

IDENTIFICATION

PRODUCT NAME: HIGH-SPEED READER/PUNCH TESTS
 PRODUCT CODE: MAINDEC-08-DHPCA-A-D
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 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 PCB-E AND PCB-E HIGH-SPEED READER/PUNCH WHEN ATTACHED TO A PDP-8E 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

PDP-8E WITH ASR33/35 TELETYPE, PRB-E READER, OR PRP-E PUNCH, OR PUB-E READER/PUNCH. THE FOLLOWING TAPES ARE REQUIRED IN CONJUNCTION WITH THIS TEST:

- MAINDEC-00-D261-PT
- MAINDEC-00-D262-PT
- MAINDEC-00-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 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.

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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). SR=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 READS 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 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. 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)
- G. PROGRAM HALTS AT LOC 4230 AFTER PRINTOUT.
- H. 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.
- CL 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.

E. OPERATING PROCEDURES

E.1 PROGRAM AND/OR OPERATOR ACTION

E.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 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.

E.2 ERRORS

ERROR PRINTOUTS AND ERROR HALTS ARE USED IN THIS PROGRAM.

E.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
R00YY=ROUTINE NUMBER IN THE PROGRAM
Y=A LETTER, INDICATES WHICH ERROR OCCURRED 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

250 MS AFTER ISSUING RCF 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 6D10 (RPE) MALFUNCTION.

*P0000 R0004

PCE (6U20) 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.

MO1

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(I0T022) FAILED TO CLEAR FLAG.

*P0001 R0001

PSF(I0T021) FAILED TO SKIP WITH FLAG = 1. OR FLAG IS NOT SET.

*P0001 R0002

PCF(I0T022) 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.

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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

- 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 1076 COMMON ERROR HALT. OCCURS AFTER ERROR PRINTOUT IF SR3=0 AND OPTION APPLIES TO PROGRAM BEING RUN. PRESS CONTINUE.
- L00 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 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-D2G4-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-D2G1-PT AND MAINDEC-00-D2G2-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.
/PINDEX-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.

6000 SKON=6000
6003 SRG=6003
6007 CRF=6007
6010 RPE=6010
6020 RCF=6020
6024 RPF=6024
0000
0000
0001
0002
0003
0005
0006
0020
0021
0022
0023
0024
0025
0026
0027
0028
0029
0030
0031
0032
0033
0034
0035
0036
0037
0038
0039
0040
0041

SKON=6000
SRG=6003
CRF=6007
RPE=6010
RCF=6020
RPF=6024
00
0000
0001
0002
0003
0005
0006
0020
0021
0022
0023
0024
0025
0026
0027
0028
0029
0030
0031
0032
0033
0034
0035
0036
0037
0038
0039
0040
0041

420
KSTART
DELAYN
COUNT
PC
LINK
CHAIN
SMIT
RANDOM
PROMN
PGTAS
PRG0
PRG1
PRG2
PRG3
PRG4
PRG5
PRG6
PRG7
PRG10
PRG11
PRG12
PRG13
PRG14
PRG15

USER PROGRAM START.

G02

0048 4100
0049 4110
0044 4200
0045 4233
0046 4333
0047 0516
0050 0500
0051 1000
0052 1000
0053 1000
0054 1000
0055 1000
0056 1000
0057 1412
0070 1435
0071 0521
0072 0513
0073 0526
0074 0536
0075 0400
0076 0443
0077 1111
0100 1117
0101 1042
0102 0411
0103 0733
0104 0000
0105 0000
0106 7354
0107 0000
0108 0000
0109 0000
0110 0000
0111 0000
0112 0000
0113 0000
0114 0000
0115 0000
0116 0000
0117 0000
0118 0000
0119 0000
0120 0000
0121 0000
0122 0000
0123 0000
0124 0000
0125 0000
0126 0000
0127 0000
0128 0000
0129 0000
0130 0000
0131 0000
0132 0000
0133 0000
0134 0000
0135 0000
0136 0000
0137 0000
0138 0000
0139 0000
0140 0000

PRG11
PRG12
PRG13
PRG14
PRG15
XTYPS, TYPSTG
CORLF, CORLF
LEARR, LEARR
LASCCN, LASCCN
LEPRGN, LEPRGN
LEARRN, LEARRN
LREPD, LREPD
LTPCH, LTPCH
LDR, LDR
LDRK, LDRK
LCHK, LCHK
LTSB, LTSB
ORCNT, ORCNT
LYNS, LYNS
LYNCA, LYNCA
LNPATT, LNPATT
GETPT, GETPT
GETPTR, GETPTR
CHECK, CHECK
DLYCNT, DLYCNT
PUNCH, PUNCH
MOVE, MOVE
USTCTR, USTCTR
URDR, URDR
USTCTA, USTCTA
USTCTB, USTCTB
USTDLM, USTDLM
DLYMS, DLYMS
LOUT, LOUT
DLYMSK, DLYMSK
SPMSK, SPMSK
LST, LST
LPTC, LPTC
LCHR1, LCHR1
LCHR2, LCHR2
LCHR3, LCHR3
LCHR4, LCHR4
LCHR5, LCHR5
LCHR6, LCHR6
LCHR7, LCHR7
LCHR8, LCHR8
LCHR9, LCHR9
LCHR10, LCHR10
LCHR11, LCHR11
LCHR12, LCHR12
LCHR13, LCHR13
LCHR14, LCHR14
LCHR15, LCHR15
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LCHR17, LCHR17
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LCHR20, LCHR20
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LCHR23, LCHR23
LCHR24, LCHR24
LCHR25, LCHR25
LCHR26, LCHR26
LCHR27, LCHR27
LCHR28, LCHR28
LCHR29, LCHR29
LCHR30, LCHR30
LCHR31, LCHR31
LCHR32, LCHR32
LCHR33, LCHR33
LCHR34, LCHR34
LCHR35, LCHR35
LCHR36, LCHR36
LCHR37, LCHR37
LCHR38, LCHR38
LCHR39, LCHR39
LCHR40, LCHR40
LCHR41, LCHR41
LCHR42, LCHR42
LCHR43, LCHR43
LCHR44, LCHR44
LCHR45, LCHR45
LCHR46, LCHR46
LCHR47, LCHR47
LCHR48, LCHR48
LCHR49, LCHR49
LCHR50, LCHR50

CONSTANT FOR MILLISECOND 354

STORED NUMBER OF MILLISEC TO BE COUNTED
MILLISECOND VALUE

0272	7006	RTL	CLA	/ROUTINE SELECT? (SR1)
0273	7630	SZL	CLA	/YES
0274	6243	JMS	GETRDY	
0275	1117	TRO	NXTST	
0276	7001	IAC		
0277	7640	SZA	CLA	/LAST ROUTINE?
0300	6246	JMS	GETRDY+3	/NO.
0301	7272	READSR	OSR	
0302	7208	RTL	CLA	/LOOP PROGRAM? (SR2)
0303	7272	JMS	GETRDY	/YES
0304	7272	JMS	GETRDY	/END OF PROGRAM HALT
0305	7272	JMS	GETRDY	
0306	7272	JMS	GETRDY	
0307	7272	JMS	GETRDY	
0308	7272	JMS	GETRDY	
0309	7272	JMS	GETRDY	
0310	7272	JMS	GETRDY	
0311	7272	JMS	GETRDY	
0312	7272	JMS	GETRDY	
0313	7272	JMS	GETRDY	
0314	7272	JMS	GETRDY	
0315	7272	JMS	GETRDY	
0316	7272	JMS	GETRDY	
0317	7272	JMS	GETRDY	
0318	7272	JMS	GETRDY	
0319	7272	JMS	GETRDY	
0320	7272	JMS	GETRDY	
0321	7272	JMS	GETRDY	
0322	7272	JMS	GETRDY	
0323	7272	JMS	GETRDY	
0324	7272	JMS	GETRDY	
0325	7272	JMS	GETRDY	
0326	7272	JMS	GETRDY	
0327	7272	JMS	GETRDY	
0328	7272	JMS	GETRDY	
0329	7272	JMS	GETRDY	
0330	7272	JMS	GETRDY	
0331	7272	JMS	GETRDY	
0332	7272	JMS	GETRDY	
0333	7272	JMS	GETRDY	
0334	7272	JMS	GETRDY	
0335	7272	JMS	GETRDY	
0336	7272	JMS	GETRDY	
0337	7272	JMS	GETRDY	
0338	7272	JMS	GETRDY	
0339	7272	JMS	GETRDY	
0340	7272	JMS	GETRDY	
0341	7272	JMS	GETRDY	
0342	7272	JMS	GETRDY	
0343	7272	JMS	GETRDY	
0344	7272	JMS	GETRDY	
0345	7272	JMS	GETRDY	
0346	7272	JMS	GETRDY	
0347	7272	JMS	GETRDY	
0348	7272	JMS	GETRDY	
0349	7272	JMS	GETRDY	
0350	7272	JMS	GETRDY	
0351	7272	JMS	GETRDY	
0352	7272	JMS	GETRDY	
0353	7272	JMS	GETRDY	
0354	7272	JMS	GETRDY	
0355	7272	JMS	GETRDY	
0356	7272	JMS	GETRDY	
0357	7272	JMS	GETRDY	
0358	7272	JMS	GETRDY	
0359	7272	JMS	GETRDY	
0360	7272	JMS	GETRDY	
0361	7272	JMS	GETRDY	
0362	7272	JMS	GETRDY	
0363	7272	JMS	GETRDY	
0364	7272	JMS	GETRDY	
0365	7272	JMS	GETRDY	
0366	7272	JMS	GETRDY	
0367	7272	JMS	GETRDY	
0368	7272	JMS	GETRDY	
0369	7272	JMS	GETRDY	
0370	7272	JMS	GETRDY	
0371	7272	JMS	GETRDY	
0372	7272	JMS	GETRDY	
0373	7272	JMS	GETRDY	
0374	7272	JMS	GETRDY	
0375	7272	JMS	GETRDY	
0376	7272	JMS	GETRDY	
0377	7272	JMS	GETRDY	
0378	7272	JMS	GETRDY	
0379	7272	JMS	GETRDY	
0380	7272	JMS	GETRDY	
0381	7272	JMS	GETRDY	
0382	7272	JMS	GETRDY	
0383	7272	JMS	GETRDY	
0384	7272	JMS	GETRDY	
0385	7272	JMS	GETRDY	
0386	7272	JMS	GETRDY	
0387	7272	JMS	GETRDY	
0388	7272	JMS	GETRDY	
0389	7272	JMS	GETRDY	
0390	7272	JMS	GETRDY	
0391	7272	JMS	GETRDY	
0392	7272	JMS	GETRDY	
0393	7272	JMS	GETRDY	
0394	7272	JMS	GETRDY	
0395	7272	JMS	GETRDY	
0396	7272	JMS	GETRDY	
0397	7272	JMS	GETRDY	
0398	7272	JMS	GETRDY	
0399	7272	JMS	GETRDY	
0400	7272	JMS	GETRDY	

0416	0417	0417	+1	
0417	1106	TAD	MILI	/GET 1 MS CONSTANT
0420	3121	DCA	MILCTR	/STORE IN MILCTR
0421	3121	ISZ	MILCTR	/DELAYED 1 MSEC?
0422	3121	JMP	-1	
0423	3120	ISZ	MSCTR	/DONE DELAYING?
0424	3121	JMP	-5	
0425	3121	JMP	I DLYMS	/EXIT
0426	3121	JMP	I DLYMS	
0427	3121	JMP	I DLYMS	
0428	3121	JMP	I DLYMS	
0429	3121	JMP	I DLYMS	
0430	3121	JMP	I DLYMS	
0431	3121	JMP	I DLYMS	
0432	3121	JMP	I DLYMS	
0433	3121	JMP	I DLYMS	
0434	3121	JMP	I DLYMS	
0435	3121	JMP	I DLYMS	
0436	3121	JMP	I DLYMS	
0437	3121	JMP	I DLYMS	
0438	3121	JMP	I DLYMS	
0439	3121	JMP	I DLYMS	
0440	3121	JMP	I DLYMS	
0441	3121	JMP	I DLYMS	
0442	3121	JMP	I DLYMS	
0443	3121	JMP	I DLYMS	
0444	3121	JMP	I DLYMS	
0445	3121	JMP	I DLYMS	
0446	3121	JMP	I DLYMS	
0447	3121	JMP	I DLYMS	
0448	3121	JMP	I DLYMS	
0449	3121	JMP	I DLYMS	
0450	3121	JMP	I DLYMS	
0451	3121	JMP	I DLYMS	
0452	3121	JMP	I DLYMS	
0453	3121	JMP	I DLYMS	
0454	3121	JMP	I DLYMS	
0455	3121	JMP	I DLYMS	
0456	3121	JMP	I DLYMS	
0457	3121	JMP	I DLYMS	
0458	3121	JMP	I DLYMS	
0459	3121	JMP	I DLYMS	
0460	3121	JMP	I DLYMS	
0461	3121	JMP	I DLYMS	
0462	3121	JMP	I DLYMS	
0463	3121	JMP	I DLYMS	
0464	3121	JMP	I DLYMS	
0465	3121	JMP	I DLYMS	
0466	3121	JMP	I DLYMS	
0467	3121	JMP	I DLYMS	
0468	3121	JMP	I DLYMS	
0469	3121	JMP	I DLYMS	
0470	3121	JMP	I DLYMS	
0471	3121	JMP	I DLYMS	
0472	3121	JMP	I DLYMS	
0473	3121	JMP	I DLYMS	
0474	3121	JMP	I DLYMS	
0475	3121	JMP	I DLYMS	
0476	3121	JMP	I DLYMS	
0477	3121	JMP	I DLYMS	
0478	3121	JMP	I DLYMS	
0479	3121	JMP	I DLYMS	
0480	3121	JMP	I DLYMS	
0481	3121	JMP	I DLYMS	
0482	3121	JMP	I DLYMS	
0483	3121	JMP	I DLYMS	
0484	3121	JMP	I DLYMS	
0485	3121	JMP	I DLYMS	
0486	3121	JMP	I DLYMS	
0487	3121	JMP	I DLYMS	
0488	3121	JMP	I DLYMS	
0489	3121	JMP	I DLYMS	
0490	3121	JMP	I DLYMS	
0491	3121	JMP	I DLYMS	
0492	3121	JMP	I DLYMS	
0493	3121	JMP	I DLYMS	
0494	3121	JMP	I DLYMS	
0495	3121	JMP	I DLYMS	
0496	3121	JMP	I DLYMS	
0497	3121	JMP	I DLYMS	
0498	3121	JMP	I DLYMS	
0499	3121	JMP	I DLYMS	
0500	3121	JMP	I DLYMS	

```

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 0513 0000          0000
345 0514 4427          4427
346 0515 0174          0174
347 0516 7041          7041
348 0517 3021          3021
349 0520 5713          5713
350
351
352 0521 0000          0000
353 0522 3335          3335
354 0523 1721          1721
355 0524 7041          7041
356 0525 1335          1335
357 0526 2321          2321
358 0527 7640          7640
359 0530 5333          5333
360 0531 2321          2321
361 0532 5721          5721
362 0533 1335          1335
363 0534 5721          5721
364 0535 0000          0000
365
366
367 0536 0000          0000
368 0537 7200          7200
369 0540 1736          1736
370 0541 3361          3361
371 0542 2336          2336
372 0543 1736          1736
373 0544 3362          3362
374 0545 2336          2336
375 0546 1736          1736
376 0547 3363          3363
377 0550 2336          2336
378 0551 7200          7200
379 0552 1761          1761
380 0553 3762          3762
381 0554 2361          2361
382 0555 2362          2362
383 0556 2363          2363
384 0557 5351          5351
385 0560 5736          5736

```

```

CENTND. 0
PANSRV. 0

/SUBROUTINE TO GENERATE RANDOM DELAY COUNT
DLCNT. 0
JMS I RANDNO /GO GENERATE RANDOM NUMBER
AND I177 /MASK OUT UNDESIED BITS.
CIA /2'S COMPLEMENT IT
DCA DELAYM
JMP I DLCNT /EXIT

/SUBROUTINE TO COMPARE C(AC) TO CONTENTS STORED AT CALL+1
CHK. 0
DCA WCHK /STORE AC AT WCHK
TAD I CHCK /GET COMPARE DATA
CIA /2'S COMPLEMENT IT
TAD WCHK /ADD C(WCHK)
ISZ CHCK /SET UP FOR UNEQUAL EXIT
SZA CLA /EQUAL (AC = 0)
JMP +3 /NO
ISZ CHCK /YES, SET UP FOR EQUAL EXIT
JMP I CHCK /EQUAL EXIT
TAD WCHK /RESTORE AC
JMP I CHCK /UNEQUAL EXIT

WCHK. 0

/SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
MOVE. 0
CLA
TAD I MOVE /GET "FROM ADDR" AND
DCA FADDR /STORE AT FADDR
ISZ MOVE
TAD I MOVE /GET "TO ADDR" AND
DCA TADDR /STORE AT TADDR.
ISZ MOVE
TAD I MOVE /GET "MOVE COUNT" AND
DCA MCTR /STORE AT MCTR.
ISZ MOVE /SET UP FOR EXIT.

MOVEA. CLA
TAD I FADDR /GET "FROM" WORD
DCA I TADDR /STORE AT "TO" LOCATION
ISZ FADDR
ISZ TADDR
ISZ MCTR
JMP MOVEA /ALL WORDS MOVED?
JMP I MOVE /NO, GO MOVE AGAIN
/YES, EXIT

```

M02

```

386 0561 0000          FADDR. 0
387 0562 0000          TADDR. 0
388 0563 0000          MCTR. 0
389
390
391 0560          PAGE
392 0560          CRLF.
393 0560          OLD
394 0561          TAD I CRLF /GET NUMBER OF CRLF'S
395 0562          DCA MCTR /AND SAVE
396 0563          ISZ CRLF
397 0564          JMS I XTPST /GO CRLF
398 0565          TAD I CRLF
399 0566          DCA MCTR /ALL DONE?
400 0567          ISZ CRLF /NO
401 0568          JMS I CRLF /YES, EXIT.
402 0569          DCA MCTR /CR
403 0570          DCA MCTR /LF
404 0571          DCA MCTR /END CODE
405
406
407 0570          CLA
408 0571          DCA I TYPSTG /GET AND STORE
409 0572          DCA TEMG /INITIAL ADDRESS
410 0573          DCA FLAG /CLEAR FLAG
411 0574          ISZ TYPSTG
412 0575          TAD I TEMG /SET DATA
413 0576          RTR /ROTATE RIGHT 6.
414 0577          RTR
415 0578          JMS TSC2 /GO TYPE CHARACTER
416 0579          TAD I TEMG /GET DATA
417 0580          JMS TSCR /GO TYPE CHARACTER
418 0581          ISZ TEMG /INCR STRING ADDR
419 0582          JMP TSC1 /GO BACK FOR MAKE
420 0583          TSC2. 0
421 0584          AND I77 /MASK OFF 6 BITS
422 0585          DCA TEMR /SAVE CHARACTER
423 0586          TAD FLAG
424 0587          SZA CLA /TEST FLAG
425 0588          JMP TY2CP /SET
426 0589          TAD TEMR /NOT SET
427 0590          SNA /ZERO?
428 0591          JMP +3 /YES, SET FLAG
429 0592          PRINT /NO, PRINT IT.
430 0593          TYPAT. /RETURN
431 0594          ISZ FLAG /SET FLAG
432 0595          JMP I TSC2 /EXIT
433 0596          TWPSP. /CLEAR FLAG
434 0597          DCA TEMR
435 0598          SZA CLA /ZERO?
436 0599          JMP TYPAT /YES, TYPE "S"
437 0600          TPC /IS IT 0?
438 0601          JMP I TYPSTG /YES, EXIT CODE

```


003

496	1000	PAGE		
497	0000	ASCCN,	0	
498	1001	CLA		/SUBROUTINE TO CONVERT
499	1002	TAD I	ASCCN	/A WORD TO PRINTABLE ASCII
500	1003	DCA	ASCCN	
501	1004	ISZ	ASCCN	
502	1005	TAD I	ASCCN	
503	1006	DCA	SASC	
504	1007	ISZ	ASCCN	
505	1010	TAD I	1700	
506	1011	RND	I WASC	
507	1012	RTR	CLL	
508	1013	RTR		
509	1014	RTR		
510	1015	JMS	CNV	
511	1016	TAD	SASC	
512	1017	TAD	1700	
513	1020	CMA		
514	1021	RND	I WASC	
515	1022	JMS	CNV	
516	1023	JMP	I ASCCN	
517	1024	O		
518	1025	DCA	ASCT	
519	1026	TAD	ASCT	
520	1027	RTL		
521	1030	RAL		
522	1031	RND	(707	
523	1032	TAD	ASCT	
524	1033	RND	(707	
525	1034	TAD	1606C	
526	1035	DCA	I SASC	
527	1036	JMP	I CNV	
528	1040	WASC,	O	
529	1041	SASC,	O	
530	1041	ASCT,	O	
531	1042	STDLYM,	O	/SET DELAYM SUB.
532	1043	CLA		
533	1044	TAD I	STDLYM	/SET DELAYM TO
534	1045	DCA	DELAYM	/NUMBER SPECIFIED
535	1046	ISZ	STDLYM	/AT CALL+1
536	1047	JMP	I STDLYM	/EXIT
537	1050	O		
538	1051	JMS I	URASCCN	/CONVERT PROGRAM
539	1052	PRNUM		/NUMBER TO PRINTABLE
540	1053	PRNUM		/OCTAL
541	1054	JMS I	URASCCN	/CONVERT ROUTINE
542	1055	RTNUM		/NUMBER TO PRINTABLE
543	1056	ENUMB		/OCTAL
544	1057	TAD I	ERROR	/GET ERROR SUFFIX AND
545	1060	DCA	I SFAOR	/STORE AT SUFF
546	1061	JMS I	XTYPST	/PRINT ERROR NUMBER
547	1062	ENUMB		
548	1063	ISZ	ERROR	
549	1064	TAD I	ERROR	/GET ADDRESS OF ADDITIONAL

003

550	1065	7450	SNA	/PRINTOUT. ZERO?
551	1066	5272	JMS	+.4
552	1067	3271	DCA	+.2
553	1070	4447	JMS I	XTYPST
554	1071	0000	O	
555	1072	4475	READSR	
556	1073	0157	RND	ISR3MSK
557	1074	7650	SNA	CLA
558	1075	7402	HIT	/HALT ON EROR? (SR3)
559	1076	4475	READSR	/YES, (SR3=0)
560	1077	0157	RND	ISR4MSK
561	1100	7650	SZA	CLA
562	1101	5426	JMP	I CHAIN
563	1102	4475	READSR	
564	1103	0157	RND	ISR5MSK
565	1104	7650	SZA	CLA
566	1106	8251	ISZ	ERROR
567	1107	8251	ISZ	ERROR
568	1108	5650	JMP	I ERROR
569	1110	1476	SFAOR,	SUFF
570	1111	0000	STCTA,	O
571	1112	7200	CLA	
572	1113	1711	TAD I	STCTA
573	1114	3122	DCA	CTRB
574	1115	8211	ISZ	STCTA
575	1116	8711	JMP	I STCTA
576	1117	0000	STCTB,	O
577	1120	7200	CLA	
578	1121	1717	TAD I	STCTB
579	1122	3123	DCA	CTRB
580	1123	8217	ISZ	STCTB
581	1124	8717	JMP	I STCTB
582	1125	0000	STALL,	O
583	1126	4475	READSR	/RANDOM STALL SUBROUTINE
584	1127	0155	RND	ISR6MSK
585	1130	7640	SZA	CLA
586	1131	5725	JMP	I STALL
587	1132	4475	READSR	
588	1133	0154	RND	ISR7MSK
589	1134	7640	SZA	CLA
590	1135	741C	SKP	
591	1136	4475	JMS I	DLYCNT
592	1137	1027	TAD	DELAYM
593	1140	7440	SZA	
594	1141	4502	DELAY	
595	1142	5725	JMP	I STALL
596	1143	0000	TCHK,	O
597	1144	4471	JMS I	CHECK
598	1145	0000	TSB,	O
599	1146	535	JMP	+.3
600	1147	2343	ISZ	TCHK
601	1150	5743	JMP	I TCHK
602	1151	3131	DCA	TCHK
603	1152	4450	JMS I	URASCCN
604	1153	1145	TSB	

936	2011	2036	POT1		
937			/CHECKS	THAT FLAG=1 250MS. AFTER RFC (IOT014), INDICATING THAT	
938			/READER	IS ADVANCING.	
939	2012	4477	SETA		/-200 TO CTRA
940	2013	7470	-310		
941	2014	4501	SETDLM		/-250 TO DELAY
942	2015	7406	-372		
943	2016	6014	POT0A,	RFC	/CLEAR FLAG, FETCH CHAR (IOT014)
944	2017	4502	DELAY		/DELAY 75 MS
945	2020	6011	RSF		/SKIP IF FLAG=1 (IOT011)
946	2021	5225	JMP POE0		
947	2022	2122	ISZ CTRA		/DON?
948	2023	5216	JMP POT0A		/NO, REPEAT
949	2024	5425	JMP I CHAIN		/YES, CHAIN
950	2025	4451	JMS I UERROR		/GO TO ERROR SUBROUTINE
951	2026	4040	NOSUF		/NO PRINTOUT SUFFIX
952	2027	0000	NONE		/NO PRINTOUT
953	2030	5222	JMP POT0A+4		/CONTINUE TEST
954	2031	4501	SETDLM		/SCOPE LOOP
955	2032	7764	-14		
956	2033	6014	RFC		/FETCH CHAR (IOT014)
957	2034	4502	DELAY		/DELAY 12 MS.
958	2035	5233	JMP -2		
959	2036	0001	POT1,	1	
960	2037	2064	POT2		
961			/WITH FLAG=1, SKIP ON FLAG 4095	TIMES TO CHECK FOR RELIABLE SKIPPING	
962	2040	4477	SETA		/-4095 TO CTRA
963	2041	0001	-7777		
964	2042	6014	RFC		/FETCH CHAR (IOT014)
965	2043	6011	RSF		/SKIP ON FLAG (IOT011)
966	2044	5243	JMP -1		/REPEAT
967	2045	6011	POT1A,	RSF	/SKIP ON FLAG (IOT011)
968	2046	5252	JMP POE1		/ERROR
969	2047	2122	ISZ CTRA		/DONE 4095 TIMES?
970	2050	5245	JMP POT1A		/NO, REPEAT TEST
971	2051	5425	JMP I CHAIN		/YES, CHAIN
972	2052	4451	JMS I UERROR		/GO TO ERROR SUBROUTINE
973	2053	4040	NOSUF		/NO PRINTOUT SUFFIX
974	2054	0000	NONE		/NO PRINTOUT
975	2055	5244	JMP POT1A+2		/CONTINUE TEST

976	2056	6014	POT15,	RFC	/START SCOPE LOOP, FETCH CHAR (IOT014)
977	2057	6011	RSF		/SKIP ON FLAG (IOT011)
978	2060	5257	JMP -1		/REPEAT
979	2061	5011	RSF		/SKIP ON FLAG (IOT011)
980	2062	5251	JMP -1		/REPEAT
981	2063	5251	JMP -2		/REPEAT
982	2064	0002	POT2,	0	
983	2065	2105	POT3		
984			/CHECKS	THAT IOT011 DOES NOT SKIP WITH FLAG=0.	
985	2067	4477	SETA		/-4095 TO CTRA
986	2068	0001	-7777		
987	2069	0001	RRB		/CLEAR FLAG
988	2070	0001	REF		/SKIP ON FLAG=1(IOT011)
989	2071	0001	JMP POT20K		/OK
990	2072	0001	JMS I UERROR		/ERROR, GO TO ERROR SUB
991	2073	0001	NOSUF		/NO PRINTOUT SUFFIX
992	2074	0001	NONE		/NO PRINTOUT
993	2075	0001	JMP POT20K		/CONTINUE TEST
994	2077	0001	RSF		/START SCOPE LOOP, SKIP ON FLAG
995	2080	0001	JMP -1		/REPEAT
996	2081	0001	JMP -2		/REPEAT
997	2082	0001	ISZ CTRA		/DONE 4095 TIMES?
998	2083	0001	JMP POT2A		/NO, REPEAT
999	2084	0001	JMP I CHAIN		/YES, CHAIN
1000			/ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED		
1001			POT3,	3	
1002	2086	0003	POT4		
1003	2087	0003	TAD (4000		
1004	2088	0003	CCA COUNT		
1005	2089	0003	TAD (7773		
1006	2090	0003	CCA CTR		
1007	2091	0003	YOP		
1008	2092	0003	CLP		
1009	2093	0003	CCA MILLI		
1010	2094	0003	ISZ MILLI		
1011	2095	0003	ISZ MILLI		
1012	2096	0003	JMP -1		
1013	2097	0003	ISZ CTR		
1014	2098	0003	JMP -3		
1015	2099	0003	TAD (2260		/4.55 MS CONSTANT
1016	2100	0003	CCA DELTIM		
1017	2101	0003	CAF		
1018	2102	0003	RCP		/READ
1019	2103	0003	JMS TIM		
1020	2104	0003	RSF		/SKIP IF READER FLAG SET
1021	2105	0003	JMP POE3		/FLAG DID NOT SET
1022	2106	0003	RPE		
1023	2107	0003	SRC		/SHOULD SKIP HERE IF INT REC
1024	2108	0003	JMP POE3		/REPORT ERROR
1025	2109	0003	ISZ COUNT		
1026	2110	0003	JMP POT3+4		
1027	2111	0003	JMP I CHAIN		
1028	2112	0003	JMS I UERROR		
1029	2113	0003	NOSUF		
1030	2114	0003	NONE		

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1031 02142 5311 JMP POT3+4
1032 02143 6002 POT3S, IOF
1033 02144 6011 RSF
1034 02145 5344 JMP -1
1035 02146 6011 RSF
1036 02147 5346 JMP -1
1037 02148 5346 JMP -2
1038 02149 0000 TIM, 0
1039 02150 5313 ISZ DELTIM
1040 02151 5352 JMP -1
1041 02154 5751 JMP I TIM
1042
1043 02175 2250
1044 02176 7773
1045 02177 4000
1046 2200 0004 PAGE
1047 02201 2400 /ROUTINE TO CHECK THAT INTERRUPT ENALBE CAN BE CLEARED FOR READER.
1048 02202 6002 POT4, 4
1049 02203 1234 POTS
1050 02204 3235 IOF
1051 02205 6007 TAD R7770 RCNT2
1052 02206 6010 OCA /INIT. # OF ITERATIONS
1053 02207 6020 RLOOP, CAF /ENABLE INTERRUPT
1054 02208 6010 RPE
1055 02209 6001 PCE
1056 02211 6014 ION /READ
1057 02212 6000 RCF
1058 02213 5224 SKON
1059 02214 6003 JMP PDE4 /INTERRUPT NOT ON
1060 02215 7410 SRQ /SKIP IF INT REQ GENERATED
1061 02216 5224 SKP /NO INT REQ
1062 02217 2022 JMP PDE4 /INT REQ GENERATED
1063 02220 5205 ISZ COUNT /RELIABILITY SETUP
1064 02221 2235 POT4A, JMP RLOOP /CONTINUE
1065 02222 5205 ISZ RCNT2
1066 02223 5425 JMP I CHAIN
1067 02224 4451 POE4, JMS I UERROR
1068 02226 4040 NOSUF
1069 02227 0000 NONE
1070 02227 5425 JMP I CHAIN
1071 02230 6010 POT4S, RPE
1072 02231 4502 DELAY
1073 02232 6020 PCE
1074 02233 5230 JMP -3
1075
1076 02234 7770 R7770, 7770
1077 02235 7770 RCNT2, 7770
1078
1079 PAGE
1080 2400 0005 POTS, 5
1081 2401 8430 POT5,
1082 /CHECKS IOTD12 (RRB) FOR ABILITY TO CLEAR FLAG.
1083 2402 4477 SETA /-500 TO CTRA
1084 2403 7014 -764

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M03

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1085 02404 6014 POT5A, RFC /FETCH CHAR (IOTD14)
1086 02405 6002 RSF /WAIT FOR FLAG=1
1087 02406 6005 JMP -1
1088 02407 6012 RRB CLEAR FLAG (IOTD12)
1089 02410 6001 RSF /SKIP ON FLAG=1
1090 02411 6001 JMP POT5B /OK
1091 02411 6001 JMS I UERROR /ERROR, GO TO ERROR SUB.
1092 02411 6001 NOSUF /NO PRINTOUT SUFFIX
1093 02411 6001 NONE /NO PRINTOUT
1094 02411 6001 JMP POT5B /CONTINUE TEST
1095 02411 6001 POT5S, RFC /START SCOPE LOOP, FETCH CHAR
1096 02411 6001 RSF /WAIT FOR FLAG=1
1097 02411 6001 JMP -1
1098 02411 6001 RRB /CLEAR FLAG (IOTD12)
1099 02411 6001 RSF /SKIP IF FLAG=1
1100 02411 6001 JMP -5 /NO, IOTD12 CLEARED IT, READ AGAIN
1101 02411 6001 JMP -3 /IOTD12 FAILED, REPEAT IOTD12.
1102 02411 6001 POT5B, ISZ CTRA /DONE?
1103 02411 6001 JMS POT5A /NO, REPEAT
1104 02411 6001 JMP I CHAIN /YES, CHAIN
1105
1106 02411 6001 POT6, 6
1107 02411 6001 /CHECKS THAT IOTD14 CLEARS FLAG. /-500 TO CTRA.
1108 02411 6001 SETA
1109 02411 6001 -764
1110 02411 6001 POT6A, RFC /FETCH CLEAR (IOTD14)
1111 02411 6001 RSF /WAIT FOR FLAG=1
1112 02411 6001 JMP -1
1113 02411 6001 RFC /CLEAR FLAG WITH IOTD14
1114 02411 6001 RSF /SKIP IN FLAG=1.
1115 02411 6001 JMP POT6B /OK FLAG IS 0.
1116 02411 6001 JMS I UERROR /ERROR FLAG=1, GO TO ERROR SUB.
1117 02411 6001 NOSUF /NO PRINTOUT SUFFIX
1118 02411 6001 NONE /NO PRINTOUT
1119 02411 6001 JMP POT6B /CONTINUE TEST
1120 02411 6001 POT6S, DELAY /START SCOPE LOOP, DELAY 20 MS.
1121 02411 6001 RFC /FETCH CHAR (IOTD14)
1122 02411 6001 RSF /WAIT FOR FLAG=1
1123 02411 6001 JMP -1
1124 02411 6001 JMP -3 /GO CLEAR FLAG AND FETCH CHAR.
1125 02411 6001 POT6B, ISZ CTRA /DONE?
1126 02411 6001 JMS POT6A /NO, REPEAT
1127 02411 6001 JMP I CHAIN /YES, CHAIN
1128
1129 PAGE
1130 2500 POT7, 7
1131 02501 8033 POT10
1132 /CHECKS ABILITY TO READ ALL D'S CHARACTERS
1133 02502 4477 SETA /-500 TO CTRA
1134 02503 7014 -764
1135 02504 6014 POT7A, RFC /FETCH CHAR (IOTD14)
1136 02505 6002 RSF /WAIT FOR FLAG=1
1137 02506 6005 JMP -1
1138 02507 6001 RRD /READ BUFFER

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1140 0000 6014 POT5A, RFC /FETCH CHAR (IOTO14)
1141 0001 0000 RSP /WAIT FOR FLAG=1
1142 0002 0000 JMP -1
1143 0003 0000 RRB /CLEAR FLAG (IOTO12)
1144 0004 0000 RSP /SKIP ON FLAG=1
1145 0005 0000 JMP POT5B /OK
1146 0006 0000 JMS I LERROR /ERROR, GO TO ERROR SUB.
1147 0007 0000 NOSUF /NO PRINTOUT SUFFIX
1148 0008 0000 NONE /NO PRINTOUT
1149 0009 0000 JMP POT5B /CONTINUE TEST
1150 0010 0000 POT5S, RFC /START SCOPE LOOP. FETCH CHAR
1151 0011 0000 RSP /WAIT FOR FLAG=1
1152 0012 0000 JMP -1
1153 0013 0000 RRB /CLEAR FLAG (IOTO12)
1154 0014 0000 RSP /SKIP IF FLAG=1
1155 0015 0000 JMP -5 /NO, IOTO12 CLEARED IT. READ AGAIN
1156 0016 0000 JMP -3 /IOTO12 FAILED, REPEAT INTO12.
1157 0017 0000 ISZ CTR A /DONE?
1158 0018 0000 POT5B, JMS POT5A /NO REPEAT
1159 0019 0000 JNB I CHAIN /YES, CHAIN
1160 0020 0000
1161 0021 0000 POT6, POT7
1162 0022 0000 /CHECKS THAT IOTO14 CLEARS FLAG. /-500 TO CTR A.
1163 0023 0000 SETA -500
1164 0024 0000 RFB
1165 0025 0000 RRB
1166 0026 0000 RSP
1167 0027 0000 JMP POT6A /FETCH CLEAR (IOTO14)
1168 0028 0000 JNB -1 /WAIT FOR FLAG=1.
1169 0029 0000 RFB
1170 0030 0000 RSP
1171 0031 0000 JMP POT6B /CLEAR FLAG WITH IOTO14
1172 0032 0000 RFB /SKIP IN FLAG=1.
1173 0033 0000 JNB POT6B /OK FLAG IS 0.
1174 0034 0000 JMS I LERROR /ERROR FLAG=1, GO TO ERROR SUB.
1175 0035 0000 NOSUF /NO PRINTOUT SUFFIX
1176 0036 0000 NONE /NO PRINTOUT
1177 0037 0000 JMP POT6B /CONTINUE TEST
1178 0038 0000 POT6S, DELAY /START SCOPE LOOP. DELAY 20 MS.
1179 0039 0000 RFB /FETCH CHAR (IOTO14)
1180 0040 0000 RSP /WAIT FOR FLAG=1.
1181 0041 0000 JMP -1
1182 0042 0000 JNB -3 /GO CLEAR FLAG AND FETCH CHAR.
1183 0043 0000 ISZ CTR A /DONE?
1184 0044 0000 JNB POT6A /NO REPEAT
1185 0045 0000 JNB I CHAIN /YES, CHAIN
1186 0046 0000
1187 0047 0000
1188 0048 0000
1189 0049 0000
1190 0050 0000
1191 0051 0000
1192 0052 0000
1193 0053 0000
1194 0054 0000
1195 0055 0000
1196 0056 0000
1197 0057 0000
1198 0058 0000
1199 0059 0000
1200 0060 0000
1201 0000 0000 PAGE 7
1202 0000 0000 POT7, 7
1203 0000 0000 POT10
1204 0000 0000 /CHECKS ABILITY TO READ ALL 0'S CHARACTERS
1205 0000 0000 SETA -500
1206 0000 0000 RFB /-500 TO CTR A
1207 0000 0000 RRB
1208 0000 0000 RSP
1209 0000 0000 JMP POT7A /FETCH CHAR (IOTO14)
1210 0000 0000 JNB -1 /WAIT FOR FLAG=1.
1211 0000 0000 RFB
1212 0000 0000 CLA
1213 0000 0000 RRB /READ BUFFER

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N03

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1140 0000 32236 DCA POT74B /SAVE
1141 0001 0000 TRD POT74B
1142 0002 0000 SZA CLA /RESULT 0?
1143 0003 0000 JMP POE7 /ERROR, DID NOT READ 0'S CHAR.
1144 0004 0000 POT7B, ISZ CTR A /DONE?
1145 0005 0000 JMP POT7A /NO, REPEAT
1146 0006 0000 JNB I CHAIN /YES, CHAIN
1147 0007 0000 POT7, JMS I LERROR
1148 0008 0000 NOSUF
1149 0009 0000 NONE
1150 0010 0000 JMP POT7C /CONTINUE TEST
1151 0011 0000 POT7S, CLA
1152 0012 0000 RRB /READ BUFFER. PC S/B 7400
1153 0013 0000 JMP -2 /REPEAT
1154 0014 0000 POT74A, GO00
1155 0015 0000 POT74B, GO00
1156 0016 0000 POT10, IS
1157 0017 0000 /CHECKS ABILITY OF READER FLAG TO CAUSE AN INTERRUPT.
1158 0018 0000 SETLOC /SET INTERRUPT RETURN TO
1159 0019 0000 RFB /PBE10A
1160 0020 0000 POT10A, RFB
1161 0021 0000 RFB
1162 0022 0000 RFB
1163 0023 0000 RFB
1164 0024 0000 RFB
1165 0025 0000 RFB
1166 0026 0000 RFB
1167 0027 0000 RFB
1168 0028 0000 RFB
1169 0029 0000 RFB
1170 0030 0000 RFB
1171 0031 0000 RFB
1172 0032 0000 RFB
1173 0033 0000 RFB
1174 0034 0000 RFB
1175 0035 0000 RFB
1176 0036 0000 RFB
1177 0037 0000 RFB
1178 0038 0000 RFB
1179 0039 0000 RFB
1180 0040 0000 RFB
1181 0041 0000 RFB
1182 0042 0000 RFB
1183 0043 0000 RFB
1184 0044 0000 RFB
1185 0045 0000 RFB
1186 0046 0000 RFB
1187 0047 0000 RFB
1188 0048 0000 RFB
1189 0049 0000 RFB
1190 0050 0000 RFB
1191 0051 0000 RFB
1192 0052 0000 RFB
1193 0053 0000 RFB
1194 0054 0000 RFB
1195 0055 0000 RFB
1196 0056 0000 RFB
1197 0057 0000 RFB
1198 0058 0000 RFB
1199 0059 0000 RFB
1200 0060 0000 RFB
1201 0000 0000 POT10C, RFB
1202 0000 0000 RFB
1203 0000 0000 RFB
1204 0000 0000 RFB
1205 0000 0000 RFB
1206 0000 0000 RFB
1207 0000 0000 RFB
1208 0000 0000 RFB
1209 0000 0000 RFB
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1391 0000 0000 RFB
1392 0000 0000 RFB
1393 0000 0000 RFB
1394 0000 0000 RFB
1395 0000 0000 RFB
1396 0000 0000 RFB
1397 0000 0000 RFB
1398 0000 0000 RFB
1399 0000 0000 RFB
1400 0000 0000 RFB

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INCH TESTS.

NONE
 JMP POT10E
 SETLOC
 POT10D
 RSC
 RSC
 JMP .-1
 NONE
 JMS .-2
 JMS .-3
 ISZ CTRA
 POT10C
 RSC
 JMS I CHAIN
 JMS I CHAIN
 TEST
 11, 11
 7777
 SETA
 -310
 JMS DLY250
 SETDLM
 RSC
 RSC
 JMS .-1
 DELAY
 RSC
 DELAY
 RSC
 JMS POT11B
 JMS I UERROR
 NONE
 JMS POT11A
 JMS POT11S
 JMS DLY212
 RSC
 RSC
 JMS +4
 ISZ CTRA
 POT11A
 JMS I CHAIN
 JMS I UERROR
 NONE
 JMS POT11C
 SETDLM
 -17
 RSC
 JMS
 DELAY
 RSC
 JMS .-1
 NONE
 JMS POT11C
 SETDLM
 -17
 RSC
 JMS
 DELAY
 RSC
 JMS .-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
 /30 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, 0 JMS .-4
 0000 SETDLM
 4501 -324
 7454 DELAY
 4502 JMS I DLY212
 5755 DLY250, 0
 0000 SETDLM
 4501 -372
 7405 DELAY
 4502 JMS I DLY250
 5773
 3000
 PAGE
 PROGRAM 1, BASIC PUNCH AND CONTROL LOGIC TEST
 PRG1. SETLOC /SET KSTART TO
 KSTART /INITIAL ROUTINE
 PIT0 /ADDRESS
 SETLOC /SET SR MASK
 SRMSK
 7717 /GET STARTED
 JMS I .+1
 SRSET
 PIT0. PIT1
 0 THAT PSF (IOT021) DOES NOT SKIP WITH FLAG = 1
 /CHECKS SETA /-4095 TO CTRA
 -7777
 PIT0A. PCF /CLEAR FLAG
 PSF /SKIP IF FLAG=1 (IOT021)
 JMS PIT0B /NO SKIP, OK
 JMS I UERROR /SKIP ERROR, GO TO ERROR SUB
 NONE /NO SUFFIX
 NOSUF /NO PRINTOUT
 PIT0B. JMS PIT0B /CONTINUE TEST.
 PCF /CLEAR FLAG
 PSF /SKIP IF FLAG=1
 JMS .-1 /DONE?
 -2 /NO, REPEAT
 ISZ CTRA /YES, CHAIN
 JMS PIT0A
 JMS 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 4095 MILLISECONDS
 DELAY /SKIP IF FLAG=1. SHOULD BE 1
 PSF /NO, SKIP, ERROR.
 JMS PIE1

004

SEQ 0041

PCB

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

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2122 0003 ISZ CTR4 /DONE?
0004 JMF PIT18 /NO REPEAT
0005 JMF I CHAIN /YES CHAIN
4425 P1E1. JMS I UERROR /GO TO ERROR SUBROUTINE
4461 NOSUF /NO SUFFIX
4040 NONE /NO PRINTOUT
5246 JMF PIT19 /CONTINUE TEST
7200 P1T15. OLD
6022 PCF /CLEAR FLAG AND BUFFER
6023 PCF /SKIP IF FLAG=1
6024 PCF /LOAD AND PUNCH
6025 JMF /REPEAT
6026 JMF /REPEAT
3115 P1T2. B
P1T3
/CHECKS THAT PCF (IOT022) IS ABLE TO CLEAR THE FLAG
SETA -500 TO CTR4
7200 P1T2A. CLA /CLEAR LOAD AND PUNCH
6026 PLS /WAIT FOR FLAG=1
6027 JMF -1
6028 PCF /CLEAR FLAG (IOT022)
6029 PCF /SKIP IF FLAG=1
6030 JMF PIT2B /NO SKIP OK
P1E2. JMS I UERROR /SKIP ERROR GO TO ERRCR SUB
4451 NOSUF
4040 NONE
5312 JMF PIT2B /CONTINUE TEST.
7200 P1T2S. CLA /CLEAR LOAD AND PUNCH
6026 PLS /WAIT FOR FLAG
6027 JMF -1
6028 PCF /CLEAR FLAG
6029 PCF /SKIP IF FLAG=1
6030 JMF /CLEARED
6031 JMF -3 /NOT CLEAR.
P1T2B. ISZ CTR4 /SAVE?
JMF PIT2A /NO REPEAT
JMF I CHAIN /YES CHAIN
/ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED
P1T3. B
P1T4
TAD (4000
DCA COUNT
TAD (7773
DCA CTR
FOR
CLA
DCA MILLI
ISZ MILLI
JMF -1
JMF CTR -3
JMF (0001
.16 MS CONSTANT

```

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7000
7100
7200
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7500
7600

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E04

```

3133 3134 DCA DELTIM
3134 6007 CAF
3135 6024 PPC /PUNCH
3136 4361 JMS TIM1
3137 6021 P1T3A. PSF /SKIP IF PUNCH FLAG SET
3140 5347 JMF P1E3
3141 6010 RPE
3142 6003 SRG /SHOULD SKIP HERE FOR INT REQ
3143 5347 JMF P1E3 /REPORT ERROR
3144 ISZ COUNT
3145 JMF PIT3+4
3146 JMF I CHAIN
3147 JMS I UERROR
3150 NOSUF
3151 NONE
3152 JMF PIT3+4
3153 6002 PCF
3154 6021 PCF
3155 6024 PCF -1
3156 6027 JMF -1
3157 6028 JMF -2
3160 5356 TIM1. /44 MILLISECOND TIME OUT
3161 0000
3162 2134 ISZ DELTIM
3163 5362 JMF -1
3164 1374 TAD (0500
3165 3134 DCA DELTIM
3166 2134 ISZ DELTIM
3167 5366 JMF -1
3170 5367 ISZ DELTIM
3171 5370 JMF -1
3172 5761 JMF I TIM1
RETURN
3174 0500
3175 0001
3176 7773
3177 4000
3200 PAGE
3201 0004 /ROUTINE TO CHECK THAT INTERRUPT ENABLE CAN BE CLEARED FOR PUNCH.
3202 3234 P1T4. B
3203 6002 IOF
3204 1322 TAD P7770
3205 3201 DCA PCNT2
3206 6001 PLOOP. CAF /INIT. COUNTER
3207 5010 RPE /ENABLE INTERRUPT
3208 6020 PCF
3209 ISZ CTR
3210 6001 PCN
3211 6024 PPC
3212 6000 SKON
3213 6024 JMF P1E4 /PUNCH
3214 6003 SRG /ERROR -- NO ION
3215 7410 PCF /SKIP IF INT REQ GENERATED
3216 6024 PCF /NO INT REQ
3217 6024 JMF P1E4 /ERROR -- INT REQ GENERATED
3218 6024 ISZ COUNT /RELIABILITY SETUP

```

```

P174. JMP PLOOP
      ISZ PONT2
      JMP PLOOP
      JMP I CHAIN
P1E4. JMS I UERROR
      NOSUP
      NONE
      JMP I CHAIN
P174S. RPP
      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. 6
      P177
      /CHECKS ABILITY OF 107024 TO SET BUFFER TO 125 AND PUNCH IT
      SETA /-500 TO CTRA
      -764
P176A. CLA /125
      TAD (125 /CLEAR, LOAD AND PUNCH
      PLS /WAIT FOR FLAG 1
      PSF
      JMP .-1
      ISZ CTRA /DONE?
      JMP P176A /NO, REPEAT
      JMP I CHAIN /YES, CHAIN
P177. 7
      P178
      /CHECKS ABILITY OF 107024 TO SET BUFFER TO 252 AND PUNCH IT
      SETA /-500 TO CTRA
      -764
P177A. CLA /252
      TAD (252 /CLEAR LOAD AND PUNCH.
      PLS /WAIT FOR FLAG 1
      PSF
      JMP .-1
      ISZ CTRA /DONE?
      JMP P177A /NO, REPEAT
      JMP I CHAIN /YES, CHAIN
PONT2. 7770

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G04

P03-E

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7770 P7770. 7770
3400 PAGE
0010 P1710. 10
7777 /CHECKS ABILITY OF PUNCH FLAG TO CAUSE AN INTERRUPT
      SETLOC /SET INTERRUPT RETURN
      /TO P1E10A.
P1710A. KCC /CLEAR ITTY READER
      ICF /CLEAR READER
      ARD /CLEAR READER
      ICF /CLEAR PUNCH FLAG
      ION /ENABLE INTERRUPT
      NOP
      ICF /TURN OFF INTERRUPT
      JMP P1710B
P1E10A. JMS I UERROR
      NONE
      JMP P1710A
      JMP P1710A
P1710B. SETA /-4095 TO CTRA
      -7777
      SETLOC /SET INTERRUPT RETURN
      /TO P1710C
      P1710C
      CLA /SET INTERRUPT ENABLE
      RPP /CLEAR, LOAD AND PUNCH
      PLS /WAIT FOR FLAG 1.
      JMP .-1
P1710C. ION
      NOP
      ICF
      JMS I UERROR
      NONE
      JMP P1710C
P1710S. SETLOC /SET INTERRUPT
      /RETURN TO P1710C
      P1710D
      CLA /CLEAR, LOAD AND PUNCH
      PLS /WAIT FOR FLAG 1.
      PSF
      JMP .-1
      ION /ENABLE INTERRUPT
      NOP
      JMP .-1
      ISZ CTRA /DONE?
      JMP P1710C /NO, REPEAT
      JMP I CHAIN /YES, CHAIN

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ERRORS
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99-100

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PROGRAM 2 READER TEST. SPECIAL BINARY COUNT PATTERN

```

PRG2.  SET LOC           /SET SR
       SRMSK           /MASK TO
       D460           /D460
72A.   JMS I SYNC       /SYNC READER
       SET A
       .
72B.   .
       .
       .
72C.   .
       .
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72D.   .
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72E.   .
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```

PROGRAM 3 PUNCH TEST. SPECIAL BINARY COUNT PATTERN

```

PRG3.  JMS I UNPUSH     /UNPUSH
       JMS I UPDR       /PUNCH LEADER
       JMS I INPATT     /INITIALIZE BINARY PATTERN
       TAD I60
       DCA SRMSK
73A.   JMS I GETPT       /GET BINARY CHARACTER
       JMS I UTPEH       /PUNCH IT
       JMS I (STALL)
       JMR P3A          /REPEAT.
       .
734.   JMS I INPATT     /INITIALIZE BINARY PATTERN
       SET LOC
       SRMSK
       D400
       JMS I GETPT       /GET BINARY CHARACTER
       DCA I UTSEB       /STORE IT
       JMS I UTREAD      /READ CHARACTER
       JMS I (ZERO?)
       JMR P3B          /NO
       JMR P3          /YES. REPEAT READ.
       JMS I GETPT       /GET BINARY CHARACTER
       DCA I UTSEB       /STORE IT
       JMS I UTREAD      /READ CHARACTER
       JMS I UTCHK       /GO CHECK IT
       JMR P3A          /REPEAT.

```

PROGRAM 5 PUNCH TEST. RANDOM CHARACTER PATTERN.

```

PRG5.  JMS I UNPUSH     /MARK TAPE
       JMS I UPDR       /PUNCH LEADER
       JMS I UNPUSH     /INITIALIZE RANDOM
       SET A             /CHARACTER ROUTINE.

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I04

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PRG6.  .
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```

PROGRAM 6 PUNCH VERIFY. RANDOM CHARACTER PATTERN

```

PRG6.  JMS I UNPUSH     /INITIALIZE RANDOM
       JMS I UNPUSH     /CHARACTER ROUTINE
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```

PROGRAM 7 COMBINED READER-PUNCH TEST. SPECIAL BINARY COUNT PATTERN.

```

PRG7.  SET SR
       SRMSK           /D460
       .
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```

ED READER AND PUNCH TESTS.

PAL10 V142A 4-FEB-77

7710	SPA CLA	/GREATER THAN 100?
5233	JMS .+3	/NO OK
7402	HLT	/YES, ERROR. HALT
5231	JMP	/PUNCH BIN CHARACTER
4246	JMS CPCH	
1127	TAD RBSY	/READER BUSY?
7640	SZA CLA	/YES, EXIT
5503	OUT	/GET PUNCH COUNT
1132	TAD PCHCNT	/SUBTRACT SLACK COUNT
1146	TAD (-12	/POSITIVE?
7710	SPA CLA	/NO
5503	OUT	/YES, START READER
6014	RFC	/SET READER BUSY
2127	ISZ RBSY	/EXIT.
5503	OUT	
0000	CPCH, JMS I GETPTR	/GET BIN CHAR.
4470	PLUS	/ENABLE PUNCH
6026	CLD	/CLEAR AC
7200	JMS I CPCH	/EXIT
5546	OUT	
0000	CREAD, D	/READ CHARACTER
7200	ORAB	/STORE IT
6012	TAD TCHKW	/GET PUNCH COUNT
3131	TAD PCHCNT	/MINUS 1
1132	TAD (-1	/STORE IT
1146	TAD PCHCNT	
3132	DCA PCHCNT	
1132	TAD PCHCNT	
7640	SZA .+3	/0?
5267	JMS RBSY	/NO
3127	DCA I CREAD	/YES, CLEAR READER BUSY
5553	RFC	/EXIT
6014	JMS I CREAD	/FETCH NEXT CHARACTER
70	JMS CREAD	/EXIT
4253	TAD TCHKW	/READ CHARACTER
1131	SMA CLA	/IS IT 0?
7650	OUT	/YES
5503	SETLOC	/SET INTERRUPT SERVICE
4475	RVCTR	/TO RBIN.
0711	RVCTR	/TO RBIN.
3703	RBIN	/-5 TO CTRA
4477	SETLOC	
7773	SKP	/READ CHARACTER
7410	JMS CREAD	/GET BINARY CHARACTER
4253	JMS I GETPT	
4467	DCA I UT5B	/GET CHARACTER READ
3462	TAD TCHKW	/GO CHECK IT
1131	JMS I UTCHK	/ERROR
4451	SKP	/NO
7410	OUT	/5 ERRORS?
5503	ISZ CTRA	/NO TO MAILLINE
2122	OUT	/YES, SET READER SERVICE
5503	SETLOC	/TO RESYNC TAPE.
4477	RVCTR	
4711	RVCTR	

HIGH SPEED READER AND PUNCH TESTS.

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K04

10:03 PAGE 2-13

SEC 0049

3716	3720	.+2		
3717	5503	OUT		/READ CHARACTER
3720	4253	JMS CREAD		
3721	1131	TAD TCHKW		/STORE
3722	3140	DCA CHR1		/SET READER SERVICE
3723	4475	SETLOC		
3724	0711	RVCTR		
3725	4477	OUT		/READ CHAR.
3726	4477	JMS CREAD		
3727	4477	TAD TCHKW		
3730	4477	DCA CHR2		/SET RDR
3731	4477	SETLOC		/SERVICE
3732	4477	RVCTR		
3733	4477	OUT		
3734	4477	OUT		
3735	4477	JMS CREAD		/READ CHAR.
3736	4477	TAD TCHKW		
3737	4477	DCA CHR3		/STORE AT CHR3
3740	4477	JMS I SYNCA		/GO SYNC
3741	4477	JMP RBINA		/SYNC ERROR, TRY AGAIN
3742	4477	SETA		/YES, -5 TO CTRA.
3743	4477	-5		
3744	7773	SETLOC		/RESTORE READER SERVICE
3745	4477	RVCTR		/TO RBIN
3746	4477	RVCTR		
3747	4477	RVCTR		/TO MAINLINE.
3750	5503	OUT		
4000	4475	PAGE		
4000	4475	PROGRAM 10, REAR AMPLIFIER ADJUSTMENT LOOP		/SET INTERRUPT SERVICE
4001	0000	PRG10, SETLOC		/TO INTSVC.
4002	0000	2		
4003	0000	INTSVC		/SET PUNCH SERVICE ADDRESS
4004	0000	SETLOC		/TO PCHCLR.
4005	0000	PVCTR		
4006	0000	PCHCLR		/SET READER SERVICE ADDRESS
4007	0000	SETLOC		/TO AMPRDR
4010	0000	RVCTR		
4011	0000	AMPRDR		
4012	0000	SETLOC		
4013	0000	ERRORA		
4014	0000	7000		
4015	0000	TAD INOP		
4016	0000	DCA I (STALL+3		/NO TO SRMSK
4017	0000	DCA SRMSK		/GO READ CHARACTER
4018	0000	JMS AMPRD		/ZERO?
4019	0000	SZA		/NO.
4020	0000	SKP		/GO READ CHARACTER.
4021	0000	JMS AMPRD		
4022	0000	CIA		
4023	0000	TAD (PTMSK		/ALL 1'S?
4024	0000	SZA CLA		/NO, ERROR
4025	0000	JMP AMPRD		/YES, GO READ
4026	0000	JMS AMPRD		/ZERO?
4027	0000	SZA CLA		


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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 4202 7604 LAS /READ SR
811 4203 7104 CLL RAL
812 4204 7710 SPA CLA /LONG OR SHORT?
813 4205 1143 TAD (-416 /LONG
814 4205 1143 TAD (-36 /SHORT
815 4207 3232 DCA TKN /STORE AT TKN
816 4210 5220 JMS TSTRL
817 4211 6014 TSTRD, RFC /START READER
818 4212 6011 RSE /WAIT FOR
819 4213 6212 JMS -1 /FLAG
820 4214 3123 JMS CTRA /INCREMENT CTRA.
821 4215 3123 JMS TSTRC /NO
822 4215 3123 JMS CTRB /YES, INCREMENT CTRB
823 4217 7000 JMS -1
824 4220 1232 TSTRL, TAD TKN /LOAD CTRA
825 4221 3123 DCA CTRA
826 4223 7604 TSTRC, LAS /READ SR
827 4223 7700 SPA CLA /PRINT SPEED?
828 4224 5211 JMS TSTRD /NO CONTINUE READING
829 4225 4447 JMS I XTYPST /YES.
830 4225 1532 RSPD
831 4227 JMS TSTRPC
832 4230 7402 JMS -1
833 4231 5200 JMP PRG13
834 4232 0000 TKN, OPEN
835
836 4233 7200 PRG14, CLA
837 4234 3123 DCA CTRB /CLEAR CTRB
838 4235 3123 JMS TSTRL
839 4235 6026 TSTPP, PLS
840 4237 6021 PLS
841 4240 3123 JMS -1 /60?
842 4241 3123 JMS CTRA /NO
843 4242 3123 JMS TSTRPC /YES, INCREMENT CTRB
844 4243 3123 JMS CTRB
845 4244 7000 JMS -1
846 4245 1151 TSTPL TAD (-74 /LOAD -60 IN CTRA
847 4246 3123 DCA CTRA
848 4247 7604 TSTPC, SPA CLA /READ SR
849 4248 7700 JMS CTRA /PRINT SPEED? (AFTER 60 SECONDS)
850 4249 5235 JMS TSTPP /NO CONTINUE
851 4250 4447 JMS I XTYPST /YES.
852 4251 RSPD
853 4252 JMS TSTRPC

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1854 4255 7402 HLT
1855 4256 5233 JMP PRG14
1856
1857 4257 0000 TSTRPC, 0
1858 4260 4265 JMS BDCNV /TYPE C(CTRB) IN DECIMAL
1859 4261 0123 CTRB
1860 4262 4447 JMS I XTYPST /TYPE "CPS"
1861 4263 1532 CPS
1862 4264 3333 JMS I TSTRPC /EXIT.
1863 4265 0 BDCNV, 0 /BINARY TO DECIMAL CONVERT
1864 4266 1178 SETLOC /AND PRINT SUBROUTINE
1865 4267 5333 CNVCTR
1866 4270 -4
1867 4271 1332 TAD ADDRZA /INITIALIZE ARROW.
1868 4272 1332 DCA ARROW
1869 4273 1332 TAD I BDCNV /GET AND STORE BINARY
1870 4274 1332 ISZ BDCNV /NUMBER. STORE IT AT VALUE.
1871 4275 1332 DCA DIGIT
1872 4276 1332 TAD I DIGIT
1873 4277 3333 DCA VALUE
1874 4300 3333 DCA DIGIT /0 TO DIGIT.
1875 4301 7100 CLL
1876 4302 1000 TAD VALUE
1877 4303 1000 ARROW, TAD TENPWR
1878 4304 7402 SNL
1879 4305 5333 JMP +4
1880 4306 3333 ISZ DIGIT
1881 4307 3333 DCA VALUE
1882 4310 5303 JMP ARROW-2
1883 4311 7200 CLA
1884 4312 1332 TAD DIGIT
1885 4313 1143 TAD (-260
1886 4314 4473 JMS I UPUNCH
1887 4315 7303 CLA CLL
1888 4316 2303 ISZ ARROW
1889 4317 2303 ISZ CNVCTR
1890 4320 3303 JMP ARROW-3
1891 4321 5265 ADDRZA, TAD BDCNV
1892 4322 1333 TAD TENPWR
1893 4323 5303 TENPWR, -1750
1894 4324 7604 -144
1895 4325 7765 -12
1896 4326 7777 -1
1897 4327 0000 VALUE, 0
1898 4330 0000 DIGIT, 0
1899 4331 0000 CNVCTR, 0
1900
1901 /PROGRAM 15. READ X CHARACTERS. STALL Y MS. LOOP (TO ADJUST TIMINGS)
1902 4332 7500 PRG15, HLT CLA /HALT TO GET SR
1903 4333 7504 LAS /READ SR
1904 4334 0177 AND (177 /MASK OFF EXCESS BITS
1905 4335 7504 CIA
1906 4336 3303 DCA DELAYM /STORE STALL COUNT
1907 4337 7504 LAS /READ SR
1908 4340 0177 AND (7600 /MASK OFF EXCESS BITS

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0000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1000	11111111	11111111	11100000	00000000	00000000	00000000	00000000	00000000
2000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
4000								
4500								
4600								
4700								
5000								
5100								
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7000								
7100								
7200								
7300								
7400								
7500								
7600								

EOS

2	0140	ERRORA	1075	POT10E	2713	PIT10E	3456
AC	0023	FADDR	0023	POT10F	2701	PIT10F	3456
ACTIND	0033	FLAG	0033	POT10G	2717	PIT10G	3456
ADDRZA	4333	FORMD	0033	POT10H	2723	PIT10H	3456
AMPRD	4057	GETPT	0057	POT10I	2743	PIT10I	3456
AMPRDA	4057	GETPR	0057	POT10J	2743	PIT10J	3456
ARROW	4333	GETPTT	0057	POT10K	2743	PIT10K	3456
ASCCN	4057	GETRDY	0057	POT10L	2743	PIT10L	3456
SCT	41	GTPTTR	41	POT10M	2743	PIT10M	3456
BDDCNV	4057	INCRTN	4057	POT10N	2743	PIT10N	3456
BELL3	4057	INIT	4057	POT10O	2743	PIT10O	3456
CHAIN	4057	INITPT	4057	POT10P	2743	PIT10P	3456
CHAINN	4057	INPATT	4057	POT10Q	2743	PIT10Q	3456
CHECK	4057	INTSVC	4057	POT10R	2743	PIT10R	3456
CHR1	4057	IOUT	4057	POT10S	2743	PIT10S	3456
CHR2	4057	KSTART	4057	POT10T	2743	PIT10T	3456
CHR3	4057	LINK	4057	POT10U	2743	PIT10U	3456
CHR4	4057	LRGN	4057	POT10V	2743	PIT10V	3456
CHRCNT	4057	LRGN	4057	POT10W	2743	PIT10W	3456
CNV	4057	MARK	4057	POT10X	2743	PIT10X	3456
CNVCTR	4057	MARKAD	4057	POT10Y	2743	PIT10Y	3456
COUNT	4057	MARKEP	4057	POT10Z	2743	PIT10Z	3456
CPCH	4057	MCTR	4057	POT6	2743	PIT6	3456
CPIC	4057	MILL	4057	POT6B	2743	PIT6B	3456
CPICNT	4057	MILLTR	4057	POT6C	2743	PIT6C	3456
CPICNT	4057	MILLI	4057	POT6D	2743	PIT6D	3456
CPICNT	4057	MOVE	4057	POT6E	2743	PIT6E	3456
CPICNT	4057	MSCTR	4057	POT6F	2743	PIT6F	3456
CPICNT	4057	NONE	4057	POT6G	2743	PIT6G	3456
CPICNT	4057	NOSUF	4057	POT6H	2743	PIT6H	3456
CPICNT	4057	NXTST	4057	POT6I	2743	PIT6I	3456
CPICNT	4057	OPEN	4057	POT6J	2743	PIT6J	3456
CPICNT	4057	OUT	4057	POT6K	2743	PIT6K	3456
CPICNT	4057	POED	4057	POT6L	2743	PIT6L	3456
CPICNT	4057	POEL	4057	POT6M	2743	PIT6M	3456
CPICNT	4057	POELOR	4057	POT6N	2743	PIT6N	3456
CPICNT	4057	POE3	4057	POT6O	2743	PIT6O	3456
CPICNT	4057	POE4	4057	POT6P	2743	PIT6P	3456
CPICNT	4057	POE5	4057	POT6Q	2743	PIT6Q	3456
CPICNT	4057	POE6	4057	POT6R	2743	PIT6R	3456
CPICNT	4057	POE7	4057	POT6S	2743	PIT6S	3456
CPICNT	4057	POE8	4057	POT6T	2743	PIT6T	3456
CPICNT	4057	POE9	4057	POT6U	2743	PIT6U	3456
CPICNT	4057	POE0	4057	POT6V	2743	PIT6V	3456
CPICNT	4057	POE1	4057	POT6W	2743	PIT6W	3456
CPICNT	4057	POE2	4057	POT6X	2743	PIT6X	3456
CPICNT	4057	POE3	4057	POT6Y	2743	PIT6Y	3456
CPICNT	4057	POE4	4057	POT6Z	2743	PIT6Z	3456
CPICNT	4057	POE5	4057	POT6A	2743	PIT6A	3456
CPICNT	4057	POE6	4057	POT6B	2743	PIT6B	3456
CPICNT	4057	POE7	4057	POT6C	2743	PIT6C	3456
CPICNT	4057	POE8	4057	POT6D	2743	PIT6D	3456
CPICNT	4057	POE9	4057	POT6E	2743	PIT6E	3456
CPICNT	4057	POE0	4057	POT6F	2743	PIT6F	3456
CPICNT	4057	POE1	4057	POT6G	2743	PIT6G	3456
CPICNT	4057	POE2	4057	POT6H	2743	PIT6H	3456
CPICNT	4057	POE3	4057	POT6I	2743	PIT6I	3456
CPICNT	4057	POE4	4057	POT6J	2743	PIT6J	3456
CPICNT	4057	POE5	4057	POT6K	2743	PIT6K	3456
CPICNT	4057	POE6	4057	POT6L	2743	PIT6L	3456
CPICNT	4057	POE7	4057	POT6M	2743	PIT6M	3456
CPICNT	4057	POE8	4057	POT6N	2743	PIT6N	3456
CPICNT	4057	POE9	4057	POT6O	2743	PIT6O	3456
CPICNT	4057	POE0	4057	POT6P	2743	PIT6P	3456
CPICNT	4057	POE1	4057	POT6Q	2743	PIT6Q	3456
CPICNT	4057	POE2	4057	POT6R	2743	PIT6R	3456
CPICNT	4057	POE3	4057	POT6S	2743	PIT6S	3456
CPICNT	4057	POE4	4057	POT6T	2743	PIT6T	3456
CPICNT	4057	POE5	4057	POT6U	2743	PIT6U	3456
CPICNT	4057	POE6	4057	POT6V	2743	PIT6V	3456
CPICNT	4057	POE7	4057	POT6W	2743	PIT6W	3456
CPICNT	4057	POE8	4057	POT6X	2743	PIT6X	3456
CPICNT	4057	POE9	4057	POT6Y	2743	PIT6Y	3456
CPICNT	4057	POE0	4057	POT6Z	2743	PIT6Z	3456