IDENTIFICATION

PRODUCT NAME: HIGH-SPEED READER/PUNCH TESTS

PRODUCT CODE: MAINDEC-08-DHPCA-A-D

PRODUCT DATE: MARCH 1977

MAINTAINER: DIAGNOSTIC ENGINEERING

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1.0 ABSTRACT

THE PC8-E HIGH-SPEED READER AND PUNCH TESTS ARE A TEST PACKAGE USED TO TEST THE TYPE PC04 AND PC03 HIGH-SPEED READER-PUNCH WHEN ATTACHED TO A PDP8/E SYSTEMS. THE TESTS PERFORM BASIC INPUT AND OUTPUT CONTROL LOGIC TESTS, READER AND PUNCH TESTS, READER AND PUNCH SPEED PRINTOUTS, AND PROVIDE MAINTENANCE LOOPS USEFUL IN ADJUSTING THE READER AND PUNCH.

THE AVAILABLE TEST PROGRAMS ARE:

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

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP8/E WITH ASR33/35 TELETYPE, PR8-E READER, OR PP8-E PUNCH, OR PC8-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 SR8-SR11.
SR2 LOOP PROGRAM.
SR3 0=HALT ON ERROR. 1=DO NOT HALT ON ERROR.
SR4 SKIP TEST AFTER ERROR.
SR5 ENTER SCOPE LOOP AFTER ERROR.
SR6
THROUGH ROUTINE NUMBER TO BE SELECTED.
SR11

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

4.2 PRG1 USE PROCEDURE

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

PRG1 SR OPTIONS

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

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

E01

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.

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.

PRG7 SR OPTIONS

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

4.9 PRG10 USE PROCEDURE

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

4.10 PRG11 USE PROCEDURE

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

4.11 PRG12 USE PROCEDURE

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

PRG12 SR OPTIONS

SR6 =0-STALL (RANDOM), SR6=1-RUN FULL SPEED.
SR7 LOCK ON 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 SR1=0, FOR 300 SECOND TIMING, SET SR1 TO A 1.
F. PRESS START. READER WILL RUN CONTINUOUSLY.
G. WHEN THE 30 OR 300 SECOND TIME IS UP, TURN ON SR0, 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 SR0 IS OFF, AND THAT SR1 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 SR0, AND THEN TURN IT OFF. THE PROGRAM WILL TYPE OUT THE PUNCH SPEED IN CHARACTERS PER SECOND (CPS).

G. PROGRAM HALTS AT LOC 4255 AFTER PRINTOUT.

H. TO RETIME THE PUNCH, PRESS CONTINUE AFTER MAKING SURE THAT SR0 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.

LOC 0340 ROUTINE END HALT. OCCURS DURING EOEXUTION 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.

6.0 ERRORS

ERROR PRINTOUTS AND ERROR HALTS ARE USED IN THIS PROGRAM.

6.1 ERROR PRINTOUTS

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

*PGGXX RGGYY ZZZZZZZZZ

WHERE,

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

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

*P0000 R0000

350 MS AFTER ISSUING RFC COMMAND (IOT6134) RSF DID NOT SKIP.
FLAG IS NOT SET, OR RSF COMMAND FAILED TO SKIP.

*P0000 R0001

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

*P0000 R0002

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

*P0000 R0003

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

*P0000 R0004

PCE (6020) MALFUNCTION. INTERRUPT ENABLE NOT CLEARED.

*P0000 R0005

RRB(IOT012) COMMAND FAILED TO CLEAR FLAG.

*R0000 R0006

RFC(IOT014) FAILED TO CLEAR FLAG.

*P0000 R0007

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

*P0000 R00010A

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

*P0000 R00010B

WITH READER FLAG SET, READER FAILED TO INTERRUPT.

*P0000 R00011A

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

*P0000 R00011B

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

*P0001 R0000

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

M01

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		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 R0001QA

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

*P0001 R0001QB

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	
*P0010 R0000	S/B	XXXX	WAS	YYYY

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

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 INTERRUPTIG DEVICE. PRESS CONTINUE.

6.2 ERROR HALTS

LOC 0201 — INCORRECT PROGRAM NUMBER SELECTED. SET SR TO CORRECT NUMBER AND PRESS CONTINUE.

LOC 0266 — INCORRECT ROUTINE NUMBER SELECTED, PRECEDED BY PRINTOUT. SET CORRECT ROUTINE NUMBER IN SR AND PRESS CONTINUE.

LOC 0732 — UNEXPECTED INTERRUPT. PRECEDED BY PRINTOUT. OCCURS DURING PRG7 EXECUTION. TURN OFF INTERRUPTING DEVICE. PRESS CONTINUE.

LOC 1347 — SYNC ERROR. OCCURS DURING PRG2 AND PRG7. IF PROGRAM IS UNABLE TO SYNC. PRESS CONTINUE TO RETRY.

LOC 1075 — COMMON ERROR HALT. OCCURS AFTER ERROR PRINTOUT IF SR3=0 AND OPTION APPLIES TO PROGRAM BEING RUN.
PRESS CONTINUE.

LOC 3631 — PRG7. PUNCH COUNT HAS EXCEEDED 100. READER IS PROBABLY NOT RUNNING. RESTART PROGRAM.

7.0 RESTRICTIONS

7.1 STARTING RESTRICTIONS

THIS PROGRAM MUST BE STARTED AT LOC 0200.

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

PRG0 1 MINUTE 50 SECONDS
PRG1 45 SECONDS
PRG2 THROUGH PRG15 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 (IOT014). FAILURE TO SKIP ON FLAG COULD BE CAUSED BY FLAG NOT SET, OR RSF FAILURE TO SKIP. TEST IS DONE 200 TIMES.

RTN1 CHECKS THAT RSF COMMAND (IOT011) SKIPS WITH FLAG = 1. TEST IS DONE 4095 TIMES.

RTN2 CHECK THAT RSF COMMAND (IOT011) DOES NOT SKIP WITH FLAG = 0. DONE 4095 TIMES.

RTN3 CHECKS FOR SKIP WITH INTERRUPT OFF. (DONE 2047 TIMES)

RTN4 CHECKS THAT INTERRUPT ENABLE CAN BE CLEARED FOR READER. (DONE 4095 TIMES)

RTN5 CHECKS THAT RRB COMMAND (IOT012) CLEARS THE FLAG. DONE 500 TIMES.

RTN6 CHECKS THAT RFC COMMAND (IOT014) CLEARS THE FLAG. DONE 500 TIMES.

RTN7 CHECKS ABILITY TO READ ALL 0'S CHARACTER. DONE 500 TIMES.

RTN10 CHECKS FOR UNEXPECTED INTERRUPTS, AND THEN CHECKS THAT READER IS ABLE TO INTERRUPT.

RTN11 THIS ROUTINE CHECKS THAT THE "STOP DELAY" IS NOT LESS THAN 10 MS. OR MORE THAN 250 MS. THE TEST SEQUENCE IS:

A. RFC (FETCH CHARACTER)

B. WAIT FOR FLAG 1 (SHOULD BE SET IMMEDIATELY)

C. DELAY 19 MS. (STOP DELAY SHOULD FIRE 6 MS AFTER STEP A.)

D. RFC (FETCH CHARACTER. CLEAR FLAG.)

E. DELAY 19 MS.

F. SKIP ON FLAG. (IF SKIP OCCURS, THE "STOP DELAY" DID NOT FIRE, OR IS TOO SHORT).

G. DELAY ADDITIONAL 212 MILLISECONDS.

H. SKIP ON FLAG. (IF NO SKIP OCCURS, THE "STOP DELAY" IS TOO LONG.) TEST IS DONE 200 TIMES.

9.2 PRG1 - BASIC PUNCH AND PUNCH CONTROL LOGIC TEST

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

RTN0 CHECKS THAT PSF COMMAND (IOT021) DOES NOT SKIP WITH FLAG = 0.

RTN1 CHECKS THAT PSF COMMAND (IOT021) SKIPS WITH FLAG = 1. DONE 4095 TIMES.

RTN2 CHECKS THAT PCF COMMAND (IOT022) IS ABLE TO CLEAR THE FLAG. DONE 500 TIMES.

RTN3 CHECKS FOR SKIP WITH INTERRUPT OFF. (DONE 2047 TIMES)

RTN4 CHECKS THAT INTERRUPT ENABLE CAN BE CLEARED FOR PUNCH. (DONE 4095 TIMES)

RTN5 TEST DONE 500 TIMES. VISUAL CHECK OF TAPE REQUIRED. CHECKS THAT PCF COMMAND (IOT022) IS ABLE TO CLEAR THE PUNCH BUFFER. THE TEST SEQUENCE IS:

A. ALL 1'S TO PUNCH BUFFER, AND PUNCH (PLS).
B. IMMEDIATELY CLEAR THE PUNCH BUFFER BY ISSUING PCF COMMAND. NO HOLES SHOULD BE PUNCHED EXCEPT FOR FEED-HOLE.

RTN6 TEST IS DONE 500 TIMES, VISUAL CHECK OF TAPE REQUIRED. ROUTINE LOADS PUNCH BUFFER WITH 125 (8) AND PUNCHES. ALTERNATE HOLES SHOULD BE PUNCHED.

RTN7 TEST IS DONE 500 TIMES. VISUAL CHECK OF TAPE REQUIRED. ROUTINE LOADS PUNCH BUFFER WITH 252(8) AND PUNCHES. ALTERNATE HOLES SHOULD BE PUNCHED.

RTN10 CHECKS FOR UNEXPECTED INTERRUPTS, AND THEN CHECKS THAT PUNCH IS ABLE TO INTERRUPT.

9.3 PRG2 - READER TEST

THE READER IS TESTED USING A SPECIAL BINARY COUNT PATTERN TEST TAPE. THE PROGRAM IS CONTINUOUS RUNNING. ERRORS ARE INDICATED BY PRINTOUTS. NORMAL TEST MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER GROUP READ. SR6 = 1 GIVES FULL SPEED TESTING. SR7 = 1 LOCKS PROGRAM ON CURRENT STALL. (SR6 MUST BE 0). PROGRAM RESYNCS AFTER 5 ERRORS. THE LENGTH OF A CHARACTER GROUP IS RANDOM, BUT DOES NOT EXCEED 15 CHARACTERS.

9.4 PRG3 - PUNCH TEST, SPECIAL BINARY COUNT PATTERN

THIS CONTINUOUS RUNNING PROGRAM PUNCHES SPECIAL BINARY COUNT PATTERN. NORMAL TEST MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER PUNCHED. SR6 = 1 GIVES FULL SPEED PUNCHING. SR7 = 1 LOCKS PROGRAM ON THE CURRENT STALL. (SR6 MUST BE 0).

9.5 PRG4 - PUNCH VERIFY, BINARY COUNT PATTERN

THIS PROGRAM READS AND CHECKS THE TAPE PUNCHED DURING EXECUTION OF PRG3. ERRORS ARE INDICATED BY ERROR PRINTOUTS.

9.6 PRG5 - PUNCH TEST, RANDOM CHARACTERS

THIS CONTINUOUS RUNNING PROGRAM PUNCHES RANDOM CHARACTERS. NORMAL TEST MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER PUNCHED. SR6 = 1 GIVES FULL SPEED PUNCHING. SR7 = 1 LOCKS PROGRAM ON THE CURRENT STALL. (SR6 MUST BE 0).

9.7 PRG6 - PUNCH VERIFY, RANDOM CHARACTERS

THIS CONTINUOUS RUNNING PROGRAM READS AND CHECKS THE TAPE PUNCHED DURING EXECUTION OF PRG5. ERRORS ARE INDICATED BY ERROR PRINTOUTS.

9.8 PRG7 - COMBINED READER - PUNCH TEST

THIS CONTINUOUS RUNNING PROGRAM PUNCHES AND READ - CHECKS SPECIAL BINARY COUNT PATTERN. THE READER AND PUNCH WORK IN THE INTERRUPT MODE. NORMAL TEST MODE IS WITH RANDOM STALLS AFTER EVERY CHARACTER PUNCHED. SR6 = 1 GIVES FULL SPEED PUNCHING AND READING. SR7 = 1 LOCKS PROGRAM ON THE CURRENT STALL. (SR6 MUST BE 0.) THE READER RESYNCS ITSELF AUTOMATICALLY AFTER 5 ERRORS.

9.9 PRG10 - READ AMPLIFIER ADJUSTMENT LOOP

THIS CONTINUOUS RUNNING PROGRAM USES A 1'S AND 0'S TEST TAPE LOOP, AND PROVIDES A MEANS OF DETERMINING THE UPPER AND LOWER LIMITS OF CORRECT OPERATION OF THE READ AMPLIFIER OF THE PAPER TAPE READER. AFTER OBTAINING THE LIMITS THE POT CAN BE SET TO THE MIDDLE POSITION. READ ERRORS ARE INDICATED BY ERROR PRINT-

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 SR3 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

```
                    /PC8-E HIGH SPEED READER AND PUNCH TESTS.
                    /MAINDEC-08-DHPCA-A-D
                    /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 0'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    SRQ=6003
            6007    CAF=6007
            6010    RPE=6010
            6020    PCE=6020
            6014    RCF=6014
            6024    PPC=6024
            0000    *0
     0000   0000            0000
     0001   5001            JMP 1
     0002   0002            2
     0003   0003            3
            0005    *5
     0005   5402            JMP I 2
     0006   0000            0
            0020    *20
     0020   0000    KSTART, 0                     /USER PROGRAM START.
     0021   0000    DELAYM, 0
     0022   0000    COUNT,  0000
     0023   0000    AC,     0
     0024   0000    LINK,   0
     0025   0270    CHAIN,  CHAINN
     0026   0333    SHLT,   SHALT
     0027   0447    RANDNO, RANGEN
     0030   0000    PRGNUM, 0
     0031   2000    PRGTAB, PRG0
     0032   3000            PRG1
     0033   3462            PRG2
     0034   3506            PRG3
     0035   3517            PRG4
     0036   3537            PRG5
     0037   3553            PRG6
     0040   3600            PRG7
     0041   4000            PRG10
```



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     0042   4102            PRG11
     0043   4110            PRG12
     0044   4200            PRG13
     0045   4233            PRG14
     0046   4332            PRG15
     0047   0516    XTYPST, TYPSTG
     0050   0600    UCRLF,  CRLF
     0051   1030    UERROR, ERROR
     0052   1000    UASCCN, ASCCN
     0053   1235    ULPRGN, LPRGN
     0054   [illegible] ULRRGN, LRRGN
     0055   1200    UTREAD, TREAD
     0056   1207    UTPCH,  TPCH
     0057   1214    UPLDR,  PLDR
     0060   1230    UMARK,  MARK
     0061   1143    UTCHK,  TCHK
     0062   [illegible] UTSB,   TSB
     0063   0024    CRCNT,  CRCNT
     0064   [illegible] SYNC,   SYNK
     0065   1324    SYNCA,  SYNKA
     0066   1400    INPATT, INITPT
     0067   1412    GETPT,  GETPTT
     0070   1435    GETPTR, GTPTRR
     0071   0521    CHECK,  CHCK
     0072   0513    DLYCNT, DLCNT
     0073   0426    UPUNCH, PUNCH
     0074   0536    UMOVE,  MOVE
     0075   0400    USTCTR, STCTR
     0076   0443    URDSR,  RDSR
     0077   1111    USTCTA, STCTA
     0100   1117    USTCTB, STCTB
     0101   1042    USTDLM, STDLYM
     0102   0411    UDLYMS, DLYMS
     0103   0733    UIOUT,  IOUT
     0104   0000    DLYMSK, 0
     0105   0000    SRMSK,  0
     0106   7354    MILI,   7354                  CONSTANT FOR MILLISECOND CTR
     0107   0000    CPID,   0
     0110   0000    CHR1,   0
     0111   0000    CHR2,   0
     0112   0000    CHR3,   0
     0113   0000    TEMP,   0
     0114   0000    TEMP1,  0
     0115   0000    CURTST, 0
     0116   0000    RTNNO,  0
     0117   0000    NXTST,  0
     0120   0000    MSCTR,  0                     STORED NUMBER OF MILLISEC TO BE COUNTED
     0121   0000    MILCTR, 0                     MILLISECOND TALLY
     0122   0000    CTRA,   0
     0123   0000    CTRB,   0
     0124   0000    CTRC,   0
     0125   0000    CTRD,   0
     0126   0000    PFLAG,  0
     0127   0000    RBUSY,  0
     0130   0000    [illegible] 0
```

```
0131  0000           TCHKW,  0
0132  0000           PCHCNT, 0
0133  0000           ACTIND, 0
0134  0000           DELTIM, 0
0135  0000           MILLI,  0
0136  0000           CTR,
      4000           SR0MSK=4000
      2000           SR1MSK=2000
      1000           SR2MSK=1000
      0400           SR3MSK=0400
      0200           SR4MSK=0200
      0100           SR5MSK=0100
      0040           SR6MSK=0040
      0020           SR7MSK=0020
      0017           TSTMSK=0017
      0377           PTMSK=0377
      4475           SETLOC=JMS I USTCTR
      4476           READSR=JMS I URDSR
      4477           SETA=JMS I USTCTA
      4500           SETB=JMS I USTCTB
      4502           DELAY=JMS I UDLYMS
      5503           OUT=JMP I UIOUT
      0140           A=0140
      0240           B=0240
      0000           NONE=0000
      4040           NOSUF=4040
      4501           SETDLM=JMS I   TDLM
      4502           DELAY=JMS I   YMS
      5503           OUT=JMP I UIOUT
      0000           OPEN=0000

                             /SET INT ENABLE FOR READER AND PUNCH
                             /SKIP IF RDR FLAG = 1
                             /READ READER BUFFER AND CLEAR FLAG
                             /CLEAR FLAG AND BUFFER AND FETCH CHARACTER
                             /RRB,RCC
                             /CLEAR INTERRUPT ENABLE FOR READER AND PUNCH
                             /SKIP IF PUNCH FLAG = 1
                             /CLEAR FLAG AND BUFFER
                             /LOAD BUFFER AND PUNCH CHARACTER
                             /PCF,PPC

                     /SKIP IF INTERRUPT ON AND TURN INTERRUPT OFF
                     /TURN INTERRUPT ON
                     /TURN INTERRUPT OFF
                     /SKIP ON INTERRUPT REQUEST
                     /GET FLAGS
                     /RESTORE FLAGS
                     /SKIP ON GREATER THAN FLAGS
                             /CLEAR ALL FLAGS

      0200           *200
0200  7410           STRT,   SKP
0201  7602                   HLT CLA                 /INCORRECT PRGNUM
0202  7604                   LAS                     /READ SR
```

I02


```
0203  0177                   AND [17                 /MASK ALL BUT LAST 4 BITS
0204  1176                   TAD [-15
0205  7540                   SMA SZA                 /VALID PROGRAM?
0206  5201                   JMP STRT+1              /NO, GO TO ERROR HALT.
0207  7604                   LAS                     /YES, REREAD SR
0210  0177                   AND [17
0211  3030                   DCA PRGNUM
0212  1030                   TAD PRGNUM              /DEVELOP PROGRAM ADDRESS
0213  1175                   TAD (PRGTAB
0214  3113                   DCA TEMP
0215  1513                   TAD I TEMP
0216  3240                   DCA PRGADR              /STORE DEVELOPED ADDRESS.
0217  4474           INIT,   JMS I UMOVE             /INITIALIZE INTERRUPT
0220  0005                   5                       /AREA.
0221  0001                   1
0222  7776                   -2
0223  3113                   DCA TEMP                /0 TO TEMP
0224  4474                   JMS I UMOVE             /CLEAR WORK AREA
0225  0113                   TEMP
0226  0114                   TEMP1
0227  7760                   -20
0230  4475                   SETLOC
0231  1075                   ERRORA
0232  7402                   7402
0233  1174                   TAD [177
0234  3104                   DCA DLYMSK
0235  1173                   TAD [7640
0236  3572                   DCA I (STALL+3
0237  5640                   JMP I .+1               /JUMP TO SELECTED
0240  0000           PRGADR, 0                       /PROGRAM
0241  7602           SRSET,  HLT CLA
0242  7200           GETRDY, CLA
0243  1020                   TAD KSTART              /SET ADDRESS OF 1ST ROUTINE
0244  3117                   DCA NXTST               /STORE AT NXTST
0245  4307                   JMS FORWD
0246  4476                   READSR                   READ SR
0247  7006                   RTL
0250  7420                   SNL                     /ROUTINE SELECT? (SR1)
0251  5515                   JMP I CURTST            /NO, START WITH 1ST RTN
0252  4476                   READSR                  /YES
0253  0177                   AND       (TSTMSK
0254  7041                   CIA
0255  1116                   TAD RTNNO
0256  7650                   SNA CLA                 /IS IT THIS RTN?
0257  5515                   JMP I CURTST            /YES, GO DO IT
0260  1117                   TAD NXTST               /NO
0261  7001                   IAC                     /IS THIS LAST RTN?
0262  7640                   SZA CLA                 /NO
0263  5245                   JMP GETRDY+3
0264  4477                   JMS I XTYPST
0265  1560                   WRTN
0266  7602           INCRTN, HLT CLA                 /YES, INCORRECT ROUTINE NO.
0267  5242                   JMP GETRDY
0270  4426           CHAINN, JMS I SHLT              /HALT? (ERO)
0271  4476                   READSR                  /READ SR
```

```
0272  7006          RTL
0273  7630          SZL CLA                 /ROUTINE SELECT? (SR11)
0274  5242          JMP GETRDY              /YES
0275  1117          TAD NXTST
0276  7001          IAC
0277  7640          SZA CLA                 /LAST ROUTINE?
0300  5245          JMP GETRDY+3            /NO.
0301  4476          READSR
0302  7006          RTL
0303  7710          SPA CLA                 /LOOP PROGRAM? (SR8)
0304  5242          JMP GETRDY              /YE
0305  7402  PRGEND, HLT                     /END OF PROGRAM HALT
0306  5270          JMP CHAINN
0307  0000  FORWD,  0
0310  7300          CLA CLL
0311  1517          TAD I NXTST             /GET NEXT RTN NO
0312  3116          DCA RTNNO               /STORE AT RTNNO
0313  2117          ISZ NXTST
0314  1117          TAD NXTST               /SET CURRENT
0315  3113          DCA TEMP                /RTN NUMBER
0316  2117          ISZ NXTST
0317  1117          TAD NXTST               /SET CURRENT
0320  3115          DCA CURTST              /RTN ADDR.
0321  1513          TAD I TEMP              /SET NEXT
0322  3117          DCA NXTST               /RTN ADDR.
0323  5707          JMP I FORWD             /EXIT
0324  0000  CHRCNT, 0
0325  4427          JMS I RANDNO            /SET RANDOM NUMBER
0326  0177          AND [17                 /REMOVE EXCESS BITS
0327  7450          SNA                     /0?
0330  5325          JMP CHRCNT+1            /YES, REPEAT
0331  7041          CIA                     /COMPLEMENT
0332  5724          JMP I CHRCNT            /EXIT.
0333  000C  SHALT,  0
0334  4476          READSR                  /READ SR
0335  7700          SMA CLA                 /HALT? (SR0)
0336  5733          JMP I SHALT
0337  1116          TAD RTNNO
0340  7402          HLT                     /UNCONDITIONAL HALT (SR = 1)
0341  5733          JMP I SHALT             /EXIT.S/-IOL
              PAGE
0400  0000  STCTR,  0
0401  7200          CLA
0402  1600          TAD I STCTR             /GET CTR ADDR
0403  3113          DCA TEMP                /AND SAVE AT TEMP
0404  2200          ISZ STCTR
0405  1600          TAD I STCTR             /GET COUNT AND
0406  3513          DCA I TEMP              /STORE PER C(TEMP)
0407  2200          ISZ STCTR
0410  5600          JMP I STCTR             /EXIT
0411  0000  DLYMS,  0
0412  7300          CLA CLL
0413  1021          TAD DELAYM              /GET MS COUNT
0414  3120          DCA MSCTR               /STORE IN MSCTR
0415  7416          JMP .+1
```



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0416  0417          .+1
0417  1106          TAD MIL1                /GET 1 MS CONSTANT
0420  3121          DCA MILCTR              /STORE IN MILCTR
0421  2121          ISZ MILCTR              /DELAYED 1 MSEC?
0422  5221          JMP .-1
0423  2120          ISZ MSCTR               /DONE DELAYING?
0424  5217          JMP .-5
0425  5611          JMP I DLYMS             /EXIT
              /PUNCH/PRINT ONE CHARACTER SUBROUTINE (CHAR IN AC).
0426  0000  PUNCH,  0
0427  2126          ISZ PFLAG               /SET PFLAG
0430  6046          TLS                     /PUNCH PRINT
0431  7200          CLA
0432  1126          TAD PFLAG
0433  7640          SZA CLA                 /FLAG RESET?
0434  7410          SKP                     /NO
0435  5240          JMP .+3                 /YES.
0436  6041          TSF                     /DONE PRINTING
0437  5236          JMP .-5                 /NO.
0440  6042          TCF                     /YES, RESET PUNCH/PRINTER FLAG
0441  3126          DCA     PFLAG           /RESET FLAG
0442  5626          JMP I PUNCH             /EXIT.
0443  0000  RDSR,   0
0444  7604          LAS
0445  0105          AND SRMSK
0446  5643          JMP I RDSR
0447
              /RANDOM NUMBER GENERATOR SUBROUTINE
0447  0000  RANGEN, 0
0450  7200          CLA
0451  1311          TAD RANTMO
0452  1276          TAD RANDEX
0453  7640          SZA CLA
0454  5664          JMP RANTAD
0455  1300          TAD RANTBL
0456  3276          DCA RANDEX
0457  1277          TAD RANCON
0460  7104          CLL RAL
0461  7430          SZL
0462  7001          IAC
0463  3277          DCA RANCON
0464  1277  RANTAD, TAD RANCON
0465  1676          TAD I RANDEX
0466  3676          DCA I RANDEX
0467  1312          TAD RANSAV
0470  7010          RAR
0471  1676          TAD I RANDEX
0472  2276          ISZ RANDEX
0473  3312          DCA RANSAV
0474  1312          TAD RANSAV
0475  5647          JMP I RANGEN
0476  0311  RANDEX, RANTMO
0477  6543  RANCON, 6543
0500  0501  RANTBL, .+1
              6543
```

```
0502  3210          3210
0503  0765          0765
0504  5432          5432
0505  2107          2107
0506  7654          7654
0507  4321          4321
0510  1076          1076
0511  7257  CNTNO,  .-.
0512  0000  RANSAV,  0

                    /SUBROUTINE TO GENERATE RANDOM DELAY COUNT
                    /
0513  0000  DLCNT,   0
0514  4427          JMS I RANDNO          /GO GENERATE RANDOM NUMBER
0515  0174          AND [177              /MASK OUT UNDESIRED BITS.
0516  7041          CIA                   /2'S COMPLEMENT IT
0517  3021          DCA DELAYM
0520  5713          JMP I DLCNT           /EXIT

                    /SUBROUTINE TO COMPARE C(AC) TO CONTENTS STORED AT CALL+1
                    /
0521  0000  CHCK,    0
0522  3335          DCA WCHK              /STORE AC AT WCHK
0523  1721          TAD I CHCK            /GET COMPARE DATA
0524  7041          CIA                   /2'S COMPLEMENT IT
0525  1335          TAD WCHK              /ADD C(WCHK)
0526  6321          ISZ CHCK              /SET UP FOR UNEQUAL EXIT
0527  7640          SZA CLA               /EQUAL (AC = 0)
0530  5333          JMP .+3               /NO
0531  2321          ISZ CHCK              /YES, SET UP FOR EQUAL EXIT
0532  5721          JMP I CHCK            /EQUAL EXIT
0533  1335          TAD WCHK              /RESTORE AC
0534  5721          JMP I CHCK            /UNEQUAL EXIT
0535  0000  WCHK,    0

                    /SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
0536  0000  MOVE,    0
0537  7200          CLA
0540  1736          TAD I MOVE            /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
```



```
0561  0000  FADDR,   0
0562  0000  TADDR,   0
0563  0000  MCTR,    0

              0600  PAGE
0600  0000  CRLF,    0
0601  7200          CLA                   /CRLF SUBROUTINE
0602  1600          TAD I CRLF            /GET NUMBER OF CRLF'S
0603  0000          DCA CRCTR             /AND SAVE
0604  2200          ISZ CRLF
0605  4447          JMS I XTYPST          /GO CRLF
0606  0612                .+4
0607  0000          ISZ CRCTR             /ALL DONE?
0610  5206          JMP .-2               /NO
0611  5600          JMP I CRLF            /YES, EXIT.
0612  0215          0215                  /CR
0613  0212          0212                  /LF
0614  0001          0001                  /END CODE
0615  0000  CRCTR,   0
0616  0000  TYPSTG,  0
0617  7200          CLA
0620  1616          TAD I TYPSTG          /GET AND STORE
0621  3600          DCA TEMQ              /INITIAL ADDRESS
0622  3609          DCA FLAG              /CLEAR FLAG
0623  2216          ISZ TYPSTG
0624  1700  TSC1,    TAD I TEMQ            /SET DATA
0625  7012          RTR                   /ROTATE RIGHT 6.
0626  7012          RTR
0627  7012          RTR
0630  4235          JMS TSC2              /GO TYPE CHARACTER
0631  1700          TAD I TEMQ            /GET DATA
0632  4235          JMS TSC2              /GO TYPE CHARACTER
0633  2000          ISZ TEMQ              /INCR STRING ADDR
0634  5224          JMP TSC1              /GO BACK FOR MORE
0635  0000  TSC2,    0
0636  0177          AND [177              /MASK OFF 6 BITS
0637  3611          DCA TEMR              /SAVE CHARACTER
0640  1209          TAD FLAG
0641  7640          SZA CLA               /TEST FLAG
0642  5252          JMP TYPSP             /SET
0643  1211          TAD TEMR              /NOT SET
0644  7450          SNA                   /ZERO?
0645  5250          JMP .+3               /YES, SET FLAG
0646  4271  TYPAT,   JMS PRINT             /NO, PRINT IT.
0647  5635          JMP I TSC2            /RETURN
0650  2209          ISZ FLAG              /SET FLAG
0651  5635          JMP I TSC2            /EXIT
0652  3209  TYPSP,   DCA FLAG              /CLEAR FLAG
0653  1211          TAD TEMR
0654  7041          CIA
0655  7450          SNA                   /ZERO?
0656  5246          JMP TYPAT             /YES, TYPE "@"
0657  7001          IAC
0660  7650          SNA CLA               /IS IT CTL
0661  5616          JMP I TYPSTG          /YES, EXIT CODE
```

```
0561  0000  FADDR,  0
0562  0000  TADDR,  0
0563  0000  MCTR,   0

      0600          PAGE
0600  0000  CRLF,   0
0601  7200          CLA                     /CRLF SUBROUTINE
0602  1600          TAD I CRLF              /GET NUMBER OF CRLF'S
0603  3215          DCA CRCTR               /AND SAVE
0604  2200          ISZ CRLF
0605  4447          JMS I XTYPST            /GO CRLF
0606  0612          .+4
0607  2215          ISZ CRCTR               /ALL DONE?
0610  5205          JMP .-3                 /NO
0611  5600          JMP I CRLF              /YES, EXIT.
0612  0015          0015                    /CR
0613  0012          0012                    /LF
0614  0001          0001                    /END CODE
0615  0000  CRCTR,  0
0616  0000  TYPSTG, 0
0617  7200          CLA
0620  1616          TAD I TYPSTG            /GET AND STORE
0621  3300          DCA TEMQ                /INITIAL ADDRESS
0622  3302          DCA FLAG                /CLEAR FLAG
0623  2216          ISZ TYPSTG
0624  1700  TSC1,   TAD I TEMQ              /GET DATA
0625  7012          RTR                     /ROTATE RIGHT 6.
0626  7012          RTR
0627  7012          RTR
0630  4235          JMS TSC2                /GO TYPE CHARACTER
0631  1700          TAD I TEMQ              /GET DATA
0632  4235          JMS TSC2                /GO TYPE CHARACTER
0633  2300          ISZ TEMQ                /INCR STRING ADDR
0634  5224          JMP TSC1                /GO BACK FOR MORE
0635  0000  TSC2,   0
0636  0171          AND [77                 /MASK OFF 6 BITS
0637  3301          DCA TEMR                /SAVE CHARACTER
0640  1302          TAD FLAG
0641  7640          SZA CLA                 /TEST FLAG
0642  5252          JMP TYPSP               /SET
0643  1301          TAD TEMR                /NOT SET
0644  7450          SNA                     /ZERO?
0645  5250          JMP .+3                 /YES, SET FLAG
0646  4271  TYPAT,  JMS PRINT               /NO, PRINT IT.
0647  5635          JMP I TSC2              /RETURN
0650  2302          ISZ FLAG                /SET FLAG
0651  5635          JMP I TSC2              /EXIT
0652  3302  TYPSP,  DCA FLAG                /CLEAR FLAG
0653  1301          TAD TEMR
0654  7041          CIA
0655  7450          SNA                     /ZERO?
0656  5246          JMP TYPAT               /YES, TYPE "@"
0657  7001          IAC
0660  7650          SNA CLA                 /IS IT 01?
0661  5616          JMP I TYPSTG            /YES, EXIT CODE
```

N02


```
0662  1170          TAD [SMA                /SMA TO SWITCH
0663  3273          DCA SWITCH
0664  1301          TAD TEMR                /GET CHARACTER
0665  4271          JMS PRINT               /PRINT IT
0666  1167          TAD [SPA
0667  3273          DCA SWITCH              /SPA TO SWITCH
0670  5635          JMP I TSC2              /RETURN
0671  0000  PRINT,  0
0672  1165          TAD [-40
0673  7510  SWITCH, SPA
0674  1166          TAD [100
0675  1167          TAD [240
0676  4473          JMS I XPUNCH
0677  5671          JMP I PRINT
0700  4040  TEMQ,   0
0701  0000  TEMR,   0
0702  0000  FLAG,   0

            /
0703  3023  INTSVC, DCA AC                  /SAVE AC
0704  7010          RAR
0705  3024          DCA LINK                /SAVE LINK
0706  6011          RSF                     /READER?
0707  5312          JMP .+3                 /NO.
0710  5711          JMP I .+1               /YES
0711  0000  RVCTR,  0
0712  6021          PSF                     /PUNCH?
0713  5317          JMP .+4                 /NO.
0714  4553          JMS I [STALL            /STALL IF DESIRED.
0715  5716          JMP I .+1               /YES.
0716  0000  PVCTR,  0
0717  6031          KSF                     /TTY READER /KYBD?
0720  5323          JMP .+3                 /NO.
0721  6032          KCC                     /YES.
0722  5503          OUT                     /TO MAINLINE
0723  6041          TSF                     /TTY PRINTER/PUNCH?
0724  5330          JMP .+4                 /NO.
0725  6042          TCF                     /YES.
0726  3126          DCA PFLAG
0727  5503          OUT                     /TO MAINLINE
0730  4447  UNEXIT, JMS I XTYPST            /PRINT ERROR MESSAGE
0731  1501          UNINT
0732  7402          HLT CLA                 /HALT, UNEXPECTED INTERRUPT
0733  7300  IOUT,   CLA CLL
0734  1024          TAD LINK
0735  7004          RAL                     /RESTORE LINK
0736  1023          TAD AC                  /RESTORE AC
0737  6001          ION
0740  5400          JMP I 0                 /EXIT INTERRUPT
            /
0741  6022  PCHCLR, PCF
0742  5503          OUT
0743  6012  RDRCLR, RRB
0744  5503          OUT
```

```
                1000    PAGE
1000 0000       ASCCN,  0                       /SUBROUTINE TO CONVERT
1001 7200               CLA                     /A WORD TO PRINTABLE ASCII
1002 1600               TAD I ASCCN
1003 3237               DCA WASC
1004 2200               ISZ ASCCN
1005 1600               TAD I ASCCN
1006 3240               DCA SASC
1007 2200               ISZ ASCCN
1010 1163               TAD I7700
1011 0637               AND I WASC
1012 7112               RTR CLL
1013 7012               RTR
1014 7012               RTR
1015 4224               JMS CNV
1016 2240               ISZ SASC
1017 1162               TAD I7700
1020 7040               CMA
1021 0637               AND I WASC
1022 4224               JMS CNV
1023 5600               JMP I ASCCN
1024 0000       CNV,    0
1025 3241               DCA ASCT
1026 1241               TAD ASCT
1027 7006               RTL
1030 7004               RAL
1031 0161               AND I707
1032 1241               TAD ASCT
1033 0161               AND I707
1034 1160               TAD I6060
1035 3640               DCA I SASC
1036 5624               JMP I CNV
1037 0000       WASC,   0
1040 0000       SASC,   0
1041 0000       ASCT,   0
                /
1042 0000       STDLYM, 0                       /SET DELAYM SUB.
1043 7200               CLA
1044 1642               TAD I STDLYM            /SET DELAYM TO
1045 3021               DCA DELAYM              /NUMBER SPECIFIED
1046 2242               ISZ STDLYM              /AT CALL+1
1047 5642               JMP I STDLYM            /EXIT
1050 0000       ERROR,  0
1051 4452               JMS I UASCCN            /CONVERT PROGRAM
1052 0030               PRGNUM                  /NUMBER TO PRINTABLE
1053 1471               PRUMB                   /OCTAL.
1054 4452               JMS I UASCCN            /CONVERT ROUTINE
1055 0116               RTNNO                   /NUMBER TO PRINTABLE
1056 1474               ENUMB                   /OCTAL.
1057 1650               TAD I ERROR             /GET ERROR SUFFIX AND
1060 3710               DCA I SFADR             /STORE AT SUFX
1061 4447               JMS I XTYPST            /PRINT ERROR NUMBER
1062 1466               ERNUMB
1063 2250               ISZ ERROR
1064 1650               TAD I ERROR             /GET ADDRESS OF ADDITIONAL
```



```
1065 7450               SNA                     /PRINTOUT. ZERO?
1066 5272               JMP .+4                 /YES.
1067 3271               DCA .+2
1070 4447               JMS I XTYPST            /NO, PRINT IT.
1071 0000               0
1072 4476               READSR
1073 0157               AND I SR3MSK
1074 7650               SNA CLA                 /HALT ON EROR? (SR3)
1075 7402       ERRORA, HLT                     /YES, (SR3-0)
1076 4476               READSR
1077 0156               AND I SR4MSK
1100 7640               SZA CLA                 /SKIP TEST? (SR4)
1101 5425               JMP I CHAIN             /YES.
1102 4476               READSR
1103 0165               AND I SR5MSK
1104 7640               SZA CLA                 /ENTER SCOPE LOOP?
1105 2250               ISZ ERROR               /YES.
1106 2250               ISZ ERROR
1107 5650               JMP I ERROR
1110 1476       SFADR,  SUFX
1111 0000       STCTA,  0                       /SET CTRA TO
1112 7200               CLA                     /NUMBER SPECIFIED
1113 1711               TAD I STCTA             /AT CALL+1
1114 3122               DCA CTRA
1115 2311               ISZ STCTA
1116 5711               JMP I STCTA             /EXIT
1117 0000       STCTB,  0                       /SET CTRB TO
1120 7200               CLA                     /NUMBER SPECIFIED
1121 1717               TAD I STCTB             /AT CALL+1
1122 3123               DCA CTRB
1123 2317               ISZ STCTB
1124 5717               JMP I STCTB             /EXIT
1125 0000       STALL,  0                       /RANDOM STALL SUBROUTINE
1126 4476               READSR
1127 0155               AND I SR6MSK
1130 7640               SZA CLA                 /STALL? (SR6)
1131 5725               JMP I STALL             /NO, EXIT
1132 4476               READSR
1133 0154               AND I SR7MSK
1134 7640               SZA CLA                 /LOCK ON STALL?
1135 7410               SKP                     /YES.
1136 4472               JMS I DLYCNT            /NO, RANDOM STALL.
1137 1021               TAD DELAYM
1140 7440               SZA
1141 4502               DELAY                   /STALL
1142 5725               JMP I STALL             /EXIT
1143 0000       TCHK,   0
1144 4471               JMS I CHECK             /CHECK THAT C(AC AND C(TSB) ARE
1145 0000       TSB,    0
1146 5351               JMP .+3                 /ERROR, NOT EQUAL
1147 2343               ISZ TCHK                /EQUAL
1150 5743               JMP I TCHK              /OK
1151 3131               DCA TCHKW               /STORE BAD CHARACTER
1152 4452               JMS I UASCCN
1153 1145               TSB
```

```
1154 1604          SB
1155 4452          JMS I UASCCN
1156 0131          TCHKW
1157 1611          WAS
1160 4451          JMS I UERROR
1161 4040          NOSUF
1162 1601          SBWAS
1163 5743          JMP I TCHK              /RETURN
1164 5743          JMP I TCHK              /RETURN

     1200    PAGE
1200 0000    TREAD, 0
1201 6014          RFC
1202 6011          RSF
1203 5202          JMP .-1
1204 7200          CLA
1205 6012          RRB
1206 5600          JMP I TREAD
1207 0000    TPCH,  0
1210 6026          PLS
1211 6021          PSF
1212 5211          JMP .-1
1213 5607          JMP I TPCH
1214 0000    PLDR,  0
1215 4475          SETLOC                  /-100 TO PLDRW
1216 1227          PLDRW
1217 7634          -144
1220 7200          CLA
1221 6026          PLS
1222 6021          PSF
1223 5222          JMP .-1
1224 2227          ISZ PLDRW               /DONE?
1225 5220          JMP .-5                 /NO
1226 5614          JMP I PLDR              /YES. EXIT
1227 0000    PLDRW, 0
                   /
1230 0000    MARK,  0
1231 4214          JMS PLDR
1232 4500          SETB
1233 7767          -11
1234 4475          SETLOC                  /MARKER ADDRESS
1235 1246          MARKAD                  /TO MARKED
1236 1521          MARKER
1237 7200          CLA
1240 1646          TAD I MARKAD            /GET MARK
1241 4207          JMS TPCH                /PUNCH IT.
1242 2246          ISZ MARKAD              /UPDATE.
1243 2123          ISZ CTR8                /DONE?
1244 5237          JMP .-5                 /NO.
1245 5630          JMP I MARK              /YES EXIT.
1246 0000    MARKAD, 0
1247 1233    SEED1, 1233
1250 7622          7622
1251 0000    RANP1, 0
1252 0000    RANP2, 0
```



```
1253 0000    RANR1, 0
1254 0000    RANR2, 0
1255 0000    LPRGN, 0
1256 7300          CLL CLA
1257 1251          TAD RANP1
1260 7006          RTL
1261 1252          TAD RANP2
1262 3251          DCA RANP1
1263 1251          TAD RANP1
1264 7006          RTL
1265 1252          TAD RANP2
1266 7006          RTL
1267 3252          DCA RANP2
1270 1251          TAD RANP1
1271 0153          AND [PTMSK
1272 5655          JMP I LPRGN
1273 0000    LRRGN, 0
1274 7300          CLL CLA
1275 1253          TAD RANR1
1276 7006          RTL
1277 1254          TAD RANR2
1300 3253          DCA RANR1
1301 1253          TAD RANR1
1302 7006          RTL
1303 1254          TAD RANR2
1304 7006          RTL
1305 3254          DCA RANR2
1306 1253          TAD RANR1
1307 0153          AND [PTMSK
1310 5673          JMP I LRRGN
1311 0000    SYNK,  0
1312 4456          JMS I INPATT
1313 4455          JMS I UTREAD            /READ CHARACTER
1314 3110          DCA CHR1                /STORE AT CHR1
1315 4455          JMS I UTREAD            /READ CHARACTER
1316 3111          DCA CHR2                /STORE AT CHR2
1317 4455          JMS I UTREAD            /READ CHAR
1320 3112          DCA CHR3                /STORE
1321 4465          JMS I SYNCA             /GO SYNC.
1322 5312          JMP SYNK+1              /NO SYNC. TRY AGAIN.
1323 5711          JMP I SYNK              /SYNCED. EXIT.
1324 0000    SYNKA, 0
1325 4475          SETLOC                  /-512 TO CTSK
1326 1363          CTSK
1327 7000          -1000
1330 4475          SETLOC                  /SET CTSK1
1331 1364          CTSK1                   /K-10
1332 7756          -12
1333 4467          JMS I GETPT             /GET BIN CHARACTER
1334 7040          CMA
1335 0110          AND CHR1                /SAME AS CHR1?
1336 7440          SZA
1337 5333          JMP .-4                 /NO.
1340 4467          JMS I GETPT             /YES. GET ANOTHER BIN CHAR.
1341 7040          CMA
```

```
1342  0111             AND CHR2
1343  7450             SNA                    /SAME AS CHR2?
1344  5351             JMP SYNKC              /YES.
1345  2363             ISZ CTSK               /NO. 512 TIMES?
1346  5330             JMP SYNKA+4            /NO
1347  7602  SYNKB,     HLT CLA                /YES. SYNC ERROR.
1350  5724             JMP I SYNKA            /TRY AGAIN.
1351  4467  SYNKC,     JMS I GETPT            /GET LINE CHARACTER.
1352  7040             CMA
1353  0112             AND CHR3               /SAME AS CHR3?
1354  7440             SZA
1355  5360             JMP .+3                /NO.
1356  2324             ISZ SYNKA              /YES.
1357  5724             JMP I SYNKA            /EXIT
1360  2364             ISZ CTSK1              /DONE 10 TIMES?
1361  5330             JMP SYNKA+4            /NO.
1362  5347             JMP SYNKB              /YES. SYNC ERROR.
1363  0000  CTSK,      0
1364  0000  CTSK1,     0

      1400             PAGE
1400  0000  INITPT,    0                      /INITIALIZE BINARY
1401  7201             CLA IAC                /PATTERN ROUTINES
1402  3260             DCA PT0
1403  4474             JMS I UMOVE
1404  1460             PT0
1405  1461             PT1
1406  7775             -3
1407  3264             DCA RIND
1410  3265             DCA PIND
1411  5600             JMP I INITPT
1412  0000  GETPTT,    0                      /BINARY COUNT PATTERN
1413  7200             CLA                    /ROUTINE(SPECIAL)
1414  1260             TAD PT0
1415  3261             DCA PT1
1416  1264             TAD RIND
1417  7040             CMA
1420  3264             DCA RIND
1421  1264             TAD RIND
1422  7650             SNA CLA
1423  5227             JMP .+4
1424  1261             TAD PT1
1425  7040             CMA
1426  5231             JMP .+3
1427  1261             TAD PT1
1430  7041             CIA
1431  0153             AND IPTMSK
1432  3260             DCA PT0
1433  1261             TAD PT1
1434  5612             JMP I GETPTT
1435  0000  GTPTRR,    0                      /BINARY COUNT PATTERN
1436  7200             CLA                    /ROUTINE
1437  1262             TAD PT2
1440  3263             DCA PT3
1441  1265             TAD PIND
```



```
1442  7040             CMA
1443  3265             DCA PIND
1444  1265             TAD PIND
1445  7650             SNA CLA
1446  5252             JMP .+4
1447  1263             TAD PT3
1450  7040             CMA
1451  5254             JMP .+3
1452  1263             TAD PT3
1453  7041             CIA
1454  0153             AND IPTMSK
1455  3262             DCA PT2
1456  1263             TAD PT3
1457  5635             JMP I GTPTRR
1460  0000  PT0,       0
1461  0000  PT1,       0
1462  0000  PT2,       0
1463  0000  PT3,       0
1464  0000  RIND,      0
1465  0000  PIND,      0
1466  0015  ERNUMB,    0015                   /CR
1467  0012             0012                   /LF
1470  5220             5220                   /*,P
1471  4040  PNUMB,     4040
1472  4040             4040
1473  4022             4022                   /SP0,R
1474  4040  ENUMB,     4040
1475  4040             4040
1476  4040  SUFX,      4040
1477  4040             4040                   /SP,SP
1500  0001             0001                   /END CODE.
1501  0015  LNINT,     0015                   /CR
1502  0012             0012                   /LF
1503  0007             0007                   /BELL
1504  4025             4025
1505  1605             1605
1506  3020             3020
1507  0503             0503
1510  2405             2405
1511  0440             0440
1512  1116             1116
1513  2405             2405
1514  2222             2222
1515  2520             2520
1516  2456             2456
1517  0015             0015
1520  0001             0001                   /END CODE
1521  0037  MARKER,    0037
1522  0040             0040
1523  0040             0040
1524  0037             0037
[illegible]
```

```
        0006
RSPD.   0015                /CR
        0012                /LF
        4022                /SP,R
        0422                /D,R
        4023                /SP,S
        2005                /P,E
        0504                /ED
        4000                /SP
        0100                /END CODE
PSPD.   0015                /CR
        0012                /LF
        4020                /SP,P
        0310                /C,H
        4023                /SP,S
        2005                /P,E
        0504                /E,D
        4000                /SP
        0100                /END CODE
CPS.    4003                /SP,C
        2023                /P,S
        0015                /CR
        0001                /END CODE
WRTN.   0015                /CR
        0012                /LF
        4000                /SPC BELL
        0711                /I
        1603                /N,C
        1722                /O,R
        2205                /R,E
        0324                /C,T
        4022                /SPC,S
        2416                /T,N
        4023                /SPC,S
        0514                /E,L
        0503                /E,C
        2405                /T,E
        0456                /D,.
        0015                /CR
        0001                /END CODE.
SBWAS.  4023                /SPC,S
        5702                /"/",B
        4040                /SPC,SPC
SB.     4040                /SPC,SPC
        4040                /SPC,SPC
        4040                /SPC,SPC
        2701                /W,A
        2340                /S,SPC
WAS.    4040                /SPC,SPC
        4040                /SPC,SPC
        0015                /CR
        0001                /END CODE
TOCMSG. 0015                /CR
        [illegible]         /LF
        [illegible]         /BE
```

IO2

SEQ 003-

```
    4040        4040                /SP,SP
    2331        2331                /SY
    2324        2324                /ST
    0515        0515                /EM
    5640        5640                /. SP
    2305        2305                /SE
    2440        2440                /T SP
    2411        2411
    [illegible]
    0605        0605                /FE
    2240        2240                /R SP
    [illegible]
    1604        1604                /ND
    4063        4063                /SP 3
    4017        4017                /SP O
    0640        0640                /F SP
    2022        2022                /PR
    0740        0740                /G SP
    [illegible]
    0756        0756                /G.
    0001        0001                /END

    2001    PAGE
            /PROGRAM 0, BASIC READER AND READER LOGIC CONTROL TEST
            /
00  4475    PPG0.   SETLOC              /SET KSTART TO
01  0020            KSTART              /INITIAL ROUTINE
02  2010            P0T0                /ADDRESS
03  4475            SETLOC              /SET SR MASK
04  0105            SRMSK
05  7717            7717
06  5607            JMP I .+1           /SET STARTED.
07  0241            ERSET
10  0000    P0T0.   0
```

```
                        POT1
                /CHECKS THAT FLAG=1 250MS. AFTER RFC (IOTO14), INDICATING THAT
                /READER IS ADVANCING.
2012  4477          SETA                    /-200 TO CTRA
2013  7470          -310
2014  4501          SETDLM                  /-250 TO DELAY
2015  7406          -372
2016  6014  POT0A,  RFC                     /CLEAR FLAG, FETCH CHAR (IOTO14)
2017  4502          DELAY                   /DELAY 75 MS.
2020  6011          RSF                     /SKIP IF FLAG=1 (IOTO11)
2021  5225          JMP POE0
2022  2122          ISZ CTRA                /DON?
2023  5216          JMP POT0A               /NO, REPEAT
2024  5425          JMP I CHAIN             /YES, CHAIN
2025  4451  POE0,   JMS I UERROR            /GO TO ERROR SUBROUTINE
2026  4040          NOSUF                   /NO PRINTOUT SUFFIX
2027  0000          NONE                    /NO PRINTOUT
2030  5222          JMP POT0A+4             /CONTINUE TEST
2031  4501  POT0S,  SETDLM                  /SCOPE LOOP
2032  7764          -14
2033  6014          RFC                     /FETCH CHAR (IOTO14)
2034  4502          DELAY                   /DELAY 12 MS.
2035  5233          JMP .-2
2036  0001  POT1,   1
2037  2064          POT2
                /WITH FLAG=1, SKIP ON FLAG 4095 TIMES TO CHECK FOR RELIABLE SKIPPING
2040  4477          SETA                    /-4095 TO CTRA
2041  0001          -7777
2042  6014          RFC                     /FETCH CHAR (OITO14)
2043  6011          RSF                     /SKIP ON FLAG (IOTO11)
2044  5243          JMP .-1                 /REPEAT
2045  6011  POT1A,  RSF                     /SKIP ON FLAG (IOTO11)
2046  5255          JMP POE1                /ERROR
2047  2122          ISZ CTRA                /DONE 4095 TIMES?
2050  5245          JMP POT1A               /NO, REPEAT TEST
2051  5425          JMP I CHAIN             /YES, CHAIN
2052  4451  POE1,   JMS I UERROR            /GO TO ERROR SUBROUTINE
2053  4040          NOSUF                   /NO PRINTOUT SUFFIX
2054  0000          NONE                    /NO PRINTOUT
2055  5247          JMP POT1A+2             /CONTINUE TEST
```



```
2056  6014  POT1S,  RFC                     /START SCOPE LOOP, FETCH CHAR (IOTO14)
2057  6011          RSF                     /SKIP ON FLAG (IOTO11)
2060  5257          JMP .-1                 /REPEAT
2061  6011          RSF                     /SKIP ON FLAG (IOTO11)
2062  5261          JMP .-1                 /REPEAT
2063  5261          JMP .-2                 /REPEAT
2064  0002  POT2,   2
2065  2105          POT3
                /CHECKS THAT IOTO11 DOES NOT SKIP WITH FLAG=0.
2066  4477          SETA                    /-4095 TO CTRA
2067  0001          -7777
2070  6012          RRB                     /CLEAR FLAG
2071  6011  POT2A,  RSF                     /SKIP ON FLAG=1(IOTO11)
2072  5303          JMP POT20K              /OK
2073  4451  POE2,   JMS I UERROR            /ERROR, GO TO ERROR SUB
2074  4040          NOSUF                   /NO PRINTOUT SUFFIX
2075  0000          NONE                    /NO PRINTOUT
2076  5303          JMP POT20K              /CONTINUE TEST
2077  6011  POT2S,  RSF                     /START SCOPE LOOP, SKIP ON FLAG
2100  5277          JMP .-1                 /REPEAT
2101  5277          JMP .-2                 /REPEAT
2102  2122  POT20K, ISZ CTRA                /DONE 4095 TIMES?
2103  5271          JMP POT2A               /NO, REPEAT
2104  5425          JMP I CHAIN             /YES, CHAIN

                /ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED
2105  0003  POT3,   3
2106  2200          POT4
2107  1377          TAD (4000
2110  3022          DCA COUNT
2111  1375          TAD (7773
2112  3136          DCA CTR
2113  6552          IOF
2114  7200          CLA
2115  3135          DCA MILLI
2116  2135          ISZ MILLI
2117  5316          JMP .-1
2120  2136          ISZ CTR
2121  5315          JMP .-3
2122  1376          TAD (2260               /4.56 MS CONSTANT
2123  3134          DCA DELTIM
2124  6007          CAF
2125  6016          RCF                     /READ
2126  4351          JMS TIM
2127  6011  POT3A,  RSF                     /SKIP IF READER FLAG SET
2130  5337          JMP POE3                /FLAG DID NOT SET
2131  6010          RPE
2132  6003          SRQ                     /SHOULD SKIP HERE IF INT REQ
2133  5337          JMP POE3                /REPORT ERROR
2134  2022          ISZ COUNT
2135  5311          JMP POT3+4
2136  5425          JMP I CHAIN
2137  4451  POE3,   JMS I UERROR
2140  4040          NOSUF
2141  0000          NONE
```

```
1031    2142  5311          JMP POT3+4
1032    2143  6002    POT3S, IOF
1033    2144  6011          RSF
1034    2145  5344          JMP .-1
1035    2146  6011          RSF
1036    2147  5346          JMP .-1
1037    2150  5346          JMP .-2
1038    2151  0000    TIM,  0
1039    2152  2134          ISZ DELTIM
1040    2153  5352          JMP .-1
1041    2154  5751          JMP I TIM
1042
1043    2175  2260
1044    2176  7773
1045    2177  4000
              2200    PAGE
1046                  /ROUTINE TO CHECK THAT INTERRUPT ENALBE CAN BE CLEARED FOR READER.
1047    2200  0004    POT4, 4
1048    2201  2400          POTS
1049    2202  6002          IOF
1050    2203  1234          TAD     R7770
1051    2204  3235          DCA     RCNT2           /INIT. # OF ITERATIONS
1052    2205  6007    RLOOP, CAF
1053    2206  6010          RPE                     /ENABLE INTERRUPT
1054    2207  6020          PCE
1055    2210  6001          ION
1056    2211  6014          RCF                     /READ
1057    2212  6000          SKON
1058    2213  5224          JMP POE4                /INTERRUPT NOT ON
1059    2214  6003          SRQ                     /SKIP IF INT REQ GENERATED
1060    2215  7410          SKP                     /NO INT REQ
1061    2216  5224          JMP POE4                /INT REQ GENERATED
1062    2217  2022          ISZ COUNT               /RELIABILITY SETUP
1063    2220  5205    POT4A, JMP RLOOP              /CONTINUE
1064    2221  2235          ISZ     RCNT2
1065    2222  5205          JMP     RLOOP
1066    2223  5425          JMP I CHAIN
1067    2224  4451    POE4, JMS I UERROR
1068    2225  4040          NOSUF
1069    2226  0000          NONE
1070    2227  5425          JMP I CHAIN
1071    2230  6010    POT4S, PPE
1072    2231  4502          DELAY
1073    2232  6020          PCE
1074    2233  5230          JMP .-3
1075
1076    2234  7770    R7770, 7770
1077    2235  7770    RCNT2, 7770
1078
1079          2400    PAGE
1080    2400  0005    POTS, 5
1081    2401  2430    POTS
1082                  /CHECKS IOTD12 (RRB) FOR ABILITY TO CLEAR FLAG.
1083    2402  4477          SETA                    /-500 TO CTRA
1084    2403  7014          -764
```



```
1085    2404  6014    POT5A, RFC                    /FETCH CHAR (IOTD14)
1086    2405  6011          RSF                     /WAIT FOR FLAG-1
1087    2406  5205          JMP .-1
1088    2407  6012          RRB                     /CLEAR FLAG (IOTD12)
1089    2410  6011          RSF                     /SKIP ON FLAG=1
1090    2411  5225          JMP POT5B               /OK.
1091    2412  4451    POE5, JMS I UERROR            /ERROR, GO TO ERROR SUB.
1092    2413  4040          NOSUF                   /NO PRINTOUT SIFFIX
1093    2414  0000          NONE                    /NO PRINTOUT
1094    2415  5225          JMP POT5B               /CONTINUE TEST
1095    2416  6014    POT5S, RFC                    /START SCOPE LOOP. FETCH CHAR
1096    2417  6011          RSF                     /WAIT FOR FLAG=1
1097    2420  5217          JMP .-1
1098    2421  6012          RRB                     /CLEAR FLAG (IOTD12)
1099    2422  6011          RSF                     /SKIP IF FLAG=1
1100    2423  5216          JMP .-5                 /NO, IOTD12 CLEARED IT. READ AGAIN
1101    2424  5221          JMP .-3                 /IOTD12 FAILED, REPEAT IMTD12.
1102    2425  2132    POT5B, ISZ CTRA               /DONE?
1103    2426  5204          JMP POT5A               /NO, REPEAT
1104    2427  5425          JMP I CHAIN             /YES, CHAIN
1105    2430  0006    POT6, 6
1106    2431  2600          POT7
1107                  /CHECKS THAT IOTD14 CLEARS FLAG.
1108    2432  4477          SETA                    /-500 TO CTRA.
1109    2433  7014          -764
1110    2434  6014          RFC                     /FETCH CLEAR (IOTD14)
1111    2435  6011    POT6A, RSF                    /WAIT FOR FLAG=1.
1112    2436  5235          JMP .-1
1113    2437  6014          RFC                     /CLEAR FLAG WITH IOTD14
1114    2440  6011          RSF                     /SKIP IN FLAG=1.
1115    2441  5253          JMP POT6B               /OK FLAG IS 0.
1116    2442  4451    POE6, JMS I UERROR            /ERROR, FLAG=1. GO TO ERROR SUB.
1117    2443  4040          NOSUF                   /NO PRINTOUT SUFFIX
1118    2444  0000          NONE                    /NO PRINTOUT
1119    2445  5253          JMP POT6B               /CONTINUE TEST
1120    2446  4502    POT6S, DELAY                  /START SCOPE LOOP, DELAY 20 MS.
1121    2447  6014          RFC                     /FETCH CHAR (IOTD14)
1122    2450  6011          RSF                     /WAIT FOR FLAG=1.
1123    2451  5250          JMP .-1
1124    2452  5247          JMP .-3                 /GO CLEAR FLAG AND FETCH CHAR.
1125    2453  2132    POT6B, ISZ CTRA               /DONE?
1126    2454  5235          JMP POT6A               /NO, REPEAT
1127    2455  5425          JMP I CHAIN             /YES, CHAIN
1128
1129          2600    PAGE
1130    2600  0007    POT7, 7
1131    2601  2637          POT10
1132                  /CHECKS ABILITY TO READ ALL 0'S CHARACTERS
1133    2602  4477          SETA                    /-500 TO CTRA
1134    2603  7014          -764
1135    2604  6014    POT7A, RFC                    /FETCH CHAR (IOTD14)
1136    2605  6011          RSF                     /WAIT FOR FLAG=1.
1137    2606  5205          JMP .-1
1138    2607  7200          CLA
1139    2610  6012          RRB                     READ BUFFER
```

```
2404 6014 POT5A,  RFC                   /FETCH CHAR (IOT014)
2405 6011         RSF                   /WAIT FOR FLAG-1
2406 5205         JMP .-1
2407 6012         RRB                   /CLEAR FLAG (IOT012)
2410 6011         RSF                   /SKIP ON FLAG=1
2411 5225         JMP POT5B             /OK.
2412 4451 POE5,   JMS I UERROR          /ERROR, GO TO ERROR SUB.
2413 4040         NOSUF                 /NO PRINTOUT SIFFIX
2414 0000         NONE                  /NO PRINTOUT
2415 5225         JMP POT5B             /CONTINUE TEST
2416 6014 POT5S,  RFC                   /START SCOPE LOOP. FETCH CHAR
2417 6011         RSF                   /WAIT FOR FLAG=1
2420 5217         JMP .-1
2421 6012         RRB                   /CLEAR FLAG (IOT012)
2422 6011         RSF                   /SKIP IF FLAG=1.
2423 5216         JMP .-5               /NO, IOT012 CLEARED IT. READ AGAIN
2424 5221         JMP .-3               /IOT012 FAILED, REPEAT IMT012.
2425 2122 POT5B,  ISZ CTRA              /DONE?
2426 5204         JMP POT5A             /NO, REPEAT
2427 5425         JMP I CHAIN           /YES, CHAIN
2430 0006 POT6,   6
2431 2600         POT7
          /CHECKS THAT IOT014 CLEARS FLAG.
2432 4477         SETA                  /-500 TO CTRA.
2433 7014         -764
2434 6014         RFC                   /FETCH CLEAR (IOT014)
2435 6011 POT6A,  RSF                   /WAIT FOR FLAG=1.
2436 5235         JMP .-1
2437 6014         RFC                   /CLEAR FLAG WITH IOT014
2440 6011         RSF                   /SKIP IN FLAG=1.
2441 5253         JMP POT6B             /OK FLAG IS 0.
2442 4451 POE6,   JMS I UERROR          /ERROR, FLAG=1. GO TO ERROR SUB.
2443 4040         NOSUF                 /NO PRINTOUT SUFFIX
2444 0000         NONE                  /NO PRINTOUT
2445 5253         JMP POT6B             /CONTINUE TEST
2446 4502 POT6S,  DELAY                 /START SCOPE LOOP. DELAY 20 MS.
2447 6014         RFC                   /FETCH CHAR (IOT014)
2450 6011         RSF                   /WAIT FOR FLAG=1.
2451 5250         JMP .-1
2452 5247         JMP .-3               /GO CLEAR FLAG AND FETCH CHAR.
2453 2122 POT6B,  ISZ CTRA              /DONE?
2454 5235         JMP POT6A             /NO, REPEAT
2455 5425         JMP I CHAIN           /YES, CHAIN

          2600 PAGE
2600 0007 POT7,   7
2601 2637         POT10
          /CHECKS ABILITY TO READ ALL 0'S CHARACTERS
2602 4477         SETA                  /-500 TO CTRA
2603 7014         -764
2604 6014 POT7A,  RFC                   /FETCH CHAR (IOT014)
2605 6011         RSF                   /WAIT FOR FLAG=1.
2606 5205         JMP .-1
2607 7200         CLA
2610 6012         RRB                   /READ BUFFER
```

N03


```
2611 3236         DCA POT7WB            /SAVE
2612 1236         TAD POT7WB
2613 7540         SZA CLA               /RESULT 0?
2614 5220         JMP POE7              /ERROR, DID NOT READ 0'S CHAR.
2615 2122 POT7B,  ISZ CTRA              /DONE?
2616 5204         JMP POT7A             /NO, REPEAT
2617 5425         JMP I CHAIN           /YES CHAIN
2620 4462 POE7,   JMS I UASCCN
2621 2635         POT7WA
2622 [illegible]  S3
2623 4462         JMS I UASCCN
2624 2636         POT7WB
2625 [illegible]  WAS
2626 4451         JMS I UERROR          /GO TO ERROR SUBROUTINE
2627 4040         NOSUF                 /NO SUFFIX
2630 [illegible]  S3WAS                 /PRINT S/3 AND WAS.
2631 5215         JMP POT7B             /CONTINUE TEST
2632 7200 POT7S,  CLA
2633 6012         RRB                   /READ BUFFER, AC S/B 7400
2634 5232         JMP .-2               /REPEAT
2635 0000 POT7WA, 0000
2636 0000 POT7WB, 0000
2637 0010 POT10,  10
2640 [illegible]  POT11
          /CHECKS ABILITY OF READER FLAG TO CAUSE AN INTERRUPT.
2641 4475         SETLOC                /SET INTERRUPT RETURN TO
2642 0002         2                     /POE10A
2643 2654         POE10A
2644 6032 POT10A, KCC                   /CLEAR TTY READER FLAG.
2645 6042         TCF                   /CLEAR TTY PRINTER FLAG.
2646 6022         PCF                   /CLEAR PUNCH FLAG
2647 6012         RRB                   /CLEAR READER FLAG.
2650 6001         ION                   /ENABLE INTERRUPT
2651 7000         NOP                   /NO OP.
2652 6002         IOF                   /TURN OFF INTERRUPT
2653 5261         JMP POT10B
2654 4451 POE10A, JMS I UERROR          /GO TO ERROR SUB.
2655 0140         A                     /SUFFIX A
2656 0000         NONE                  /NO PRINTOUT.
2657 5244         JMP POT10A            /REPEAT TEST.
2660 5244         JMP POT10A            /REPEAT TEST.
2661 4477 POT10B, SETA                  /-4095 TO CTRA
2662 0001         -7777
2663 4475         SETLOC                /SET INTERRUPT RETURN
2664 0002         2                     /POT10E.
2665 2713         POT10E
2666 6010         RPE                   /SET INTERRUPT ENABLE
2667 6014         RFC                   /FETCH CHAR (IOT014)
2670 6011         RSF                   /WAIT FOR FLAG-1.
2671 5270         JMP .-1
2672 6001 POT10C, ION                   /ENABLE INTERRUPT
2673 7000         NOP
2674 6002         IOF                   /TURN OFF INTERRUPT
2675 4451         JMS I UERROR          /GO TO ERROR SUB
2676 0240         B                     /SUFFIX B.
```

```
  NONE                    /CONTINUE TEST
  JMP POT10E              /SET INTERRUPT RETURN TO
  , SETLOC                /POT10D.
  2
  POT10D                  /FETCH CLEAR
  RFC                     /WAIT FOR FLAG=1
  RSF
  JMP .-1                 /ENABLE INTERRUPT
  ION
  NOP
  JMP .-2
DD, JMP .-3               /DONE?
.DE  ISZ CTRA             /NO, REPEAT.
  JMP POT10C              /CLEAR INTERRUPT ENABLE
  PCE                     /YES, CHAIN.
  JMP I CHAIN
OP DELAY TEST             /TEST #
11,  11                   /LAST TEST.
  7777                    /-200 TO CTRA
  SETA
  -310                    /INITIAL DELAY.
T11A. JMS DLY250          /-19 TO DELAYM
  SETDLM
  -23                     /FETCH CHAR.
  RFC                     /WAIT FOR FLAG.
  RSF
  JMP .-1                 /DELAY 19 MSECS TO CAUSE
  DELAY                   /"STOP DELAY" TO FIRE. FETCH CHAR.
  RFC                     /DELAY 19 MORE MSECS.
  DELAY                   /CHECK FLAG.
  RSF                     /FLAG NOT UP. OK
  JMP POT11B              /ERROR. FLAG SHOULD NOT BE UP
  JMS I UERROR            /38 MSECS AFTER "STOP DELAY"
  A                       FIRES.
  NONE                    /CONTINUE TEST.
  JMP POT11A              /GO TO SCOPE LOOP.
  JMP POT11S              /DELAY ADDITIONAL 212 MSECS.
POT11B, JMS DLY212        /FLAG UP?
  RSF                     /NO, ERROR.
  JMP .+4                 /DONE 500 TIMES?
POT11C, ISZ CTRA          /NO, REPEAT.
  JMP POT11A              /YES, CHAIN.
  JMP I CHAIN             /ERROR, FLAG NOT UP 250 MSECS
  JMS I UERROR            /AFTER "STOP DELAY" FIRED.
  B
  NONE                    /SET DELAYM FOR 15 MSECS.
  JMP POT11C
POT11S, SETDLM            /FETCH CHAR.
  -17                     /FLAG 1?
  RFC                     /YES, DELAY 15 MSECS.
  JMP .-1                 /FETCH CHAR.
  DELAY                   /WAIT FOR FLAG.
  RFC
  RSF
  JMP .-1
```



```
                JMP .-4                /REPEAT.
  5361   DLY212, 0                     /-212 TO DELAYM
  0000          SETDLM                 /DELAY 212 MSECS.
  4501          -324
  7454          DELAY                  /EXIT.
  4502          JMP I DLY212
  5766   DLY250, 0                     /DELAY 250 MSECS.
  0000          SETDLM
  4501          -372
  7405          DELAY                  /EXIT.
  4502          JMP I DLY250
  5773
  3000          PAGE
                /PROGRAM 1, BASIC PUNCH AND CONTROL LOGIC TEST
                /
         PRG1,  SETLOC                 /SET KSTART TO
00   4475       KSTART                 /INITIAL ROUTINE
01   0020       P1T0                   /ADDRESS.
02   3010       SETLOC                 /SET SR MASK
03   4475       SRMSK
04   0105       7717                   /GET STARTED
005  7717       JMP I .+1
006  5607       SRSET
3007 0241  P1T0, 0
3010 0000       P1T1
3011 3032  /CHECKS THAT PSF (IOT021) DOES NOT SKIP WITH FLAG = 1
                SETA                   /-4095 TO CTRA
3012 4477       -7777
3013 0001  P1T0A, PCF                  /CLEAR FLAG
3014 6022       PSF                    /SKIP IF FLAG=1 (IOT021)
3015 6021       JMP P1T0B              /NO SKIP, OK
3016 5227  P1E0, JMS I UERROR          /SKIP. ERROR, GO TO ERROR SUB
3017 4451       NOSUF                  /NO SUFFIX
3020 4040       NONE                   /NO PRINTOUT
3021 0000       JMP P1T0B              /CONTINUE TEST.
3022 5227  P1T0S. PCF                  /CLEAR FLAG
3023 6022       PSF                    /SKIP IF FLAG=1
3024 6021       JMP .-1
3025 5224       JMP .-2
3026 5224  P1T0B. ISZ CTRA             /DONE?
3027 2122       JMP P1T0A              /NO, REPEAT
3030 5214       JMP I CHAIN            /YES. CHAIN
3031 5425  P1T1,  1
3032 0001       P1T2
3033 3063  /CHECKS THAT PSF (IOT021) SKIPS WITH FLAG=1 IF FLAG=1.
                SETA                   /-4095 TO CTRA
3034 4477       -7777
3035 0001       SETDLM                 /-4095 TO DELAYM
3036 4501       -7777
3037 0001       CLA CLL
3040 7300       PCF                    /CLEAR PUNCH FLAG, LOAD BUFFER
3041 6022       PPC                    /LOAD BUFFER AND PUNCH
3042 6024       DELAY                  /DELAY 4095 MILLISECONDS
3043 4502  P1T1A. PSF                  /SKIP IF FLAG=1. (SHOULD BE 1)
3044 6021       JMP P1E1               /NO. SKIP. ERROR.
3045 5251
```

/PCE

SEQ 0041

```
      2122    P1T1B,  ISZ CTRA                /DONE?
      5244            JMP P1T1A               /NO, REPEAT
      5425            JMP I CHAIN             /YES, CHAIN
      4451    P1E1,   JMS I UERROR            /GO TO ERROR SUBROUTINE
      4040            NOSUF                   /NO SUFFIX
      0000            NONE                    /NO PRINTOUT
      5246            JMP P1T19               /CONTINUE TEST
      7200    P1T1S,  CLA
      6022            PCF                     /CLEAR FLAG AND BUFFER
      6024            PPC                     /SKIP IF FLAG 1
      6021            PSF                     /LOAD AND PUNCH
      5260            JMP .-1                 /REPEAT
      5260            JMP .-2                 /REPEAT
      0002    P1T2,   2
      3115            P1T3
              /CHECKS THAT PCF (IOT022) IS ABLE TO CLEAR THE FLAG
   5  4477            SETA                    /-500 TO CTRA
   6  7014            -764
   7  7200    P1T2A,  CLA
   0  6026            PLS                     /CLEAR, LOAD AND PUNCH
   1  602.            PSF                     /WAIT FOR FLAG-1
   2  5271            JMP .-1
   3  6022            PCF                     /CLEAR FLAG (IOT022)
   4  6021            PSF                     /SKIP IF FLAG=1
   5  5312            JMP P1T2B               /NO SKIP, OK.
   6  4451    P1E2,   JMS I UERROR            /SKIP ERROR GO TO ERRCR SUB
   7  4040            NOSUF
  00  0000            NONE
  01  5312            JMP P1T2B               /CONTINUE TEST.
  02  7200    P1T2S,  CLA
  03  6026            PLS                     /CLEAR, LOAD, AND PUNCH
  04  6021            PSF                     /WAIT FOR FLAG
  05  5304            JMP .-1
 .06  6022            PCF                     /CLEAR FLAG
 .07  6021            PSF                     /SKIP IF FLAG=1
 .10  5302            JMP .-6                 /CLEARED.
 .11  5306            JMP .-3                 /NOT CLEAR.
 112  2122    P1T2B,  ISZ CTRA                /SAVE?
 113  5267            JMP P1T2A               /NO, REPEAT
 114  5425            JMP I CHAIN             /YES, CHAIN
              /ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED
 115  0003    P1T3,   3
 116  3200            P1T4
 117  1377            TAD (4000
3120  3022            DCA COUNT
3121  1376            TAD (7773
3122  3136            DCA CTR
3123  6002            IOF
3124  7200            CLA
3125  3135            DCA MILLI
3126  2135            ISZ MILLI
3127  5326            JMP .-1
3130  2136            ISZ CTR
3131  5325            JMP .-3
3132  1375            TAD (0001               /16 MS CONSTANT
```

```
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
```

E04

IGH SPEED READER AND PUNCH TESTS.   PAL10 V142A 4-FEB-77   10:03 PAGE 2-7

SEQ 0043   /PC8-

```
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            JMP P1E3
3141  6010            RPE
3142  6003            SRQ                     /SHOULD SKIP HERE FOR INT REQ
3143  534.            JMP P1E3                /REPORT ERROR
3144                  ISZ COUNT
3145                  JMP P1T3+4
3146  5425            JMP I CHAIN
3147  4451    P1E3,   JMS I UERROR
3150  4040            NOSUF
3151  0000            NONE
3152  5321            JMP P1T3+4
3153  6002    P1T3S,  IOF
3154  6021            PSF
3155  5354            JMP .-1
3156  [illegible]     PSF
3157  5356            JMP .-1
3160  5356            JMP .-2
3161  0000    TIM1,   0                       /44 MILLISEC TIME OUT
3162  2134            ISZ DELTIM
3163  5362            JMP .-1
3164  1374            TAD (0500
3165  3134            DCA DELTIM
3166  2134            ISZ DELTIM
3167  5366            JMP .-1
3170  2134            ISZ DELTIM
3171  5370            JMP .-1
3172  5761            JMP I TIM1              /RETURN

3174  0500
3175  0001
3176  7773
3177  4000
      3200    PAGE
              /ROUTINE TO CHECK THAT INTERRUPT ENABLE CAN BE CLEARED FOR PUNCH.
3200  0004    P1T4,   4
3201  3234            P1T5
3202  6002            IOF
3203  1302            TAD     P7770
3204  3301            DCA     PCNT2           /INIT. COUNTER
3205  6007    PLOOP,  CAF
3206  6010            RPE                     /ENABLE INTERRUPT
3207  6020            PCE
3210  6001            ION
3211  6024            PPC
3212  6000            SKON                    /PUNCH
3213  5224            JMP P1E4                /ERROR -- NO ION
3214  6003            SRQ                     /SKIP IF INT REQ GENERATED
3215  7410            SKP                     /NO INT REQ
3216  5224            JMP P1E4                /ERROR -- INT REQ GENERATED
3217  2022            ISZ COUNT               /RELIABILITY SETUP
```

```
P1T4A,  JMP PLOOP
        ISZ PCNT2
        JMP PLOOP
        JMP I CHAIN
P1E4,   JMS I UERROR
        NOSUF
        NONE
        JMP I CHAIN
P1T4S,  RPE
        DELAY
        PCE
        JMP .-3
P1T5,   5
        P1T6
/USED TO CHECK ABILITY OF (IOT022) TO CLEAR BUFFER. VISUAL CHECK
        SETA                    /-500 TO CTRA
        -764
P1T5A,  CLA CMA                 /7777 TO AC
        PLS                     /CLEAR, LOAD, AND PUNCH
        CLA
        PLS                     /CLEAR BUFFER CONTENTS PRIOR
                                /TO PUNCHING
        PSF
        JMP .-1
        ISZ CTRA                /DONE?
        JMP P1T5A               /NO, REPEAT
        JMP I CHAIN             /YES, CHAIN
P1T6,   6
        P1T7
/CHECKS ABILITY OF IOT024 TO SET BUFFER TO 125 AND PUNCH IT
        SETA                    /-500 TO CTRA
        -764
P1T6A,  CLA
        TAD I125
        PLS                     /CLEAR, LOAD AND PUNCH
        PSF                     /WAIT FOR FLAG 1
        JMP .-1
        ISZ CTRA                /DONE?
        JMP P1T6A               /NO, REPEAT
        JMP I CHAIN             /YES, CHAIN
P1T7,   7
        P1T10
/CHECKS ABILITY OF IOT024 TO SET BUFFER TO 252 AND PUNCH IT
        SETA                    -500 TO CTRA
        -764
P1T7A,  CLA
        TAD I252
        PLS                     /CLEAR LOAD AND PUNCH.
        PSF                     /WAIT FOR FLAG 1
        JMP .-1
        ISZ CTRA                /DONE?
        JMP P1T7A               /NO, REPEAT
        JMP I CHAIN             YES, CHAIN

PCNT2,  7770
```



```
P7770,  7770

        PAGE
P1T10,  10
        7777
/CHECKS ABILITY OF PUNCH FLAG TO CAUSE AN INTERRUPT
        SETLOC                  /SET INTERRUPT RETURN
        2                       /TO P1E10A.
        P1E10A
P1T10A, KCC                     /CLEAR TTY READER
        TOF                     /CLEAR READER
        RRB                     /CLEAR READER
        PCF                     /CLEAR PUNCH FLAG
        ION                     /ENABLE INTERRUPT
        NOP
        IOF                     /TURN OFF INTERRUPT
        JMP P1T10B
P1E10A, JMS I UERROR
        4
        NONE
        JMP P1T10A
        JMP P1T10A
P1T10B, SETA                    /-4095 TO CTRA
        -7777
        SETLOC                  /SET INTERRUPT RETURN
        2                       /TO P1T10E
        P1T10E
        CLA
        RPE                     /SET INTERRUPT ENABLE
        PLS                     /CLEAR, LOAD AND PUNCH
        PSF                     /WAIT FOR FLAG 1.
        JMP .-1
P1T10C, ION
        NOP
        IOF
P1E10B, JMS I UERROR
        10
        NONE
        JMP P1T10E
P1T10S, SETLOC                  /SET INTERRUPT
        2                       /RETURN TO P1T10D
        P1T10D
        CLA
        PLS                     /CLEAR, LOAD AND PUNCH
        PSF                     /WAIT FOR FLAG 1.
        JMP .-1                 /ENABLE INTERRUPT
        ION
        IOF
        JMP .-2
P1T10D, JMP .-2
P1T10E, ISZ CTRA                /DONE?
        JMP P1T10C              /NO, REPEAT
        PCF                     /CLEAR INTERRUPT ENABLE
        JMP I CHAIN             /YES, CHAIN
```

```
        /PROGRAM 2, READER TEST. SPECIAL BINARY COUNT PATTERN
        PRG2,   SETLOC                  /SET SR
                SRMSK                   /MASK TO
                0460                    /0460
        P2A,    JMS I SYNC              /SYNC READER
                SETA
                -5
        P2B,    JMS I CRCNT             /GET RANDOM CHAR
                DCA CTRB                /COUNT IN CTRB.
        P2C,    JMS I GETPT             /GET BINARY CHARACTER
                DCA I UTSB              /STORE IT
                JMS I UTREAD            /GO READ CHARACTER
                JMS I UTCHK             /GO CHECK IT
                JMP P2E                 /ERROR
        P2D,    ISZ CTRB                /GROUP DONE?
                JMP P2C                 /NO.
                JMS I ISTALL            /YES, STALL
                JMP P2B                 /REPEAT
        P2E,    ISZ CTRA                /5 ERRORS?
                JMP P2D                 /NO, CONTINUE
                JMP P2A                 /RESYNC
        /
        /PROGRAM 3, PUNCH TEST. SPECIAL BINARY COUNT PATTERN
        PRG3,   JMS I UMARK             /MARK TAPE
                JMS I UPLDR             /PUNCH LEADER
                JMS I INPATT            /INITIALIZE BINARY PATTERN
                TAD I60
                DCA SRMSK
        P3A,    JMS I GETPT             /GET BINARY CHARACTER
                JMS I UTPCH             /PUNCH IT
                JMS I ISTALL
                JMP P3A                 /REPEAT.

        PRG4,   JMS I INPATT            /INITIALIZE BINARY PATTERN
                SETLOC                  /400 TO
                SRMSK                   /SR MASK
                0400
                JMS I GETPT             /GET BINARY CHARACTER
                DCA I UTSB              /STORE IT
                JMS I UTREAD            /READ CHARACTER
                SZA                     /ZERO?
                JMP P4B                 /NO.
                JMP .-3                 /YES, REPEAT READ.
        P4A,    JMS I GETPT             /GET BINARY CHARACTER
                DCA I UTSB              /STORE IT
                JMS I UTREAD            /READ CHARACTER
        P4B,    JMS I UTCHK             /GO CHECK IT
                NOP                     /ERROR
                JMP P4A                 /REPEAT.
        /
        /PROGRAM 5, PUNCH TEST, RANDOM CHARACTER PATTERN.
        PRG5,   JMS I UMARK             /MARK TAPE
                JMS I UPLDR             /PUNCH LEADER
                JMS I UMOVE             /INITIALIZE RANDOM
                SEED1                   /CHARACTER ROUTINE.
```

ACTIND
ADDRZA
AMPRD
AMPRDA
ARROW
ASCCN
ASCT
B
BDCNV
BELL3
CAF
CHAIN
CHAINN
CHCK
CHECK
CHR1
CHR2
CHR3
CHRCNT
CNV
CNVCTR
COUNT
CPCH
CPID
CPS
CRCNT
CRCTR
CREAD
CRLF
CTR
CTRA
CTRB
CTRC
CTRD
CTSK
CTSK1
CURTST
DELAY
DELAYM
DELTIM
DIGIT
DLCNT
DLY212
DLY250
DLYCNT
DLYMS
DLYMSK
ENUMB

I04


```
 1251                   RANP1
 7774                   -4
 1150                   TAD I60
 3105                   DCA SRMSK
 4453           P5A,    JMS I ULPRGN            /GET RANDOM CHARACTER
 4456                   JMS I UTPCH             /PUNCH IT
 4563                   JMS I ISTALL
 5347                   JMP P5A                 /REPEAT

                /PROGRAM 6, PUNCH VERIFY, RANDOM CHARACTER PATTERN
 4474           PRG6,   JMS I UMOVE             /INITIALIZE RANDOM
 1247                   SEED1                   /CHARACTER ROUTINE
 1251                   RANP1
 7774                   -4
 4475                   SETLOC                  /400 TO
 0105                   SRMSK                   /SR MASK
 0400                   0400
 4454                   JMS I ULRRGN            /GET RANDOM CHARACTER.
 3462                   DCA I UTSB              /STORE IT
 4455                   JMS I UTREAD            /READ CHARACTER
 7440                   SZA                     /ZERO.
 5373                   JMP P6B                 /NO.
 5364                   JMP .-3                 /YES.
 4454           P6A,    JMS I ULRRGN            /GET RANDOM CHARACTER
 3462                   DCA I UTSB              /STORE IT
 4455                   JMS I UTREAD            /READ CHARACTER
 4461           P6B,    JMS I UTCHK             /GO CHECK IT
 7000                   NOP                     /ERROR
 5370                   JMP P6A

 3600           PAGE
                /PROGRAM 7, COMBINED READER-PUNCH TEST, SPECIAL BINARY COUNT PATTERN.
 4475           PRG7,   SETLOC                  /SET SR MASK TO 0460
 0105                   SRMSK
 0460                   0460
 4475                   SETLOC
 0104                   DLYMSK
 0077                   77
 4466                   JMS I INPATT            /INITIALIZE BINARY PATTERN
 2133                   ISZ ACTIND              /SET ACTIVE INDICATOR
 4475                   SETLOC                  /SET INTERRUPT
 0002                   2                       /SERVICE ADDRESS
 0703                   INTSVC
 4475                   SETLOC                  /SET PUNCH SERVICE ADDRESS
 0716                   PVCTR
 3624                   PBIN
 4475                   SETLOC                  /SET READER SERVICE ADDRESS
 0711                   RVCTR
 0671                   WNZERO
 4246                   JMS CPCH                /PUNCH CHAR.
                        ION                     /ENABLE INTERRUPT
                        JMP                     /IDLE
                PBIN,   ISZ PCHCNT              /INCREMENT PUNCH COUNT
                        TAD PCHCNT              /COMPARE PUNCH COUNT
                        TAD                     /TO 100.
```

ERNUMB
ERROR
ERRORA
FADDR
FLAG
FORWD
GETPT
GETPTR
GETPT1
GETRDY
GTPTRR
INCRTN
INIT
INITPT
INPATT
INTSVC
IOUT
KSTART
LINK
LPRGN
LRRGN
MARK
MARKAD
MARKER
MCTR
MIL1
MILCTR
MILLI
MOVE
MOVEA
MSCTR
NONE
NOSUF
NXTST
OPEN
OUT
PDE0
PDE1
PDE10A
PDE2
PDE3
PDE4
PDE5
PDE6
PDE7
PDT0
PDT0A
PDT0S
PDT1
PDT10

```
7710            SPA CLA                 /GREATER THAN 100?
5233            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 SLACK COUNT
7710            SPA CLA                 /POSITIVE?
5503            OUT                     /NO, EXIT.
6014            RFC                     /YES, START READER
2127            ISZ RBUSY               /SET READER BUSY
5503            OUT                     /EXIT.
0000    CPCH,   0
4470            JMS I GETPTR            /GET BIN CHAR.
6026            PLS                     /ENABLE PUNCH
7200            CLA                     /CLEAR AC
5646            JMP I CPCH              /EXIT
0000    CREAD,  0
7200            CLA
6012            RRB                     /READ CHARACTER
3131            DCA TCHKW               /STORE IT
1132            TAD PCHCNT              /GET PUNCH COUNT
1146            TAD [-1                 /MINUS 1
3132            DCA PCHCNT              /STORE IT
1132            TAD PCHCNT
7640            SZA CLA                 /0?
5267            JMP .+3                 /NO.
3127            DCA RBUSY               /YES, CLEAR READER BUSY
5653            JMP I CREAD             /EXIT
6014            RFC                     /FETCH NEXT CHARACTER
5653            JMP I CREAD             /EXIT
4253    WNZERO, JMS CREAD               /READ CHARACTER
1131            TAD TCHKW
7650            SNA CLA                 /IS IT 0?
5503            OUT                     /YES.
4475            SETLOC                  /SET INTERRUPT SERVICE
0711            RVCTR                   /TO RBIN.
3703            RBIN                    /TO RBIN.
4477            SETA                    /-5 TO CTRA
7773            -5
7410            SKP
4253    RBIN,   JMS CREAD               /READ CHARACTER
4467            JMS I GETPT             /GET BINARY CHARACTER
3462            DCA I UTSB
1131            TAD TCHKW               /GET CHARACTER READ
4461            JMS I UTCHK             /GO CHECK IT
7410            SKP                     /ERROR
5503            OUT                     /NO.
2122            ISZ CTRA                /5 ERRORS?
5503            OUT                     /NO, TO MAILLINE
4475    RBINA,  SETLOC                  /YES, SET READER SERVICE
0711            RVCTR                   /TO RESYNC TAPE.
```



```
3720            .+2
5503            OUT
4253            JMS CREAD               /READ CHARACTER
1131            TAD TCHKW
3110            DCA     CHR1            /STORE.
4475            SETLOC                  /SET READER SERVICE
0711            RVCTR
[illegible]     .+2
[illegible]     OUT
[illegible]     JMS     CREAD           /READ CHAR.
[illegible]     TAD     TCHKW
[illegible]     DCA     CHR2
[illegible]     SETLOC                  /SET ROR
[illegible]     RVCTR                   /SERVICE
[illegible]     .+2
[illegible]     OUT
[illegible]     JMS     CREAD           /READ CHAR.
[illegible]     TAD     TCHKW
3740            DCA CHR3                /STORE AT CHR3
[illegible]     JMS I SYNCA             /GO SYNC.
3742            JMP RBINA               /SYNC ERROR. TRY AGAIN
3743            SETA                    /YES, -5 TO CTRA.
3744            7773            -5
3745            4475            SETLOC  /RESTORE READER SERVICE
3746            0711            RVCTR   /TO RBIN
3747            [illegible]     RBIN
3750            5503            OUT     /TO MAINLINE.

        4000    PAGE
                /PROGRAM 10, READ AMPLIFIER ADJUSTMENT LOOP
4000    4475    PRG10,  SETLOC                  /SET INTERRUPT SERVICE
4001    [illegible]     2                       /TO INTSVC.
4002    [illegible]     INTSVC
4003    [illegible]     SETLOC                  /SET PUNCH SERVICE ADDRESS
4004    [illegible]     RVCTR                   /TO PCHCLR.
4005    0741            PCHCLR
4006    4475            SETLOC                  /SET READER SERVICE ADDRESS
4007    0711            RVCTR                   /TO AMPRDA
4010    [illegible]     AMPRDA
4011    4475            SETLOC
4012    [illegible]     ERRORA
4013    7000            7000
4014    1044            TAD [NOP
4015    3672            DCA I [STALL+3
4016    3105            DCA SRMSK               /0 TO SRMSK
4017    4253    RAMPA,  JMS AMPRD               /GO READ CHARACTER
4020    7440            SZA                     /ZERO?
4021    7410            SKP                     /NO.
4022    4253    RAMPB,  JMS AMPRD               /GO READ CHARACTER.
4023    7041            CIA
4024    [illegible]     TAD [PTMSK
4025    7640            SZA CLA                 /ALL 1'S?
4026    [illegible]     JMP RAMPC               /NO, ERROR.
4027    [illegible]     JMS AMPRD               /YES, GO READ
4030    7640            SZA CLA                 /ZERO?
```

```
5242            JMP RAMPD               /NO, ERROR.
5222            JMP RAMPB               /YES, REPEAT
4452  RAMPC,   JMS I UASCCN            /CONVERT EXPECTED CHARACTER
4052            RAMPF                   /TO PRINTABLE ASCII
1604            SB
4452            JMS I   UASCCN          /CONVERT BAD CHARACTER TO
4074            RAMPWA
1611            WAS
5246            JMP RAMPE
4452  RAMPD,   JMS I   UASCCN          /CONVERT EXPECTED CHARACTER TO
4075            RAMPWB                  /PRINTABLE ASCII
1604            SB
5236            JMP RAMPD-4
4451  RAMPE,   JMS I UERROR            /GO PRINT ERROR.
4040            NOSUF
1601            SBWAS
5217            JMP RAMPA               /TRY AGAIN.
0377  RAMPF,   377
0000  AMPRD,   0
4501            SETDLM                  /-75 TO DELAYM
7665            -113
6014            RFC                     /FETCH CHARACTER
6001            ION                     /ENABLE INTERRUPT
4502            DELAY                   /DELAY 75 MSEC.
6002            IOF
6011            RSF                     /FLAG 1?
7410            SKP                     /NO, FLAG DROPPED
5270            JMP AMPRDA              /YES.
4447            JMS I XTYPST            /RING BELL 3 TIMES
4076            BELL3
5217            JMP RAMPA               /TRY AGAIN
6012  AMPRDA,  RRB
3274            DCA RAMPWA
1274            TAD RAMPWA
5653            JMP I AMPRD
0000  RAMPWA,  0
0000  RAMPWB,  0
0007  BELL3,   0007                    /BELL
0007            0007                    /BELL
0007            0007                    /BELL
0001            0001                    /END CODE.
                /
                /PROGRAM 11, PUNCH ANY CHARACTER IN SR, CONTINUOUSLY
7604  PRG11,   LAS                     /READ SR
0153            AND [PTMSK
6026            PLS                     /PUNCH CHARACTER
6021            PSF                     /FLAG 1?
5305            JMP .-1                 /NO,
5301            JMP .-5                 /YES, REPEAT
                /
                /PROGRAM 12, PUNCH 1'S AND 0'S LOOP
4475  PRG12,   SETLOC
0105            SRMSK
0075            0075
7240  PRG12A,  CLA CMA
```



```
0153            AND [PTMSK
4456            JMS I UTPCH             /PUNCH ALL 1'S
4563            JMS I [STALL
7200            CLA
4456            JMS I UTPCH             /PUNCH ALL 0'S
4563            JMS I [STALL
5313            JMP PRG12A              /REPEAT.

                PAGE
                PRG13,  CLA
                        DCA CTRB        /CLEAR CTRB
                        LAS             /READ SR
                        RAL
                        SNA CLA         /LONG OR SHORT?
                        TAD [-416       /LONG
                        TAD [-36        /SHORT
                        DCA TKN         /STORE AT TKN
                        JMP TSTRL
                TSTRD,  RSF             /START READER
                        RSF             /WAIT FOR
                        JMP .-1         /FLAG
                        ISZ CTRA        /INCREMENT CTRA.
                        JMP TSTRC       /NO.
                        ISZ CTRB        /YES, INCREMENT CTRB
                        NOP
                TSTRL,  TAD TKN         /LOAD CTRA
                        DCA CTRA
                TSTRC,  LAS             /READ SR
                        SMA CLA         /PRINT SPEED?
                        JMP TSTRD       /NO, CONTINUE READING
                        JMS I XTYPST    /YES.
                        RSPD
                        JMS TSTRPC
                        HLT
                        JMP PRG13
                TKN,    OPEN
                /
                PRG14,  CLA
                        DCA CTRB        /CLEAR CTRB
                        JMP TSTPL
                TSTPP,  PLS
                        PSF
                        JMP .-1
                        ISZ CTRA        /60?
                        JMP TSTPC       /NO,
                        ISZ CTRB        /YES, INCREMENT CTRB
                        NOP
                TSTPL   TAD [-74                /LOAD -60 IN CTRA
                        DCA CTRA
                TSTPC,  LAS             /READ SR
                        SMA CLA         /PRINT SPEED? (AFTER 60 SECONDS)
                        JMP TSTPP       /NO, CONTINUE
                        JMS I XTYPST    /YES.
                        RSPD
                        JMS TSTRPC
```

```
4114 0153           AND [PTMSK
4115 4456           JMS I UTPCH         /PUNCH ALL 1'S
4116 4563           JMS I [STALL
4117 7200           CLA
4120 4456           JMS I UTPCH         /PUNCH ALL 0'S
4121 4563           JMS I [STALL
4122 5313           JMP PRG12A          /REPEAT.

     4200           PAGE
4200 7200 PRG13,    CLA
4201 3123           DCA CTRB            /CLEAR CTRB
4202 7604           LAS                 /READ SR
4203 7104           CLL RAL
4204 7710           SPA CLA             /LONG OR SHORT?
4205 1143           TAD [-416           /LONG
4206 1142           TAD [-36            /SHORT
4207 3232           DCA TKN             /STORE AT TKN
4210 5220           JMP TSTRL
4211 6014 TSTRD,    RFC                 /START READER
4212 6011           RSF                 /WAIT FOR
4213 5212           JMP .-1             /FLAG
4214 2122           ISZ CTRA            /INCREMENT CTRA.
4215 5222           JMP TSTRC           /NO.
4216 2123           ISZ CTRB            /YES, INCREMENT CTRB
4217 7000           NOP
4220 1232 TSTRL,    TAD TKN             /LOAD CTRA
4221 3122           DCA CTRA
4222 7604 TSTRC,    LAS                 /READ SR
4223 7700           SMA CLA             /PRINT SPEED?
4224 5211           JMP TSTRD           /NO, CONTINUE READING
4225 4447           JMS I XTYPST        /YES.
4226 1532           RSPD
4227 4257           JMS TSTRPC
4230 7402           HLT
4231 5200           JMP PRG13
4232 0000           TKN,    OPEN
          /
4233 7200 PRG14,    CLA
4234 3123           DCA CTRB            /CLEAR CTRB
4235 5245           JMP TSTPL
4236 6026 TSTPP,    PLS
4237 6021           PSF
4240 5237           JMP .-1
4241 2122           ISZ CTRA            /60?
4242 5247           JMP TSTPC           /NO.
4243 2123           ISZ CTRB            /YES, INCREMENT CTRB
4244 7000           NOP
4245 1141           TSTPL,  TAD [-74            /LOAD -60 IN CTRA
4246 3122           DCA CTRA
4247 7604 TSTPC,    LAS                 /READ SR
4250 7700           SMA CLA             /PRINT SPEED? (AFTER 60 SECONDS)
4251 5236           JMP TSTPP           /NO, CONTINUE
4252 4447           JMS I XTYPST        /YES.
4253 1543           PSPD
4254 4257           JMS TSTRPC
```



```
4255 7402           HLT
4256 5233           JMP PRG14
          /
4257 0000 TSTRPC,   0
4260 4265           JMS BDCNV           /TYPE C(CTRB) IN DECIMAL
4261 0123           CTRB
4262 4447           JMS I XTYPST        /TYPE "CPS"
4263 1554           CPS
4264 5657           JMP I TSTRPC        /EXIT.
4265 0000 BDCNV,    0                   /BINARY TO DECIMAL CONVERT
4266 4475           SETLOC              /AND PRINT SUBROUTINE
4267 4331           CNVCTR
4270 7774           -4
4271 1322           TAD ADDRZA          /INITIALIZE ARROW.
4272 3303           DCA ARROW
4273 1665           TAD I BDCNV         /GET AND STORE BINARY
4274 2265           ISZ BDCNV           /NUMBER. STORE IT AT VALUE.
4275 3330           DCA DIGIT
4276 1730           TAD I DIGIT
4277 3327           DCA VALUE
4300 3330           DCA DIGIT           /0 TO DIGIT.
4301 7100           CLL
4302 1327           TAD VALUE
4303 1323 ARROW,    TAD TENPWR
4304 7420           SNL
4305 5311           JMP .+4
4306 2330           ISZ DIGIT
4307 3327           DCA VALUE
4310 5301           JMP ARROW-2
4311 7200           CLA
4312 1330           TAD DIGIT
4313 1143           TAD [260
4314 4473           JMS I UPUNCH
4315 7300           CLA CLL
4316 2303           ISZ ARROW
4317 2331           ISZ CNVCTR
4320 5300           JMP ARROW-3
4321 5665           JMP I BDCNV
4322 1323 ADDRZA,   TAD TENPWR
4323 6030 TENPWR,   -1750
4324 7634           -144
4325 7766           -12
4326 7777           -1
4327 0000 VALUE,    0
4330 0000 DIGIT,    0
4331 0000 CNVCTR,   0
          /
          /PROGRAM 15. READ X CHARACTERS, STALL Y MS, LOOP (TO ADJUST TIMINGS)
4332 7602 PRG15,    HLT CLA             /HALT TO SET SR
4333 7604           LAS                 /READ SR
4334 0174           AND [177            /MASK OFF EXCESS BITS
4335 7041           CIA
4336 3021           DCA DELAYM          /STORE STALL COUNT
4337 7604           LAS                 /READ SR
4340 0137           AND [7600           /MASK OFF EXCESS BITS
```

```
7106            ...
7006            RTL
7006            RTL
7041            CIA
3347            DCA .+2
4477    P15A,   SETA                    /-X TO CTRA.
0000            0
6014    P15B.   RFC                     /FETCH CHARACTER
6011            RSF                     /FLAG 1?
5351            JMP .-1                 /NO
2233            ISZ CTRA                /READ X CHARS?
5350            JMP P15B                /NO
4502            DELAY                   /YES DELAY "Y" MS..
5333            JMP PRG15+1             /REPEAT
        $

 7600
 0260
 7704
 7742
 7362
 7000
 7777
 7766
 7634
 0060
 0252
 0125
 0377
 0020
 0040
 0200
 0400
 6060
 0707
 7700
 1125
 0240
 0100
 7740
 7510
 7500
 0077
 1130
 7640
 0177
 0031
 7763
 0017
```


C05

```
.10110 00000000 11111111 11111111 11111111 11111111 11111111 11111111
.11111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

.11111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
.11111 11111111 11111111 11111111 11000000 00000000 00000000 00000000

.11111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
.11111 11111111 11111111 11111111 11111111 11111111 11110000 00000000

.11111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
.11111 11111111 11111111 11111111 11111000 00000000 00000000 00000000

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
11111111 11111111 11111111 11111111 11111111 11111111 11111000 00000000

[illegible] [illegible] [illegible] 11111111 11111111 11111111 11111111 11111111
[illegible] [illegible] [illegible] 11111111 11111111 11111111 11111000 00000000

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
11111111 11111111 11111111 11111111 11111111 11111000 00000000 00000111

11111111 11111111 11111111 11111100 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

11111111 11111111 11111111 11111111 11111111 11111100 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
11111111 11111111 11111111 11111111 11111111 11111111 11.11111 11111111

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
11111111 11111111 11111111 11111111 11111111 11111111 11111111 11101111

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
11100000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111100

11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
```

D05

SEQ 0055

```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111111  11100000  00000000  00000000  00000000  00000000  00000000

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11111111  11111111  11111110  00000000  00000000

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
```

E05

SEQ 0056

```
A        0140     ERRORA   1075     POT10E   2713     P1T10E   3456
AC       0023     FADDR    0561     POT10S   2701     P1T10S   3443
ACTIND   0133     FLAG     0702     POT11    2717     P1T1A    3044
ADDRZA   4322     FORWD    0307     POT11A   2723     P1T1B    3046
AMPRD    4053     GETPT    0067     POT11B   2743     P1T1S    3055
AMPRDA   4070     GETPTR   0070     POT11C   2746     P1T2     3063
ARROW    4303     GETPTT   1412     POT11S   2755     P1T2A    3067
ASCCN    1000     GETRDY   0242     POT1A    2045     P1T2B    3112
ASCT     1041     GTPTRR   1435     POT1S    2056     P1T2S    3102
B        0240     INCRTN   0266     POT2     2064     P1T3     3115
BDCNV    4255     INIT     0217     POT2A    2071     P1T3A    3107
BELL3    4076     INITPT   1400     POT20K   2102     P1T3S    3153
CAF      6007     INPATT   0066     POT2S    2077     P1T4     3200
CHAIN    0225     INTSVC   0703     POT3     2105     P1T4P    3220
CHAINN   0270     IOUT     0733     POT3A    2127     P1T4S    3230
CHCK     0521     KSTART   0020     POT3S    2143     P1T5     3234
CHECK    0071     LINK     0024     POT4     2200     P1T5A    3240
CHR1     0110     LPRGN    1255     POT4A    2220     P1T6     3251
CHR2     0111     LRRGN    1273     POT4S    2230     P1T6A    3255
CHR3     0112     MARK     1230     POT5     2400     P1T7     3265
CHRCNT   0324     MARKAD   1246     POT5A    2404     P1T7A    3271
CNV      1024     MARKEP   1321     POT5B    2425     P2A      3465
CNVCTR   4331     MCTR     0563     POT5S    2416     P2B      3470
COUNT    0022     MIL1     0106     POT6     2430     P2C      3472
CPCH     3646     MILCTR   0121     POT6A    2435     P2D      3477
CPID     0107     MILLI    0135     POT6B    2453     P2E      3503
CPS      1554     MOVE     0536     POT6S    2446     P3A      3513
CRCNT    0063     MOVEA    0551     POT7     2600     P4A      3531
CRCTR    0515     MSCTR    0120     POT7A    2604     P4B      3534
CREAD    3653     NONE     0000     POT7B    2615     P5A      3547
CRLF     0600     NOSUF    4040     POT7S    2632     P6A      3570
CTR      0136     NXTST    0117     POT7WA   2635     P6B      3573
CTRA     0122     OPEN     0000     POT7WB   2636     P7770    3302
CTRB     0123     OUT      5503     P15A     4346     PBIN     3324
CTRC     0124     POE0     2025     P15B     4350     PCE      6020
CTRD     0125     POE1     2052     P1E0     3017     PCHCLR   0741
CTSK     1363     POE10A   2654     P1E1     3051     PCHCNT   0132
CTSK1    1364     POE2     2073     P1E10A   3415     PCNT2    3301
CURTST   0115     POE3     2137     P1E10B   3437     PFLAG    0126
DELAY    4502     POE4     2224     P1E2     3076     PIND     1765
DELAYM   0031     POE5     2412     P1E3     3147     PLDR     1014
DELTIM   0134     POE6     2442     P1E4     3224     PLDRW    1027
DIGIT    4330     POE7     2620     P1T0     3010     PLOOP    3205
DLCNT    0513     POT0     2010     P1T0A    3014     PNUMB    1471
DLY212   2766     POT0A    2016     P1T0B    3027     PPC      0024
DLY250   2773     POT0S    2031     P1T0S    3023     PRG0     2000
DLYCNT   0072     POT1     2036     P1T1     3032     PRG1     3000
DLYMS    0411     POT10    2637     P1T10    3400     PRG10    4000
DLYMSK   0104     POT10A   2644     P1T10A   3405     PRG11    4100
ENUMB    1474     POT10B   2661     P1T10B   [illegible]  PRG12    [illegible]
ERNUMB   1466     POT10C   [illegible]  P1T10C   [illegible]  PRG12A   [illegible]
[illegible]  [illegible]  POT10D   [illegible]  P1T10D   [illegible]  PRG13    [illegible]
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