2558 6014 JMS I UERROR
1188 2559 6014 JMS I UERROR
1189 2560 6014 JMS I UERROR
1190 2561 6014 JMS I UERROR
1191 2562 6014 JMS I UERROR
1192 2563 6014 JMS I UERROR
1193 2564 6014 JMS I UERROR
1194 2565 6014 JMS I UERROR
1195 2566 6014 JMS I UERROR
1196 2567 6014 JMS I UERROR
1197 2568 6014 JMS I UERROR
1198 2569 6014 JMS I UERROR
1199 2570 6014 JMS I UERROR

```

INCH TESTS.  
 NONE  
 JMP POT10E  
 SETLOC  
 POT10D  
 RSC  
 RSC  
 JMP .-1  
 NONE  
 JMP .-2  
 JMP .-3  
 JMP ISZ CTRA  
 POT10C  
 RSC  
 JMP I CHAIN  
 OP DELAY TEST  
 11, 11  
 7777  
 SETA  
 -310  
 J11A. JMS DLY250  
 SETDLM  
 RSC  
 RSC  
 JMP .-1  
 DELAY  
 RSC  
 DELAY  
 RSC  
 JMP POT11B  
 I UERROR  
 NONE  
 JMP POT11A  
 POT11B  
 POT11C  
 JMS DLY212  
 RSC  
 RSC  
 JMP +4  
 CTRA  
 POT11A  
 JMP I CHAIN  
 I UERROR  
 NONE  
 JMP POT11C  
 SETDLM  
 -1  
 RSC  
 JMP .-1  
 DELAY  
 RSC  
 JMP .-1

/CONTINUE TEST  
 /SET INTERRUPT RETURN TO  
 /POT10D.  
 /FETCH CLEAR  
 /WAIT FOR FLAG=1  
 /ENABLE INTERRUPT  
 /DONE?  
 /NO, REPEAT.  
 /CLEAR INTERRUPT ENABLE  
 /YES, CHAIN.  
 /TEST #  
 /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.  
 /FLAG NOT UP, OK  
 /ERROR, FLAG SHOULD NOT BE UP  
 /38 MSECS AFTER "STOP DELAY"  
 /FIRES.  
 /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. JMP .-4  
 0000 SETDLM  
 4501 -324  
 7454 DELAY  
 4502 JMP I DLY212  
 5755 DLY250. JMP I DLY250  
 0000 SETDLM  
 4501 -372  
 7405 DELAY  
 4502 JMP I DLY250  
 5773  
 3000  
 PAGE PROGRAM 1, BASIC PUNCH AND CONTROL LOGIC TEST  
 PRG1. SETLOC /SET KSTART TO  
 KSTART /INITIAL ROUTINE  
 PITD /ADDRESS  
 SETLOC /SET SR MASK  
 SRMSK  
 7717 /GET STARTED  
 JMP I .+1  
 SRSET  
 PITD. PIT1  
 0 THAT PSF (IOT021) DOES NOT SKIP WITH FLAG = 1  
 /CHECKS SETA /-4095 TO CTRA  
 -7777  
 PITOA. PCF /CLEAR FLAG  
 PSF /SKIP IF FLAG=1 (IOT021)  
 JMP PITOB /NO SKIP, OK  
 JMS I UERROR /SKIP ERROR, GO TO ERROR SUB  
 NONE /NO SUFFIX  
 NOSUF /NO PRINTOUT  
 JMP PITOB /CONTINUE TEST.  
 PCF /CLEAR FLAG  
 PSF /SKIP IF FLAG=1  
 PITOS. JMP .-1  
 JMP .-2 /DONE?  
 ISZ CTRA /NO, REPEAT  
 JMP PITOA /YES, CHAIN  
 JMP I CHAIN  
 PIT1. PIT2  
 0 THAT PSF (IOT021) SKIPS WITH FLAG=1 IF FLAG=1.  
 /CHECKS SETA /-4095 TO DELAYM  
 -7777  
 SETDLM  
 -7777  
 CLA CLL /CLEAR PUNCH FLAG, LOAD BUFFER  
 PCF /LOAD BUFFER AND PUNCH  
 PPC /DELAY 1095 MILLISECONDS  
 DELAY /SKIP IF FLAG=1. SHOULD BE 1  
 PSF /NO, SKIP, ERROR.  
 JMP PIE1

004

SEQ 02-1

PCB

0000  
 0100  
 0200  
 0300  
 0400  
 0500  
 0600  
 0700  
 1000  
 1100  
 1200  
 1300  
 1400  
 1500  
 1600  
 1700  
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2122 3122 ISZ CTRA /DONE?
2123 3123 JMF PIT1A /NO REPEAT
2124 3124 JMF I CHAIN /YES CHAIN
4425 3125 P1E1. JMS I UERROR /GO TO ERROR SUBROUTINE
4426 3126 NOSUF /NO SUFFIX
4427 3127 NONE /NO PRINTOUT
4428 3128 JMF PIT19 /CONTINUE TEST
4429 3129 P1T1S. OLD
4430 3130 PPC /CLEAR FLAG AND BUFFER
4431 3131 PPF /SKIP IF FLAG=1
4432 3132 PPF /LOAD AND PUNCH
4433 3133 JMF -1 /REPEAT
4434 3134 JMF -2 /REPEAT
4435 3135 P1T2. P1T3
4436 3136 /CHECKS THAT PCF (IOT022) IS ABLE TO CLEAR THE FLAG
4437 3137 SETA -500 TO CTRA
4438 3138 P1T2A. CLA /CLEAR LOAD AND PUNCH
4439 3139 PLS /WAIT FOR FLAG=1
4440 3140 PLS /-1
4441 3141 JMF -1 /CLEAR FLAG (IOT022)
4442 3142 PPF /SKIP IF FLAG=1
4443 3143 PPF /NO SKIP OK
4444 3144 JMF P1T2B /SKIP ERROR GO TO ERROR SUB
4445 3145 JMS I UERROR
4446 3146 NOSUF
4447 3147 NONE
4448 3148 JMF P1T2B /CONTINUE TEST.
4449 3149 P1T2S. CLA /CLEAR LOAD AND PUNCH
4450 3150 PLS /WAIT FOR FLAG
4451 3151 PLS /-1
4452 3152 JMF -1 /CLEAR FLAG
4453 3153 PPF /SKIP IF FLAG=1
4454 3154 PPF /CLEARED
4455 3155 JMF -3 /NOT CLEAR.
4456 3156 P1T2B. ISZ CTRA /SAVE?
4457 3157 JMF P1T2A /NO REPEAT
4458 3158 JMF I CHAIN /YES CHAIN
4459 3159 /ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED
4460 3160 P1T3. P1T4
4461 3161 TAD (4000
4462 3162 DCA COUNT
4463 3163 TAD (7773
4464 3164 DCA CTR
4465 3165 FOR
4466 3166 CCA
4467 3167 DCA MILLI
4468 3168 JMF -1
4469 3169 JMF -1
4470 3170 JMF -3
4471 3171 JMF -3
4472 3172 TAD (0001 /16 MS CONSTANT

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4000
4100
4200
4300
4400
4500
4600
4700
5000
5100
5200
5300
5400
5500
5600
5700
6000
6100
6200
6300
6400
6500
6600
6700
7000
7100
7200
7300
7400
7500
7600

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E04

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3133 3134 DCA DELTIM
3134 3135 CAF
3135 3136 PPC /PUNCH
3136 3137 JMS TIM1
3137 3138 P1T3A. PPF /SKIP IF PUNCH FLAG SET
3138 3139 JMF P1E3
3139 3140 RPE
3140 3141 SRG /SHOULD SKIP HERE FOR INT REQ
3141 3142 JMF P1E3 /REPORT ERROR
3142 3143 ISZ COUNT
3143 3144 JMF P1T3+4
3144 3145 JMF I CHAIN
3145 3146 JMS I UERROR
3146 3147 NOSUF
3147 3148 NONE
3148 3149 P1T3S. P1T3+4
3149 3150 PPF
3150 3151 PPF -1
3151 3152 JMF -1
3152 3153 JMF -2
3153 3154 TIM1. /44 MILLISECOND TIME OUT
3154 3155 ISZ DELTIM
3155 3156 JMF -1
3156 3157 TAD (0500
3157 3158 DCA DELTIM
3158 3159 ISZ DELTIM
3159 3160 JMF -1
3160 3161 JMF -1
3161 3162 ISZ DELTIM
3162 3163 JMF -1
3163 3164 JMF I TIM1 /RETURN
3164 3165
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7710	SPA	CLA	/GREATER THAN 100?
5235	JMP	+3	/NO OK
7402	HLT		/YES, ERROR. HALT
5231	JMP	-1	
4246	JMS	CPCH	/PUNCH BIN CHARACTER
1127	TAD	RBUSY	
7640	SZA	CLA	/READER BUSY?
5503	OUT		/YES, EXIT
1132	TAD	PCHCNT	/GET PUNCH COUNT
1146	TAD	(-12)	/SUBTRACT BLACK COUNT
7710	SPA	CLA	/POSITIVE?
5503	OUT		/NO, EXIT
6014	RFC		/YES, START READER
8127	ISZ	RBSLY	/SET READER BUSY
5503	OUT		/EXIT.
0000	CPCH,		
4470	JMS	I GETPTR	/GET BIN CHAR.
6026	PLS		/ENABLE PUNCH
7200	CLA		/CLEAR AC
5546	JMP	I CPCH	/EXIT
0000	CREAD,		
7200	CLA		/READ CHARACTER
6012	RAB		/STORE IT
3131	DCA	TCHKW	/GET PUNCH COUNT
1132	TAD	PCHCNT	
1146	TAD	(-1)	/MINUS 1
3132	DCA	PCHCNT	/STORE IT
1132	TAD	PCHCNT	
7640	SZA	CLA	/0?
5237	JMP	+3	/NO
3127	DCA	RBUSY	/YES, CLEAR READER BUSY
5503	JMP	I CREAD	/EXIT
6014	RFC		/FETCH NEXT CHARACTER
70	JMP	I CREAD	/EXIT
4253	JMS	CREAD	/READ CHARACTER
1131	TAD	TCHKW	
7650	SMA	CLA	/IS IT 0?
74	OUT		/YES,
5503	SETLOC		/SET INTERRUPT SERVICE
4476	RVCTR		/TO RBIN.
0711	RBIN		/TO RBIN.
3703	SETA		/S TO CTRA
4477	LS		
7773	SKP		
7410	JMS	CREAD	/READ CHARACTER
4253	JMS	I GETPT	/GET BINARY CHARACTER
4477	JMS	I UTBS	
3462	DCA	TCHKW	/GET CHARACTER READ
1131	TAD	TCHKW	/GO CHECK IT
4451	JMS	I UTCHK	/ERROR
7410	SKP		/NO
5503	OUT		/S ERRORS?
2122	ISZ	CTRA	/NO, TO MAILLINE
5503	OUT		/YES, SET READER SERVICE
4476	SETLOC		/TO RESYNC TAPE.
0711	RVCTR		

K04

3716	3720	OUT	+2	
3717	5503	JMS	CREAD	/READ CHARACTER
3720	4253	TAD	TCHKW	
3721	1131	DCA	CHR1	/STORE.
3722	3110	SETLOC		/SET READER SERVICE
3723	4476	RVCTR		
3724	0711			
3726	4253			
3727	4253	JMS	CREAD	/READ CHAR.
3730	4253	TAD	TCHKW	
3731	4253	RVCTR	CHR2	
3732	4253	SETLOC		/SET RDR
3733	4253	RVCTR		/SERVICE
3734	4253			
3735	4253	JMS	CREAD	/READ CHAR.
3736	4253	TAD	TCHKW	
3737	4253	DCA	CHR3	/STORE AT CHR3
3740	4253	JMS	I SYNCA	/GO SYNC.
3741	4253	JMP	RBINA	/SYNC ERROR, TRY AGAIN
3742	4253	SETA		/YES, -S TO CTRA.
3743	4477	LS		
3744	7773			
3745	4476	SETLOC		/RESTORE READER SERVICE
3746	0711	RVCTR		/TO RBIN
3747	3703	RBIN		
3750	5503	OUT		/TO MAILLINE.
4000				
4000	4475	PROGRAM	10, READ AMPLIFIER ADJUSTMENT LOOP	
4001	0000	PRG10,	SETLOC	/SET INTERRUPT SERVICE
4002	0703			/TO INTSYN.
4003	0703	INTSYN		
4004	0703	SETLOC		/SET PUNCH SERVICE ADDRESS
4005	0703	RVCTR		/TO PCHCLR.
4006	0703	PCHCLR		
4007	0703	SETLOC		/SET READER SERVICE ADDRESS
4010	4070	RVCTR		/TO AMPRDR
4011	4476	AMPRDR		
4012	1073	SETLOC		
4013	7000	ERRORA		
4014	1144	7000		
4015	3672	TAD	INOP	
4016	3108	DCA	I (STALL+3	
4017	4253	JMS	SRMSK	/GO TO SRMSK
4020	7440	DCA	AMPRD	/GO READ CHARACTER
4021	7410	JMS	AMPRD	/ZERO?
4022	4253	SZA		/NO.
4023	7041	SKP		/GO READ CHARACTER.
4024	1144	JMS	AMPRD	
4025	7640	CLA	(PTMSK	
4026	5200	JMS	CLA	/ALL 1'S?
4027	4253	JMS	AMPRD	/NO, ERROR.
4030	7640	SZA	CLA	/YES, GO READ
				/ZERO.



M04

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799 4114 0153 AND (PTMSK
800 4115 4456 JMS I UTPCH /PUNCH ALL 1'S
801 4116 4563 JMS I (STALL
802 4117 7200 CLA
803 4120 4456 JMS I UTPCH /PUNCH ALL 0'S
804 4121 4563 JMS I (STALL
805 4122 5313 JMP PRG12A /REPEAT.
806
807 4200 PAGE
808 4201 7200 PRG13, CLA
809 4202 3123 DCA CTRB /CLEAR CTRB
810 4203 7634 LRS /READ SR
811 4204 7104 CLL RAL
812 4205 7710 SPA CLA /LONG OR SHORT?
813 4206 1143 TAD (-16 /LONG
814 4207 1143 TAD (-36 /SHORT
815 4208 3235 DCA TKN /STORE AT TKN
816 4209 5320 JMS TSTL
817 4210 6014 TSTRO, RFC /START READER
818 4211 6011 RST /WAIT FOR
819 4212 1 JMS /FLAG
820 4213 3123 JMS CTRA /INCREMENT CTRA.
821 4214 5320 JMS TSTRC /NO.
822 4215 5320 JMS CTRB /YES, INCREMENT CTRB
823 4216 7000 TSTRL, TAD TKN /LOAD CTRA
824 4217 7634 DCA CTRA
825 4218 7700 TSTRC, LRS /READ SR
826 4219 7700 SPA CLA /PRINT SPEED?
827 4220 5211 JMS TSTRO /NO CONTINUE READING
828 4221 4447 JMS I XTYPST /YES.
829 4222 1532 RST
830 4223 7400 JMS TSTRPC
831 4224 5200 JMP PRG13
832 4225 0000 TKN, OPEN
833
834 4233 7200 PRG14, CLA
835 4234 3123 DCA CTRB /CLEAR CTRB
836 4235 5320 JMS TSTPL
837 4236 7000 TSTPP, LRS
838 4237 1026 SPA -1 /60?
839 4238 3123 JMS CTRA /NO.
840 4239 5320 JMS TSTRPC /YES, INCREMENT CTRB
841 4240 5320 JMS CTRB
842 4241 1511 TAD (-74 /LOAD -60 IN CTRA
843 4242 7634 DCA CTRA
844 4243 7700 TSTPC, LRS /READ SR
845 4244 5750 SPA CLA /PRINT SPEED? (AFTER 60 SECONDS)
846 4245 5750 JMS TSTPP /NO CONTINUE
847 4246 4563 JMS I XTYPST /YES.
848 4247 1540 RST
849 4248 4257 JMS TSTRPC

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N04

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1854 4255 7402 HLT
1855 4256 5233 JMP PRG14
1856
1857 4257 0000 TSTRPC, 0
1858 4258 4255 JMS BDCNV /TYPE C(CTRB) IN DECIMAL
1859 4259 0123 CTRB
1860 4260 4447 JMS I XTYPST /TYPE "CPS"
1861 4261 1532 JMS I TSTRPC
1862 4262 1532 JMS I TSTRPC /EXIT.
1863 4263 0 BDCNV, 0 /BINARY TO DECIMAL CONVERT
1864 4264 1532 SETLOC /AND PRINT SUBROUTINE
1865 4265 1532 CNVCTR
1866 4266 -4
1867 4271 1532 TAD ADDRZA /INITIALIZE ARROW.
1868 4272 1532 DCA ARROW
1869 4273 1532 TAD I BDCNV /GET AND STORE BINARY
1870 4274 1532 ISZ BDCNV /NUMBER. STORE IT AT VALUE.
1871 4275 1532 DCA DIGIT
1872 4276 1532 TAD I DIGIT
1873 4277 3337 DCA VALUE
1874 4278 3337 DCA DIGIT /0 TO DIGIT.
1875 4301 7100 CLL
1876 4302 1026 TAD VALUE
1877 4303 1026 ARROW, TAD TENPWR
1878 4304 7402 SNL
1879 4305 JMP +4
1880 4306 ISZ DIGIT
1881 4307 DCA VALUE
1882 4310 JMP ARROW-2
1883 4311 7200 CLA
1884 4312 1333 TAD DIGIT
1885 4313 1143 TAD /260
1886 4314 4473 JMS I UPUNCH
1887 4315 7300 CLA CLL
1888 4316 1026 ISZ ARROW
1889 4317 1026 ISZ CNVCTR
1890 4320 JMP ARROW-3
1891 4321 1532 JMS I BDCNV
1892 4322 1333 ADDRZA, TAD TENPWR
1893 4323 5300 TENPWR, -1750
1894 4324 7634 -144
1895 4325 7766 -12
1896 4326 7777 -1
1897 4327 0000 VALUE, 0
1898 4330 0000 DIGIT, 0
1899 4331 0000 CNVCTR, 0
1900
1901 /PROGRAM IS READ X CHARACTERS. STALL Y MS. LOOP TO ADJUST TIMINGS.
1902 4332 7500 PRG15, HLT CLA /HALT TO GET SR
1903 4333 7500 LRS /READ SR
1904 4334 0177 AND (/177 /MASK OFF EXCESS BITS
1905 4335 7500 CTR /STORE STALL COUNT
1906 4336 3337 DCA DELAYM /READ SR
1907 4337 7500 LRS /MASK OFF EXCESS BITS
1908 4340 0137 AND (/600

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0000 11111111 11111111 11111111 11111111 11111111 11111111 11111111
1000 11111111 11111111 11111111 11111111 11111111 11111111 11111111
2000 11111111 11111111 11111111 11111111 11111111 11111111 11111111
3000 11111111 11111111 11111111 11111111 11111111 11111111 11111111
4000
4500
4600
4700
5000
5100
5200
5300
5400
5500
5600
5700
6000
6100
6200
6300
6400
6500
6600
6700
7000
7100
7200
7300
7400
7500
7600
    
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E05

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A 0140 ERRORA 1075
AC 0000 FADDR 0000
ACTIND 0000 FLAG 0000
ADDRZA 0100 FORD 0000
AMPAD 4300 GETPT 0000
AMPADA 4400 GETPT R 0000
ARROW 4500 GETPT T 0000
ASCCN 4600 GETRDY 0000
ASCT 4700 GETTR 0000
B 4800 INCRN 0000
BDCNV 4900 INIT 0000
BLL3 5000 INITPT 0000
BRT 5100 INTATT 0000
CHAIN 5200 INTSVC 0000
CHAINN 5300 IOUT 0000
CHECK 5400 KSTART 0000
CURA 5500 LINK 0000
CURB 5600 LPRGN 0000
CURC 5700 LARGN 0000
CHRCNT 5800 MARK 0000
CNY 5900 MARKAD 0000
CNYCTR 6000 MARKER 0000
COUNT 6100 MCTR 0000
CPC 6200 MILI 0000
CPC1 6300 MILCTR 0000
CPC2 6400 MILLI 0000
CPC3 6500 MOVE 0000
CPC4 6600 MOVEA 0000
CPC5 6700 MSCTR 0000
CPC6 6800 NONE 0000
CPC7 6900 NOSUF 0000
CPC8 7000 NKTST 0000
CPC9 7100 OPEN 0000
CPC10 7200 OUT 0000
CPC11 7300 P 0000
CPC12 7400 P 0000
CPC13 7500 P 0000
CPC14 7600 P 0000
CPC15 7700 P 0000
CPC16 7800 P 0000
CPC17 7900 P 0000
CPC18 8000 P 0000
CPC19 8100 P 0000
CPC20 8200 P 0000
CPC21 8300 P 0000
CPC22 8400 P 0000
CPC23 8500 P 0000
CPC24 8600 P 0000
CPC25 8700 P 0000
CPC26 8800 P 0000
CPC27 8900 P 0000
CPC28 9000 P 0000
CPC29 9100 P 0000
CPC30 9200 P 0000
CPC31 9300 P 0000
CPC32 9400 P 0000
CPC33 9500 P 0000
CPC34 9600 P 0000
CPC35 9700 P 0000
CPC36 9800 P 0000
CPC37 9900 P 0000
CPC38 0000 P 0000
CPC39 0100 P 0000
CPC40 0200 P 0000
CPC41 0300 P 0000
CPC42 0400 P 0000
CPC43 0500 P 0000
CPC44 0600 P 0000
CPC45 0700 P 0000
CPC46 0800 P 0000
CPC47 0900 P 0000
CPC48 1000 P 0000
CPC49 1100 P 0000
CPC50 1200 P 0000
CPC51 1300 P 0000
CPC52 1400 P 0000
CPC53 1500 P 0000
CPC54 1600 P 0000
CPC55 1700 P 0000
CPC56 1800 P 0000
CPC57 1900 P 0000
CPC58 2000 P 0000
CPC59 2100 P 0000
CPC60 2200 P 0000
CPC61 2300 P 0000
CPC62 2400 P 0000
CPC63 2500 P 0000
CPC64 2600 P 0000
CPC65 2700 P 0000
CPC66 2800 P 0000
CPC67 2900 P 0000
CPC68 3000 P 0000
CPC69 3100 P 0000
CPC70 3200 P 0000
CPC71 3300 P 0000
CPC72 3400 P 0000
CPC73 3500 P 0000
CPC74 3600 P 0000
CPC75 3700 P 0000
CPC76 3800 P 0000
CPC77 3900 P 0000
CPC78 4000 P 0000
CPC79 4100 P 0000
CPC80 4200 P 0000
CPC81 4300 P 0000
CPC82 4400 P 0000
CPC83 4500 P 0000
CPC84 4600 P 0000
CPC85 4700 P 0000
CPC86 4800 P 0000
CPC87 4900 P 0000
CPC88 5000 P 0000
CPC89 5100 P 0000
CPC90 5200 P 0000
CPC91 5300 P 0000
CPC92 5400 P 0000
CPC93 5500 P 0000
CPC94 5600 P 0000
CPC95 5700 P 0000
CPC96 5800 P 0000
CPC97 5900 P 0000
CPC98 6000 P 0000
CPC99 6100 P 0000
CPC100 6200 P 0000
    
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POT10E 2713
POT10F 2701
POT11 2717
POT11A 2723
POT11B 2743
POT11C 2743
POT11D 2743
POT11E 2743
POT11F 2743
POT11G 2743
POT11H 2743
POT11I 2743
POT11J 2743
POT11K 2743
POT11L 2743
POT11M 2743
POT11N 2743
POT11O 2743
POT11P 2743
POT11Q 2743
POT11R 2743
POT11S 2743
POT11T 2743
POT11U 2743
POT11V 2743
POT11W 2743
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POT100 2743
    
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