

/HIGH SPEED READER/PUNCH TESTS

/DHPCA VER A MARCH 1977

/1.0 ABSTRACT

/ THE PC8-E HIGH-SPEED READER AND PUNCH TESTS ARE A TEST PACKAGE
/ USED TO TEST THE TYPE PC02 AND PC03 HIGH-SPEED READER-PUNCH WHEN
/ ATTACHED TO A PDP8/E SYSTEM. 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 TESTS

/ 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 PR8-E PUNCH, OR
/ PC8-E READER/PUNCH. THE FOLLOWING TAPED ARE REQUIRED IN CON-
/ JUNCTION 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 MAINDEC MUST HAVE BEEN RUN SUCCESS-
/ FULLY.

/

/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 ONLINE.
- / B. LOAD READER WITH ALL 0'S TEST TAPE. PREFERABLY THE TAPE
- / SHOULD BE SPLICED INTO A LOOP.
- /
- / C. LOAD ADDRSS 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
- / SR8
- / 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 THE TELETYPE IS ONLINE.
- / B. MAKE PUNCH READY, INSURING THAT THERE ARE SEVERAL INCHES OF
- / BLANK LEADER.
- /
- / C. LOAD ADDRSS 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
- / SR8
- / 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.
- /

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 THE TELETYPE IS ONLINE.

/ B. LOAD READER WITH SPECIAL BINARY COUNT PATTERN TEST LOOP.

/ C. LOAD ADDRSS 0200.

/ D. SET SR TO 0002. PRESS START.

/ E. 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 THE TELETYPE IS ONLINE.

/ B. MAKE PUNCH READY.

/ C. LOAD ADDRSS 0200.

/ D. SET SR TO 0003. PRESS START.

/ E. THE PROGRAM PUNCHES SPECIAL BINARY COUNT PATTERN CONTIN-

/ UOUSLY UNTIL STOPPED BY USER.

/

PRG3 SR OPTIONS

/

/ SR6 =0-STALL (RANDOM), SR6=1-RUN FULL SPEED

/ SR7 LOCK IN CURRENT STALL (SR6 MUST BE 0)

/

/4.5 PRG4 USE PROCEDURE

/

/ A. INSURE THAT THE TELETYPE IS ONLINE.

/ B. LOAD READER WITH TAPE PUNCHED BY PRG3, BLANK LEADER SHOULD

/ BE UNDER READ STATION. WITH "UP" MARKER TO THE LEFT.

/ C. LOAD ADDRSS 0200.

/ D. SET SR TO 0004. PRESS START.

/ E. PROGRAM RUNS CONTINUOUSLY UNLESS 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 TAHT OCCUR WHEN THE END OF SPECIAL

/ BINARY COUNT PATTERN IS REACHED.

/

/4.6 PRG5 USE PROCEDURE

/

/ A. INSURE THAT THE TELETYPE IS ONLINE.

/ B. MAKE PUNCH READY.

/ C. LOAD ADDRSS 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 IN CURRENT STALL (SR6 MUST BE 0)
/
/4.7 PRG6 USE PROCEDURE
/
/ A. INSURE THAT THE TELETYPE IS ONLINE.
/ B. LOAD READER WITH TAPE PUNCHED BY PRG5, BLANK LEADER SHOULD
/ BE UNDER READ STATION. WITH "UP" MARKER TO THE LEFT.
/ C. LOAD ADDRSS 0200.
/ D. SET SR TO 0006. PRESS START.
/ E. PROGRAM RUNS CONTINUOUSLY UNLESS 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 TAHT OCCUR WHEN THE END OF SPECIAL
/ BINARY COUNT PATTERN IS REACHED.
/
/4.8 PRG7 USE PROCEDURE
/
/ A. INSURE THAT THE TELETYPE IS ONLINE.
/ 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 ADDRSS 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-RUN FULL SPEED
/ SR7 LOCK IN CURRENT STALL (SR6 MUST BE 0)
/
/4.9 PRG10 USE PROCEDURE
/
/ A. INSURE THAT THE TELETYPE IS ONLINE.
/ B. LOAD READER WITH 1'S AND 0'S TEST TAPE LOOP.
/ C. LOAD ADDRSS 0200.
/ D. SET SR TO 0010. PRESS START.
/ E. PROGRAM RUNS CONTINUOUSLY UNTIL STOPPED BY USER. WITH
/ THE PROGRAM RUNNING, THE USER CAN ADJUST THE READ
/ AMPLIFIERS.
/
/4.10 PRG11 USE PROCEDURE

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

/4.11 PRG12 USE PROCEDURE

- /
- /
- / A. INSURE THAT THE TELETYPE IS ONLINE.
- / B. MAKE PUNCH READY.
- / C. LOAD ADDRSS 0200.
- / D. SET SR TO 0012. PRESS START.
- / E. THE PROGRAM PUNCHES 1'S AND 0'S TAPE CONTINUOUSLY.
- /

PRG12 SR OPTIONS

- /
- /
- / SR6 =0-STALL (RANDOM), SR6=1-RUN FULL SPEED
- / SR7 LOCK IN 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
- / 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 TIMES OVER A PERIOD
/ OF 60 SECONDS. TO TIME THE PUNCH, PROCEED AS FOLLOWS:
/
/ A. INSURE TELETYPE IS ONLINE
/ B. MAKE PUNCH READY
/ C. LOAD ADDRSS 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 REIME THE PUNCH, PRESS CONTINUE AFTER MAKING SURE THAT
/ SR0 IS OFF
/

/ NOTE
/

/ ACCURATE READER 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 STALLING FOR THE SPECIFIED NUMBER OF
/ MILLISECONDS
/

/ NOTE
/

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

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/5.      OPERATING PROCEDURES
/
/5.1     PROGRAM AND/OR OPERATOR ACTION
/
/5.1.1   NORMAL HALTS
/
/        LOC 0242      SR OPTIONS HALT. THIS HALT OCCURS DURING EXECU-
/                      TION OF PRG0 AND PRG1 TO PERMIT SETTING OF DE-
/                      SIRED 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 OPTIONS, AND PRESS CONTINUE. IF NO
/                      OPTIONS ARE SET, THIS HALT REOCCURS.
/
/        LOC 0340      ROUTINE END HALT. OCCURS DURING EXECUTION OF
/                      PRG0 AND PRG1 IF SR0 IS 1.
/
/        LOC 4230      THIS HALT OCCURS IN PRG13 AFTER PROGRAM TYPES
/                      THE READER SPEED IN CHARACTERS PER SECOND. TO
/                      RETIME THE READER, PRESS CONTINUE AFTER MAKING
/                      SURE THAT SR0 IS OFF, AND THAT SR1 IS SET TO
/                      THE CORRECT TIME BASE.
/
/        LOC 4255      THIS HALT OCCURS IN PRG14 AFTER PROGRAM TYPE
/                      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
/
/6.1     ERROR PRINTOUTS ARE IDENTIFIED BY AN ASTERISK (*) PRECEDING THE
/        PRINTOUT. MOST ERROR PRINTOUTS TAKE THE FORM:
/
/                *P00XX R00XXY ZZZZZ
/
/        WHERE
/
/                P00XX=PROGRAM NUMBER
/                R00XX=ROUTINE NUMBER IN PROGRAM
/                Y=A LETTER. INDICATES WHICH ERROR OCCURRED WITHIN A
/                ROUTINE. IF NO LETTER IS PRINTED, ONLY ONE ERROR
/                IS POSSIBLE IN THE ROUTINE.
/                ZZZZZ=ADDITIONAL INFORMATION PRINTOUT
/
/        FOLLOWING AN ERROR PRINTOUT THE PROGRAM HALTS IF SR3 (HALT-ON-
/        ERROR OPTION) IS OFF, AND THE OPTION APPLIES TO THE PROGRAM.
/
/                *P0000 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, OR 6010 (RPE)
/ MALFUNCTION.
/
/ *P0000 R0004
/
/ PCE (6020) MALFUNCTION. INTERRUPT ENABLE NOT CLEARED
/
/ *P0000 R0005
/
/ RRB (IOT012) COMMAND FAILED TO CLEAR FLAG
/
/ *P0000 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 R0010A
/
/ UNEXPECTED INTERRUPT AFTER CLEARING REDER PUNCH, TTY PUNCH,
/ AND TTY READER. TURN OFF INTERRUPTING DEVICE
/
/ *P0000 R0010B
/
/ WITH READER FLAG SET, READER FAILED TO INTERRUPT.
/
/ *P0000 R0011A
/
/ "STOP DELAY" NOT FIRING OR SET FOIR TOO SHORT A DURATION, REFER
/ TO SECTION 9 FOR TEST DESCRIPTION
/
/ *P0000 R0011B
/
/ "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
/ 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

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/
/          *P0001 R0003
/
/ DID NOT SKIP WITH INTERRUPT DISABLED
/
/          *P0001 R0004
/
/ COULD NOT CLEAR INTERRUPT ENABLE FOR PUNCH
/
/          *P0001 R0010A
/
/ UNEXPECTED INTERRUPT AFTER CLEARING PUNCH, READER, TTY PUNCH
/ AND TTY READER. TURN OFF INTERRUPTING DEVICE.
/
/          *P0001 R0010B
/
/ WITH PUNCH FLAG SET, PUNCH FAILED TO INTERRUPT
/
/          *P0002 R0000   S/B   XXXX   WAS   YYYY
/          *P0004 R0000   S/B   XXXX   WAS   YYYY
/          *P0006 R0000   S/B   XXXX   WAS   YYYY
/          *P0007 R0000   S/B   XXXX   WAS   YYYY
/          *P0010 R0000   S/B   XXXX   WAS   YYYY
/
/ ONE OF THE ABOVE PRINTOUTS OCCURS DURING ITS RESPECTIVE PROGRAM
/ WHEN THE DATA READ FROM PAPER TAPE AND THE EXPECTED DATA DID NOT
/ MATCH. "S/B" (SHOUD/BE) XXXX REPRESENTS THE EXPECTED CHARACTER.
/ "WAS" REPRESENTS 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 INTERRUPTING DEVICE. PRESS CONTINUE
/
/6.2 ERROR HALTS
/
/ LOC 0201          INCORRECT PRGRAM NUMBER SELECTED. SET SR
/                   TO CORRECT NUMBER AND PRESS CONTINUE.
/
/ LOC 0266          INCORRECT ROUTINE NUMBER SELECTED. PRECEDED
/                   PRINTOUT. SET CORRECT ROUTINE NUMBER IN SR
/                   AND PRESS CONTINUE.
/
/ LOC 0732          UNEXPECTED INTERRUPT. PRECEDED BY PRINTOUT.
/                   OCCURS DURING PRG7 EXECUTION. TURN OFF INTER-
/                   RUPTING DEVICE. PRESS CONTINUE.
/
/ LOC 1347          SYNC ERROR. OCCURS DURING PRG2 AND PRG7, IF
/                   PROGRAM IS UNABLE TO SYNC. PRESS CONTINUE TO

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/
/
/      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.
/
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/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-00D2G4-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.

/

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/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 FOR 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 THE 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 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
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/

/ 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 EXCEE 15 CHARACTERS.

/

/9.4 PRG3 - PUNCH TEST, SPECIAL BINARY COUNT PATTERN

/

/ THIS CONTINUOUS RUNNING PROGEAM 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 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 CURRENT STALL. (SR6 MUST BE 0).
/
/9.7 PRG6 - PUNCH VERIFY, RANDOM CHARACTERS
/
/ THIS 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 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. 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 - READ 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 LOOP

/

/ THIS PROGRAM TYPES THE PUNCH SPEED MEASURED OVER A 60 SECOND
/ PERIOD. THE USER CONTROLS THE MEASURING TIME WITH THE AID OF A
/ WATCH WITH SWEEP SECOND HAND.

/

/9.14 PRG15 - READ X, STALL Y MS LOOP

/

/ THIS PROGRAM LOOP IS INTENDED AS AN AID IN ADJUSTING THE PAPER
/ TAPE READER. THE USER SETS IN SR0 THROUGH SR4 THE NUMBER OF
/ CHARACTERS TO BE READ (RANGE: 1 TO 37 OCTAL) AND IN SR5 THROUGH
/ SR11 THE NUMBER OF MS TO STALL AFTER READING THE CHARACTERS
/ (RANGE: 1 TO 177 OCTAL). THIS LOOP IS USEFUL IN ADJUSTING
/ CLOCK TIMING, STROBE, ETC.

/

/10.0 LISTING

/

/PC8-E HIGH SPEED READER AND PUNCH TESTS.

/MAINDEC-08-DHPCA-A-D

/DATE: MARCH 1977

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/AUTHORS: BOB KOLLER/MAIT TAFFEL/MARK SANDLER/STEVE JENSEN

/WILLEM VAN DER MARK RETYPED PROGRAM IN 2009

/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 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

00000 0000 0000

00001 5001 JMP 1

00002 0002 2

00003 0003 3

0005 *5

00005 5402 JMP I 2

00006 0000 0

0020 *20

00020 0000 KSTART, 0

00021 0000 DELAYM, 0

00022 0000 COUNT, 0000

00023 0000 AC, 0

00024 0000 LINK, 0

00025 0270 CHAIN, CHAINN

00026 0333 SHLT, SHALT

00027 0447 RANDNO, RANGEN

00030 0000 PRGNUM, 0

00031 2000 PRGTAB, PRG0

00032 3000 PRG1

00033 3462 PRG2

00034 3506 PRG3

00035 3517 PRG4
 00036 3537 PRG5
 00037 3553 PRG6
 00040 3600 PRG7
 00041 4000 PRG10
 00042 4102 PRG11
 00043 4110 PRG12
 00044 4200 PRG13
 00045 4233 PRG14
 00046 4332 PRG15

00047 0616 XTYPST, TYPSTG
 00050 0600 UCRLF, CRLF
 00051 1050 UERROR, ERROR
 00052 1000 UASCCN, ASCCN
 00053 1255 ULPRGN, LPRGN
 00054 1273 ULRRGN, LRRGN
 00055 1200 UTREAD, TREAD
 00056 1207 UTPCH, TPCH
 00057 1214 UPLDR, PLDR
 00060 1230 UMARK, MARK
 00061 1143 UTCHK, TCHK
 00062 1145 UTSB, TSB
 00063 0324 CRCNT, CHRCNT
 00064 1311 SYNC, SYNK
 00065 1324 SYNCA, SYNKA
 00066 1400 INPATT, INITPT
 00067 1412 GETPT, GETPTT
 00070 1435 GETPTR, GTPTRP
 00071 0521 CHECK, CHCK
 00072 0513 DLYCNT, DLCNT
 00073 0426 UPUNCH, PUNCH
 00074 0536 UMOVE, MOVE
 00075 0400 USTCTR, STCTR
 00076 0443 URDSR, RDSR
 00077 1111 USTCTA, STCTA
 00100 1117 USTCTB, STCTB
 00101 1042 USTDLM, STDLYM
 00102 0411 UDLYMS, DLYMS
 00103 0733 UIOUT, IOUT
 00104 0000 DLYMSK, 0
 00105 0000 SRMSK, 0
 00106 7354 MIL1, 7354
 00107 0000 CPIC, 0
 00110 0000 CHR1, 0
 00111 0000 CHR2, 0
 00112 0000 CHR3, 0
 00113 0000 TEMP, 0
 00114 0000 TEMP1, 0
 00115 0000 CURTST, 0
 00116 0000 RTNNO, 0
 00117 0000 NXTST, 0
 00120 0000 MSCTR, 0
 00121 0000 MILCTR, 0
 00122 0000 CTRA, 0

/CONSTANT FOR MILLISECONDS

/STORED NUMBER OF MILLISECONDS TO BE COUNTED
/MILLISECOND TALLY

00123 0000 CTRB, 0
00124 0000 CTRC, 0
00125 0000 CTRD, 0
00126 0000 PFLAG, 0
00127 0000 RBUSY, 0
00130 0000 RCHKW, 0 /??
00131 0000 TCHKW, 0
00132 0000 PCHCNT, 0
00133 0000 ACTIND, 0
00134 0000 DELTIM, 0
00135 0000 MILLI, 0
00136 0000 CTR, 0

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 USTDLM
4502 DELAY=JMS I UDLYMS
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
/RRB,RCC
/CLEAR INTERRUPT EANBLE 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

00200 7410  STRT,  SKP
00201 7602          HLT CLA          /INCORRECT PRGNUM
00202 7604          LAS              /READ SR
00203 0177          AND [17          /MASK ALL BUT LAST 4 BITS
00204 1176          TAD [-15
00205 7540          SMA SZA          /VALID PROGRAM?
00206 5201          JMP STRT+1       /NO, GO TO ERROR HALT
00207 7604          LAS              /YES, REREAD SR
00210 0177          AND [17
00211 3030          DCA PRGNUM
00212 1030          TAD PRGNUM       /DEVELOP PROGRAM ADDRESS
00213 1175          TAD [PRGTAB
00214 3113          DCA TEMP
00215 1513          TAD I TEMP
00216 3240          DCA PRGADR       /STORE DEVELOPED ADDRESS
00217 4474  INIT,  JMS I UMOVE       /INITIALIZE INTERRUPT
00220 0005          5                /AREAD
00221 0001          1
00222 7776          -2
00223 3113          DCA TEMP         /0 TO TEMP
00224 4474          JMS I UMOVE       /CLEAR WORK AREA
00225 0113          TEMP
00226 0114          TEMP1
00227 7760          -20
00230 4475          SETLOC
00231 1075          ERRORA
00232 7402          7402
00233 1174          TAD [177
00234 3104          DCA DLYMSK
00235 1173          TAD [7640
00236 3572          DCA I [STALL+3
00237 5640          JMP I .+1        /JMP TO SELECTED
00240 0000  PRGADR, 0                /PROGRAM

00241 7602  SRSET, HLT CLA

00242 7200  GETRDY, CLA
00243 1020          TAD KSTART       /SET ADDRESS OF 1ST ROUTINE
00244 3117          DCA NXTST       /STORE AT NXTST
00245 4307          JMS FORWD
00246 4476          READSR          /READ SR
00247 7006          RTL
00250 7420          SNL              /ROUTINE SELECT? SR1
00251 5515          JMP I CURTST     /NO, START WITH 1ST RTN
00252 4476          READSR          /YES
00253 0177          AND [TSTMSK
00254 7041          CIA
00255 1116          TAD RTNNO
00256 7650          SNA CLA          /IS IT THIS RTN?
00257 5515          JMP I CURTST     /YES, GO DO IT
00260 1117          TAD NXTST       /NO
00261 7001          IAC              /IS THIS LAST RTN?

```

00262	7640	SZA CLA	/NO
00263	5245	JMP GETRDY+3	
00264	4447	JMS I XTYPST	
00265	1560	WRTN	
00266	7602	INCRTN, HLT CLA	/YES, INCORRECT ROUTINE NO
00267	5242	JMP GETRDY	
00270	4426	CHAINN, JMS I SHLT	
00271	4476	READSR	/READ SR
00272	7006	RTL	
00273	7630	SZL CLA	/ROUTINE SELECT? SR1
00274	5242	JMP GETRDY	/YES
00275	1117	TAD NXTST	
00276	7001	IAC	
00277	7640	SZA CLA	/LAST ROUTINE?
00300	5245	JMP GETRDY+3	/NO
00301	4476	READSR	
00302	7006	RTL	
00303	7710	SPA CLA	/LOOP PROGRAM? SR2
00304	5242	JMP GETRDY	/YES
00305	7402	PRGEND, HLT	/END OF PROGRAM HALT
00306	5270	JMP CHAINN	
00307	0000	FORWD, 0	
00310	7300	CLA CLL	
00311	1517	TAD I NXTST	/GET NEXT RTN NO
00312	3116	DCA RTNNO	/STORE AT RTNNO
00313	2117	ISZ NXTST	
00314	1117	TAD NXTST	/SET CURRENT
00315	3113	DCA TEMP	/RTN NUMBER
00316	2117	ISZ NXTST	
00317	1117	TAD NXTST	/SET CURRENT
00320	3115	DCA CURTST	/RTN ADDR.
00321	1513	TAD I TEMP	/SET NEXT
00322	3117	DCA NXTST	/RTN ADDR.
00323	5707	JMP I FORWD	
00324	0000	CHRCNT, 0	
00325	4427	JMS I RANDNO	/SET RANDOM NUMBER
00326	0177	AND [17	/REMOVE EXCESS BITS
00327	7450	SNA	/0?
00330	5325	JMP CHRCNT+1	/YES, REPEAT
00331	7041	CIA	/COMPLEMENT
00332	5724	JMP I CHRCNT	/EXIT.
00333	0000	SHALT, 0	
00334	4476	READSR	/READ SR
00335	7700	SMA CLA	/HALT? (SR0)
00336	5733	JMP I SHALT	
00337	1116	TAD RTNNO	
00340	7402	HLT	/UNCONDITIONAL HALT
00341	5733	JMP I SHALT	/EXIT.S/-10L
	0400	PAGE	
00400	0000	STCTR, 0	
00401	7200	CLA	
00402	1600	TAD I STCTR	/GET CTR ADDR
00403	3113	DCA TEMP	/AND SAVE AT TEMP
00404	2200	ISZ STCTR	

```

00405 1600      TAD I STCTR      /GET COUNT AND
00406 3513      DCA I TEMP      /STORE PER C(TEMP)
00407 2200      ISZ STCTR
00410 5600      JMP I STCTR      /EXIT
00411 0000      DLYMS, 0
00412 7300      CLA CLL
00413 1021      TAD DELAYM      /GET MS COUNT
00414 3120      DCA MSCTR      /STORE IN MSCTR
00415 5616      JMP I .+1
00416 0417      .+1
00417 1106      TAD MIL1      /GET 1 MS CONSTANT
00420 3121      DCA MILCTR      /STORE IN MILCTR
00421 2121      ISZ MILCTR      /DELAYED 1 MSEC?
00422 5221      JMP .-1
00423 2120      ISZ MSCTR      /DONE DELAYING?
00424 5217      JMP .-5
00425 5611      JMP I DLYMS      /EXIT

```

/PUNCH/PRINT ONE CHARACTER SUBROUTINE (CHAR IN AC)

```

00426 0000      PUNCH, 0
00427 2126      ISZ PFLAG      /SET PFLAG
00430 6046      TLS          /PUNCH PRINT
00431 7200      CLA
00432 1126      TAD PFLAG
00433 7640      SZA CLA          /FLAG RESET?
00434 7410      SKP
00435 5240      JMP .+3          /YES
00436 6041      TSF          /DONE PRINTING?
00437 5232      JMP .-5          /NO
00440 6042      TCF          /YES, RESET PRINTER FLAG
00441 3126      DCA PFLAG      /RESET FLAG
00442 5626      JMP I PUNCH
00443 0000      RDSR, 0
00444 7604      LAS
00445 0105      AND SRMSK
00446 5643      JMP I RDSR

```

/

/RANDOM NUMBER GENERATOR SUBROUTINE

```

00447 0000      RANGEN, 0
00450 7200      CLA
00451 1311      TAD RANTND
00452 1276      TAD RANDEX
00453 7640      SZA CLA
00454 5264      JMP RANTAD
00455 1300      TAD RANTBL
00456 3276      DCA RANDEX
00457 1277      TAD RANCON
00460 7104      CLL RAL
00461 7430      SZL
00462 7001      IAC
00463 3277      DCA RANCON
00464 1277      RANTAD, TAD RANCON
00465 1676      TAD I RANDEX
00466 3676      DCA I RANDEX
00467 1312      TAD RANSAV

```

```

00470 7010      RAR
00471 1676      TAD I RANDEX
00472 2276      ISZ RANDEX
00473 3312      DCA RANSAV
00474 1312      TAD RANSAV
00475 5647      JMP I RANGEN
00476 0511      RANDEX, RANTND
00477 6543      RANCON, 6543
00500 0501      RANTBL, .+1
00501 6543      6543
00502 3210      3210
00503 0765      0765
00504 5432      5432
00505 2107      2107
00506 7654      7654
00507 4321      4321
00510 1076      1076
00511 7267      RANTND, -.
00512 0000      RANSAV, 0
/
/SUBROUTINE TO GENERATE RANDOM DELAY COUNT
/
00513 0000      DLCNT, 0
00514 4427      JMS I RANDNO      /GO GENERATE RANDOM NUMBER
00515 0174      AND [177          /MASK OUT UNDESIRED BITS
00516 7041      CIA              /2'S COMPLEMENT IT
00517 3021      DCA DELAYM
00520 5713      JMP I DLCNT      /EXIT
/
/SUBROUTINE TO COMPARE C(AC) TO CONTENTS STORED AT CALL+1
/
00521 0000      CHCK, 0
00522 3335      DCA WCHK          /STORE AC AT WCHK
00523 1721      TAD I CHCK        /GET COMPARE DATE
00524 7041      CIA              /2'S COMPLEMENT IT
00525 1335      TAD WCHK          /ADD C(WCHK)
00526 2321      ISZ CHCK        /SET UP FOR UNEQUAL
00527 7640      SZA CLA          /EQUAL (AC=0)
00530 5333      JMP .+3            /NO
00531 2321      ISZ CHCK        /YES, SET UP FOR EQUAL
00532 5721      JMP I CHCK        /EQUAL EXIT
00533 1335      TAD WCHK          /RESTORE AC
00534 5721      JMP I CHCK        /UNEQUAL EXIT
00535 0000      WCHK, 0
/
/SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
/
00536 0000      MOVE, 0
00537 7200      CLA
00540 1736      TAD I MOVE        /GET "FROM ADDR" AND
00541 3361      DCA FADDR        /STORE AT FADDR
00542 2336      ISZ MOVE
00543 1736      TAD I MOVE        /GET "TO ADDR" AND
00544 3362      DCA TADDR        /STORE AT TADDR

```


00545	2336	ISZ MOVE	
00546	1736	TAD I MOVE	/GET "MOVE COUNT" AND
00547	3363	DCA MCTR	/STORE AT MCTR
00550	2336	ISZ MOVE	/SET UP FOR EXIT
00551	7200	MOVEA, CLA	
00552	1761	TAD I FADDR	/GET "FROM" WORD
00553	3762	DCA I TADDR	/STORE AT "TO" LOCATION
00554	2361	ISZ FADDR	/+1 TO "FROM" ADDR
00555	2362	ISZ TADDR	/+1 TO "TO" LOCATION
00556	2363	ISZ MCTR	/ALL WORDS MOVED?
00557	5351	JMP MOVEA	/NO, GO MOVE AGAIN
00560	5736	JMP I MOVE	/YES, EXIT
00561	0000	FADDR, 0	
00562	0000	TADDR, 0	
00563	0000	MCTR, 0	
	0600	PAGE	

```

00600 0000  CRLF,  0
00601 7200          CLA          /CRLF SUBROUTINE
00602 1600          TAD I CRLF    /GET NUMBER OF CRLF'S
00603 3215          DCA CRCTR     /AND SAVE
00604 2200          ISZ CRLF
00605 4447          JMS I XTYPST   /GO CRLF
00606 0612          .+4
00607 2215          ISZ CRCTR     /ALL DONE?
00610 5205          JMP .-3        /NO
00611 5600          JMP I CRLF    /YES, EXIT
00612 0015          0015          /CR
00613 0012          0012          /LF
00614 0001          0001          /END CODE
00615 0000  CRCTR,  0
00616 0000  TYPSTG, 0
00617 7200          CLA
00620 1616          TAD I TYPSTG   /GET AND STORE
00621 3300          DCA TEMQ       /INITIAL ADDRESS
00622 3302          DCA FLAG       /CLEAR FLAG
00623 2216          ISZ TYPSTG
00624 1700  TSC1,  TAD I TEMQ      /SET DATA
00625 7012          RTR            /ROTATE RIGHT 6
00626 7012          RTR
00627 7012          RTR
00630 4235          JMS TSC2       /GO TYPE CHARACTER
00631 1700          TAD I TEMQ      /GET DATA
00632 4235          JMS TSC2       /GO TYPE CHARACTER
00633 2300          ISZ TEMQ        /INCR STRING ADDR
00634 5224          JMP TSC1       /GO BACK FOR MORE
00635 0000  TSC2,  0
00636 0171          AND [77        /MASK OFF 6 BITS
00637 3301          DCA TEMR       /SAVE CHARACTER
00640 1302          TAD FLAG
00641 7640          SZA CLA        /TEST FLAG
00642 5252          JMP TYPSP      /SET
00643 1301          TAD TEMR       /NOT SET
00644 7450          SNA            /ZERO?
00645 5250          JMP .+3        /YES, SET FLAG
00646 4271  TYPAT, JMS PRINT      /NO, PRINT IT
00647 5635          JMP I TSC2     /RETURN
00650 2302          ISZ FLAG       /SET FLAG
00651 5635          JMP I TSC2     /EXIT
00652 3302  TYPSP, DCA FLAG       /CLEAR FLAG
00653 1301          TAD TEMR
00654 7041          CIA
00655 7450          SNA            /ZERO?
00656 5246          JMP TYPAT      /YES, TYPE "@"
00657 7001          IAC
00660 7650          SNA CLA        /IS IT 01?
00661 5616          JMP I TYPSTG   /YES, EXIT
00662 1170          TAD [SMA       /SMA TO SWITCH
00663 3273          DCA SWITCH
00664 1301          TAD TEMR       /GET CHARACTER
00665 4271          JMS PRINT      /PRINT IT

```

00666	1167	TAD [SPA	/SPA TO SWITCH
00667	3273	DCA SWITCH	
00670	5635	JMP I TSC2	
00671	0000	PRINT,	0
00672	1166	TAD [-40	
00673	7510	SWITCH,	SPA
00674	1165	TAD [100	
00675	1164	TAD [240	
00676	4473	JMS I UPUNCH	
00677	5671	JMP I PRINT	
00700	0000	TEMQ,	0
00701	0000	TEMR,	0
00702	0000	FLAG,	0

```

/
00703 3023 INTSVC, DCA AC          /SAVE AC
00704 7010          RAR
00705 3024          DCA LINK      /SAVE LINK
00706 6011          RSF           /READER?
00707 5312          JMP .+3       /NO
00710 5711          JMP I .+1
00711 0000 RVCTR, 0
00712 6021          PSF           /PUNCH?
00713 5317          JMP .+4       /NO
00714 4563          JMS I [STALL  /STALL IF DESIRED
00715 5716          JMP I .+1
00716 0000 PVCTR, 0
00717 6031          KSF           /TTY READER/KYBD?
00720 5323          JMP .+3
00721 6032          KCC           /YES
00722 5503          OUT           /TO MAINLINE
00723 6041          TSF           /TTY PRINTER/PUNCH?
00724 5330          JMP .+4       /NO
00725 6042          TCF           /YES
00726 3126          DCA PFLAG
00727 5503          OUT           /TO MAINLINE
00730 4447 UNEXIT, JMS I XTYPST  /PRINT ERROR MESSAGE
00731 1501          UNINT
00732 7602          HLT CLA       /HALT, UNEXPECTED INTERRUPT
00733 7300 IOUT,   CLA CLL
00734 1024          TAD LINK
00735 7004          RAL           /RESTORE LINK
00736 1023          TAD AC        /RESTORE AC
00737 6001          ION
00740 5400          JMP I 0       /EXIT INTERRUPT
/
00741 6022 PCHCLR, PCF
00742 5503          OUT
00743 6012 RDRCLR, RRB
00744 5503          OUT
1000 PAGE
```

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01000 0000  ASCCN,  0           /SUBROUTINE TO CONVERT
01001 7200          CLA         /A WORD TO PRINTABLE ASCII
01002 1600          TAD I ASCCN
01003 3237          DCA WASC
01004 2200          ISZ ASCCN
01005 1600          TAD I ASCCN
01006 3240          DCA SASC
01007 2200          ISZ ASCCN
01010 1162          TAD [7700
01011 0637          AND I WASC
01012 7112          RTR CLL
01013 7012          RTR
01014 7012          RTR
01015 4224          JMS CNV
01016 2240          ISZ SASC
01017 1162          TAD [7700
01020 7040          CMA
01021 0637          AND I WASC
01022 4224          JMS CNV
01023 5600          JMP I ASCCN
01024 0000  CNV,    0
01025 3241          DCA ASCT
01026 1241          TAD ASCT
01027 7006          RTL
01030 7004          RAL
01031 0161          AND [707
01032 1241          TAD ASCT
01033 0161          AND [707
01034 1160          TAD [6060
01035 3640          DCA I SASC
01036 5624          JMP I CNV
01037 0000  WASC,  0
01040 0000  SASC,  0
01041 0000  ASCT,  0
/
01042 0000  STDLYM, 0          /SET DELAYM SUB
01043 7200          CLA
01044 1642          TAD I STDLYM /SET DELAYM TO
01045 3021          DCA DELAYM /NUMBER SPECIFIED
01046 2242          ISZ STDLYM  /AT CALL +1
01047 5642          JMP I STDLYM /EXIT
01050 0000  ERROR,  0
01051 4452          JMS I UASCCN /CONVERT PROGRAM
01052 0030          PRGNUM      /NUMBER TO PRINTABLE
01053 1471          PNUMB      /OCTAL
01054 4452          JMS I UASCCN /CONVERT ROUTINE
01055 0116          RTNNO      /NUMBER TO PRINTABLE
01056 1474          ENUMB      /OCTAL
01057 1650          TAD I ERROR /GET ERROR SUFFIX AND
01060 3710          DCA I SFADR /STORE AT SUFX
01061 4447          JMS I XTYPST /PRINT ERROR NUMBER
01062 1466          ERNUMB
01063 2250          ISZ ERROR
01064 1650          TAD I ERROR /GET ADDRESS OF ADDITIONAL

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01065 7450          SNA          /PRINTOUT. ZERO?
01066 5272          JMP  .+4          /YES
01067 3271          DCA  .+2
01070 4447          JMS I XTYPST      /NO, PRINT IT
01071 0000          0
01072 4476          READSR
01073 0157          AND [SR3MSK
01074 7650          SNA CLA          /HALT ON ERROR? (SR3)
01075 7402  ERRORA, HLT          /YES
01076 4476          READSR
01077 0156          AND [SR4MSK
01100 7640          SZA CLA          /SKIP TEST? (SR4)
01101 5425          JMP I CHAIN      /YES
01102 4476          READSR
01103 0165          AND [SR5MSK
01104 7640          SZA CLA          /ENTER SCOPE LOOP? (SR5)
01105 2250          ISZ ERROR      /YES
01106 2250          ISZ ERROR
01107 5650          JMP I ERROR
01110 1476  SFADR,  SUFX
01111 0000  STCTA,  0          /SET CTRA TO
01112 7200          CLA          /NUMBER SPECIFIED
01113 1711          TAD I STCTA      /AT CALL+1
01114 3122          DCA CTRA
01115 2311          ISZ STCTA
01116 5711          JMP I STCTA      /EXIT
01117 0000  STCTB,  0          /SET CTRB TO
01120 7200          CLA          /NUMBER SPECIFIED
01121 1717          TAD I STCTB      /AT CALL+1
01122 3123          DCA CTRB
01123 2317          ISZ STCTB
01124 5717          JMP I STCTB      /EXIT
01125 0000  STALL,  0          /RANDOM STALL SUBROUTINE
01126 4476          READSR
01127 0155          AND [SR6MSK
01130 7640          SZA CLA          /STALL? (SR6)
01131 5725          JMP I STALL      /NO, EXIT
01132 4476          READSR
01133 0154          AND [SR7MSK
01134 7640          SZA CLA          /LOCK ON STALL? (SR7)
01135 7410          SKP          /YES
01136 4472          JMS I DLYCNT      /NO, RANDOM STALL
01137 1021          TAD DELAYM
01140 7440          SZA
01141 4502          DELAY          /STALL
01142 5725          JMP I STALL      /EXIT
01143 0000  TCHK,  0
01144 4471          JMS I CHECK      /CHECK THAT C(AC) AND C(TSB) ARE
01145 0000  TSB,  0
01146 5351          JMP  .+3          /ERROR, NOT EQUAL
01147 2343          ISZ TCHK          /EQUAL
01150 5743          JMP I TCHK          /OK
01151 3131          DCA TCHKW      /STORE BAD CHARACTER
01152 4452          JMS I UASCCN
01153 1145          TSB

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01154	1604	SB	
01155	4452	JMS I UASCCN	
01156	0131	TCHKW	
01157	1611	WAS	
01160	4451	JMS I UERROR	
01161	4040	NOSUF	
01162	1601	SBWAS	
01163	5743	JMP I TCHK	/RETURN
01164	5743	JMP I TCHK	/RETURN
	1200	PAGE	

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01200 0000 TREAD, 0
01201 6014 RFC
01202 6011 RSF
01203 5202 JMP .-1
01204 7200 CLA
01205 6012 RRB
01206 5600 JMP I TREAD
01207 0000 TPCH, 0
01210 6026 PLS
01211 6021 PSF
01212 5211 JMP .-1
01213 5607 JMP I TPCH
01214 0000 PLDR, 0
01215 4475 SETLOC /-100 TO PLDRW
01216 1227 PLDRW
01217 7634 -144
01220 7200 CLA
01221 6026 PLS
01222 6021 PSF
01223 5222 JMP .-1
01224 2227 ISZ PLDRW /DONE?
01225 5220 JMP .-5 /NO
01226 5614 JMP I PLDR /YES, EXIT
01227 0000 PLDRW, 0
/
01230 0000 MARK, 0
01231 4214 JMS PLDR
01232 4500 SETB
01233 7767 -11
01234 4475 SETLOC /MARKER ADDRESS
01235 1246 MARKAD /TO MARKAD
01236 1521 MARKER
01237 7200 CLA
01240 1646 TAD I MARKAD /GET MARK
01241 4207 JMS TPCH /PUNCH IT
01242 2246 ISZ MARKAD /UPDATE
01243 2123 ISZ CTRB /DONE?
01244 5237 JMP .-5 /NO
01245 5630 JMP I MARK /YES, EXIT
01246 0000 MARKAD, 0
01247 1233 SEED1, 1233
01250 7622 7622
01251 0000 RANP1, 0
01252 0000 RANP2, 0
01253 0000 RANR1, 0
01254 0000 RANR2, 0
01255 0000 LPRGN, 0
01256 7300 CLL CLA
01257 1251 TAD RANP1
01260 7006 RTL
01261 1252 TAD RANP2
01262 3251 DCA RANP1
01263 1251 TAD RANP1
01264 7006 RTL

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01265	1252	TAD RANP2	
01266	7006	RTL	
01267	3252	DCA RANP2	
01270	1251	TAD RANP1	
01271	0153	AND [PTMSK	
01272	5655	JMP I LPRGN	
01273	0000	LRRGN,	0
01274	7300	CLL CLA	
01275	1253	TAD RANR1	
01276	7006	RTL	
01277	1254	TAD RANR2	
01300	3253	DCA RANR1	
01301	1253	TAD RANR1	
01302	7006	RTL	
01303	1254	TAD RANR2	
01304	7006	RTL	
01305	3254	DCA RANR2	
01306	1253	TAD RANR1	
01307	0153	AND [PTMSK	
01310	5673	JMP I LRRGN	
01311	0000	SYNK,	0
01312	4466	JMS I INPATT	
01313	4455	JMS I UTREAD	/READ CHARACTER
01314	3110	DCA CHR1	/STORE AT CHR1
01315	4455	JMS I UTREAD	/READ CHARACTER
01316	3111	DCA CHR2	/STORE AT CHR2
01317	4455	JMS I UTREAD	/READ CHAR
01320	3112	DCA CHR3	/STORE
01321	4465	JMS I SYNCA	/GO SYNC
01322	5312	JMP SYNK+1	/NO SYNC, TRY AGAIN
01323	5711	JMP I SYNK	/SYNCED, EXIT
01324	0000	SYNKA,	0
01325	4475	SETLOC	/-512 TO CTSK
01326	1363	CTSK	
01327	7000	-1000	
01330	4475	SETLOC	/SET CTSK1
01331	1364	CTSK1	/TO -10
01332	7766	-12	
01333	4467	JMS I GETPT	/GET BIN CHARACTER
01334	7040	CMA	
01335	0110	AND CHR1	/SAME AS CHR1?
01336	7440	SZA	
01337	5333	JMP .-4	/NO
01340	4467	JMS I GETPT	/YES, GET ANOTHER BIN CHAR
01341	7040	CMA	
01342	0111	AND CHR2	
01343	7450	SNA	/SAME AS CHR2?
01344	5351	JMP SYNKC	/YES
01345	2363	ISZ CTSK	/NO, 512 TIMES?
01346	5330	JMP SYNKA+4	/NO
01347	7602	SYNKB,	HLT CLA /YES, SYNC ERROR
01350	5724	JMP I SYNKA	/TRY AGAIN
01351	4467	SYNKC,	JMS I GETPT /GET LINE CHARACTER
01352	7040	CMA	
01353	0112	AND CHR3	/SAME AS CHR3?

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01354 7440          SZA
01355 5360          JMP .+3          /NO
01356 2324          ISZ SYNKA        /YES
01357 5724          JMP I SYNKA        /EXIT
01360 2364          ISZ CTSK1        /DONE 10 TIMES?
01361 5330          JMP SYNKA+4        /NO
01362 5347          JMP SYNKB         /YES, SYNC ERROR
01363 0000 CTSK,    0
01364 0000 CTSK1,  0
          1400 PAGE
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01400 0000  INITPT, 0          /INITIALIZE BINARY
01401 7201          CLA IAC      /PATTERN ROUTINES
01402 3260          DCA PT0
01403 4474          JMS I UMOVE
01404 1460          PT0
01405 1461          PT1
01406 7775          -3
01407 3264          DCA RIND
01410 3265          DCA PIND
01411 5600          JMP I INITPT
01412 0000  GETPPT, 0        /BINARY COUNT PATTERN
01413 7200          CLA          /ROUTINE SPECIAL
01414 1260          TAD PT0
01415 3261          DCA PT1
01416 1264          TAD RIND
01417 7040          CMA
01420 3264          DCA RIND
01421 1264          TAD RIND
01422 7650          SNA CLA
01423 5227          JMP .+4
01424 1261          TAD PT1
01425 7040          CMA
01426 5231          JMP .+3
01427 1261          TAD PT1
01430 7041          CIA
01431 0153          AND [PTMSK
01432 3260          DCA PT0
01433 1261          TAD PT1
01434 5612          JMP I GETPPT
01435 0000  GTPTRP, 0       /BINARY COUNT PATTERN
01436 7200          CLA          /ROUTINE
01437 1262          TAD PT2
01440 3263          DCA PT3
01441 1265          TAD PIND
01442 7040          CMA
01443 3265          DCA PIND
01444 1265          TAD PIND
01445 7650          SNA CLA
01446 5252          JMP .+4
01447 1263          TAD PT3
01450 7040          CMA
01451 5254          JMP .+3
01452 1263          TAD PT3
01453 7041          CIA
01454 0153          AND [PTMSK
01455 3262          DCA PT2
01456 1263          TAD PT3
01457 5635          JMP I GTPTRP
01460 0000  PT0, 0
01461 0000  PT1, 0
01462 0000  PT2, 0
01463 0000  PT3, 0
01464 0000  RIND, 0
01465 0000  PIND, 0

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01466	0015	ERNUMB,	0015	/CR
01467	0012		0012	/LF
01470	5220		5220	/*,P
01471	4040	PNUMB,	4040	
01472	4040		4040	
01473	4022		4022	/SP,R
01474	4040	ENUMB,	4040	
01475	4040		4040	
01476	4040	SUFIX,	4040	
01477	4040		4040	/SP,SP
01500	0001		0001	/END CODE
01501	0015	UNINT,	0015	/CR
01502	0012		0012	/LF
01503	0007		0007	/BELL
01504	4025		4025	/SP,U
01505	1605		1605	/N,E
01506	3020		3020	/X,P
01507	0503		0503	/E,C
01510	2405		2405	/T,E
01511	0440		0440	/D,SP
01512	1116		1116	/I,N
01513	2405		2405	/T,E
01514	2222		2222	/R,R
01515	2520		2520	/U,P
01516	2456		2456	/T,.
01517	0015		0015	/CR
01520	0001		0001	/END CODE
01521	0037	MARKER,	0037	
01522	0040		0040	
01523	0040		0040	
01524	0037		0037	
01525	0000		0000	
01526	0077		0077	
01527	0011		0011	
01530	0011		0011	
01531	0006		0006	
01532	0015	RSPD,	0015	/CR
01533	0012		0012	/LF
01534	4022		4022	/SP,R
01535	0422		0422	/D,R
01536	4023		4023	/SP,S
01537	2005		2005	/P,E
01540	0504		0504	/E,D
01541	4000		4000	/SP
01542	0100		0100	/END CODE
01543	0015	PSPD,	0015	/CR
01544	0012		0012	/LF
01545	4020		4020	/SP,P
01546	0310		0310	/C,H
01547	4023		4023	/SP,S
01550	2005		2005	/P,E
01551	0504		0504	/E,D
01552	4000		4000	/SP
01553	0100		0100	/END CODE
01554	4003	CPS,	4003	/SP,C

01555	2023	2023	/P,S	
01556	0015	0015	/CR	
01557	0001	0001	/END CODE	
01560	0015	WRTN,	0015	/CR
01561	0012	0012	/LF	
01562	4000	4000	/SP	
01563	0711	0711	/BELL,I	
01564	1603	1603	/N,C	
01565	1722	1722	/O,R	
01566	2205	2205	/R,E	
01567	0324	0324	/C,T	
01570	4022	4022	/SP,R	
01571	2416	2416	/T,N	
01572	4023	4023	/SP,S	
01573	0514	0514	/E,L	
01574	0503	0503	/E,C	
01575	2405	2405	/T,E	
01576	0456	0456	/D,.	
01577	0015	0015	/CR	
01600	0001	0001	/END CODE	
01601	4023	SBWAS,	4023	/SP,S
01602	5702	5702	/"",B	
01603	4040	4040	/SP,SP	
01604	4040	SB,	4040	/SP,SP
01605	4040	4040	/SP,SP	
01606	4040	4040	/SP,SP	
01607	2701	2701	/W,A	
01610	2340	2340	/S,SP	
01611	4040	WAS,	4040	/SP,SP
01612	4040	4040	/SP,SP	
01613	0015	0015	/CR	
01614	0001	0001	/END CODE	
01615	0015	TDOMSG,	0015	/CR
01616	0012	0012	/LF	
01617	7005	7005	/8,E	
01620	4040	4040	/SP,SP	
01621	2331	2331	/SY	
01622	2324	2324	/ST	
01623	0515	0515	/EM	
01624	5640	5640	/. ,SP	
01625	2305	2305	/SE	
01626	2440	2440	/T,SP	
01627	2411	2411	/TI	
01630	1505	1505	/ME	
01631	4004	4004	/SP,D	
01632	0514	0514	/EL	
01633	0131	0131	/AY	
01634	4003	4003	/SP,C	
01635	1716	1716	/ON	
01636	2324	2324	/ST	
01637	0116	0116	/AN	
01640	2440	2440	/T,SP	
01641	1116	1116	/IN	
01642	4023	4023	/SP,S	
01643	2256	2256	/R,.	

01644	0015	0015	/CR
01645	0012	0012	/LF
01646	2205	2205	/RE
01647	0605	0605	/FE
01650	2240	2240	/R,SP
01651	2417	2417	/TO
01652	4020	4020	/SP,P
01653	0107	0107	/AG
01654	0523	0523	/ES
01655	4062	4062	/SP,2
01656	4001	4001	/SP,A
01657	1604	1604	/ND
01660	4063	4063	/SP,3
01661	4017	4017	/SP,O
01662	0640	0640	/F,SP
01663	2022	2022	/PR
01664	0740	0740	/G,SP
01665	1411	1411	/LI
01666	2324	2324	/ST
01667	1116	1116	/IN
01670	0756	0756	/G.
01671	0001	0001	/END

2000 PAGE

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        /PRGRAM 0, BASIC READER AND READER LOGIC CONTROL TEST
        /
02000 4475 PRG0,   SETLOC           /SET KSTART TO
02001 0020         KSTART         /INITIAL ROUTINE
02002 2010         P0T0           /ADDRESS
02003 4475         SETLOC         /SET SR MSAK
02004 0105         SRMSK
02005 7717         7717
02006 5607         JMP I .+1      /SET STARTED
02007 0241         SRSET
02010 0000 P0T0,   0
02011 2036         P0T1

        /CHECKS THAT FLAG=1 250MS AFTER RFC (IOT014), INDICATING THAT
        /READER IS ADVANCING
02012 4477         SETA           /-200 TO CTRA
02013 7470         -310
02014 4501         SETDLM        /-250 TO DELAY
02015 7406         -372
02016 6014 P0T0A,  RFC           /CLEAR FLAG, FETCH CHAR (IOT014)
02017 4502         DELAY         /DELAY 75MS
02020 6011         RSF           /SKIP IF FLAG=1 (IOT011)
02021 5225         JMP P0E0
02022 2122         ISZ CTRA      /DONE?
02023 5216         JMP P0T0A     /NO, REPEAT
02024 5425         JMP I CHAIN   /YES, CHAIN
02025 4451 P0E0,   JMS I UERROR  /GO TO ERROR SUBROUTINE
02026 4040         NOSUF        /NO PRINTOUT SUFFIX
02027 0000         NONE         /NO PRINTOUT
02030 5222         JMP P0T0A+4   /CONTINUE TEST
02031 4501 P0T0S,  SETDLM        /SCOPE LOOP
02032 7764         -14
02033 6014         RFC           /FETCH CHAR (IOT014)
02034 4502         DELAY         /DELAY 12 MS
02035 5233         JMP .-2
02036 0001 P0T1,   1
02037 2064         P0T2

        /WITH FLAG=1, SKIP ON FLAG 4095 TIMES TO CHECK FOR RELIABLE SKIPPING
02040 4477         SETA           /-4095 TO CTRA
02041 0001         -7777
02042 6014         RFC           /FETCH CHAR (IOT014)
02043 6011         RSF           /SKIP ON FLAG (IOT011)
02044 5243         JMP .-1      /REPEAT
02045 6011 P0T1A,  RSF           /SKIP ON FLAG (IOT011)
02046 5252         JMP P0E1     /ERROR
02047 2122         ISZ CTRA      /DONE 4095 TIMES?
02050 5245         JMP P0T1A     /NO, REPEAT TEST
02051 5425         JMP I CHAIN   /YES, CHAIN
02052 4451 P0E1,   JMS I UERROR  /GO TO ERROR SUBROUTINE
02053 4040         NOSUF        /NO PRINTOUT SUFFIX
02054 0000         NONE         /NO PRINTOUT
02055 5247         JMP P0T1A+2   /CONTINUE TEST
02056 6014 P0T1S,  RFC           /START SCOPE LOOP. FETCH CHAR (IOT014)
02057 6011         RSF           /SKIP ON FLAG (IOT011)
02060 5257         JMP .-1      /REPEAT

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02061 6011      RSF          /SKIP ON FLAG (IOT011)
02062 5261      JMP  .-1      /REPEAT
02063 5261      JMP  .-2      /REPEAT
02064 0002 P0T2,  2
02065 2105      P0T3
          /CHECKS THAT IOT011 DOES NOT SKIP WITH FLAG=0
02066 4477      SETA          /-4095 TO CTRA
02067 0001      -7777
02070 6012      RRB          /CLEAR FLAG
02071 6011 P0T2A, RSF          /SKIP ON FLAG=1 (IOT011)
02072 5302      JMP P0T2OK    /OK
02073 4451 P0E2,  JMS I UERROR /ERROR, GO TO ERROR SUB
02074 4040      NOSUF        /NO PRINTOUT SUFFIX
02075 0000      NONE         /NO PRINTOUT
02076 5302      JMP P0T2OK    /CONTINUE TEST
02077 6011 P0T2S, RSF          /START SCOPE LOOP, SKIP ON FLAG
02100 5277      JMP  .-1      /REPEAT
02101 5277      JMP  .-2      /REPEAT
02102 2122 P0T2OK, ISZ CTRA    /DONE 4095 TIMES?
02103 5271      JMP P0T2A     /NO, REPEAT
02104 5425      JMP I CHAIN    /YES, CHAIN
          /
          /ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED
02105 0003 P0T3,  3
02106 2200      P0T4
02107 1377      TAD (4000
02110 3022      DCA COUNT
02111 1376      TAD (7773
02112 3136      DCA CTR
02113 6002      IOF
02114 7200      CLA
02115 3135      DCA MILLI
02116 2135      ISZ MILLI
02117 5316      JMP  .-1
02120 2136      ISZ CTR
02121 5316      JMP  .-3
02122 1375      TAD (2260      /4.56 MS CONSTANT
02123 3134      DCA DELTIM
02124 6007      CAF
02125 6014      RCF          /READ
02126 4351      JMS TIM
02127 6011 P0T3A, RSF          /SKIP IF READER FLAG SET
02130 5337      JMP P0E3     /FLAG DID NOT SET
02131 6010      RPE          /ENABLE INTERRUPT
02132 6003      SRQ          /SHOULD SKIP HERE IF INT REQ
02133 5337      JMP P0E3     /REPORT ERROR
02134 2022      ISZ COUNT
02135 5311      JMP P0T3+4
02136 5425      JMP I CHAIN
02137 4451 P0E3,  JMS I UERROR
02140 4040      NOSUF
02141 0000      NONE
02142 5311      JMP P0T3+4
02143 6002 P0T3S, IOF
02144 6011      RSF

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02145 5344      JMP  .-1
02146 6011      RSF
02147 5346      JMP  .-1
02150 5346      JMP  .-2
02151 0000  TIM,  0
02152 2134      ISZ DELTIM
02153 5352      JMP  .-1
02154 5751      JMP I TIM
02175 2260
02176 7773
02177 4000
      2200 PAGE
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/
/ROUTINE TO CHECK THAT INTERRUPT ENABLE CAN BE CLEARED FOR READER
02200 0004 P0T4, 4
02201 2400 P0T5
02202 6002 IOF
02203 1234 TAD R7770
02204 3235 DCA RCNT2 /INIT # OF ITERATIONS
02205 6007 RLOOP, CAF
02206 6010 RPE /ENABLE INTERRUPT
02207 6020 PCE /DISABLE INTERRUPT
02210 6001 ION
02211 6014 RCF /READ
02212 6000 SKON
02213 5224 JMP P0E4 /INTERRUPT NOT ON
02214 6003 SRQ /SKIP IF INT REQ GENERATED
02215 7410 SKP /NO INT REQ
02216 5224 JMP P0E4 /INT REQ GENERATED
02217 2022 ISZ COUNT /RELIABILITY SETUP
02220 5205 P0T4A, JMP RLOOP /CONTINUE
02221 2235 ISZ RCNT2
02222 5205 JMP RLOOP
02223 5425 JMP I CHAIN
02224 4451 P0E4, JMS I UERROR
02225 4040 NOSUF
02226 0000 NONE
02227 5425 JMP I CHAIN
02230 6010 P0T4S, RPE
02231 4502 DELAY
02232 6020 PCE
02233 5230 JMP .-3
02234 7770 R7770, 7770
02235 7770 RCNT2, 7770
2400 PAGE

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02400 0005 P0T5, 5
02401 2430 P0T6
/CHECKS IOT012 (RRB) FOR ABILITY TO CLEAR FLAG
02402 4477 SETA /-500 TO CTRA
02403 7014 -764
02404 6014 P0T5A, RFC /FETCH CHAR (IOT014)
02405 6011 RSF /WAIT FOR FLAG=1
02406 5205 JMP .-1
02407 6012 RRB /CLEAR FLAG (IOT012)
02410 6011 RSF /SKIP ON FLAG=1
02411 5225 JMP P0T5B /OK
02412 4451 P0E5, JMS I UERROR /ERROR, GO TO ERROR SUB
02413 4040 NOSUF
02414 0000 NONE
02415 5225 JMP P0T5B /CONTINUE TEST
02416 6014 P0T5S, RFC /START SCOPE LOOP, FETCH CHAR
02417 6011 RSF /WAIT FOR FLAG=1
02420 5217 JMP .-1
02421 6012 RRB /CLEAR FLAG (IOT012)
02422 6011 RSF /SKIP IF FLAG=1
02423 5216 JMP .-5 /NO, IOT012 CLEARED IT, READ AGAIN
02424 5221 JMP .-3 /IOT012 FAILED, REPEAT
02425 2122 P0T5B, ISZ CTRA /DONE?
02426 5204 JMP P0T5A /NO, REPEAT
02427 5425 JMP I CHAIN /YES, CHAIN

02430 0006 P0T6, 6
02431 2600 P0T7
/CHECKS THAT IOT014 CLEARS FLAG
02432 4477 SETA /-500 TO CTRA
02433 7014 -764
02434 6014 RFC /FETCH CLEAR (IOT014)
02435 6011 P0T6A, RSF /WAIT FOR FLAG=1
02436 5235 JMP .-1
02437 6014 RFC /CLEAR FLAG WITH IOT014
02440 6011 RSF /SKIP ON FLAG=1
02441 5253 JMP P0T6B /OK, FLAG IS OFF
02442 4451 P0E6, JMS I UERROR /ERROR, FLAG=1, GO TO ERROR SUB
02443 4040 NOSUF
02444 0000 NONE
02445 5253 JMP P0T6B
02446 4502 P0T6S, DELAY /START SCOPE LOOP, DELAY 20 MS
02447 6014 RFC /FETCH CHAR (IOT014)
02450 6011 RSF /WAIT FOR FLAG=1
02451 5250 JMP .-1
02452 5247 JMP .-3 /GO CLEAR FLAG AND FETCH CHAR
02453 2122 P0T6B, ISZ CTRA /DONE?
02454 5235 JMP P0T6A /NO, REPEAT
02455 5425 JMP I CHAIN /YES, CHAIN
2600 PAGE

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02600 0007 P0T7, 7
02601 2637 P0T10
/CHECKS ABILITY TO READ ALL 0'S CHARACTERS
02602 4477 SETA /-500 TO CTRA
02603 7014 -764
02604 6014 P0T7A, RFC /FETCH CHAR (IOT014)
02605 6011 RSF /WAIT FOR FLAG=1
02606 5205 JMP .-1
02607 7200 CLA
02610 6012 RRB /READ BUFFER
02611 3236 DCA P0T7WB /SAVE
02612 1236 TAD P0T7WB
02613 7640 SZA CLA /RESULT 0?
02614 5220 JMP P0E7 /ERROR, DID NOT READ 0'2 CHAR
02615 2122 P0T7B, ISZ CTRA /DONE?
02616 5204 JMP P0T7A /NO, REPEAT
02617 5425 JMP I CHAIN /YES, CHAIN
02620 4452 P0E7, JMS I UASCCN
02621 2635 P0T7WA
02622 1604 SB
02623 4452 JMS I UASCCN
02624 2636 P0T7WB
02625 1611 WAS
02626 4451 JMS I UERROR
02627 4040 NOSUF
02630 1601 SBWAS
02631 5215 JMP P0T7B
02632 7200 P0T7S, CLA
02633 6012 RRB
02634 5232 JMP .-2
02635 0000 P0T7WA, 0000
02636 0000 P0T7WB, 0000

02637 0010 P0T10, 10
02640 2717 P0T11
/CHECKS ABILITY OF READER FLAG TO CAUSE AN INTERRUPT
02641 4475 SETLOC /SET INTERRUPT TO RETURN TO
02642 0002 2 /P0E10A
02643 2654 P0E10A
02644 6032 P0T10A, KCC /CLEAR TTY READER FLAG
02645 6042 TCF /CLEAR TTY PRINTER FLAG
02646 6022 PCF /CLEAR PUNCH FLAG
02647 6012 RRB /CLEAR READER FLAG
02650 6001 ION /ENABLE INTERRUPT
02651 7000 NOP /NO OP
02652 6002 IOF /TURN OFF INTERRUPT
02653 5261 JMP P0T10B
02654 4451 P0E10A, JMS I UERROR /GO TO ERROR SUB
02655 0140 A /SUFFIX A
02656 0000 NONE /NO PRINTOUT
02657 5244 JMP P0T10A /REPEAT TEST
02660 5244 JMP P0T10A /REPEAT TEST
02661 4477 P0T10B, SETA /-4095 TO CTRA

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02662 0001          -7777
02663 4475          SETLOC          /SET INTERRUPT RETURN TO
02664 0002          2                /P0T10E
02665 2713          P0T10E
02666 6010          RPE              /SET INTERRUPT ENABLE
02667 6014          RFC              /FETCH CHAR (IOT014)
02670 6011          RSF              /WAIT FOR FLAG=1
02671 5270          JMP .-1
02672 6001 P0T10C, ION          /ENABLE INTERRUPT
02673 7000          NOP
02674 6002          IOF              /TURN OFF INTERRUPT
02675 4451          JMS I UERROR     /GO TO ERROR SUB
02676 0240          B                /SUFFIX B
02677 0000          NONE
02700 5313          JMP P0T10E       /CONTINUE TEST
02701 4475 P0T10S, SETLOC       /SET INTERRUPT RETURN TO
02702 0002          2                /P0T10D
02703 2712          P0T10D
02704 6014          RFC              /FETCH CLEAR
02705 6011          RSF              /WAIT FOR FLAG=1
02706 5305          JMP .-1
02707 6001          ION              /ENABLE INTERRUPT
02710 7000          NOP
02711 5307          JMP .-2
02712 5307 P0T10D, JMP .-3
02713 2122 P0T10E, ISZ CTRA     /DONE?
02714 5272          JMP P0T10C       /NO, REPEAT
02715 6020          PCE              /CLEAR INTERRUPT ENABLE
02716 5425          JMP I CHAIN       /YES, CHAIN
/STOP DELAY TEST
02717 0011 P0T11, 11
02720 7777          7777            /LAST TEST
02721 4477          SETA             /-200 TO CTRA
02722 7470          -310
02723 4373 P0T11A, JMS DLY250    /INITIAL DELAY
02724 4501          SETDLM           /-19 TO DELAYM
02725 7755          -23
02726 6014          RFC              /FETCH CHAR
02727 6011          RSF              /WAIT FOR FLAG
02730 5327          JMP .-1
02731 4502          DELAY            /DELAY 19 MS TO CAUSE
02732 6014          RFC              /"STOP DELAY" TO FIRE, FETCH CHAR
02733 4502          DELAY            /DELAY 19 MORE MS
02734 6011          RSF              /CHECK FLAG
02735 5343          JMP P0T11B       /FLAG NOT UP, OK
02736 4451          JMS I UERROR     /ERROR, FLAG SHOULD NOT BE UP
02737 0140          A                /38 MS AFTER "STOP DELAY"
02740 0000          NONE             /FIRES
02741 5323          JMP P0T11A       /CONTINUE TEST
02742 5355          JMP P0T11S       /GO TO SCOPE LOOP
02743 4366 P0T11B, JMS DLY212    /DELAY ADDITIONAL 212 MS
02744 6011          RSF              /FLAG UP?
02745 5351          JMP .+4          /NO, ERROR
02746 2122 P0T11C, ISZ CTRA     /DONE 500 TIMES?
02747 5323          JMP P0T11A       /NO, REPEAT

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02750 5425      JMP I CHAIN      /YES, CHAIN
02751 4451      JMS I UERROR    /ERROR, FLAG NOT UP 250 MS
02752 0240      B              /AFTER "STOP DELAY" FIRED
02753 0000      NONE
02754 5346      JMP P0T11C
02755 4501 P0T11S, SETDLM /SET DELAYM FOR 15 MS
02756 7761      -17
02757 6014      RFC              /FETCH CHAR
02760 5357      JMP .-1         /FLAG 1?
02761 4502      DELAY          /YES DELAY 15 MS
02762 6014      RFC              /FETCH CHAR
02763 6011      RSF              /WAIT FOR FLAG
02764 5363      JMP .-1
02765 5361      JMP .-4         /REPEAT
02766 0000 DLY212, 0
02767 4501      SETDLM          /-212 TO DELAYM
02770 7454      -324
02771 4502      DELAY
02772 5766      JMP I DLY212
02773 0000 DLY250, 0
02774 4501      SETDLM          /DELAY 250 MS
02775 7406      -372
02776 4502      DELAY
02777 5773      JMP I DLY250
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3000 PAGE

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        /PROGRAM 1, BASIC PUNCH AND CONTROL LOGIC TEST
        /
03000  4475  PRG1,   SETLOC       /SET KSTART TO
03001  0020          KSTART      /INITIAL ROUTINE
03002  3010          P1T0        /ADDRESS
03003  4475          SETLOC
03004  0105          SRMSK
03005  7717          7717
03006  5607          JMP I .+1    /GET STARTED
03007  0241          SRSET
03010  0000  P1T0,   0
03011  3032          P1T1

        /CHECKS THAT PSF (IOT021) DOES NOT SKIP WITH FLAG=0
03012  4477          SETA        /-4095 TO CTRA
03013  0001          -7777
03014  6022  P1T0A,  PCF          /CLEAR FLAG
03015  6021          PSF          /SKIP IF FLAG=1
03016  5227          JMP P1T0B    /NO SKIP, OK
03017  4451  P1E0,   JMS I UERROR /SKIP ERROR, GO TO ERROR SUB
03020  4040          NOSUF        /NO SUFFIX
03021  0000          NONE         /NO PRINTOUT
03022  5227          JMP P1T0B    /CONTINUE TEST
03023  6022  P1T0S,  PCF          /CLEAR FLAG
03024  6021          PSF          /SKIP IF FLAG=1
03025  5224          JMP .-1
03026  5224          JMP .-2
03027  2122  P1T0B,  ISZ CTRA     /DONE?
03030  5214          JMP P1T0A    /NO, REPEAT
03031  5425          JMP I CHAIN   /YES, CHAIN
03032  0001  P1T1,   1
03033  3063          P1T2

        /CHECKS THAT PSF (IOT021) SKIPS WITH FLAG=1
03034  4477          SETA        /-4095 TO CTRA
03035  0001          -7777
03036  4501          SETDLM       /-4095 TO DELAYM
03037  0001          -7777
03040  7300          CLA CLL
03041  6022          PCF          /CLEAR PUNCH FLAG, LOAD BUFFER
03042  6024          PPC          /LOAD BUFFER AND PUNCH
03043  4502          DELAY
03044  6021  P1T1A,  PSF          /SKIP IF FLAG=1, SHOULD BE 1
03045  5251          JMP P1E1     /NO SKIP, ERROR
03046  2122  P1T1B,  ISZ CTRA     /DONE?
03047  5244          JMP P1T1A    /NO, REPEAT
03050  5425          JMP I CHAIN   /YES, CHAIN
03051  4451  P1E1,   JMS I UERROR /GO TO ERROR SUB
03052  4040          NOSUF
03053  0000          NONE
03054  5246          JMP P1T1B    /CONTINUE TEST
03055  7200  P1T1S,  CLA
03056  6022          PCF          /CLEAR FLAG AND BUFFER
03057  6024          PPC          /LOAD AND PUNCH
03060  6021          PSF          /SKIP IF FLAG
03061  5260          JMP .-1

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03062 5260          JMP  .-2
03063 0002 P1T2,    2
03064 3115          P1T3
          /CHECKS THAT PCF (IOT022) IS ABLE TO CLEAR FLAG
03065 4477          SETA          /-500 TO CTRA
03066 7014          -764
03067 7200 P1T2A,   CLA
03070 6026          PLS          /CLEAR, LOAD AND PUNCH
03071 6021          PSF          /WAIT FOR FLAG
03072 5271          JMP  .-1
03073 6022          PCF          /CLEAR FLAG (IOT022)
03074 6021          PSF          /SKIP IF FLAG=1
03075 5312          JMP P1T2B    /NO SKIP OK
03076 4451 P1E2,    JMS I UERROR /SKIP ERROR, GO TO ERROR SUB
03077 4040          NOSUF
03100 0000          NONE
03101 5312          JMP P1T2B    /CONTINUE TEST
03102 7200 P1T2S,   CLA
03103 6026          PLS          /CLEAR LOAD AND PUNCH
03104 6021          PSF          /WAIT FOR FLAG
03105 5304          JMP  .-1
03106 6022          PCF          /CLEAR FLAG
03107 6021          PSF          /SKIP IF FLAG
03110 5302          JMP  .-6    /CLEARED
03111 5306          JMP  .-3    /NOT CLEARED
03112 2122 P1T2B,   ISZ CTRA    /DONE?
03113 5267          JMP P1T2A    /NO, REPEAT
03114 5425          JMP I CHAIN  /YES, CHAIN
          /ROUTINE TO CHECK FOR SKIP WITH INTERRUPT DISABLED
03115 0003 P1T3,    3
03116 3200          P1T4
03117 1377          TAD (4000
03120 3022          DCA COUNT
03121 1376          TAD (7773
03122 3136          DCA CTR
03123 6002          IOF
03124 7200          CLA
03125 3135          DCA MILLI
03126 2135          ISZ MILLI
03127 5326          JMP  .-1
03130 2136          ISZ CTR
03131 5326          JMP  .-3
03132 1375          TAD (0001
03133 3134          DCA DELTIM
03134 6007          CAF
03135 6024          PPC          /PUNCH
03136 4361          JMS TIM1
03137 6021 P1T3A,   PSF          /SKIP IF PUNCH FLAG
03140 5347          JMP P1E3
03141 6010          RPE          /R/P INTERRUPT ON
03142 6003          SRQ          /SHOULD SKIP HERE FOR INT REQ
03143 5347          JMP P1E3    /REPORT ERROR
03144 2022          ISZ COUNT
03145 5321          JMP P1T3+4
03146 5425          JMP I CHAIN

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03147 4451 P1E3, JMS I UERROR
03150 4040 NOSUF
03151 0000 NONE
03152 5321 JMP P1T3+4
03153 6002 P1T3S, IOF
03154 6021 PSF
03155 5354 JMP .-1
03156 6011 RSF
03157 5356 JMP .-1
03160 5356 JMP .-2
03161 0000 TIM1, 0 /44 MS TIME OUT
03162 2134 ISZ DELTIM
03163 5362 JMP .-1
03164 1374 TAD (0500
03165 3134 DCA DELTIM
03166 2134 ISZ DELTIM
03167 5366 JMP .-1
03170 2134 ISZ DELTIM
03171 5370 JMP .-1
03172 5761 JMP I TIM1
03174 0500
03175 0001
03176 7773
03177 4000
3200 PAGE
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/ROUTINE TO CHECK THAT INTERRUPT ENABLE CAN BE CLEARED FOR PUNCH
03200 0004 P1T4, 4
03201 3234 P1T5
03202 6002 IOF
03203 1302 TAD P7770
03204 3301 DCA PCNT2 /INT COUNTER
03205 6007 PLOOP, CAF
03206 6010 RPE /ENABLE INTERRUPT
03207 6020 PCE /CLEAR INTERRUPT
03210 6001 ION
03211 6024 PPC /PUNCH
03212 6000 SKON
03213 5224 JMP P1E4 /ERROR , NO ION
03214 6003 SRQ /SKIP IF INT REQ GENERATED
03215 7410 SKP /NO INT REQ
03216 5224 JMP P1E4 /ERROR, INT REQ GENERATED
03217 2022 ISZ COUNT /RELIABILITY SETUP
03220 5205 P1T4A, JMP PLOOP
03221 2301 ISZ PCNT2
03222 5205 JMP PLOOP
03223 5425 JMP I CHAIN
03224 4451 P1E4, JMS I UERROR
03225 4040 NOSUF
03226 0000 NONE
03227 5425 JMP I CHAIN
03230 6010 P1T4S, RPE
03231 4502 DELAY
03232 6020 PCE
03233 5230 JMP .-3
03234 0005 P1T5, 5
03235 3251 P1T6

/USED TO CHECK ABILITY OF IOT022 TO CLEAR BUFFER. VISUAL CHECK
03236 4477 SETA /-500 TO CTRA
03237 7014 -764
03240 7240 P1T5A, CLA CMA /7777 TO AC
03241 6026 PLS /CLEAR, LOAD AND PUNCH
03242 7200 CLA
03243 6026 PLS /CLEAR BUFFER CONTENTS PRIOR TO PUNCHING
03244 6021 PSF
03245 5244 JMP .-1
03246 2122 ISZ CTRA /DONE?
03247 5240 JMP P1T5A /NO, REPEAT
03250 5425 JMP I CHAIN /YES, CHAIN
03251 0006 P1T6, 6
03252 3265 P1T7

/CHECKS ABILITY OF IOT024 TO SET BUFFER TO 125 AND PUNCH IT
03253 4477 SETA /-500 TO CTRA
03254 7014 -764
03255 7200 P1T6A, CLA
03256 1152 TAD [125
03257 6026 PLS /CLEAR, LOAD AND PUNCH
03260 6021 PSF /WAIT FOR FLAG
03261 5260 JMP .-1
03262 2122 ISZ CTRA /DONE?

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03263 5255          JMP P1T6A          /NO, REPEAT
03264 5425          JMP I CHAIN        /YES, CHAIN
03265 0007 P1T7,    7
03266 3400          P1T10
          /CHECKS ABILITY OF IOT024 TO SET BUFFER TO 252 AND PUNCH IT
03267 4477          SETA              /-500 TO CTRA
03270 7014          -764
03271 7200 P1T7A,  CLA
03272 1151          TAD [252
03273 6026          PLS              /CLEAR, LOAD AND PUNCH
03274 6021          PSF              /WAIT FOR FLAG
03275 5274          JMP .-1
03276 2122          ISZ CTRA          /DONE?
03277 5271          JMP P1T7A          /NO, REPEAT
03300 5425          JMP I CHAIN        /YES, CHAIN
03301 7770 PCNT2,  7770
03302 7770 P7770,  7770
          3400 PAGE
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03400 0010 P1T10, 10
03401 7777 7777 /END OF TESTS
/CHECKS ABILITY OF PUNCH FLAG TO CAUSE AN INTERRUPT
03402 4475 SETLOC /SET INTERRUPT RETURN
03403 0002 2 /TO P1E10A
03404 3415 P1E10A
03405 6032 P1T10A, KCC /CLEAR TTY READER
03406 6042 TCF /CLEAR TTY PUNCH
03407 6012 RRB /CLEAR READER
03410 6022 PCF /CLEAR PUNCH
03411 6001 ION /ENABLE INTERRUPT
03412 7000 NOP
03413 6002 IOF /TURN OFF INTERRUPT
03414 5222 JMP P1T10B
03415 4451 P1E10A, JMS I UERROR
03416 0140 A
03417 0000 NONE
03420 5205 JMP P1T10A
03421 5205 JMP P1T10A
03422 4477 P1T10B, SETA /-4095 TO CTRA
03423 0001 -7777
03424 4475 SETLOC /SET INTERRUPT RETURN
03425 0002 2 /TO P1T10E
03426 3456 P1T10E
03427 7200 CLA
03430 6010 RPE /SET INTERRUPT ENABLE
03431 6026 PLS /CLEAR, LOAD AND PUNCH
03432 6021 PSF /WAIT FOR FLAG
03433 5232 JMP .-1
03434 6001 P1T10C, ION
03435 7000 NOP
03436 6002 IOF
03437 4451 P1E10B, JMS I UERROR
03440 0240 B
03441 0000 NONE
03442 5256 JMP P1T10E
03443 4475 P1T10S, SETLOC /SET INTERRUPT RETURN
03444 0002 2 /TO P1T10D
03445 3455 P1T10D
03446 7200 CLA
03447 6026 PLS /CLEAR, LOAD AND PUNCH
03450 6021 PSF /WAIT FOR FLAG
03451 5250 JMP .-1
03452 6001 ION /ENABLE INTERRUPT
03453 7000 NOP
03454 5252 JMP .-2
03455 5252 P1T10D, JMP .-3
03456 2122 P1T10E, ISZ CTRA /DONE?
03457 5234 JMP P1T10C /NO, REPEAT
03460 6020 PCE /CLEAR INTERRUPT ENABLE
03461 5425 JMP I CHAIN /YES, CHAIN
/PROGRAM 2, READER TEST, SPECIAL BINARY COUNT PATTERN
03462 4475 PRG2, SETLOC /SET SR
03463 0105 SRMSK /MASK TO

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03464 0460          0460          /0460
03465 4464 P2A,    JMS I SYNC      /SYNC READER
03466 4477          SETA
03467 7773          -5
03470 4463 P2B,    JMS I CRCNT      /GET RANDOM CHAR
03471 3123          DCA CTRB      /COUNT IN CTRB
03472 4467 P2C,    JMS I GETPT      /GET BINARY CHAR
03473 3462          DCA I UTSB      /STORE IT
03474 4455          JMS I UTREAD     /GO READ CHAR
03475 4461          JMS I UTCHK      /GO CHECK IT
03476 5303          JMP P2E        /ERROR
03477 2123 P2D,    ISZ CTRB      /GROUP DONE?
03500 5272          JMP P2C        /NO
03501 4563          JMS I [STALL    /YES, STALL
03502 5270          JMP P2B        /REPEAT
03503 2122 P2E,    ISZ CTRA      /5 ERRORS?
03504 5277          JMP P2D        /NO, CONTINUE
03505 5265          JMP P2A        /RESYNC

/
/PROGRAM 3, PUNCH TEST, SPECIAL BINARY COUNT PATTERN
03506 4460 PRG3,   JMS I UMARK      /MARK TAPE
03507 4457          JMS I UPLDR      /PUNCH LEADER
03510 4466          JMS I INPATT     /INITIALIZE BINARY PATTERN
03511 1150          TAD [60
03512 3105          DCA SRMSK
03513 4467 P3A,    JMS I GETPT      /GET BINARY CHAR
03514 4456          JMS I UTPCH      /PUNCH IT
03515 4563          JMS I [STALL
03516 5313          JMP P3A

/PROGRAM 4, PUNCH VERIFY, SPECIAL BINARY COUNT PATTERN
03517 4466 PRG4,   JMS I INPATT     /INITIALIZE BINARY PATTERN
03520 4475          SETLOC        /400 TO
03521 0105          SRMSK          /TO SR MASK
03522 0400          0400
03523 4467          JMS I GETPT      /GET BINARY CHAR
03524 3462          DCA I UTSB      /STORE IT
03525 4455          JMS I UTREAD     /READ CHARACTER
03526 7440          SZA            /ZERO?
03527 5334          JMP P4B        /NO
03530 5325          JMP .-3        /YES, REPEAT READ
03531 4467 P4A,    JMS I GETPT      /GET BINARY CHAR
03532 3462          DCA I UTSB      /STORE IT
03533 4455          JMS I UTREAD     /READ CHAR
03534 4461 P4B,    JMS I UTCHK      /GO CHECK IT
03535 7000          NOP
03536 5331          JMP P4A        /REPEAT

/PROGRAM 5, PUNCH TEST, RANDOM CHARACTER PATTERN
03537 4460 PRG5,   JMS I UMARK      /MARK TAPE
03540 4457          JMS I UPLDR      /PUNCH LEADER
03541 4474          JMS I UMOVE     /INITIALIZE RANDOM
03542 1247          SEED1          /CHARACTER ROUTINE
03543 1251          RANP1
03544 7774          -4
03545 1150          TAD [60
03546 3105          DCA SRMSK

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03547 4453 P5A,    JMS I ULPRGN    /GET RANDOM CHAR
03550 4456        JMS I UTPCH    /PUNCH IT
03551 4563        JMS I [STALL
03552 5347        JMP P5A      /REPEAT
        /PROGRAM 6, PUNCH VERIFY, RANDOM CHARACTER PATTERN
03553 4474 PRG6,   JMS I UMOVE    /INITIALIZE RANDOM
03554 1247        SEED1      /CHARACTER ROUTINE
03555 1251        RANP1
03556 7774        -4
03557 4475        SETLOC     /400 TO
03560 0105        SRMSK     /SR MASK
03561 0400        0400
03562 4454        JMS I ULRRGN    /GET RANDOM CHAR
03563 3462        DCA I UTSB    /STORE IT
03564 4455        JMS I UTREAD    /READ CHAR
03565 7440        SZA        /ZERO?
03566 5373        JMP P6B      /NO
03567 5364        JMP .-3
03570 4454 P6A,   JMS I ULRRGN    /GET RANDOM CHAR
03571 3462        DCA I UTSB    /STORE IT
03572 4455        JMS I UTREAD    /READ CHAR
03573 4461 P6B,   JMS I UTCHK    /GO CHECK IT
03574 7000        NOP        /ERROR
03575 5370        JMP P6A
        3600 PAGE
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/PROGRAM 7, COMBINES READER-PUNCH TEST, SPECIAL BINARY COUNT PATTERN
03600 4475 PRG7, SETLOC /SET SR MASK TO 0460
03601 0105 SRMSK
03602 0460 0460
03603 4475 SETLOC
03604 0104 DLYMSK
03605 0077 77
03606 4466 JMS I INPATT /INITIALIZE BINARY PATTERN
03607 2133 ISZ ACTIND /SET ACTIVE INDICATOR
03610 4475 SETLOC /SET INTERRUPT
03611 0002 2 /SERVIE ADDRESS
03612 0703 INTSVC
03613 4475 SETLOC /SET PUNCH SERVICE ADDRESS
03614 0716 PVCTR
03615 3624 PBIN
03616 4475 SETLOC /SET READER SERVICE ADDRESS
03617 0711 RVCTR
03620 3671 WNZERO
03621 4246 JMS CPCH /PUNCH CHAR
03622 6001 ION /ENABLE INTERRUPT
03623 5223 JMP . /IDLE
03624 2132 PBIN, ISZ PCHCNT /INCREMENT PUNCH COUNT
03625 1132 TAD PCHCNT /COMPARE PUNCH COUNT
03626 1147 TAD [-144 /TO 100
03627 7710 SPA CLA /GREATER THAN 100?
03630 5233 JMP .+3 /NO, OK
03631 7402 HLT /YES, ERROR HALT
03632 5231 JMP .-1
03633 4246 JMS CPCH /PUNCH BIN CHAR
03634 1127 TAD RBUSY
03635 7640 SZA CLA /READER BUSY?
03636 5503 OUT /YES, EXIT
03637 1132 TAD PCHCNT /GET PUNCH COUNT
03640 1146 TAD [-12 /SUBTRACT SLACK COUNT
03641 7710 SPA CLA /POSITIVE?
03642 5503 OUT /NO, EXIT
03643 6014 RFC /YES, START READER
03644 2127 ISZ RBUSY /SET READER BUSY
03645 5503 OUT /EXIT
03646 0000 CPCH, 0
03647 4470 JMS I GETPTR /GET BIN CHAR
03650 6026 PLS /ENABLE PUNCH
03651 7200 CLA /CLEAR AC
03652 5646 JMP I CPCH /EXIT
03653 0000 CREAD, 0
03654 7200 CLA
03655 6012 RRB /READ CHAR
03656 3131 DCA TCHKW /STORE IT
03657 1132 TAD PCHCNT /GET PUNCH COUNT
03660 1145 TAD [-1 /MINUS 1
03661 3132 DCA PCHCNT /STORE IT
03662 1132 TAD PCHCNT
03663 7640 SZA CLA /0?
03664 5267 JMP .+3 /NO

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03665	3127	DCA RBUSY	/YES, CLEAR READER BUSY
03666	5653	JMP I CREAD	/EXIT
03667	6014	RFC	/FETCH NEXT CHAR
03670	5653	JMP I CREAD	/EXIT
03671	4253	WNZERO, JMS CREAD	/READ CHAR
03672	1131	TAD TCHKW	
03673	7650	SNA CLA	/IS IT 0?
03674	5503	OUT	/YES
03675	4475	SETLOC	/SET INTERRUPT SERVICE
03676	0711	RVCTR	/TO RBIN
03677	3703	RBIN	
03700	4477	SETA	/-5 TO CTRA
03701	7773	-5	
03702	7410	SKP	
03703	4253	RBIN, JMS CREAD	/READ CHAR
03704	4467	JMS I GETPT	/GET BINARY CHAR
03705	3462	DCA I UTSB	
03706	1131	TAD TCHKW	/GET CHAR READ
03707	4461	JMS I UTCHK	/GO CHECK IT
03710	7410	SKP	/ERROR
03711	5503	OUT	/NO
03712	2122	ISZ CTRA	/5 ERRORS?
03713	5503	OUT	/NO, TO MAINLINE
03714	4475	RBINA, SETLOC	/YES, SET READER SERVICE
03715	0711	RVCTR	/TO RESYNC TAPE
03716	3720	+.2	
03717	5503	OUT	
03720	4253	JMS CREAD	/READ CHAR
03721	1131	TAD TCHKW	
03722	3110	DCA CHR1	/STORE
03723	4475	SETLOC	/SET READER SERVICE
03724	0711	RVCTR	
03725	3727	+.2	
03726	5503	OUT	
03727	4253	JMS CREAD	/READ CHAR
03730	1131	TAD TCHKW	
03731	3111	DCA CHR2	
03732	4475	SETLOC	/SET READER SERVICE
03733	0711	RVCTR	
03734	3736	+.2	
03735	5503	OUT	
03736	4253	JMS CREAD	/READ CHAR
03737	1131	TAD TCHKW	
03740	3112	DCA CHR3	
03741	4465	JMS I SYNCA	/GO SYNC
03742	5314	JMP RBINA	/SYNC ERROR, TRY AGAIN
03743	4477	SETA	/YES, -5 TO CTRA
03744	7773	-5	
03745	4475	SETLOC	/RESTORE READER SERVICE TO
03746	0711	RVCTR	/TO RBIN
03747	3703	RBIN	
03750	5503	OUT	

4000 PAGE


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/PROGRAM 10, READ AMPLIFIER ADJUSTMENT LOOP
04000 4475 PRG10, SETLOC /SET INTERRUPT SERVICE
04001 0002 2 /TO INTSVC
04002 0703 INTSVC
04003 4475 SETLOC /SET PUNCH SERVICE ADDRESS
04004 0716 PVCTR /TO PCHCLR
04005 0741 PCHCLR
04006 4475 SETLOC /SET READER SERVICE ADDRESS
04007 0711 RVCTR /TO AMPRDA
04010 4070 AMPRDA
04011 4475 SETLOC
04012 1075 ERRORA
04013 7000 7000
04014 1144 TAD [NOP
04015 3572 DCA I [STALL+3
04016 3105 DCA SRMSK /0 TO SR MASK
04017 4253 RAMPA, JMS AMPRD /GO READ CHAR
04020 7440 SZA /ZERO?
04021 7410 SKP /NO
04022 4253 RAMPB, JMS AMPRD /GO READ CHAR
04023 7041 CIA
04024 1153 TAD [PTMSK
04025 7640 SZA CLA /ALL 1'S?
04026 5233 JMP RAMPC /NO, ERROR
04027 4253 JMS AMPRD /YES, GO READ
04030 7640 SZA CLA /ZERO?
04031 5242 JMP RAMPD /NO, ERROR
04032 5222 JMP RAMPB /YES, REPEAT
04033 4452 RAMPC, JMS I UASCCN /CONVERT EXPECTED CHAR
04034 4052 RAMPF /TO PRINTABLE ASCII
04035 1604 SB
04036 4452 JMS I UASCCN /CONVERT BAD CHAR TO
04037 4074 RAMPWA /TO PRINTABLE ASCII
04040 1611 WAS
04041 5246 JMP RAMPE
04042 4452 RAMPD, JMS I UASCCN /CONVERT EXPECTED CHAR
04043 4075 RAMPWB /TO PRINTABLE ASCII
04044 1604 SB
04045 5236 JMP RAMPD-4
04046 4451 RAMPE, JMS I UERROR /GO PRINT ERROR
04047 4040 NOSUF
04050 1601 SBWAS
04051 5217 JMP RAMPA /TRY AGAIN
04052 0377 RAMPF, 377
04053 0000 AMPRD, 0
04054 4501 SETDLM /-75 TO DELAYM
04055 7665 -113
04056 6014 RFC /FETCH CHAR
04057 6001 ION /ENABLE INTERRUPT
04060 4502 DELAY /DELAY 75 MS
04061 6002 IOF
04062 6011 RSF /FLAG 1?
04063 7410 SKP /NO, FLAG DROPPED
04064 5270 JMP AMPRDA /YES

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04065 4447      JMS I XTYPST      /RING BELL 3 TIMES
04066 4076      BELL3
04067 5217      JMP RAMPA      /TRY AGAIN
04070 6012  AMPRDA, RRB
04071 3274      DCA RAMPWA
04072 1274      TAD RAMPWA
04073 5653      JMP I AMPRD
04074 0000  RAMPWA, 0
04075 0000  RAMPWB, 0
04076 0007  BELL3, 0007      /BELL
04077 0007      0007      /BELL
04100 0007      0007      /BELL
04101 0001      0001      /END CODE

/
/PROGRAM 11, PUNCH ANY CHAR IN SR CONTIUOUSLY
04102 7604  PRG11, LAS      /READ SR
04103 0153      AND [PTMSK
04104 6026      PLS      /PUNCH CHAR
04105 6021      PSF      /FLAG 1?
04106 5305      JMP .-1
04107 5301      JMP .-6      /YES, REPEAT

/
/PROGRAM 12, PUNCH 1'S AND 0'S LOOP
04110 4475  PRG12, SETLOC
04111 0105      SRMSK
04112 0075      0075
04113 7240  PRG12A, CLA CMA
04114 0153      AND [PTMSK
04115 4456      JMS I UTPCH      /PUNCH ALL 1'S
04116 4563      JMS I [STALL
04117 7200      CLA
04120 4456      JMS I UTPCH      /PUNCH ALL 0'S
04121 4563      JMS I [STALL
04122 5313      JMP PRG12A      /REPEAT

4200 PAGE
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/PROGRAM 13, READER SPEED PRINT LOOP
04200 7200 PRG13, CLA
04201 3123          DCA CTRB          /CLEAR CTRB
04202 7604          LAS              /READ SR
04203 7104          CLL RAL
04204 7710          SPA CLA          /LONG OR SHORT?
04205 1143          TAD [-416        /LONG
04206 1142          TAD [-36        /SHORT
04207 3232          DCA TKN          /STORE AT TKN
04210 5220          JMP TSTRL
04211 6014 TSTRD,   RFC              /START READER
04212 6011          RSF              /WAIT FOR
04213 5212          JMP .-1          /FLAG
04214 2122          ISZ CTRA          /INCREMENT CTRA
04215 5222          JMP TSTRC
04216 2123          ISZ CTRB          /INCREMENT CTRB
04217 7000          NOP
04220 1232 TSTRL,   TAD TKN          /LOAD CTRA
04221 3122          DCA CTRA
04222 7604 TSTRC,   LAS              /READ SR
04223 7700          SMA CLA          /PRINT SPEED?
04224 5211          JMP TSTRD        /NO, CONTINUE
04225 4447          JMS I XTYPST     /YES
04226 1532          RSPD
04227 4257          JMS TSTRPC
04230 7402          HLT
04231 5200          JMP PRG13
04232 0000 TKN,     OPEN
/PROGRAM 14, PUNCH SPEED PRINT LOOP
04233 7200 PRG14, CLA
04234 3123          DCA CTRB          /CLEAR CTRB
04235 5245          JMP TSTPL
04236 6026 TSTPP,   PLS
04237 6021          PSF
04240 5237          JMP .-1
04241 2122          ISZ CTRA          /60?
04242 5247          JMP TSTPC        /NO
04243 2123          ISZ CTRB          /YES, INCREMENT CTRB
04244 7000          NOP
04245 1141 TSTPL,   TAD [-74
04246 3122          DCA CTRA          /LOAD -60 IN CTRA
04247 7604 TSTPC,   LAS              /READ SR
04250 7700          SMA CLA          /PRINT SPEED (AFTER 60 SECONDS)
04251 5236          JMP TSTPP        /NO, CONTINUE
04252 4447          JMS I XTYPST     /YES
04253 1543          PSPD
04254 4257          JMS TSTRPC
04255 7402          HLT
04256 5233          JMP PRG14
04257 0000 TSTRPC,  0
04260 4265          JMS BDCNV        /TYPE C(CTRB) IN DECIMAL
04261 0123          CTRB
04262 4447          JMS I XTYPST     /TYPE "CPS"
04263 1554          CPS

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04264 5657          JMP I TSTRPC      /EXIT
04265 0000 BDCNV, 0      /BINARY TO DECIMAL CONVERT
04266 4475          SETLOC          /AND PRINT SUBROUTINE
04267 4331          CNVCTR
04270 7774          -4
04271 1322          TAD ADDRZA      /INITIALIZE ARROW
04272 3303          DCA ARROW
04273 1665          TAD I BDCNV     /GET AND STORE BINARY
04274 2265          ISZ BDCNV       /NUMBER, STORE IT AT VALUE
04275 3330          DCA DIGIT
04276 1730          TAD I DIGIT
04277 3327          DCA VALUE
04300 3330          DCA DIGIT       /O TO DIGIT
04301 7100          CLL
04302 1327          TAD VALUE
04303 1323 ARROW, TAD TENPWR
04304 7420          SNL
04305 5311          JMP .+4
04306 2330          ISZ DIGIT
04307 3327          DCA VALUE
04310 5301          JMP ARROW-2
04311 7200          CLA
04312 1330          TAD DIGIT
04313 1140          TAD [260
04314 4473          JMS I UPUNCH
04315 7300          CLA CLL
04316 2303          ISZ ARROW
04317 2331          ISZ CNVCTR
04320 5300          JMP ARROW-3
04321 5665          JMP I BDCNV
04322 1323 ADDRZA, TAD TENPWR
04323 6030 TENPWR, -1750
04324 7634          -144
04325 7766          -12
04326 7777          -1
04327 0000 VALUE, 0
04330 0000 DIGIT, 0
04331 0000 CNVCTR, 0
/
/PROGRAM 15, READ X CHARACTERS, STALL Y MS, LOOP TO ADJUST TIMINGS
04332 7602 PRG15, HLT CLA      /HALT TO SET SR
04333 7604          LAS            /READ SR
04334 0174          AND [177      /MASK OFF EXCESS BITS
04335 7041          CIA
04336 3021          DCA DELAYM     /STORE STALL COUNT
04337 7604          LAS            /READ SR
04340 0137          AND [7600     /MASK OFF EXCESS BITS
04341 7106          CLL RTL
04342 7006          RTL
04343 7006          RTL
04344 7041          CIA
04345 3347          DCA .+2
04346 4477 P15A, SETA          /-X TO CTRA
04347 0000          0
04350 6014 P15B, RFC          /FETCH CHAR

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04351	6011	RSF	/FLAG 1?
04352	5351	JMP .-1	
04353	2122	ISZ CTRA	/READ X CHARS?
04354	5350	JMP P15B	/NO
04355	4502	DELAY	/YES, DELAY Y MS
04356	5333	JMP PRG15+1	/REPEAT

/WOW! I MADE IT...

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00137	7600
00140	0260
00141	7704
00142	7742
00143	7362
00144	7000
00145	7777
00146	7766
00147	7634
00150	0060
00151	0252
00152	0125
00153	0377
00154	0020
00155	0040
00156	0200
00157	0400
00160	6060
00161	0707
00162	7700
00163	1125
00164	0240
00165	0100
00166	7740
00167	7510
00170	7500
00171	0077
00172	1130
00173	7640
00174	0177
00175	0031
00176	7763
00177	0017

A	0140	GETPT	0067	PRG4	3517	P0T6A	2435
AC	0023	GETPTR	0070	PRG5	3537	P0T6B	2453
ACTIND	0133	GETPTT	1412	PRG6	3553	P0T6S	2446
ADDRZA	4322	GETRDY	0242	PRG7	3600	P0T7	2600
AMPRD	4053	GTPTRP	1435	PRINT	0671	P0T7A	2604
AMPRDA	4070	INCRTN	0266	PSPD	1543	P0T7B	2615
ARROW	4303	INIT	0217	PTMSK	0377	P0T7S	2632
ASCCN	1000	INITPT	1400	PT0	1460	P0T7WA	2635
ASCT	1041	INPATT	0066	PT1	1461	P0T7WB	2636
B	0240	INTSVC	0703	PT2	1462	P1E0	3017
BDCNV	4265	IOUT	0733	PT3	1463	P1E1	3051
BELL3	4076	KSTART	0020	PUNCH	0426	P1E10A	3415
CHAIN	0025	LINK	0024	PVCTR	0716	P1E10B	3437
CHAINN	0270	LPRGN	1255	P0E0	2025	P1E2	3076
CHCK	0521	LRRGN	1273	P0E1	2052	P1E3	3147
CHECK	0071	MARK	1230	P0E10A	2654	P1E4	3224
CHRCNT	0324	MARKAD	1246	P0E2	2073	P1T0	3010
CHR1	0110	MARKER	1521	P0E3	2137	P1T0A	3014
CHR2	0111	MCTR	0563	P0E4	2224	P1T0B	3027
CHR3	0112	MILCTR	0121	P0E5	2412	P1T0S	3023
CNV	1024	MILLI	0135	P0E6	2442	P1T1	3032
CNVCTR	4331	MIL1	0106	P0E7	2620	P1T1A	3044
COUNT	0022	MOVE	0536	P0T0	2010	P1T1B	3046
CPCH	3646	MOVEA	0551	P0T0A	2016	P1T1S	3055
CPIC	0107	MSCTR	0120	P0T0S	2031	P1T10	3400
CPS	1554	NONE	0000	P0T1	2036	P1T10A	3405
CRCNT	0063	NOSUF	4040	P0T1A	2045	P1T10B	3422
CRCTR	0615	NXTST	0117	P0T1S	2056	P1T10C	3434
CREAD	3653	OPEN	0000	P0T10	2637	P1T10D	3455
CRLF	0600	OUT	5503	P0T10A	2644	P1T10E	3456
CTR	0136	PBIN	3624	P0T10B	2661	P1T10S	3443
CTRA	0122	PCHCLR	0741	P0T10C	2672	P1T2	3063
CTRB	0123	PCHCNT	0132	P0T10D	2712	P1T2A	3067
CTRC	0124	PCNT2	3301	P0T10E	2713	P1T2B	3112
CTRD	0125	PFLAG	0126	P0T10S	2701	P1T2S	3102
CTSK	1363	PIND	1465	P0T11	2717	P1T3	3115
CTSK1	1364	PLDR	1214	P0T11A	2723	P1T3A	3137
CURTST	0115	PLDRW	1227	P0T11B	2743	P1T3S	3153
DELAY	4502	PLOOP	3205	P0T11C	2746	P1T4	3200
DELAYM	0021	PNUMB	1471	P0T11S	2755	P1T4A	3220
DELTIM	0134	PRGADR	0240	P0T2	2064	P1T4S	3230
DIGIT	4330	PRGEND	0305	P0T2A	2071	P1T5	3234
DLCNT	0513	PRGNUM	0030	P0T2OK	2102	P1T5A	3240
DLYCNT	0072	PRGTAB	0031	P0T2S	2077	P1T6	3251
DLYMS	0411	PRG0	2000	P0T3	2105	P1T6A	3255
DLYMSK	0104	PRG1	3000	P0T3A	2127	P1T7	3265
DLY212	2766	PRG10	4000	P0T3S	2143	P1T7A	3271
DLY250	2773	PRG11	4102	P0T4	2200	P15A	4346
ENUMB	1474	PRG12	4110	P0T4A	2220	P15B	4350
ERNUMB	1466	PRG12A	4113	P0T4S	2230	P2A	3465
ERROR	1050	PRG13	4200	P0T5	2400	P2B	3470
ERRORA	1075	PRG14	4233	P0T5A	2404	P2C	3472
FADDR	0561	PRG15	4332	P0T5B	2425	P2D	3477
FLAG	0702	PRG2	3462	P0T5S	2416	P2E	3503
FORWD	0307	PRG3	3506	P0T6	2430	P3A	3513

P4A	3531	SR1MSK	2000	ULRRGN	0054
P4B	3534	SR2MSK	1000	UMARK	0060
P5A	3547	SR3MSK	0400	UMOVE	0074
P6A	3570	SR4MSK	0200	UNEXIT	0730
P6B	3573	SR5MSK	0100	UNINT	1501
P7770	3302	SR6MSK	0040	UPLDR	0057
RAMPA	4017	SR7MSK	0020	UPUNCH	0073
RAMPB	4022	STALL	1125	URDSR	0076
RAMPC	4033	STCTA	1111	USTCTA	0077
RAMPD	4042	STCTB	1117	USTCTB	0100
RAMPE	4046	STCTR	0400	USTCTR	0075
RAMPF	4052	STDLYM	1042	USTDLM	0101
RAMPWA	4074	STRT	0200	UTCHK	0061
RAMPWB	4075	SUFY	1476	UTPCH	0056
RANCON	0477	SWITCH	0673	UTREAD	0055
RANDEX	0476	SYNC	0064	UTSB	0062
RANDNO	0027	SYNCA	0065	VALUE	4327
RANGEN	0447	SYNK	1311	WAS	1611
RANP1	1251	SYNKA	1324	WASC	1037
RANP2	1252	SYNKB	1347	WCHK	0535
RANR1	1253	SYNKC	1351	WNZERO	3671
RANR2	1254	TADDR	0562	WRTN	1560
RANSAV	0512	TCHK	1143	XTYPST	0047
RANTAD	0464	TCHKW	0131		
RANTBL	0500	TDOMSG	1615		
RANTND	0511	TEMP	0113		
RBIN	3703	TEMP1	0114		
RBINA	3714	TEMQ	0700		
RBUSY	0127	TEMR	0701		
RCF	6014	TENPWR	4323		
RCHKW	0130	TIM	2151		
RCNT2	2235	TIM1	3161		
RDRCLR	0743	TKN	4232		
RDSR	0443	TPCH	1207		
READSR	4476	TREAD	1200		
RIND	1464	TSB	1145		
RLOOP	2205	TSC1	0624		
RSPD	1532	TSC2	0635		
RTNNO	0116	TSTMSK	0017		
RVCTR	0711	TSTPC	4247		
R7770	2234	TSTPL	4245		
SASC	1040	TSTPP	4236		
SB	1604	TSTRC	4222		
SBWAS	1601	TSTRD	4211		
SEED1	1247	TSTRL	4220		
SETA	4477	TSTRPC	4257		
SETB	4500	TYPAT	0646		
SETDLM	4501	TYPSP	0652		
SETLOC	4475	TYPSTG	0616		
SFADR	1110	UASCCN	0052		
SHALT	0333	UCRLF	0050		
SHLT	0026	UDLYMS	0102		
SRMSK	0105	UERROR	0051		
SRSET	0241	UIOUT	0103		
SRMSK	4000	ULPRGN	0053		

ERRORS DETECTED: 0
LINKS GENERATED: 0

