PDP11

READER/PUNCH TESTS

MD-11-DZPAA-B

EP-DZPAA-B-DL-A

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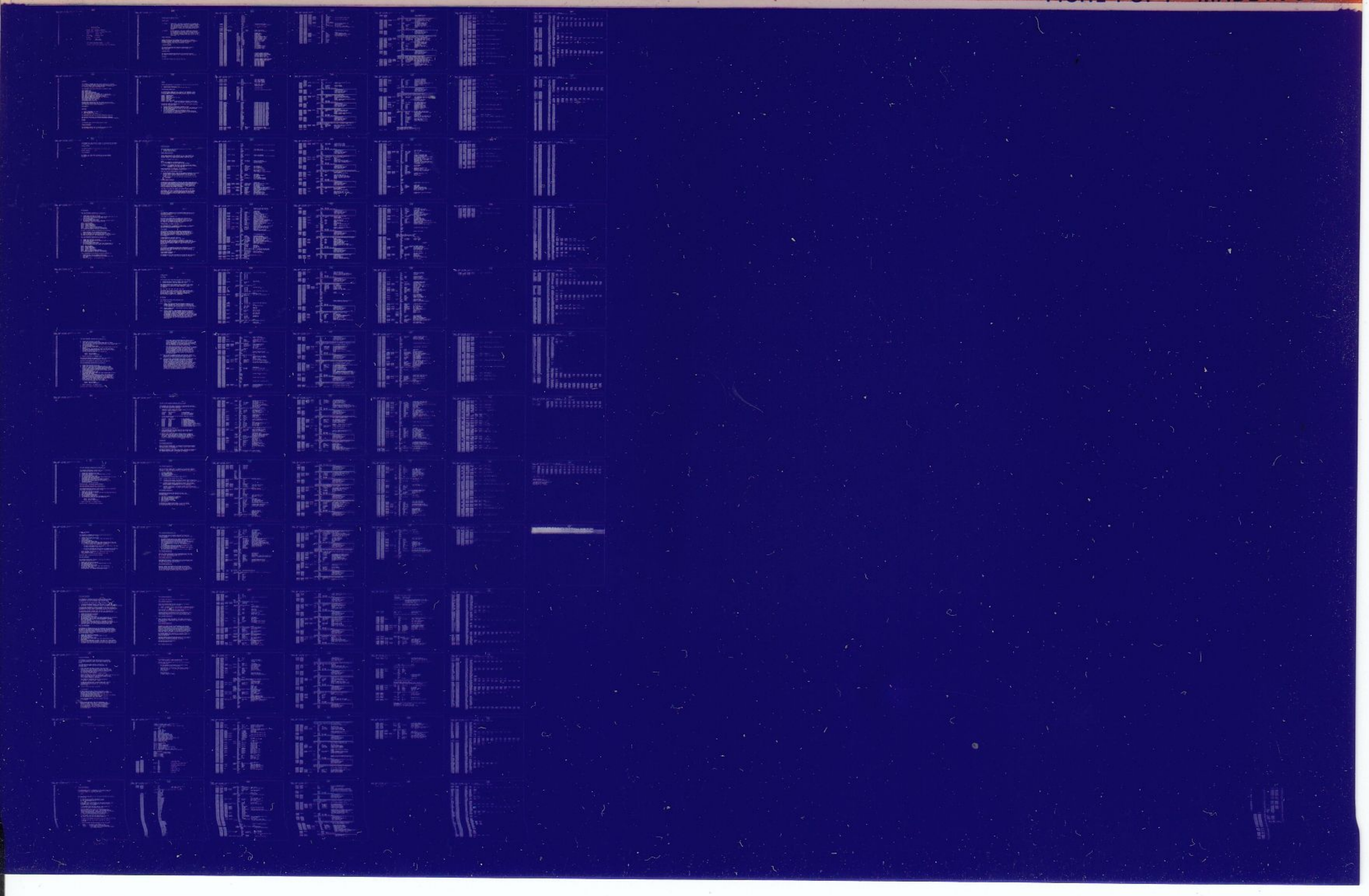
MADE IN USA



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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZPAAA-D

PRODUCT NAME: TYPESET- 11 READER-PUNCH TESTS

DATE: JAN 15, 1972

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: R. KOLLER

MODIFIED: APRIL 1975
MIKE MITCHELL

THIS MAINDEC OBSOLETES MAINDEC - 11 - D2EA

1. ABSTRACT

THE TYPESET-11 READER AND PUNCH TESTS CONSISTS OF A PACKAGE
OF TEST PROGRAMS DESIGNED TO TEST THE PA611 READER LOGIC, READER,
PUNCH LOGIC, PUNCH, AND THE READER AND PUNCH IN COMBINATION.
ALL TESTS ARE INCLUDED IN ONE OBJECT TAPE.

THE AVAILABLE TESTS ARE LISTED HERE IN NUMERICAL ORDER:

PRG0 -READER TEST
PRG1 -PUNCH TEST
PRG2 -PUNCH VERIFY ROUTINE
PRG3 -COMBINED READER-PUNCH TEST
PRG4 -PUNCH TAPE WITH 2 CHARACTERS SET IN SR ROUTINE.
PRG5 -READ AND CHECK TAPE PUNCHED WITH 2 CHARACTERS SET IN SR.
PRG6 -READ X CHARACTERS, THEN STALL Y MSECS.
PRG7 -SPECIAL BINARY COUNT PATTERN TAPE GENERATOR.
PRG10-READER SPEED PRINT ROUTINE.
PRG11-PUNCH SPEED PRINT ROUTINE.
PRG12-PUNCH LOGIC INIT TEST
PRG13-READER LOGIC LIGHT TEST

PROGRAMS PRG0 THROUGH PRG3 ARE THE READER AND PUNCH TESTS.
PROGRAMS PRG4 THROUGH PRG11 ARE UTILITY ROUTINES THAT PRODUCE
TEST TAPES AND AID IN MAKING ADJUSTMENTS.

2. REQUIREMENTS

2.1 EQUIPMENT

A. PDP-11 PROCESSOR. (4K CORE)
B. ASR33/35 TELETYPE
C. PA611 READER(S) AND PUNCH(S).

THE PROCESSOR AND TELETYPE MUST BE IN OPERATING CONDITION.

THE TELETYPE MUST BE AT ITS STANDARD PERIPHERAL ADDRESSES.
SEE SECTION 7.3 FOR OPERATION WITH NON-STANDARD PERIPHERAL ADDRESSES.

2.2 STORAGE

THIS PROGRAM USES LOCATION 00200 THROUGH 015600.

3. LOADING PROCEDURE

THIS PROGRAM'S OBJECT TAPE IS PUNCHED IN ABSOLUTE FORMAT.
THE ABS LOADER IS USED TO LOAD THE PROGRAM.

THE PROGRAM WILL SELF-START IN ORDER TO INITIALIZE FOR THE NUMBER
OF READERS AND PUNCHES IN THE SYSTEM. FOLLOW TYPED INSTRUCTIONS.

3.1 RESTART ADDRESS

THE RESTART ADDRESS OF THIS PROGRAM IS LOCATION 1004.

RESTART ADDRESS: 1004

3.2 START PROCEDURE

IN GENERAL, ALL TESTS ARE INITIATED BY LOADING ADDRESS
200, DEPOSITING TEST # IN SWITCH REGISTER, AND HITTING
CONTINUE.

4. USE PROCEDURE

4.1 PRG0 USE PROCEDURE (DESCRIPTION IN SECTION 8.1)

A. INSURE THAT TELETYPE IS ON-LINE
B. LOAD READER WITH SPECIAL BINARY COUNT PATTERN TEST LOOP. IF NOT USING A LOOP, DATA MUST BE UNDER READ HEAD.
C. LOAD ADDRESS 00200.
D. SET SR TO 000000. PRESS START.
E. THE PROGRAM IDENTIFIES ITSELF, TYPES SET UP AND SR OPTION INSTRUCTIONS. SELECT ANY DESIRED OPTIONS.

SR15=1 HALT ON ERROR.
SR14=1 ENTER SCOPE MODE.
SR13=1 INHIBIT ERROR PRINT.
SR11=1 INHIBIT ITERATION.
SR10=1 HALT AT END OF CURRENT ROUTINE.
SR9=1 SELECT A SPECIFIC ROUTINE FOR EXECUTION.
SR7 THROUGH SR0=NUMBER OF ROUTINE TO BE SELECTED.

SECTION 7.2 GIVES A COMPLETE EXPLANATION OF SR OPTIONS.

F. PRESS CONTINUE. FOLLOW PROGRAM INSTRUCTIONS
G. REFER TO SECTION 6.2 IF ANY ERROR PRINTOUTS OCCUR.
H. WHEN THE PROGRAM HAS COMPLETED ONE PASS IT WILL TYPE P00END.
ONE ERROR-FREE PASS WILL TAKE APPROXIMATELY 10 MINUTES.

4.2 PRG1 USE PROCEDURE (DESCRIPTION IN SECTION 8.2)

A. INSURE THAT TELETYPE IS ON-LINE.
B. INSURE THAT THE PUNCH HAS AN ADEQUATE SUPPLY OF TAPE.
C. LOAD ADDRESS 00200.
D. SET SR TO 000001. PRESS START.
E. THE PROGRAM IDENTIFIES ITSELF AND TYPES INSTRUCTIONS TO SET ANY DESIRED SR OPTIONS. SELECT ANY DESIRED OPTIONS.

SR15=1 HALT ON ERROR.
SR14=1 ENTER SCOPE MODE.
SR13=1 INHIBIT ERROR PRINT.
SR11=1 INHIBIT ITERATION.
SR10=1 HALT AT END OF CURRENT ROUTINE.
SR9=1 SELECT A SPECIFIC ROUTINE FOR EXECUTION.
SR7 THROUGH SR0=NUMBER OF ROUTINE TO BE SELECTED.

A FULL EXPLANATION OF SR OPTIONS IS GIVEN IN SECTION 7.2.

F. PRESS CONTINUE. FOLLOW PROGRAM INSTRUCTIONS.
G. UPON COMPLETION OF A PROGRAM PASS THE PROGRAM WILL TYPE "P01 END".
H. REFER TO SECTION 6. IF ANY ERRORS OCCUR.

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   164
   165                                  ONE ERROR-FREE PASS WILL TAKE APPROXIMATELY 10 MINUTES.
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4.3 PRG2 USE PROCEDURE (DESCRIPTION IN SECTION 8.3)

A. INSURE THAT TELETYPE IS ON-LINE.
B. LOAD TAPE THAT WAS PUNCHED BY PRG1-PUNCH TEST IN READER. LOAD TAPE SO THAT THE FIRST RUBOUT CHARACTER (ALL 1'S) IS ON THE RIGHT EDGE OF THE METAL PLATE OVER THE READ STATION. MAKE READER READY.
C. LOAD ADDRESS 00200.
D. SET SR TO 000002. PRESS START.
E. THE PROGRAM IDENTIFIES ITSELF AND TYPES INSTRUCTIONS TO LOAD THE READER.
F. PRESS CONTINUE. THE PROGRAM WILL READ THE TAPE AND REPORT ANY ERRORS. DISREGARD ANY ERRORS THAT OCCUR WHEN THE READER REACHES THE END OF THE TAPE.
G. THE SR OPTIONS AVAILABLE IN THIS PROGRAM ARE:

    SR15=1 HALT ON ERROR.
    SR13=1 INHIBIT ERROR PRINT.

H. REFER TO SECTION 6. IF ERRORS OCCUR.

PRG2 DOES NOT RESYNC THE READER AT ANY TIME. IT'S INTENT IS TO SHOW EACH AND EVERY ERROR CAUSED BY THE PUNCH.

EXECUTION TIME DEPENDS ON LENGTH OF TAPE TO BE VERIFIED.

4.4 PRG3 USE PROCEDURE (DESCRIPTION IN SECTION 8.4)

A. INSURE THAT TELETYPE IS ON-LINE.
B. INSURE THAT THE PUNCH HAS AN ADEQUATE SUPPLY OF TAPE.
C. USING THE "PUNCH FEED" KEY, PUNCH 2 FEET BLANK LEADER. LOAD A 1" THICK STACK OF PREPUNCHED SPECIAL BINARY COUNT PATTERN TAPE IN READER, AND MAKE READER READY. THE BLANK LEADER PORTION OF THE TAPE MUST BE AT THE READ STATION.
D. LOAD ADDRESS 000200.
E. SET SR TO 000003. PRESS START.
F. THE PROGRAM IDENTIFIES ITSELF AND TYPES INSTRUCTIONS TO PUNCH LEADER AND LOAD READER.
G. PRESS CONTINUE. THE PROGRAM WILL PUNCH A NEW BINARY COUNT PATTERN WHILE READING THE PREPUNCHED TAPE IN THE READER. THE PROGRAM SHOULD RUN ERROR-FREE UNTIL THE READER TAPE IS EXHAUSTED, AT WHICH POINT A READER NOT READY MESSAGE WILL OCCUR. REPLACE THE READER TAPE WITH THE TAPE JUST PUNCHED AND RERUN THE TEST. RUN THE TEST 6 TIMES.
H. THE SR OPTIONS AVAILABLE WITH THIS PROGRAM ARE:

    SR15=1 HALT ON ERROR.
    SR13=1 INHIBIT ERROR PRINT.

I. REFER TO SECTION 6. IF ERRORS OCCUR.

EXECUTION TIME: PRG3 IS CONTINUOUS RUNNING.

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4.5 PRG4 USE PROCEDURE (DESCRIPTION IN SECTION 8.5)

THIS PROGRAM CONTINUOUSLY PUNCHES TAPE WITH 2 CHARACTERS
WHOSE CODES HAVE BEEN SET IN SR. TO RUN:

A. INSURE THAT TELETYPE IS ON-LINE.
B. INSURE TAHT THE PUNCH HAS AN ADEQUATE SUPPLY OF TAPE.
C. LOAD ADDRESS 000200
D. SET SR TO 000004. PRESS START.
E. THE PROGRAM IDENTIFIES ITSELF AND TYPES INSTRUCTIONS TO SET SR
   TO DESIRED CODES AND PUNCH READY.
F. PRESS CONTINUE. THE PROGRAM WILL PUNCH THE DESIRED
   CHARACTERS CONTINUOUSLY UNTIL STOPPED BY USER.
G. THE CHARACTERS TO BE PUNCHED MAY BE CHANGED WHILE THE
   PROGRAM IS RUNNING.
H. THIS PROGRAM HAS NO SR OPTIONS.

EXECUTION TIME: CONTINUOUS RUNNING PROGRAM.

4.6 PRG5 USE PROCEDURE (DESCRIPTION IN SECTION 8.6)

THIS PROGRAM READS AND CHECKS A TAPE PUNCHED WITH ANY 2 CHARACTERS
WHOSE CODES HAVE BEEN SET IN THE SR. TO RUN:

A. INSURE THAT TELETYPE IS ON-LINE.
B. LOAD TAPE TO BE READ IN READER. DATA MUST BE UNDER READ STATION.
C. LOAD ADDRESS 000200.
D. SET SR TO 000005. PRESS START.
E. FOLLOW PROGRAM INSTRUCTIONS.
F. THE PROGRAM WILL READ THE TAPE AND REPORT ANY ERRORS.
G. THE SR OPTIONS AVAILABLE WITH THIS PROGRAM ARE:

    SR15=1 HALT ON ERROR.
    SR13=1 INHIBIT ERROR PRINT.

H. REFER TO SECTION 6. IF ERRORS OCCUR.

EXECUTION TIME: CONTINUOUS RUNNING PROGRAM.

4.7 PRG6 USE PROCEDURE

THIS PROGRAM IS INTENDED AS AN AID IN SCOPING AND ADJUSTING
THE READER AND READER LOGIC. TO RUN:

A. INSURE THAT TELETYPE IS ON-LINE.
B. LOAD ANY TAPE LOOP IN THE READER. ONE'S AND ZEROES LOOP IS
   A GOOD CHOICE.
C. LOAD ADDRESS 000200
D. SET SR TO 000006. PRESS START
E. THE PROGRAM IDENTIFIES ITSELF AND TYPES INSTPUCTIONS TO SET THE
   SR TO NUMBER OF CHARACTERS TO READ AND TO NUMBER OF MILLISECONDS
   TO STALL AFTER READING THE CHARACTERS. PLEASE NOTE:

   1. THE LEFT 8 SWITCHES ARE FOR THE NUMBER OF CHARACTERS TO BE READ.
      THE RANGE IS BETWEEN 1 AND 377(8).

   2. THE RIGHT 8 SWITCHES ARE FOR SETTING THE NUMBER OF MILLISECONDS
      TO STALL AFTER READING THE NUMBER OF CHARACTERS SPECIFIED.

F. PRESS CONTINUE. THE PROGRAM WILL CONTINUOUSLY READ AND STALL
   UNTIL STOPPED BY USER.
G. THE SETTINGS OF THE SR MAY BE CHANGED AT ANY TIME.

EXECUTION TIME: CONTINUOUS RUNNING PROGRAM.

4.8 PRG7 USE PROCEDURE

THIS PROGRAM CONTINUOUSLY PUNCHES A TAPE WITH THE SPECIAL
BINARY COUNT PATTERN. TO RUN:

A. INSURE THAT TELETYPE IS ON-LINE
B. MAKE SURE THAT THE PUNCH HAS AN ADEQUATE SUPPLY OF TAPE.
C. LOAD ADDRESS 000200.
D. SET SR TO 000007. PRESS START
E. THE PROGRAM IDENTIFIES ITSELF, AND TYPES INSTRUCTION
   TO MAKE THE PUNCH READY.
F. PRESS CONTINUE. THE SPECIAL BINARY COUNT PATTERN WILL
   BE PUNCHED UNTIL THE PROGRAM IS STOPPED BY USER.

4.9 PRG10 USE PROCEDURE

THIS PROGRAM IS INTENDED AS AN AID IN DETERMINING THE SPEED
OF THE READER. IT IS NOT INTENDED TO REPLACE REGULAR SCOPING
PROCEDURES FOR SETTING THE READER TO ITS CORRECT SPEED.

WITH THIS PROGRAM THE READER SPEED CAN BE MEASURED IN TWO WAYS:

1. 30 SECOND MEASUREMENT PERIOD. PLUS OR MINUS 10 CHARACTER ACCURACY
2. 300 SECOND (5 MINUTE) MEASUREMENT PERIOD. PLUS OR MINUS 1 CHARACTER ACCURACY

IN EITHER CASE MEASUREMENT ACCURACY DEPENDS ON THE USER'S ATTENTION
TO STARTING AND ENDING TIMES OF MEASUREMENT, AS THE TIME INTERVALS ARE
DETERMINED BY THE USER USING A SWEEP SECOND HAND WATCH OR STOP WATCH.

THE SPECIFIED ACCURACY ASSUMES THAT THE USER WILL TERMINATE THE
MEASURING INTERVAL WITHIN ONE SECOND OF THE MEASUREMENT PERIOD. TO RUN:

A. INSURE THAT TELETYPE IS ON-LINE
B. MOUNT ANY TAPE LOOP IN READER.
C. LOAD ADDRESS 000200.
D. SET SR TO 000010. PRESS START
E. THE PROGRAM IDENTIFIES ITSELF AND TYPES INSTRUCTIONS TO LOAD READER
   AND MAKE READY, AND TO SELECT DESIRED MEASUREMENT PERIOD.
F. PRESS CONTINUE WHEN READY TO START MEASUREMENT. THE READER
   WILL START RUNNING.
G. AT END OF TIME PERIOD, SET SR15 TO A 1 AND BACK TO 0 AGAIN.
   THE PROGRAM WILL TYPE READER SPEED IN CHARACTERS PER SECOND AND HALT.
H. TO REPEAT, SELECT THE DESIRED TIME FERIOD WITH SR14, MAKE
   SURE THAT SR15 IS SET TO 0, AND PRESS CONTINUE WHEN READY.

4.10 PRG11 USE PROCEDURE

THIS PROGRAM IS INTENDED AS AN AID IN DETERMINING THE PUNCH SPEED.
THE SPEED OF THE PUNCH CAN BE MEASURED WITHIN ONE CHARACTER ACCURACY
PROVIDED THE USER PAYS CLOSE ATTENTION TO THE STARTING AND STOPPING
TIME OF THE MEASUREMENT PERIOD. THE MEASUREMENT PERIOD IS CONTROLLED
BY THE USER USING A SWEEP SECOND WATCH OR STOP WATCH. THE PERIOD
USED IS 60 SECONDS. TO RUN:

A. INSURE THAT TELETYPE IS ON-LINE
B. INSURE THAT PUNCH HAS AN ADEQUATE SUPPLY OF TAPE.
C. LOAD ADDRESS 000200.
D. SET SR TO 000011. PRESS START
E. THE PROGRAM IDENTIFIES ITSELF AND TYPES INSTRUCTIONS TO MAKE
   PUNCH READY.
F. PRESS CONTINUE WHEN READY TO START. THE PUNCH WILL START RUNNING.
G. AT END OF TIME PERIOD (60 SECONDS), SET SR15 TO A 1 AND BACK TO 0.
   THE PROGRAM WILL TYPE PUNCH SPEED IN CHARACTER PER SECOND AND HALT.
H. TO REPEAT, MAKE SURE THAT SR15 IS SET TO A 0, AND PRESS CONTINUE.

4.11 PRG12 USE PROCEDURE

THIS PROGRAM IS INTENDED TO BE USED AS AN AID IN CHECKING
OUT THE ADDITIONAL LOGIC ADDED TO THE PUNCH CONTROLLER THAT
ALLOWS THE PROGRAMMER TO ISSUE "PUNCH RESET" UNDER SOFTWARE
CONTROL.

THIS CODE EXECUTES UNDER OPERATOR INTERVENTION. THE
OPERATOR TRIES TO "HANG" THE PUNCH BY PERFORMING THE
FOLLOWING STEPS.

0. FIRST MAKE SURE THE PUNCH IS READY. THE PUNCH KNOB
    SHOULD BE SET TO THE "AVAILABLE" POSITION. RUN THIS TEST
    THE PUNCH WILL START PUNCHING A BINARY BY LOADING ADDRESS
    BY LOADING ADDRESS 200, SETTING THE SWITCH REGISTER TO 12
    AND HITTING THE START SWITCH.
    THE PUNCH WILL START PUNCHING A BINARY PATTERN.

1. REMOVE THE PAPER ROLL FROM IT'S HOLDER AND PLACE IT ON THE RIGHT HAND
    SIDE OF THE PUNCH. (DO NOT TEAR THE PAPER TAPE AND MAKE
    SURE IT FEEDS CORRECTLY'. THE TEST WILL CONTINUE TO PUNCH
    OUT AN ENDLESS STREAM OF CHARACTERS.

    THIS STREAM OF CHARACTERS CAN ONLY BE INTERRUPTED
    BY "HANGING" THE PUNCH CONTROL LOGIC.

2. TO HANG THE CONTROL LOGIC, TURN THE PUNCH "OFF" VIA THE
    "OFFLINE/ONLINE" KNOB ON THE TOP OF THE PUNCH, WHILE
    CHARACTERS ARE BEING PUNCHED OUT. WAIT FOR THE PUNCH
    MOTOR TO STOP.

    THIS WILL CAUSE THE PUNCH TO SHUTOFF.

5. AT THIS POINT

THE PUNCH SHOULD BE HUNG. TO SEE IF THE PUNCH IS HUNG,
TURN THE CONTROL KNOB BACK TO "AVAILABLE". IF TURNING THE
KNOB BACK TO AVAILABLE CAUSES MORE CHARACTERS TO BE
PUNCHED, THEN THE PUNCH IS NOT HUNG.
IF CHARACTERS ARE BEING PUNCHED OUT, THEN THIS SHUT- OFF PROCESS
MUST BE REPEATED UNTIL THE PUNCH HANGS.
IF THE PUNCH DOES NOT HANG, START AGAIN AT STEP #2.

AFTER THE PUNCH IS HUNG, TURN THE CONTROL KNOB BACK
TO "AVAILABLE".

6. IF THE PUNCH DOES HANG, THEN THE PROGRAMMABLE INIT
    FUNCTION IS READY TO BE TESTED. HITTING "CONTINUE" ON
    THE PDP-11 CONTROL PANEL WILL CAUSE THE PROGRAMMABLE
    INIT TO BE INVOKED. THE PROGRAM WILL CONTINUE TO
    PUNCH CHARACTERS IF THE INIT IS WORKING CORRECTLY.
    IF THE PUNCH IS STILL HANGING THEN THE PROGRAMMABLE
    INIT DID NOT WORK.

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                                7.  SWITCH REGISTER OPTIONS:
                                    SR14=1      TO SCOPE LOOP ON THE PROGRAMMABLE INIT FUNCTION
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4.12 PRG13 USE PROCEDURE

THIS PROCEDURE IS USED TO DETERMINE IF THE READER LIGHT LOGIC IS WORKING CORRECTLY. IT CHECKS THE ABILITY OF THE READER LIGHT TO BE TURNED OFF UNDER PROGRAM CONTROL.

STEPS:

RUN THIS TEST BY SELECTING IT VIA THE SWITCH REGISTER AND STARTING AT LOCATION 200.

1. PUT SWITCH 8 OF THE SWITCH REGISTER TO ZERO.
   PUT THE READER NUMBER IN THE SWITCH REGISTER
   WHEN THE PROGRAM ASKS FOR IT.

2. AFTER SELECTING A GIVEN READER VIA THE SWITCH REGISTER, TURN THE READER LIGHT "ON" BY PRESSING THE MOMENTARY CONTACT "ON/OFF' SWITCH ON THE READER.

   IF THE READER LIGHT DOES NOT COME ON, THEN EITHER THE LIGHT OR THE SWITCH IS PROBABLY DEFECTIVE.

3. ONCE THE READER LIGHT IS ON, THE OPERATOR SHOULD PUT SWITCH 8 TO A ONE TO TURN IT OFF. THE PROGRAM MONITORS THE POSITION OF SWITCH 8. WHEN SWITCH 8 IS ONE, THE PROGRAMS ISSUES A SOFTWARE COMMAND TO TURN THE LIGHT OFF.
   IF THE LIGHT REMAINS ON AFTER SWITCH 8 HAS BEEN SET TO A ONE, THEN THE READER LOGIC IS DEFECTIVE.

4. IF THE READER LIGHT GOES OFF WHEN SWITCH 8 IS IN THE ONE STATE, THEN THE TEST HAS WORKED CORRECTLY.

   TO SELECT A NEW READER, PUT SWITCH 12 TO A ONE AND HIT CONTINUE.

   TO RE-RUN THE TEST, GO DO STEP 1 AND STEP 2, THEN HIT CONTINUE.

5. SWITCH REGISTER OPTIONS AVAILABLE IN THIS TEST ARE:

SR12=1	TO SELECT A NEW READER TO TEST.
SR 8=1	TO TURN LIGHT OFF ON READER SELECTED.
SR14=1	TO DO A SCOPE LOOP ON THE PROGRAMMABLE READER LIGHT DISABLE FUNCTION.

5. PROGRAM AND/OR OPERATOR ACTION

5.1 NORMAL HALTS

LOC 002502 — COMMON HALT. THIS HALT IS CONTAINED IN A SUBROUTINE THAT IS CALLED BY THOSE PARTS OF THE PROGRAM REQUIRING THAT THE PROCESSOR HALT. THIS HALT NORMALLY OCCURS UPON COMPLETION ON AN INSTRUCTION OR STATUS PRINTOUT. WHEN THE HALT OCCURS, THE CONSOLE DATA LIGHTS DISPLAY THE ADDRESS OF INSTRUCTION THAT GENERATED THE HALT REQUEST.

LOC 002032 — ROUTINE END HALT. THIS HALT OCCURS UPON COMPLETION OF THE CURRENT TEST ROUTINE. WHEN THE HALT OCCURS, THE CONSOLE DATA LIGHTS DISPLAY THE NUMBER OF ROUTINE JUST COMPLETED. THE HALT OCCURS ONLY IF SR10 IS SET TO A 1, FOR THOSE PROGRAMS THAT MAKE USE OF THE OPTION (PRG0,PRG1).

5.2 NORMAL PRINTOUTS

NORMAL PRINTOUTS IN THIS PROGRAM SERVE TO IDENTIFY A STARTING PROGRAM, TO PROVIDE INSTRUCTIONS, TO INDICATE STATUS, OR TO SIGNAL AN OPERATOR ERROR. MOST PRINTOUTS ARE SELF-EXPLANATORY. THOSE PRINTOUTS REQUIRING ADDITIONAL EXPLANATION FOLLOW.

"?INVALID PROGRAM"

THE USER HAS SELECTED FOR EXECUTION A NON-EXISTENT PROGRAM. SET IN SR3 THROUGH SR0 THE CORRECT PROGRAM NUMBER AND PRESS CONTINUE.

"?INVALID TEST"

THE USER HAS SELECTED FOR EXECUTION A NON-EXISTENT ROUTINE SET CORRECT ROUTINE NUMBER IN SR7 THROUGH SR0 AND PRESS CONTINUE.

"PXX END."

THE SPECIFIED PROGRAM HAS COMPLETED ONE PASS.

6. ERRORS

ERRORS ARE REPORTED IN THIS PROGRAM BY ONE OF THE FOLLOWING METHODS:

A. UNCONDITIONAL ERROR HALTS, OR
B. ERROR PRINTOUT FOLLOWED BY AN OPTIONAL ERROR HALT.

6.1 UNCONDITIONAL ERROR HALTS

AN UNCONDITIONAL ERROR HALT WILL OCCUR AT THE ADDRESSES LISTED BELOW IF THROUGH HARDWARE OR SOFTWARE FAILURE, PROGRAM CONTROL IS TRANSFERRED TO AN UNEXPECTED AREA BETWEEN 000000 AND 000776.

000002 - RESERVED AREA.
000006 - ERROR TRAP
000012 - RESERVED INSTRUCTION TRAP
000016 - DEBUG TRAP
000022 - IOT TRAP
000026 - POWER FAIL TRAP
000040 THROUGH 000776 - SYSTEM SOFTWARE AND INTERRUPT VECTOR AREA, EXCEPT FOR READERS, PUNCHES, AND TTY VECTORS.

TO FIND OUT WHERE THE PROGRAM WAS AT THE TIME THE FAILURE OCCURRED, PERFORM THE FOLLOWING STEPS:

A. EXAMINE CONTENTS OF REGISTER 6 (ADDRESS 177706)
B. TRANSFER THE CONTENTS OF REGISTER 6 TO THE SR, LOAD ADDRESS AND EXAMINE.
C. THE DATA SHOWN IN THE DATA LIGHTS IS THE VALUE OF THE PC WHEN THE FAILURE OCCURRED.
D. LOCATE IN PROGRAM LISTING THE DISPLAYED PC VALUE.
E. THE INSTRUCTION THAT IMMEDIATELY PRECEDES THE ONE REFERENCED BY THE DISPLAYED PC VALUE IS THE INSTRUCTION THAT WAS/WAS BEING EXECUTED WHEN THE FAILURE OCCURRED.

6.2 ERROR PRINTOUTS

ERROR PRINTOUTS IN THIS PROGRAM CAN BE ONE OF TWO TYPES:
A. NORMAL ERROR PRINTOUTS
B. EXTENDED ERROR PRINTOUTS

6.2.1 NORMAL ERROR PRINTOUTS

NORMAL ERROR PRINTOUTS ARE GENERATED BY THE "ERR" SUBROUTINE. THE ERR SUBROUTINE IS CALLED BY AN "ERROR" STATEMENT IN THE PROGRAM LISTING. THE NORMAL ERROR PRINTOUT TAKES THE FORM:

"PXX TYYY PC OZZZZZ ICNT VVVVV."

WHERE:
PXX IS THE NUMBER OF THE PROGRAM BEING RUN,
TYYY IS THE NUMBER OF ROUTINE WHERE FAILURE OCCURRED.

PC OZZZZZ IS THE ADDRESS FROM WHICH THE ERROR CALLED WAS ISSUED.
ICNT VVVVV. IS NUMBER OF TIMES TEST WAS DONE WHEN FAILURE OCCURRED.
MEANINGFUL ONLY IN PRG0 AND PRG1.

AFTER THE PRINTOUT IS COMPLETED, THE PROGRAM WILL HALT AT COMMON ERROR HALT AT LOC 002516 IF SR15 IS SET.

WHEN THIS TYPE OF ERROR PRINTOUT OCCURS:

A. IN THE PROGRAM LISTING, LOOK UP THE ADDRESS REFERENCED BY PCOZZZZZ.
B. OPPOSITE THE PC VALUE AN ERROR STATEMENT WILL BE FOUND, AND IN THE COMMENTS SECTION A DESCRIPTION OF THE FAILURE WILL BE FOUND.
C. AT THE BEGINNING OF THE TEST ROUTINE A DESCRIPTION OF THE TEST WILL BE FOUND.

6.2.2 EXTENDED ERROR PRINTOUTS

IN ADDITION TO THE INFORMATION TYPED BY THE NORMAL ERROR PRINTOUTS, THE EXTENDED ERROR PRINTOUTS TYPE INFORMATION THAT DESCRIBES THE TYPE OF FAILURE. MOST EXTENDED PRINTOUTS CONCERN THEMSELVES WITH DATA PROBLEMS. THE PRINTOUTS ARE GENERATED BY THE "ERRN" SUBROUTINE WHICH IS CALLED BY AN "ERRORN" STATEMENT IN THE PROGRAM LISTING. A TYPICAL PRINTOUT WOULD LOOK AS FOLLOWS:

"P05 T000 PC 011350 ICNT 00000. DATA ERROR S/B:0371 WAS:0071"

THE PROGRAM, TEST AND PC INFORMATION ARE THE SAME AS FOR NORMAL ERROR PRINTOUTS. THE PC VALUE ALTHOUGH HAVING THE SAME MEANING, IS NOT AS MEANINGFUL, SINCE THE ERRN SUBROUTINE MAY BE BEING CALLED BY A COMMON DATA ERROR SUBROUTINE WHICH IS USED BY MORE THAN ONE PROGRAM.

(6.2.2 CONT'D)

THE IMPORTANT INFORMATION IN AN EXTENDED ERROR PRINTOUT IS THE "EXTENDED" INFORMATION TYPED. SOME OF THE EXTENDED PRINTOUTS ARE DESCRIBED BELOW:

"DATA ERROR S/B XXXX WAS: YYYY"

DATA READ WITH READER DOES NOT AGREE WITH EXPECTED DATA. S/B XXXX (SHOULD BE) IS THE EXPECTED DATA. WAS YYYY IS THE RECEIVED DATA. DEPENDING ON THE PROGRAM, THE FAILURE COULD BE CAUSED BY THE READER OR THE PUNCH. EXAMINING THE TAPE WILL SHOW IF THE TAPE IS PUNCHED CORRECTLY.

"REREAD ERROR. 1ST READ: XXXX WAS: YYYY"

THIS ERROR PRINTOUT IS GENERATED BY PRGO TEST14. IT INDICATES THAT A REREAD OF THE READER BUFFER DID NOT AGREE WITH THE ORIGINAL DATA READ FROM THE BUFFER.

"SYNC ERROR"

THIS PRINTOUT INDICATES THAT A PROGRAM WAS UNSUCCESSFUL IN SYNCING UP WITH THE SPECIAL BINARY COUNT PATTERN TAPE IN THE READER, OR IN THE CASE OF PRG2, THAT THE PROGRAM HAS NOT READ A SUFFICIENT NUMBER OF ZEROES BEFORE SYNCING UP WITH THE LEADER CHARACTER (377). IF HALTED, PRESS CONTINUE TO TRY AGAIN.

"LEADER ERROR S/B: 377 WAS: XXXX" OR
"LEADER ERROR S/B BETWEEN 0 AND 3. WAS: XXXX

ONE OR BOTH OF THESE PRINTOUTS IS GENERATED BY PRG? WHEN IN READING THE LEADER THAT PRECEDES THE SPECIAL BINARY COUNT PUNCHED BY PRG3 THE DATA DOES NOT AGREE WITH THE EXPECTED DATA. CHECK THAT THE TAPE IS PUNCHED CORRECTLY. REFER TO PRG1 AND PRG2 DESCRIPTION.

"MATCH ERROR"

THIS PRINTOUT IS GENERATED BY PRG5 WHEN UNSUCCESSFUL IN MATCHING UP THE DATA READ FROM THE READER WITH THE EXPECTED DATA AS SPECIFIED BY SR. CHECK THAT THE TAPE IS THE ONE TO BE READ AND RESTART THE PROGRAM.

"FALSE READER INTERRUPT" OR,
"FALSE PUNCH INTERRUPT"

THE PROGRAM DID NOT FIND THE ERROR OR THE DONE BIT SET FOLLOWING AN INTERRUPT. POSSIBLY NOISE COULD BE CAUSING THE PROBLEM.

7. MISCELLANEOUS

7.1 TEST TAPES

THE FOLLOWING TEST TAPES ARE RELEASED WITH THIS PROGRAM:

A. MAINDEC-00-D2G4-PT SPECIAL BINARY COUNT PATTERN TEST TAPE.
B. MAINDEC-00-D2G2-PT ONES AND ZEROES TEST TAPE.

THE SPECIAL BINARY COUNT PATTERN TAPE IS PUNCHED WITH A PATTERN CONSISTING OF THE NUMBERS 000 THROUGH 377. EACH NUMBER IS IMMEDIATELY FOLLOWED BY ITS ONES COMPLEMENT NUMBER. FOR EXAMPLE:

001, 376, 002, 375, 003, 374, 004, 373, ETC.

THE EASIEST WAY TO MAKE A SPECIAL BINARY COUNT PATTERN TEST LOOP IS TO OVERLAP THE TAPE AT THE POINT WHERE THE CHARACTERS 377,000,000;377. APPEAR. THAT SEQUENCE OF CHARACTERS APPEARS EVERY 512 CHARACTERS. THEREFORE A MINIMUM SIZE TEST LOOP WOULD CONSIST OF 512 CHARACTERS.

7.2 SR OPTIONS

THE STANDARD SR OPTIONS ARE DESCRIBED HERE.

SR15 - HALT ON ERROR.

SR14 - SCOPE. THIS OPTION CAUSES THE PROGRAM TO REMAIN IN THE CURRENT TEST ROUTINE. WHEN THE OPTION IS REMOVED THE PROGRAM PERFORMS THE TEST THE NUMBER OF TIMES SPECIFIED BY ITS ITERATION COUNT, BEFORE GOING ON TO THE NEXT ROUTINE.

SR13 - INHIBIT ERROR PRINT. THIS OPTION IF SET WILL REMOVE ALL ERROR PRINTOUTS.

SR11 - INHIBIT ITERATION. SOME PROGRAMS CONSIST OF INDIVIDUAL TEST ROUTINES. FOR EACH ROUTINE THE FUNCTION BEING TESTED CAN BE TESTED A VARIABLE NUMBER OF TIMES BEFORE THE ROUTINE IS COMPLETED. THE NUMBER OF TIMES THE TEST IS TO BE PERFORMED IS CALLED THE ITERATION COUNT AND IT MAY DIFFER FROM ROUTINE TO ROUTINE. SETTING SR11 WILL CAUSE THE PROGRAM TO PERFORM ONLY ONE ITERATION FOR EACH ROUTINE DURING WHICH THE SWITCH IS SET. TWO POSSIBLE USES OF THIS OPTION ARE:

(7.2 CONT'D)

A. QUICK PASS. WHEN A PROGRAM RUNS FOR SEVERAL MINUTES FOR ONE PROGRAM PASS, THE USER MAY ELECT TO RUN THROUGH THE PROGRAM QUICKLY TO FIND OUT IF ANY FAILURES SHOW UP IMMEDIATELY. A SUCCESSFUL QUICK PASS HOWEVER, DOES NOT GUARANTEE THAT THE SAME PROGRAM WILL RUN ERROR-FREE WHEN PERFORMING A NORMAL ITERATION PASS.

B. SKIP OVER FAILING ROUTINE. WHEN A ROUTINE WITH A MULTIPLE ITERATION COUNT HAS DETECTED A SOLID FAILURE, THE ERROR WILL BE REPORTED MANY TIMES. TO GO ON TO THE NEXT ROUTINE IF DESIRED, THE USER CAN INHIBIT ITERATION. IT WILL BE NECESSARY TO SET SR11 ROUTINE AND HALT, TO CAUSE THE PROGRAM TO STOP AT END OF FAILING ROUTINE. OTHERWISE THE PROGRAM WILL QUICKLY RUN THROUGH THE NEXT ROUTINE ALSO.

SR10 - HALT AT END OF CURRENT ROUTINE. PRG0 AND PRG1 CONSIST OF INDIVIDUALLY NUMBERED TEST ROUTINES. SETTING SR10 WILL CAUSE PROGRAM TO HALT UPON COMPLETION OF CURRENT ROUTINE.

SR9 - SELECT ROUTINE. FOR PROGRAMS THAT CONSIST OF INDIVIDUAL TEST ROUTINES, THE USER MAY ELECT TO RUN ONLY A SPECIFIED ROUTINE. TO SELECT A ROUTINE SR9 MUST BE SET, AND SR7 THROUGH SR0 MUST BE SET TO THE NUMBER OF THE DESIRED ROUTINE. THE SELECTED NUMBER MUST BE A VALID ROUTINE NUMBER FOR THE PROGRAM BEING RUN, OR A USER ERROR PRINTOUT WILL OCCUR. THE PROGRAM WILL RUN THE SELECTED ROUTINE UNTIL THE SELECT ROUTINE OPTION IS CLEARED, OR UNTIL THE SELECTED ROUTINE NUMBER IS CHANGED. IF THE OPTION IS CLEARED, THE PROGRAM WILL PROCEED TO EXECUTE THE REMAINING ROUTINES IN THE PROGRAM. IF THE ROUTINE NUMBER IS CHANGED, THE PROGRAM WILL EXECUTE THE NEWLY SELECTED ROUTINE.

7.3 TESTING AT NON-STANDARD ADDRESSES AND/OR VECTORS

THIS PROGRAM CAN TEST PA611'S ASSIGNED TO NON-STANDARD ADDRESSES. ALL READERS MUST BE ASSIGNED CONSECUTIVE ADDRESSES, AND ALL PUNCHES MUST BE ASSIGNED CONSECUTIVE ADDRESSES.

A. IMMEDIATELY AFTER LOADING THE PROGRAM CHANGE THE FOLLOWING LOCATIONS. REFER TO PROGRAM LISTING.

LOCATION	FROM STANDARD	TO NON-STANDARD
001220	172600	1ST READER CSR ADDRESS
001222	172700	1ST PUNCH CSR ADDRESS

B. IF THE TELETYPE IS ALSO AT NON STANDARD ADDRESSES, PERFORM THE FOLLOWING CHANGES:

LOCATION	FROM STANDARD	TO NON-STANDARD
001224	177560	TTY READER CSR ADDRESS
001226	177562	TTY READER BUFFER ADDRESS
001230	177564	TTY PRINTER CSR ADDRESS
001232	177566	TTY PRINTER BUFFER ADDRESS
001234	000060	TTY READER INTERRUPT VECTOR ADDRESS
001236	000200	TTY READER PRIORITY LEVEL
001240	000064	TTY PRINTER INTERRUPT VECTOR ADDRESS
001242	000200	TTY PRINTER PRIORITY LEVEL

C. PROCEED TO USE THE PROGRAM, OR

D. USING STANDARD DUMP ROUTINES, DUMP OUT THE ENTIRE PROGRAM IN ABSOLUTE FORMAT TO HAVE AN UPDATED OBJECT TAPE THAT REFLECTS YOUR SYSTEM, OR

E. DUMP OUT ONLY LOCATIONS 001224 THROUGH 001242 IN ABSOLUTE FORMAT, AND SPLICE THE TAPE TO THE END OF THE STANDARD OBJECT TAPE. THIS PROCEDURE WOULD REQUIRE THAT THE SHORT LENGTH OF TAPE BE LOADED IMMEDIATELY AFTER THE MAIN PROGRAM IS LOADED, IN ORDER TO OVERLAY LOCATIONS 001224 THROUGH C01242.

8. DESCRIPTION

8.1 PRGO PROGRAM DESCRIPTION

PRGO IS THE PA611 READER TEST. IT CONSISTS OF 22 ROUTINES NUMBERED FROM 00 TO 24(8). THE PROGRAM USES A SPECIAL BINARY COUNT PATTERN TEST TAPE LOOP IN ALL ROUTINES.

ROUTINES 00 THROUGH 17 ARE BASIC LOGIC TESTS. ROUTINES 20 THROUGH 24 ARE READER EXERCISER TESTS. IN ROUTINES 20 THROUGH 24 THE READER WILL RESYNC ITSELF AFTER 3 DATA ERRORS HAVE OCCURRED.

8.2 PRG1 PROGRAM DESCRIPTION

PRG1 IS THE PA611 PUNCH TEST. IT CONSISTS OF 16 ROUTINES NUMBERED FROM 00 TO 17(8). ROUTINES 00 THROUGH 13 ARE BASIC LOGIC TESTS. ROUTINES 14 THROUGH 17 EXERCISE THE PUNCH USING THE FOLLOWING FORMAT:

A. 20 BLANK CHARACTERS
B. SYNC CHARACTER RUBOUT.
C. MODE NUMBER (BETWEEN 0 AND 3)
D. 4 BLANK CHARACTERS
E. 512 CHARACTERS OF SPECIAL BINARY COUNT PATTERN.

RTN14 - PUNCHES 5 DATA BLOCKS AT FULL SPEED.

RTN15 - PUNCHES 5 DATA BLOCKS. THE SPECIAL BINARY COUNT PATTERN DATA IS PUNCHED WITH RANDOM STALLS OF UP TO 47 MSECS. AFTER EACH CHARACTER.

RTN16 - PUNCHES 5 DATA BLOCKS. THE SPECIAL BINARY COUNT PATTERN DATA IS PUNCHED WITH RANDOM STALLS OF UP TO 47 MILLISECONDS BETWEEN GROUPS OF CHARACTERS OF UP TO 15 CHARACTERS.

RTN17 - PUNCHES 1 DATA BLOCK. THE SPECIAL BINARY COUNT PATTERN DATA DATA IS PUNCHED WITH A 5 SECOND STALL PRECEDING EACH 32 CHARACTER GROUP PUNCHED.

8.3 PRG2 PROGRAM DESCRIPTION

PRG2 VERIFIES THE PAPER TAPE PRODUCED BY PRG1. THE PROGRAM CONSISTS OF A SINGLE ROUTINE THAT PERFORMS THE FOLLOWING STEPS:

A. LOOK FOR 10 CONSECUTIVE 0 CHARACTERS
B. LOOK FOR SYNC CHARACTER (RUBOUT)
C. LOOK FOR MODE #. BETWEEN 0 AND 3.
D. READ 4 BLANK CHARACTERS
E. READ 512 BINARY CHARACTERS.
F. GO TO STEP A.

THE ROUTINE WILL REPORT EVERY ERROR. IT WILL NOT RESYNC ON THE SPECIAL BINARY COUNT PATTERN, SINCE IT IS INTENDED THAT EVERY ERROR CAUSED BY THE PUNCH BE REPORTED.

8.4 PRG3 COMBINED READER-PUNCH TEST

THIS CONTINUOUS RUNNING PROGRAM EXERCISES THE PUNCH AND READER CONCURRENTLY. THE SPECIAL BINARY COUNT PATTERN IS USED IN THIS PROGRAM,

A. THE PUNCH PUNCHES DATA AT FULL SPEED. WHEN THE CHARACTER COUNT REACHES 20, THE PUNCH ROUTINE ENABLES THE READER.
B. WHEN THE CHARACTER COUNT REACHES 40, THE PUNCH ROUTINE WILL STOP PUNCHING. PUNCHING WILL NOT RESUME UNTIL THE CHARACTER COUNT IS DECREMENTED TO 31 BY THE READ ROUTINE.
C. IF THE CHARACTER COUNT IS OVER 31, THE READER READS AT FULL SPEED.
D. IF THE CHARACTER COUNT IS 31 OR LESS THE READER WILL READ WITH RANDOM STALLS BETWEEN CHARACTERS.
E. IF THE CHARACTER COUNT BECOMES 0, THE READER STOPS READING UNTIL THE COUNT CLIMBS TO 20.
F. THE READ ROUTINE WILL RESYNC AUTOMATICALLY AFTER 3 ERRORS.

8.5 PRG4 PROGRAM DESCRIPTION

PRG4 WILL PUNCH CONTINUOUSLY THE 2 CHARACTERS WHOSE CODES ARE SET IN THE SR. THE ROUTINE IS USED FOR GENERATING ALL 0'S TAPE, ALL 1'S TAPE, ONES AND ZEROES TAPE, ETC.

8.6 PRG5 PROGRAM DESCRIPTION

PRG5 READS AND CHECKS A TAPE PUNCHED WITH THE CHARACTERS WHOSE CODES ARE SET IN THE SR. THIS ROUTINE IS USEFUL IN SETTING UP THE READ PHOTOCELLS AND READ AMPLIFIER.

8.7 PRG6 PROGRAM DESCRIPTION

PRG6 WILL ENABLE THE READER FOR THE NUMBER OF CHARACTERS SPECIFIED IN THE LEFT HALF OF THE SR, AND THEN IT WILL STALL FOR THE NUMBER OF MILLISECONDS SPECIFIED IN THE RIGHT HALF OF THE SR. THIS ROUTINE IS USEFUL IN SETTING UP THE READER CLOCK, ACCELERATOR, STROBE, AND FOR CHECKING THE STOP DELAY.

8.8 PRG7 PROGRAM DESCRIPTION

PRG7 PUNCHES THE SPECIAL BINARY COUNT PATTERN CONTINUOUSLY.

8.9 PRG10 PROGRAM DESCRIPTION

PRG10 IS A ROUTINE USED TO CHECK THE SPEED OF THE READER.
READER SPEED CAN BE MEASURED IN TWO WAYS:

A. COARSE. 30 SECOND TIMING. PLUS OR MINUS 10 CHARACTER ACCURACY.
B. FINE. 300 SECOND TIMING. PLUS OR MINUS 1 CHARACTER ACCURACY.

SR14 INDICATES TO THE ROUTINE THE TIMING PERIOD THE USER IS
GOING TO USE. SR14=0 INDICATES 30 SECOND TIMING.

THE USER CONTROLS THE DURATION OF THE TIMING PERIOD BY USING A
SWEEP SECOND HAND WATCH OR STOP-WATCH. AT THE END OF THE
TIMING PERIOD, SR15 IS SET TO A 1 TO OBTAIN A SPEED PRINTOUT.

8.10 PRG11 PROGRAM DESCRIPTION

PRG11 IS USED TO CHECK THE SPEED OF THE PUNCH. THE ROUTINE
USES A 60 SECOND TIMING PERIOD THAT IS CONTROLLED BY THE USER.
AT THE END OF THE TIMING PERIOD SR15 IS SET TO A 1 TO OBTAIN A
SPEED PRINTOUT.

8.11 PRG12 PROGRAM DESCRIPTION

PROGRAM 12 IS USED TO TEST THE PROGRAMMABLE INIT FEATURE
ADDED TO THE PUNCH CONTROL LOGIC. THE PROGRAM PUNCHES AN
ENDLESS BINARY PATTERN, WAITING FOR THE OPERATOR TO HANG THE
PUNCH UP. THIS CAN USUALLY BE ACCOMPLISHED BY TURNING THE
CONTROL SWITCH OFF AND JIGGLING THE TAPE LOW SENSOR SWITCH
WHILE THE PUNCH IS PUNCHING. IF THE PUNCH CYCLE HAS NOT BEEN
COMPLETED, READY WILL REMAIN LOW AND THE PUNCH WILL HANG.

THE PROGRAM SENSES THIS CONDITION IN A WATCHDOG TIMER LOOP.
WHEN THE PROGRAM SEES THAT THE PUNCH IS HUNG, THEN IT
TIMES OUT AND HALTS.

WHEN THE OPERATOR HITS THE CONTINUE SWITCH, AN INIT PULSE IS
GENERATED BY THE PROGRAM TO RE-INIT THE PUNCH. [THIS INIT
PULSE DOES NOT EFFECT OTHER DEVICES ON THE BUS.]

UPON HITTING THE CONTINUE SWITCH,
THE PROCESS REPEATS ITSELF.

8.12 PRG13 PROGRAM DESCRIPTION

```
                        ;------------------------

                        ;THIS PROGRAM IS USED TO CHECK THE ABILITY OF THE READER
                        ;LIGHT TO BE TURNED OFF UNDER PROGRAM CONTROL.

                        ;ASSUMING THAT THE READER LIGHT IS ON, THE STEPS PERFORMED
                        ;BY THE PROGRAM ARE:

                        ;1.  GET THE ADDRESS OF THE READER TO BE TESTED (READER
                        ;    IS SELECTED VIA CONSOLE TTY RESPONSE)

                        ;2.  CHECK SWITCH 8.  IF SWITCH 8=1 THEN ISSUE A COMMAND TO
                        ;    TURN THE LIGHT OFF.  IF SWITCH 8=0 THEN RECHECK THE
                        ;    SWITCH AND LOOP
                        ;    ON THIS STEP.

                        ;3.  CHECK SWITCH 12.
                        ;    IF SW12=1 THEN GO TO STEP 1.
                        ;    IF SW12=0 THEN GO TO STEP 2.
```

```
                                        %

                                ;STORED IN DECTAPE LIB12 - MIKE MITCHELL 3/75
                                ;TYPESET 11 READER-PUNCH TESTS
                                ;COPYRIGHT 1972, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
                                        .TITLE  PA611
                                        .ABS
                                .ENABLE AMA
                                        .LIST   ME
                                        .NLIST  MD,SEQ
                                ;PRG0 - READER TEST
                                ;PRG1 - PUNCH TEST
                                ;PRG2 - PUNCH VERIFY ROUTINE
                                ;PRG3 - COMBINED READER-PUNCH TEST
                                ;PRG4 - PUNCH 2 CHARACTERS FROM SR.
                                ;PRG5 - READ 2 CHARACTERS AS PER SR.
                                ;PRG6 - READ X CHARS, STALL Y MSECS.
                                ;PRG7 - PUNCH SPECIAL BINARY COUNT PATTERN TAPE.
                                ;PRG10 - READER SPEED PRINT ROUTINE.
                                ;PRG11 - PUNCH SPEED PRINT ROUTINE.
                                ;PRG12 - PUNCH INIT TEST
                                ;PRG13 - READER LIGHT TEST.
                                ;
                                ;SR 15 - HALT-ON-ERROR.
                                ;SR 14 - SCOPE.
                                ;SR 13 - INHIBIT ERROR PRINT.
                                ;SR 11 - INHIBIT ITERATION.
                                ;SR 10 - HALT AT END OF CURRENT ROUTINE.
                                ;SR  9 - SELECT ROUTINE.
                                ;SR  8 - TURN READER LIGHT OFF (PRG13 ONLY)
                                ;SR 7 THROUGH SR 0 - NUMBER OF ROUTINE TO BE SELECTED.

                                ;PA611 ADDRESSES:
                                ;PUNCH.............772776-772700
                                ;READER............772676-772600
                                ;RDR0-------172600
                                ;RDR1-------172604
                                ;RDR2-----  172610
                                ;RDR3---------172614


                                ;
    000000                              .=0
000000  000002                          .+2                     ;UNASSIGNED TRAP
000002  000000                          HALT
000004  000006              MACHER:     .+2                     ;SP OVERFLOW, BUS ERROR TRAP
000006  000000                          HALT
000010  000012                          .+2                     ;RESERVED INSTRUCTION TRAP
000012  000000                          HALT
000014  002336              TRCV:       SV5S                    ;TRACE TRAP
000016  000340                          PRTY7
000020  002366              IOTV:       RS5S                    ;TRAP TO CALL IOX
000022  000340                          PRTY7
000024  000026                          .+2                     ;POWER FAIL TRAP
000026  000000                          HALT
000030  002136              EMTV:       EMTINT                  ;EMT TRAP
```

```
000032  000340                  PRTY7
000034  000036          TRPV:   .+2                     ;TRAP TRAP. SIMILAR TO EMT.
000036  000002                  RTI                     ;EXIT TRAP CALL.
        000040                  .=40
                        ;LOCATIONS 40 THROUGH 776 ARE FILLED WITH .+2 AND HALT.
                                .NLIST  ME
                                .LIST   ME
                        ;EQUATE STATEMENTS
        177570                  SR=177570
        177776                  PSW=177776
        001200                  SPBOT=1200
        000240                  NOP=240
        000000                  OPEN=0
        100000                  MANUAL=BIT15
        100000                  BIT15=100000
        040000                  BIT14=40000
        020000                  BIT13=20000
        010000                  BIT12=10000
        004000                  BIT11=4000
        002000                  BIT10=2000
        001000                  BIT9=1000
        000400                  BIT8=400
        000200                  BIT7=200
        000100                  BIT6=100
        000040                  BIT5=40
        000020                  BIT4=20
        000010                  BIT3=10
        000004                  BIT2=4
        000002                  BIT1=2
        000001                  BIT0=1
        000000                  R0=%0
        000001                  R1=%1
        000002                  R2=%2
        000003                  R3=%3
        000004                  R4=%4
        000005                  R5=%5
        000006                  R6=%6
        000007                  R7=%7
        000007                  PC=%7
        005746                  PUSH=005746
        024646                  PUSH2=024646
        005726                  POPSP=005726
        022626                  POPSP2=022626
        000340                  PRTY7=340
        000300                  PRTY6=300
        000240                  PRTY5=240
        000200                  PRTY4=200
        000140                  PRTY3=140
        000100                  PRTY2=100
        000040                  PRTY1=40
        000000                  PRTY0=0
        000007                  BELL=007
        177777                  POTLST=-1
        177777                  P1TLST=-1
        177777                  TLAST=-1
        000003                  TRC=3
```

```
                000040                          I=40
                100000                          A=BIT15
                040000                          B=BIT14
                020000                          C=BIT13
                000100                          IE=BIT6
                000000                          EMTX=0
                000003                          SAVSS=3
                000004                          RSTSS=4
                000060                          .=60
000060          002450                          KBSVC                   ;KEYBOARD VECTOR SETUP.
000062          000340                          PRTY7                   ;STATUS UPON KEYBOARD INTERRUPT.
                000200                          .=200
000200          000137  001450                  JMP     START           ;GO TO START OF PROGRAM.
                001000                          .=1000
001000          000240                          NOP
001002          000240                          NOP
001004          005037  001252                  CLR     INITD           ;RESET INIT SWITCH.
001010          000137  001450                  JMP     START           ;GO TO START OF PROGRAM.
                001200                          .=1200
001200          000000          PRS:    OPEN                            ;READER CSR
001202          000000          PRB:    OPEN                            ;READER BUFFER
001204          000000          PPS:    OPEN                            ;PUNCH CSR
001206          000000          PPB:    OPEN                            ;PUNCH BUFFER
001210          000000          RDRVTR: OPEN                            ;READER INTERRUPT VECTOR
001212          000200          RDRLVL: PRTY4                           ;READER PRIORITY LEVEL
001214          000000          PCHVTR: OPEN                            ;PUNCH INTERRUPT VECTOR
001216          000200          PCHLVL: PRTY4                           :PUNCH PRIORITY LEVEL
001220          172600          FSTRDR: 172600                          ;ADDR OF 1ST READER.
001222          172700          FSTPCH: 172700                          ;ADDR OF 1ST PUNCH.
001224          177560          TKS:    177560                          ;LSR CSR
001226          177562          TKB:    177562                          ;LSR BUFFER
001230          177564          TPS:    177564                          ;LSP CSR
001232          177566          TPB:    177566                          ;LSP BUFFER
001234          000060          TKVTR:  60                              ;LSR INTERRUPT VECTOR
001236          000200          TKLVL:  PRTY4                           ;LSR PRIORITY LEVEL
001240          000064          TPVTR:  64                              ;LSP INTERRUPT VECTOR
001242          000200          TPLVL:  PRTY4                           ;LSP PRIORITY LEVEL
001244          000000          FSTVCT: OPEN
001246          000000          RDRLIM: OPEN
001250          000000          PCHLIM: OPEN
001252          000000          INITD:  OPEN
001254          000000          PRGNUM: OPEN                            ;CONTAINS CURRENT PROGRAM#
001256          000000          KSTART: OPEN                            ;CURRENT PROGRAM START ADDRESS.
001260          000000          CURTST: OPEN                            ;CONTAINS ADDR OF CURRENT TEST.
001262          000000          RTNNO:  OPEN                            ;CONTAINS CURRENT TEST #.
001264          000000          NXTST:  OPEN                            ;CONTAINS ADDR OF NEXT TEST.
001266          000000          ICNT:   OPEN                            ;
001270          000000          ICTR:   OPEN                            ;CONTAINS CURRENT ITERATION COUNT
001272          000000          SCOPTR: OPEN                            ;CONTAINS CURRENT SCOPE POINTER.
001274          000000          PRGID:  OPEN                            ;CONTAINS PROGRAM INDICATORS
001276          005204          PRGTAB: PRG0                            ;PRG0 START ADDRESS
001300          006656                  PRG1                            ;PRG1 START ADDRESS
001302          010146                  PRG2                            ;PRG2 START ADDRESS
001304          010530                  PRG3                            ;PRG3 START ADDRESS
001306          011302                  PRG4                            ;PRG4 START ADDRESS
001310          011354                  PRG5                            ;PRG5 START ADDRESS
```

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001312  011634                          PRG6                    ;PRG6 START ADDRESS
001314  011722                          PRG7                    ;PRG7 START ADDRESS
001316  011774                          PRG10                   ;PRG10 START ADDRESS
001320  012116                          PRG11                   ;PRG11 START ADDRESS
                                ;OPERATOR INTERVENTION TESTS:
001322  012246                          PRG12                   ;PUNCH TEST (OPR INTV.)
001324  012502                          PRG13                   ;READER LIGH TEST
                                                                ;(OPR INTV REQD.)
001326  000000                  ERRT:   OPEN
001330  000000                  RCNT:   OPEN                    ;CHARACTER COUNT
001332  000000                  PCHOUT: OPEN
001334  000000                  CRBUF:  OPEN                    ;HOLDS ONE CHARACTER FROM READER.
001336  000000                  CHR1:   OPEN
001340  000000                  CHR2:   OPEN
001342  000000                  CHR3:   OPEN
001344  000000                  ERCTR:  OPEN
001346  000000                  PCHMSK: OPEN
001350  000000                  RDRMSK: OPEN
001352  000000                  CTRA:   OPEN
001354  000000                  CTRB:   OPEN
001356  000000                  CTRC:   OPEN
001360  000000                  CTRD:   OPEN
001362  000000                  FPC:    OPEN
                                .NLIST  MC
001364                          EMTTAB:
001364  001752                          CHAINN                  ;POINTER FOR EMT CALL SCOPE
001366  002412                          SRSETT                  ;POINTER FOR EMT CALL SRESET
001370  002156                          SV03                    ;POINTER FOR EMT CALL SAV03
001372  002256                          RS03                    ;POINTER FOR EMT CALL RST03
001374  002206                          SV05                    ;POINTER FOR EMT CALL SAV05
001376  002306                          RS05                    ;POINTER FOR EMT CALL RST05
001400  002176                          SV05S                   ;POINTER FOR EMT CALL SAV05S
001402  002302                          RS05S                   ;POINTER FOR EMT CALL RST05S
001404  002702                          TYP                     ;POINTER FOR EMT CALL TYPE
001406  002774                          TYPS                    ;POINTER FOR EMT CALL TYPES
001410  004152                          STAL                    ;POINTER FOR EMT CALL STALL
001412  003744                          STPTRV                  ;POINTER FOR EMT CALL STRDRV
001414  003774                          STPTPV                  ;POINTER FOR EMT CALL STPCHV
001416  002526                          ERR                     ;POINTER FOR EMT CALL ERROR
001420  002536                          ERRN                    ;POINTER FOR EMT CALL ERRORN
001422  003304                          OACNVV                  ;POINTER FOR EMT CALL OACNV
001424  003376                          BDCNVV                  ;POINTER FOR EMT CALL BDCNV
001426  003560                          RNGEN                   ;POINTER FOR EMT CALL RNDNUM
001430  003636                          INRNDN                  ;POINTER FOR EMT CALL INRND
001432  003354                          BMOVV                   ;POINTER FOR EMT CALL BMOVE
001434  002502                          CHLT                    ;POINTER FOR EMT CALL CHALT
001436  002514                          EHLT                    ;POINTER FOR EMT CALL EHALT
001440  003070                          INBINN                  ;POINTER FOR EMT CALL INBIN
001442  003234                          GTBINR                  ;POINTER FOR EMT CALL GETBNR
001444  003156                          GTBINP                  ;POINTER FOR EMT CALL GETBNP
001446  003024                          DLYN                    ;POINTER FOR EMT CALL DELAY
                                        .LIST   MC
001450  012706  001200          START:  MOV     #SPBOT,R6       ;SET BOTTOM OF SP STACK.
001454  005737  001252                  TST     INITD           ;SEE IF PROGRAM IS INITIALIZED.
001460  001041                          BNE     STRTA           ;BR IF YES.
001462  104010                          TYPE                    ;TYPE TITLE.
```

```
001464  012712                          PGTIT
001466  104011                          TYPES                   ;TYPE INSTRUCTIONS TO SET RDR 0 VECTOR.
001470  012775                          MSVCTR
001472  014001                          IM23
001474  177777                          -1
001476  104024                          CHALT
001500  013737  177570  001244          MOV     SR,FSTVCT       ;SAVE RDR0 VECTOR.
001506  104011                          TYPES                   ;TYPE INSTRUCTIONS TO SET # OF READERS.
001510  013027                          SELRDR
001512  014001                          IM23
001514  177777                          -1
001516  104024                          CHALT
001520  113737  177570  001246          MOVB    SR,RDRLIM       ;SAVE # OF READERS.
001526  104011                          TYPES                   ;TYPE INSTRUCTIONS TO SET # OF PUNCHES.
001530  013060                          SELPCH
001532  014001                          IM23
001534  177777                          -1
001536  104024                          CHALT
001540  113737  177570  001250          MOVB    SR,PCHLIM       ;SAVE # OF PUNCHES.
001546  012737  177777  001252          MOV     #-1,INITD       ;INITIALIZATION COMPLETE.
001554  104010                          TYPE                    ;RESTART MESSAGE.
001556  012753                          RUNINS
001560  104024                          CHALT
001562  000776                          BR      .-2
001564  012737  000340  177776  STRTA:  MOV     #PRTY7,PSW      ;SET PRIORITY 7.
001572  004737  005134                  JSR     PC,CLNUP        ;GO DO CLEAN-UP.
001576  013700  177570                  MOV     SR,R0           ;GET PROGRAM NUMBER.
001602  042700  177760                  BIC     #177760,R0
001606  020027  000013                  CMP     R0,#13          ;VALID PROGRAM NUMBER?
001612  101404                          BLOS    STRTB           ;BR IF YES.
001614  104010                          TYPE                    ;TYPE INCORRECT PROGRAM MESSAGE.
001616  012601                          CM2
001620  104024                          CHALT
001622  000760                          BR      STRTA           ;TRY AGAIN.
001624  010037  001254          STRTB:  MOV     R0,PRGNUM       ;SAVE PROGRAM NUMBER.
001630  006300                          ASL     R0              ;R0 TIMES 2.
001632  104001                          SRESET                  ;SYSTEM RESET.
001634  000170  001276                  JMP     @PRGTAB(0)      ;GO TO SELECTED PROGRAM.
001640  104011                  SRSET:  TYPES                   ;TYPE SR OPTION MESSAGE.
001642  012644                          ASETSR
001644  014001                          IM23
001646  177777                          -1
001650  104024                          CHALT                   ;COMMON HALT.
001652  013737  001256  001264  GETRDY: MOV     KSTART,NXTST    ;ADDR OF 1ST ROUTINE TO NXTST
001660  012737  000340  177776  GTRDYX: MOV     #PRTY7,PSW      ;SET PRIORITY 7.
001666  012706  001200                  MOV     #SPBOT,R6       ;SET BOTTOM OF STACK.
001672  104001                          SRESET                  ;ISSUE RESET.
001674  004737  002076          GTRDYA: JSR     R7,FORWD        ;ROLL FORWARD TO "NEXT" ROUTINE.
001700  032737  001000  177570  GTRDYB: BIT     #BIT9,SR        ;CHECK SELECT ROUTINE SWITCH
001706  001002                          BNE     GTRDYC          ;BRANCH IF SELECT ROUTINE SWITCH IS SET.
001710  000177  177344          GORUN:  JMP     @CURTST         ;GO RUN CURRENT ROUTINE.
001714  013700  177570          GTRDYC: MOV     SR,R0           ;(SR) TO R0
001720  042700  177600                  BIC     #177600,R0      ;MASK UNDESIRED BITS
001724  123700  001262                  CMPB    RTNNO,R0        ;COMPARE RTNNO TO (R0)
001730  001767                          BEQ     GORUN           ;BR IF ROUTINE FOUND.
001732  022737  177777  001264  GTRDYD: CMP     #-1,NXTST       ;NO. CHECK FOR LAST ROUTINE.
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001740  001355                          BNE     GTRDYA          ;BRANCH IF NOT LAST ROUTINE.
001742  104010                          TYPE                    ;TYPE INCORRECT RTN SELECTED.
001744  012624                          CM3
001746  104024                          CHALT                   ;COMMON HALT.
001750  000740                          BR      GETRDY          ;START OVER.
001752  012706  001200          CHAINN: MOV     #SPBOT,R6       ;RESTORE STACK.
001756  005237  001266                  INC     ICNT            ;INCREMENT ITERATION COUNT.
001762  001002                          BNE     CHNAC           ;BR IF RESULT NOT 0.
001764  005137  001266                  COM     ICNT            ;RESULT 0. RESET ICNT TO -1.
001770  032737  040000  177570  CHNAC:  BIT     #BIT14,SR       ;CHECK FOR SCOPE OPTION.
001776  001402                          BEQ     CHNA            ;BRANCH IF SCOPE SW NOT SET.
002000  000177  177266          CHNAB:  JMP     @SCOPTR         ;RETURN TO ROUTINE.
002004  032737  004000  177570  CHNA:   BIT     #BIT11,SR       ;TEST INHIBIT ITERATION SWITCH
002012  001003                          BNE     CHNAA           ;BRANCH IF INHIBIT ITERATION SW SET.
002014  005337  001270                  DEC     ICTR            ;DECREMENT ITERATION COUNT.
002020  001367                          BNE     CHNAB           ;BRANCH IF COUNT NOT 0.
002022  032737  002000  177570  CHNAA:  BIT     #BIT10,SR       ;ROUTINE END HALT SW SET? (SR10)
002030  001403                          BEQ     CHNB            ;BRANCH IF NOT SET.
002032  013700  001262                  MOV     RTNNO,R0        ;TEST # TO R0.
002036  000000                          HALT                    ;ROUTINE END HALT. TEST # IN LIGHTS.
002040  032737  001000  177570  CHNB:   BIT     #BIT9,SR        ;CHECK SELECT ROUTINE SWITCH
002046  001301                          BNE     GETRDY          ;BRANCH IF SELECT RTN SW SET
002050  022737  177777  001264          CMP     #-1,NXTST       ;LAST TEST?
002056  001300                          BNE     GTRDYX          ;BRANCH IF NOT LAST TEST.
002060  104017                          OACNV                   ;CONVERT PROGRAM NUMBER TO ASCII.
002062  001254                          PRGNUM
002064  012571                          APN
002066  000002                          2
002070  104010                          TYPE                    ;TYPE PROGRAM END BELL.
002072  012566                          APGEND
002074  000666                          BR      GETRDY          ;GO REPEAT PROGRAM.
002076  013705  001264          FORWD:  MOV     NXTST,R5        ;ADDR OF NEXT ROUTINE TO R5.
002102  012537  001262                  MOV     (5)+,RTNNO      ;GET NEXT ROUTINE NUMBER.
002106  012537  001264                  MOV     (5)+,NXTST      ;GET ADDR OF NEXT "NEXT" ROUTINE.
002112  012537  001270                  MOV     (5)+,ICTR       ;GET ITERATION COUNT.
002116  012537  001272                  MOV     (5)+,SCOPTR     ;GET SCOPE LOOP ENTRY POINTER.
002122  010537  001260          FORWDA: MOV     R5,CURTST       ;ADDR OF NOW CURRENT TEST TO CURTST.
002126  012737  000001  001266          MOV     #1,ICNT         ;PRESET ICNT TO 1.
002134  000207                          RTS     R7              ;EXIT FORWD SUBROUTINE.
                        ;EMT INTERPRETER ROUTINE.
002136  010046                  EMTINT: MOV     R0,-(6)         ;PUSH R0.
002140  016600  000002                  MOV     2(6),R0         ;GET EMT PC.
002144  011000                          MOV     -(0),R0         ;GET EMT CALL.
002146  006300                          ASL     R0              ;TIMES 2.
002150  016000  171364                  MOV     EMTTAB-10000(0),R0      ;FORM EMT ROUTINE ADDR.
002154  000200                          RTS     R0              ;GO TO EMT ROUTINE; RESTORE R0.
                        ;SAVE REGS 0 TO 3 SUBROUTINE.
002156  012666  177766          SV03:   MOV     (6)+,-10.(6)    ;MOVE PC UPSTACK.
002162  012666  177766                  MOV     (6)+,-10.(6)    ;MOVE STATUS UPSTACK.
002166  012737  000002  002242          MOV     #RTI,SV05C
002174  000415                          BR      SV05B
                        ;SUB TO SAVE REGS 0 TO 5 AND PLACE EMT PC IN R5.
002176  012737  000240  002242  SV05S:  MOV     #NOP,SV05C
002204  000403                          BR      SV05A
                        ;SUB TO SAVE REGS 0 TO 5.
002206  012737  000002  002242  SV05:   MOV     #RTI,SV05C
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002214  012666  177762          SVO5A:  MOV     (6)+,-14.(6)    ;MOVE PC AND PSW UPSTACK.
002220  012666  177762                  MOV     (6)+,-14.(6)
002224  010546                          MOV     R5,-(6)
002226  010446                          MOV     R4,-(6)
002230  010346                  SVO5B:  MOV     R3,-(6)
002232  010246                          MOV     R2,-(6)
002234  010146                          MOV     R1,-(6)
002236  010046                          MOV     R0,-(6)
002240  024646                          PUSH2
002242  000002                  SVO5C:  RTI                     ;RTI OR NOP.
002244  016605  000020                  MOV     16.(6),R5       ;EMT PC TO R5.
002250  010504                          MOV     R5,R4
002252  005744                          TST     -(4)
002254  000002                          RTI                     ;EXIT.
                                ;RESTORE REGS 0 TO 3 SUBROUTINE.
002256  022626                  RS03:   POPSP2
002260  012600                          MOV     (6)+,R0         ;RESTORE REGS 0 TO 4.
002262  012601                          MOV     (6)+,R1
002264  012602                          MOV     (6)+,R2
002266  012603                          MOV     (6)+,R3
002270  016646  177766                  MOV     -10.(6),-(6)    ;MOVE PC AND PSW DOWN STACK.
002274  016646  177766                  MOV     -10.(6),-(6)
002300  000002                          RTI                     ;EXIT.
                                ;SUB TO SET R5 IN EMT PC AND RESTORE REGS 0 TO5.
002302  010566  000020          RS05S:  MOV     R5,16.(6)       ;SET EMT PC TO R5 CONTENTS.
                                ;SUB TO RESTORE REGS 0 TO 5.
002306  022626                  RS05:   POPSP2
002310  012600                          MOV     (6)+,R0
002312  012601                          MOV     (6)+,R1
002314  012602                          MOV     (6)+,R2
002316  012603                          MOV     (6)+,R3
002320  012604                          MOV     (6)+,R4
002322  012605                          MOV     (6)+,R5
002324  016646  177762                  MOV     -14.(6),-(6)    ;MOVE PC AND PSW DOWNSTACK.
002330  016646  177762                  MOV     -14.(6),-(6)
002334  000002                          RTI                     ;EXIT.
002336  012666  177772          SV5S:   MOV     (6)+,-6(6)      ;PC AND PSW UPSTACK.
002342  012666  177772                  MOV     (6)+,-6(6)
002346  010546                          MOV     R5,-(6)         ;SAVE R5.
002350  010446                          MOV     R4,-(6)         ;SAVE R4.
002352  024646                          PUSH2
002354  016605  000010                  MOV     8.(6),R5        ;EMT PC TO R5.
002360  010504                          MOV     R5,R4           ;EMT PC TO R4.
002362  005744                          TST     -(4)
002364  000002                          RTI                     ;EXIT EMT SUB.
002366  010566  000010          RS5S:   MOV     R5,8.(6)        ;R5 TO EMT PC.
002372  022626                          POPSP2
002374  012604                          MOV     (6)+,R4         ;RESTORE R4.
002376  012605                          MOV     (6)+,R5         ;RESTORE R5.
002400  016646  177772                  MOV     -6(6),-(6)
002404  016646  177772                  MOV     -6(6),-(6)
002410  000002                          RTI                     ;EXIT.
                                ;ROUTINE TO ISSUE RESET  AND ENABLE KEYBOARD INTERRUPTS.
002412  104004                  SRSETT: SAV05
002414  012700  052525                  MOV     #52525,R0       ;DATA TO R0.
002420  005100                          COM     R0              ;COMPLEMENT (R0).
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002422  010037  002416                  MOV     R0,SRSETT+4     ;(R0) TO SRSETT+4.
002426  000005                          RESET                   ;RESET. R0 IS DISPLAYED.
002430  104005                          RSTOS
002432  005737  000042                  TST     @#42            ;LOADED FROM DECTAPE?
002436  001403                          BEQ     SRSETA          ;BR IF NOT.
002440  052777  000100  176556          BIS     #BIT6,@TKS      ;ENABLE KEYBOARD INTERRUPTS.
002446  000002              SRSETA:     RTI                     ;EXIT.
                            ;KEYBOARD SERVICE ROUTINE.
002450  017727  176552  000000  KBSVC:  MOV     @TKB,#0         ;READ KEYBOARD BUFFER.
002456  042737  000200  002454          BIC     #BIT7,KBSVC+4   ;CLEAR PARITY BIT.
002464  022737  000003  002454          CMP     #3,KBSVC+4      ;IS IT CTRL C?
002472  001401                          BEQ     .+4             ;BR IF YES.
002474  000002                          RTI                     ;NO. EXIT.
002476  013707  000042                  MOV     @#42,PC         ;EXIT TO DECTAPE MONITOR.
                            ;COMMON HALT ROUTINE
002502  104006              CHLT:       SAV0SS
002504  010400                          MOV     R4,R0           ;DEVELOP ADDR OF CALLER.
002506  000000                          HALT                    ;HALT CALL ADDR IN DATA LIGTHS.
002510  104007                          RST0SS
002512  000002                          RTI                     ;EXIT.
                            ;CONDITIONAL ERROR HALT ROUTINE.
002514  005737  177570          EHLT:   TST     SR              ;CHECK FOR HALT ON ERROR.
002520  100001                          BPL     EHLTA           ;BRANCH IF NO HALT DESIRED.
002522  000000                          HALT                    ;HALT.
002524  000002              EHLTA:      RTI                     ;IN DATA LIGHTS.
002526  012737  000406  002656  ERR:    MOV     #406,ERRNB      ;SET UP FOR SINGLE MESSAGE.
002534  000403                          BR      ERRN+6
002536  012737  000240  002656  ERRN:   MOV     #NOP,ERRNB      ;SET UP FOR MULTIPLE MESSAGES.
002544  010437  001362                  MOV     R4,FPC          ;CONVERT CALL ADDR OF SUB CALLING.
002550  104017                          OACNV
002552  001362                          FPC
002554  015032                          AFPC
002556  000006                          6
002560  000003                          SAV5S                   ;SAVE REG 5S
002562  010537  002654                  MOV     R5,ERRB         ;DETERMINE CALLING ADDR.
002566  162737  000002  002654          SUB     #2,ERRB
002574  104017                          OACNV                   ;CONVERT CALLING ADDR TO ASCII.
002576  002654                          ERRB
002600  015000                          APC
002602  000006                          6
002604  104017                          OACNV                   ;CONVERT PROGRAM # TO ASCII.
002606  001254                          PRGNUM
002610  014764                          APNUMB
002612  000002                          2
002614  104017                          OACNV                   ;CONVERT TEST # TO ASCII.
002616  001262                          RTNNO
002620  014771                          ATNUMB
002622  000003                          3
002624  104020                          BOCNV                   ;CONVERT ICNT TO DECIMAL ASCII.
002626  001266                          ICNT
002630  015015                          AICNT
002632  000005                          5
002634  012737  014761  002654          MOV     #EM0,ERRB       ;TYPE ERR HEADER MSG IF NOT INHIBITED.
002642  032737  020000  177570  ERRNA:  BIT     #BIT13,SR       ;INHIBIT ERR PRINT?
002650  001002                          BNE     ERRNB           ;BR TO INHIBIT.
002652  104010                          TYPE                    ;TYPE MSG.
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002654  000000                  ERRB:   OPEN                    ;DESIRED MSG ADDR GOES HERE.
002656  000000                  ERRNB:  OPEN                    ;NOP OR 406
002660  012537  002654                  MOV     (5)+,ERRB       ;GET ADDR OF NEXT MSG.
002664  022737  177777  002654        CMP     #-1,ERRB        ;TERMINATOR?
002672  001363                        BNE     ERRNA           ;GO TYPE IF NOT TERMINATOR.
002674  104025                  ERRNC:  EHALT                   ;END OF MSGS. HALT IF REQUIRED.
002676  000004                          RST5S                   ;RESTORE REG 5S.
002700  000002                          RTI                     ;EXIT EMT SUB.
                                ;SUBROUTINE TO OUTPUT ASCII MESSAGE ON TELETYPE PRINTER.
002702  104006                  TYP:    SAV05S
002704  012500                          MOV     (5)+,R0         ;ADDRESS OF MESSAGE TO R0.
002706  112001                  TYPA:   MOVB    (0)+,R1         ;GET CHARACTER
002710  122701  000100                  CMPB    #100,R1         ;CHECK FOR"@"CHARACTER
002714  001002                          BNE     TYPC            ;BRANCH IF NOT"@".
002716  104007                          RST05S
002720  000002                          RTI                     ;TERMINATOR CHAR. DONE. EXIT.
002722  122701  000045          TYPC:   CMPB    #45,R1          ;CHECK FOR"%".
002726  001411                          BEQ     TYPF            ;BRANCH IF"%"
002730  004737  002736                  JSR     R7,TYPD         ;TYPE CHAR IN R1
002734  000764                          BR      TYPA
002736  110177  176270          TYPD:   MOVB    R1,@TPB         ;OUTPUT CHARACTER TO PRINTER
002742  105777  176262                  TSTB    @TPS            ;WAIT FOR DONE FLAG.
002746  100375                          BPL     .-4
002750  000207                          RTS     R7              ;EXIT
002752  112701  000015          TYPF:   MOVB    #15,R1          ;MOVE CARRIAGE RETURN CODE TO R1
002756  004737  002736                  JSR     R7,TYPD         ;GO TYPE CHAR.
002762  112701  000012          TYPG:   MOVB    #12,R1          ;MOVE LF CODE TO R1.
002766  004737  002736                  JSR     R7,TYPD         ;GO TYPE CHAR.
002772  000745                          BR      TYPA
                                ;SUBROUTINE TO OUTPUT A SERIES OF ASCII MESSAGES ON TELETYPE PRINTER
002774  000003                  TYPS:   SAV5S
002776  012537  003020                  MOV     (5)+,TYPSB      ;ADDR OF MESSAGE TO TYPSB.
003002  022737  177777  003020        CMP     #-1,TYPSB       ;CHECK FOR TERMINATOR
003010  001002                          BNE     TYPSA           ;BRANCH IF NOT TERMINATOR.
003012  000004                          RST5S
003014  000002                          RTI                     ;TERMINATOR, EXIT
003016  104010                  TYPSA:  TYPE                    ;CALL ON TYP SUB TO TYPE MESSAGE
003020  000000                  TYPSB:  OPEN                    ;ADDRESS OF MESSAGE GOES HERE
003022  000765                          BR      TYPS+2          ;GO PROCESS NEXT MESSAGE
                                ;SUBROUTINE TO DELAY A SPECIFIED NUMBER OF MILLISECONDS
003024  011637  003064          DLYN:   MOV     (6),DLCNT       ;GET EMT PC.
003030  062716  000002                  ADD     #2,(6)          ;SET UP EXIT PC.
003034  104002                          SAV03                   ;SAVE REGS
003036  017700  000022                  MOV     @DLCNT,R0       ;DELAY COUNT TO R0.
003042  001406                          BEQ     DLYCN           ;BR IF 0.
003044  012701  000303          DLYAN:  MOV     #303,R1         ;1 MSEC COUNT TO R1.
003050  005301                  DLYBN:  DEC     R1              ;DECREMENT 1 MSEC COUNT.
003052  001376                          BNE     DLYBN           ;BR IF NOT 0.
003054  005300                          DEC     R0              ;DECREMENT DELAY COUNT.
003056  001372                          BNE     DLYAN           ;BR IF NOT DONE DELAYING.
003060  104003                  DLYCN:  RST03
003062  000002                          RTI                     ;EXIT.
003064  000000                  DLCNT:  OPEN
003066  000000                  DLCTR:  OPEN
                                ;SUBROUTINE TO INITIALIZE BINARY COUNT PATTERNS
003070  012737  177777  003136  INBINN: MOV     #-1,RIND        ;SET ALL VARIABLES
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003076  013737  003136  003140          MOV     RIND,PIND
003104  013737  003136  003142          MOV     RIND,PTO
003112  013737  003136  003144          MOV     RIND,PT1
003120  013737  003136  003146          MOV     RIND,RTO
003126  013737  003136  003150          MOV     RIND,RT1
003134  000002                          RTI                             ;EXIT.
003136  000000                  RIND:   OPEN
003140  000000                  PIND:   OPEN
003142  000000                  PTO:    OPEN
003144  000000                  PT1:    OPEN
003146  000000                  RTO:    OPEN
003150  000000                  RT1:    OPEN
003152  000000                  BINR:   OPEN
003154  000000                  BINP:   OPEN
                                ;SPECIAL BINARY COUNT PATTERN SUBROUTINE (PUNCH)
003156  013737  003142  003144  GTBINP: MOV     PTO,PT1         ;PREVIOUS BIN CHAR TO PT1
003164  005137  003144                  COM     PT1
003170  005137  003140                  COM     PIND
003174  001002                          BNE     .+6
003176  005237  003144                  INC     PT1
003202  043737  001346  003144          BIC     PCHMSK,PT1
003210  013737  003144  003142          MOV     PT1,PTO         ;SAVE BIN CHAR IN PTO
003216  013737  003144  003154          MOV     PT1,BINP        ;BIN CHAR TO BINP.
003224  013737  003144  001332          MOV     PT1,PCHOUT
003232  000002                          RTI                             ;EXIT.
                                ;SPECIAL BINARY COUNT PATTERN SUBROUTINE (READER)
003234  013737  003146  003150  GTBINR: MOV     RTO,RT1         ;PREVIOUS BIN CHAR TO RT1.
003242  005137  003150                  COM     RT1
003246  005137  003136                  COM     RIND
003252  001002                          BNE     .+6
003254  005237  003150                  INC     RT1
003260  043737  001350  003150          BIC     RDRMSK,RT1
003266  013737  003150  003146          MOV     RT1,RTO         ;SAVE BIN CHAR IN RTO.
003274  013737  003150  003152          MOV     RT1,BINR        ;BIN CHAR TO BINR.
003302  000002                          RTI                             ;EXIT.
                                ;EMT SUB TO CONVERT OCTAL TO ASCII.
003304  104006                  OACNVV: SAVOSS                  ;SAVE REGS.
003306  013500                          MOV     @(5)+,R0        ;GET OCTAL VALUE.
003310  012501                          MOV     (5)+,R1         ;GET DESTINATION ADDR.
003312  012502                          MOV     (5)+,R2         ;GET CONVERT COUNT.
003314  060201                          ADD     R2,R1           ;DEVELOP ADDR TO STORE 1ST CHAR.
003316  010003                  OACNVA: MOV     R0,R3
003320  042703  177770                  BIC     #177770,R3      ;ISOLATE LEAST SIGNIFICANT DIGIT.
003324  062703  000060                  ADD     #60,R3          ;CONVERT DIGIT TO ASCII.
003330  110341                          MOVB    R3,-(1)         ;STORE ASCII CHARACTER.
003332  042700  000007                  BIC     #7,R0
003336  006000                          ROR     R0
003340  006000                          ROR     R0
003342  006000                          ROR     R0
003344  005302                          DEC     R2              ;DONE ALL DIGITS?
003346  001363                          BNE     OACNVA          ;BRANCH IF NOT DONE.
003350  104007                          RSTOSS                  ;RESTORE REGS.
003352  000002                          RTI                     ;DONE. EXIT.
                                ;EMT SUB TO MOVE VARIABLE NUMBER OF BYTES.
003354  104006                  BMOVV:  SAVOSS                  ;SAVE REGS.
003356  012501                          MOV     (5)+,R1         ;GET"FROM"ADDRESS
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003360  012502                          MOV     (5)+,R2         ;GET"TO"ADDRESS
003362  012503                          MOV     (5)+,R3         ;GET COUNT
003364  112122                  BMOVA:  MOVB    (1)+,(2)+       ;MOVE BYTE
003366  005303                          DEC     R3              ;DECREMENT COUNT
003370  001375                          BNE     BMOVA           ;BRANCH IF NOT DONE.
003372  104007                          RSTOSS                  ;RESTORE REGS.
003374  000002                          RTI                     ;DONE. EXIT.
                                ;EMT SUB TO CONVERT BINARY TO DECIMAL ASCII.
003376  104006                  BDCNVV: SAVOSS                  ;SAVE REGS.
003400  012700  003552                  MOV     #DECVAL,R0      ;SET UP ADDR TO STORE DECIMAL ASCII IN R0
003404  013501                          MOV     @(5)+,R1        ;BINARY VALUE TO R1.
003406  012537  003462                  MOV     (5)+,BDCNVC     ;DESTINATION ADDR TO BDCNVC.
003412  012537  003464                  MOV     (5)+,BDCNVD     ;CHAR COUNT TO BDCNVD.
003416  012702  003540                  MOV     #ADTENP,R2      ;ADDR OF TEN POWER STRING TO R2.
003422  012737  000005  003532          MOV     #5,CNVCTR       ;SET UP FOR 5 POWER CONVERSIONS.
003430  012237  003536          BDCNVA: MOV     (2)+,TENPWR     ;MOVE POWER OF TEN VALUE TO TENPWR.
003434  004737  003472                  JSR     R7,SUBTEN       ;PERFORM CONVERSION
003440  005337  003532                  DEC     CNVCTR          ;DONE 5 CONVERSIONS?
003444  001371                          BNE     BDCNVA          ;BRANCH IF NOT YET 5.
003446  163700  003464                  SUB     BDCNVD,R0
003452  010037  003460                  MOV     R0,BDCNVB
003456  104023                          BMOVE
003460  000000                  BDCNVB: OPEN
003462  000000                  BDCNVC: OPEN
003464  000000                  BDCNVD: OPEN
003466  104007                          RSTOSS                  ;RESTORE REGS.
003470  000002                          RTI                     ;YES. EXIT.
003472  005037  003534          SUBTEN: CLR     DIGIT           ;CLEAR DIGIT
003476  163701  003536          SUBTNA: SUB     TENPWR,R1       ;SUBTRACT TEN POWER FROM BINARY VALUE.
003502  103403                          BCS     SUBTNB          ;BRANCH IF UNSUCCESSFUL SUBTRACTION.
003504  005237  003534                  INC     DIGIT
003510  000772                          BR      SUBTNA
003512  063701  003536          SUBTNB: ADD     TENPWR,R1       ;RESTORE SUBTRACTED VALUE.
003516  062737  000060  003534          ADD     #60,DIGIT       ;CONVERT (DIGIT) TO ASCII
003524  113720  003534                  MOVB    DIGIT,(0)+      ;MOVE ASCII CHAR TO DECVAL FIELD.
003530  000207                          RTS     R7              ;EXIT.
003532  000000                  CNVCTR: OPEN
003534  000000                  DIGIT:  OPEN
003536  000000                  TENPWR: OPEN
003540  023420                  ADTENP: 10000.
003542  001750                          1000.
003544  000144                          100.
003546  000012                          10.
003550  000001                          1
003552    040     040     040   DECVAL: .BYTE   040,040,040,040,040,040
003555    040     040     040
                                ;EMT RANDOM NUMBER GENERATOR. NUMBER IS STORED AT LOC AFTER SUB CALL.
003560  104006                  RNGEN:  SAVOSS
003562  013700  003632                  MOV     RP1,R0
003566  006100                          ROL     R0
003570  006100                          ROL     R0
003572  063700  003634                  ADD     RP2,R0
003576  010037  003632                  MOV     R0,RP1
003602  006100                          ROL     R0
003604  006100                          ROL     R0
003606  063700  003634                  ADD     RP2,R0
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003612  006100                          ROL     R0
003614  006100                          ROL     R0
003616  010037  003634                  MOV     R0,RP2
003622  013725  003632                  MOV     RP1,(5)+        ;STORE # AT LOC AFTER SUB CALL.
003626  104007                          RSTOSS
003630  000002                          RTI                     ;EXIT.
003632  001233                  RP1:    1233
003634  007622                  RP2:    7622
                                ;EMT SUB TO INITIALIZE RANDOM NUMBER GENERATOR.
003636  012737  001233  003632  INRNDN: MOV     #1233,RP1
003644  012737  007622  003634          MOV     #7622,RP2
003652  000002                          RTI                     ;EXIT.
                                ;ROUTINE TO FETCH A CHARACTER
003654  105277  175320          AREAD:  INCB    @PRS            ;READER ENABLE.
003660  104031                          DELAY                   ;WAIT 12 MSECS FOR READER DONE.
003662  000014                          12.
003664  105777  175310                  TSTB    @PRS            ;DONE SET?
003670  100411                          BMI     ARDB            ;BR IF YES.
003672  104031                          DELAY                   ;WAIT ADDT'L 18 MSECS.
003674  000022                          18.
003676  105777  175276                  TSTB    @PRS            ;READER DONE NOW?
003702  100404                          BMI     ARDB            ;BR IF YES.
003704  104016                          ERRORN                  ;ERROR. NO READER RESPONSE.
003706  015337                          EM7
003710  177777                          -1
003712  000760                          BR      AREAD           ;TRY AGAIN.
003714  005777  175260          ARDB:   TST     @PRS            ;ERROR BIT SET?
003720  100401                          BMI     ARDC            ;BR IF YES.
003722  000207                          RTS     %7              ;NO. EXIT.
003724  004737  003732          ARDC:   JSR     %7,TSM2         ;TYPE READER ERROR MESSAGE.
003730  000751                          BR      AREAD           ;TRY AGAIN.
003732  104016                  TSM2:   ERRORN                  ;TYPE READER ERROR MESSAGE.
003734  014575                          SM1
003736  013203                          IM6
003740  177777                          -1
003742  000207                          RTS     %7              ;EXIT
                                ;ROUTINE TO SET READER INTERRUPT VECTOR AND PRIORITY
003744  017637  000000  003764  STPTRV: MOV     @(6),STPRA+2    ;MOVE VECTOR ADDR TO STPRA+2
003752  062716  000002                  ADD     #2,@%6          ;SET UP EXIT
003756  013701  001210                  MOV     RDRVTR,%1
003762  012721  000000          STPRA:  MOV     #OPEN,(1)+      ;SET VECTOR ADDRESS
003766  013721  001212                  MOV     RDRLVL,(1)+     ;SET PRIORITY
003772  000002                          RTI                     ;EXIT
                                ;ROUTINE TO SET PUNCH INTERRUPT VECTOR AND PRIORITY.
003774  017637  000000  004014  STPTPV: MOV     @(6),STPPA+2    ;MOVE VECTOR ADDR TO STPPA+2
004002  062716  000002                  ADD     #2,@%6          ;SET UP EXIT
004006  013701  001214                  MOV     PCHVTR,%1
004012  012721  000000          STPPA:  MOV     #OPEN,(1)+      ;SET VECTOR ADDRESS.
004016  013721  001216                  MOV     PCHLVL,(1)+     ;SET PRIORITY
004022  000002                          RTI                     ;EXIT.
                                ;SUBROUTINE TO READ CHARACTER FROM READER USING INTERRUPT.
004024  104013                  BREAD:  STRDRV                  ;SET READER VECTOR
004026  004106                          BREADB                  ;TO BREADB
004030  052777  000101  175142          BIS     #101,@PRS       ;ENABLE PTR AND PTRI.
004036  005037  177776                  CLR     PSW             ;SET UP PRTY0.
004042  012737  072460  004150          MOV     #30000.,BRCTR   ;DELAY APPROX. 150 MSECS.
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004050  005337  004150                 DEC     BRCTR
004054  001375                         BNE     .-4
004056  005077  175116                 CLR     @PRS            ;CLEAR PTRI ENABLE.
004062  104016                         ERRORN                  ;TYPE NO PTR RESPONSE
004064  015337                         EM7                     ;MESSAGE
004066  177777                         -1
004070  000755                         BR      BREAD           ;TRY AGAIN.
004072  005077  175102         BREADA: CLR     @PRS            ;CLEAR READER CSR.
004076  017737  175100  001334         MOV     @PRB,CRBUF      ;CHAR READ TO CRBUF.
004104  000207                         RTS     %7              ;EXIT SUBROUTINE.
004106  022626                 BREADB: POPSP2                  ;RESTORE STACK.
004110  012737  000340  177776         MOV     #PRTY7,PSW      ;SET UP PRTY7.
004116  005777  175056                 TST     @PRS            ;TEST FOR ERROR.
004122  100003                         BPL     BREADC          ;BRANCH IF NO ERROR.
004124  004737  003732                 JSR     PC,TSM2         ;
004130  000735                         BR      BREAD           ;
004132  105777  175042         BREADC: TSTB    @PRS            ;TEST FOR DONE BIT.
004136  100755                         BMI     BREADA          ;BRANCH IF DONE BIT SET.
004140  104016                         ERRORN                  ;ERROR.FALSE READER INTERRUPT.
004142  015361                         EM10
004144  177777                         -1
004146  000726                         BR      BREAD
004150  000000                 BRCTR:  OPEN
                               ;SUBROUTINE TO STALL A RANDOM NUMBER OF MILLISECONDS. MAXIMUM STALL
                               ;DETERMINED BY CONTENTS OF LOC STLMSK.
004152  104021                 STAL:   RNDNUM                  ;GET RANDOM NUMBER.
004154  000000                 STLA:   OPEN                    ;NUMBER GOES HERE.
004156  043737  004202  004154         BIC     STLMSK,STLA     ;APPLY STALL MASK.
004164  001405                         BEQ     STALB           ;BRANCH IF RESULT IS 0.
004166  013737  004154  004176         MOV     STLA,STALA
004174  104031                         DELAY                   ;DELAY
004176  000000                 STALA:  OPEN                    ;DELAY COUNT
004200  000002                 STALB:  RTI                     ;DONE. EXIT.
004202  000000                 STLMSK: OPEN                    ;STALL MASK.
                               ;SUBROUTINE TO GENERATE RANDOM CHARACTER COUNT (1-77)
004204  104021                 GRCNT:  RNDNUM                  ;GET RANDOM NUMBER.
004206  000000                 GRCNTA: OPEN                    ;NUMBER GOES HERE.
004210  043737  004230  004206         BIC     RCMSK,GRCNTA    ;APPLY MASK.
004216  001772                         BEQ     GRCNT           ;TRY AGAIN IF RESULT 0
004220  013737  004206  004232         MOV     GRCNTA,RNCNT    ;COUNT TO RNCNT
004226  000207                         RTS     %7              ;EXIT.
004230  000000                 RCMSK:  OPEN                    ;RANDOM CHARACTER MASK.
004232  000000                 RNCNT:  OPEN                    ;RANDOM CHARACTER COUNT.
                               ;SUB TO COMPARE DATA READ FROM READER AGAINST EXPECTED DATA AND REPORT ERRORS.
004234  104027                 BCHECK: GETBNR                  ;GET BIN CHARACTER
004236  023737  003152  001334         CMP     BINR,CRBUF      ;COMPARE BINR TO DATA IN CRBUF
004244  001001                         BNE     .+4             ;BRANCH IF NOT SAME(ERROR).
004246  000207                         RTS     %7              ;OK.EXIT.
004250  104017                         OACNV
004252  003152                         BINR
004254  015066                         ASB
004256  000004                         4
004260  104017                         OACNV
004262  001334                         CRBUF
004264  015101                         AWAS
004266  000004                         4
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004270  104016                          ERRORN
004272  015043                          EM1
004274  177777                          -1
004276  005337  001344                  DEC     ERCTR           ;DECREMENT ERROR COUNTER
004302  001002                          BNE     .+6             ;BRANCH IF NO THIRD ERROR
004304  004737  004312                  JSR     %7,BSYNC        ;RESYNC THE READER.
004310  000207                          RTS     %7              ;EXIT.
                        ;SUBROUTINE TO SYNC THE READER TO A SPECIAL BINARY COUNT PATTERN TEST TAPE.
004312  104026                  BSYNC:  INBIN                   ;INITIALIZE BINARY PATTERN
004314  004737  004024                  JSR     %7,BREAD        ;READ CHAR.
004320  004737  004024                  JSR     %7,BREAD        ;READ CHAR.
004324  004737  004024                  JSR     %7,BREAD        ;READ CHAR AND STORE AT CHR1
004330  013737  001334  001336          MOV     CRBUF,CHR1
004336  004737  004024                  JSR     %7,BREAD        ;READ CHAR AND STORE AT CHR2
004342  013737  001334  001340          MOV     CRBUF,CHR2
004350  004737  004024                  JSR     %7,BREAD        ;READ CHAR AND STORE AT CHR3.
004354  013737  001334  001342          MOV     CRBUF,CHR3
004362  004737  004400                  JSR     %7,SYNCA        ;GO SYNC
004366  000751                          BR      BSYNC           ;NO SYNC. TRY AGAIN.
004370  012737  000003  001344          MOV     #3,ERCTR
004376  000207                          RTS     %7              ;SUCCESS.EXIT.
004400  104004                  SYNCA:  SAVO5
004402  012700  001000                  MOV     #512.,R0        ;SET UP FOR 512 TRIES.
004406  104027                  SYNCB:  GETBNR                  ;GET BIN CHAR.
004410  013701  003152                  MOV     BINR,R1         ;STORE AT R1.
004414  104027                          GETBNR                  ;GET BIN CHAR.
004416  013702  003152                  MOV     BINR,R2         ;STORE AT R2.
004422  104027                          GETBNR                  ;GET BIN CHAR.
004424  013703  003152                  MOV     BINR,R3         ;STORE AT R3.
004430  020137  001336                  CMP     R1,CHR1         ;MATCH ON 1ST WORD?
004434  001012                          BNE     SYNCC           ;BR IF NOT.
004436  020237  001340                  CMP     R2,CHR2         ;MATCH ON 2ND WORD?
004442  001007                          BNE     SYNCC           ;BR IF NOT.
004444  020337  001342                  CMP     R3,CHR3         ;MATCH ON 3RD WORD?
004450  001004                          BNE     SYNCC           ;BR IF NOT.
004452  104005                          RSTO5
004454  062716  000002                  ADD     #2,(6)          ;SET UP SINCED EXIT.
004460  000207                          RTS     PC              ;EXIT.
004462  005300                  SYNCC:  DEC     R0              ;TRIED 512 TIMES?
004464  001350                          BNE     SYNCB           ;BR IF NOT.
004466  104016                          ERRORN                  ;YES. SYNC ERROR.
004470  015160                          EM3
004472  177777                          -1
004474  104005                          RSTO5
004476  000207                          RTS     PC              ;SYNC ERROR EXIT.
                        ;SUBROUTINE TO CHECK FOR PUNCH READY.
004500  005777  174500          CPRDY:  TST     @PPS            ;TEST FOR ERROR BIT.
004504  100404                          BMI     CPRDYA          ;BRANCH IF ERROR BIT SET.
004506  105777  174472                  TSTB    @PPS            ;TEST FOR READY BIT.
004512  100001                          BPL     CPRDYA          ;BRANCH IF READY NOT SET.
004514  000207                          RTS     %7              ;OK. EXIT.
004516  104011                  CPRDYA: TYPES                   ;TYPE NOT READY MESSAGE.
004520  014647                          SM3
004522  013254                          IM16
004524  177777                          -1
004526  104024                          CHALT
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004530  000763                          BR      CPRDY
                        ;SUBROUTINE TO PUNCH CHARACTER IN LOC PCHOUT.
004532  004737  004500        HSPCH:    JSR     %7,CPRDY        ;GO CHECK FOR PUNCH READY.
004536  043737  001346  001332          BIC     PCHMSK,PCHOUT
004544  013777  001332  174434          MOV     PCHOUT,@PPB     ;LOAD PUNCH BUFFER.
004552  105777  174426                  TSTB    @PPS            ;WAIT FOR DONE.
004556  100375                          BPL     .-4
004560  000207                          RTS     %7              ;DONE. EXIT.
                        ;SUBROUTINE TO SELECT PUNCH TO BE TESTED/USED.
004562  104011        PCHSEL:   TYPES                           ;TYPE SELECT PUNCH MESSAGE.
004564  015507                  SPCHM
004566  014001                  IM23
004570  177777                  -1
004572  104024                  CHALT                           ;WAIT FOR USER.
004574  123737  177570  001250          CMPB    SR,PCHLIM       ;VALID PUNCH NUMBER?
004602  103403                          BLO     PCHSLA          ;BR IF YES.
004604  104010                          TYPE                    ;NO. TYPE MESSAGE, AND
004606  015556                          INVRP
004610  000764                          BR      PCHSEL          ;GO TRY AGAIN.
004612  013737  177570  001204  PCHSLA: MOV     SR,PPS          ;DEVELOP PCH CSR ADDR.
004620  006337  001204                  ASL     PPS
004624  006337  001204                  ASL     PPS
004630  063737  001222  001204          ADD     FSTPCH,PPS
004636  013737  001204  001206          MOV     PPS,PPB         ;DEVELOP PCH BUFFER ADDR.
004644  062737  000002  001206          ADD     #2,PPB
004652  013737  001246  001214          MOV     RDRLIM,PCHVTR   ;DEVELOP PCH VECTOR ADDR.
004660  005237  001214                  INC     PCHVTR          ;IF RDRLIM WAS ODD INCR TO MAKE IT EVEN.
004664  006037  001214                  ROR     PCHVTR
004670  006337  001214                  ASL     PCHVTR
004674  063737  177570  001214          ADD     SR,PCHVTR
004702  006337  001214                  ASL     PCHVTR
004706  006337  001214                  ASL     PCHVTR
004712  063737  001244  001214          ADD     FSTVCT,PCHVTR
004720  012737  177400  001346          MOV     #177400,PCHMSK  ;SET UP PUNCH MASK FOR 8 LEVEL.
004726  005737  177570                  TST     SR              ;8 LEVEL PUNCH?
004732  100003                          BPL     PCHSLB          ;BR IF YES.
004734  012737  177700  001346          MOV     #177700,PCHMSK  ;NO. SET UP 6 LEVEL MASK.
004742  104017        PCHSLB:   OACNV                           ;CONVERT SELECTED PCH NUMBER TO ASCII.
004744  177570                  SR
004746  015630                  APCHID
004750  000002                  2
004752  104010                  TYPE                            ;TYPE PCH SELECTED MESSAGE.
004754  015623                  PCHIDM
004756  000207                  RTS     PC                      ;EXIT.
                        ;SUBROUTINE TO SELECT READER TO BE TESTED/USED.
004760  104011        RDRSEL:   TYPES                           ;TYPE SELECT READER MESSAGE.
004762  015440                  SRDRM
004764  014001                  IM23
004766  177777                  -1
004770  104024                  CHALT                           ;WAIT FOR USER.
004772  123737  177570  001246          CMPB    SR,RDRLIM       ;VALID READER?
005000  103403                          BLO     RDRSLA  ;BR IF YES.
005002  104010                          TYPE                    ;NO. TYPE MESSAGE AND TRY AGAIN.
005004  015556                          INVRP
005006  000764                          BR      RDRSEL
005010  013737  177570  001200  RDRSLA: MOV     SR,PRS          ;DEVELOP RDR CSR ADDR.
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005016  006337  001200                  ASL     PRS
005022  006337  001200                  ASL     PRS
005026  063737  001220  001200          ADD     FSTRDR,PRS
005034  013737  001200  001202          MOV     PRS,PRB         ;DEVELOP READER BUFFER ADDR.
005042  062737  000002  001202          ADD     #2,PRB
005050  013737  177570  001210          MOV     SR,RDRVTR       ;DEVELOP RDR VECTOR ADDR.
005056  006337  001210                  ASL     RDRVTR
005062  006337  001210                  ASL     RDRVTR
005066  063737  001244  001210          ADD     FSTVCT,RDRVTR
005074  012737  177400  001350          MOV     #177400,RDRMSK  ;SET UP 8LEVEL READER MASK.
005102  005737  177570                  TST     SR              ;8 LEVEL READER?
005106  100003                          BPL     RDRSLB          ;BR IF YES.
005110  012737  177700  001350          MOV     #177700,RDRMSK  ;NO. SET UP 6 LEVEL MASK.
005116  104017                  RDRSLB: OACNV                   ;CONVERT SELECTED RDR NUMBER TO ASCII.
005120  177570                          SR
005122  015606                          ARDRID
005124  000002                          2
005126  104010                          TYPE                    ;TYPE RDR SELECTED MESSAGE.
005130  015601                          RDRIDM
005132  000207                          RTS     PC              ;EXIT.
005134  005037  001266          CLNUP:  CLR     ICNT            ;CLEAR ITERATION COUNT.
005140  005037  001262                  CLR     RTNNO           ;CLEAR CURRENT ROUTINE NUMBER.
005144  012737  000003  001344          MOV     #3,ERCTR        ;SET ERROR COUNT TO 3.
005152  012701  000300                  MOV     #300,R1         ;CLEAR INTERRUPT VECTORS.
005156  012702  000302                  MOV     #302,R2
005162  010221                  CLNUPA: MOV     R2,(1)+
005164  005021                          CLR     (1)+
005166  020237  001000                  CMP     R2,1000
005172  001403                          BEQ     CLNUPB
005174  062702  000004                  ADD     #4,R2
005200  000770                          BR      CLNUPA
005202  000207                  CLNUPB: RTS     PC              ;EXIT.
```

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                                        ;PRG0 - READER TESTS
            177777                              X=-1
            000000                              Y=0
005204  012737  005226  001256  PRG0:   MOV     #POT0,KSTART    ;ADDR OF 1ST ROUTINE TO KSTART.
005212  104010                          TYPE                    ;TYPE TITLE.
005214  013227                          TITLO
005216  004737  004760                  JSR     PC,RDRSEL       ;SELECT READER.
005222  000137  001640                  JMP     SRSET           ;GO GET STARTED.
005226                                  TSTA    P0A,1000.
005226                                  TSTAA   P0A,1000.,\X+1,\X+2,\Y
                                        ;*************************************************************************
005226  000000                POT0:     0                       ; PRG0 ROUTINE 0                        *
005230  005256                          P0T1                    ;ADDRESS OF NEXT ROUTINE                *
005232  001750                          1000.                   ;TEST ITERATION COUNT                   *
005234  005244                          P0AA                    ;SCOPE ENTRY POINT                      *
            000000                      X=X+1
                                        ;*************************************************************************
                                        ;TEST ABILITY TO REFERENCE THE READER STATUS WORD
005236  012737  005252  000004          MOV     #P0AE,MACHER    ;SET UP MACHINE ERROR TRAP.
005244  005777  173730          P0AA:   TST     @PRS            ;REFERENCE READER STATUS WORD.
005250  104000                          SCOPE                   ;SCOPE
005252  104015                  P0AE:   ERROR                   ;ERROR. TRAPPED WHEN REFERENCING READER
005254  104000                          SCOPE                   ;STATUS WORD (PRS).
005256                                  TSTA    P0B,1000.
005256                                  TSTAA   P0B,1000.,\X+1,\X+2,\Y
                                        ;*************************************************************************
005256  000001                P0T1:     1                       ; PRG0 ROUTINE 1                        *
005260  005306                          P0T2                    ;ADDRESS OF NEXT ROUTINE                *
005262  001750                          1000.                   ;TEST ITERATION COUNT                   *
005264  005274                          P0BA                    ;SCOPE ENTRY POINT                      *
            000001                      X=X+1
                                        ;*************************************************************************
                                        ;TEST ABILITY TO REFERENCE THE READER BUFFER.
005266  012737  005302  000004          MOV     #P0BB,MACHER    ;SET UP MACHINE ERROR TRAP.
005274  005777  173702          P0BA:   TST     @PRB            ;REFERENCE READER BUFFER
005300  104000                          SCOPE                   ;SCOPE
005302  104015                  P0BB:   ERROR                   ;ERROR. TRAPPED WHEN REFERENCING
005304  104000                          SCOPE                   ;READER BUFFER. (PRB)
005306                                  TSTA    P0D,1000.
005306                                  TSTAA   P0D,1000.,\X+1,\X+2,\Y
                                        ;*************************************************************************
005306  000002                P0T2:     2                       ; PRG0 ROUTINE 2                        *
005310  005362                          P0T3                    ;ADDRESS OF NEXT ROUTINE                *
005312  001750                          1000.                   ;TEST ITERATION COUNT                   *
005314  005316                          P0DA                    ;SCOPE ENTRY POINT                      *
            000002                      X=X+1
                                        ;*************************************************************************
                                        ;TEST ABILITY TO SET AND CLEAR THE ID BIT (INTERRUPT ENABLE (BIT 6))
                                        ;IN READER STATUS WORD
005316  052777  000100  173654  P0DA:   BIS     #BIT6,@PRS      ;SET ID BIT (BIT 6) IN READER PRS
005324  032777  000100  173646          BIT     #BIT6,@PRS      ;CHECK ID BIT IN PRS
005332  001002                          BNE     P0DB            ;ID BIT SET?
005334  104015                          ERROR                   ;NO. ERROR. FAILED TO SET ID BIT (BIT 6)
                                                                ;IN PRS.
005336  104000                          SCOPE
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005340  042777  000100  173632  PODB:   BIC     #BIT6,@PRS      ;CLEAR ID BIT IN PRS.
005346  032777  000100  173624          BIT     #BIT6,@PRS      ;CHECK ID BIT IN PRS
005354  001401                          BEQ     .+4             ;BRANCH IF BIT CLEAR.
005356  104015                          ERROR                   ;ERROR. ID BIT IN PRS FAILED TO CLEAR.
005360  104000                          SCOPE
005362                                  TSTA    POE,100.
005362                                  TSTAA   POE,100.,\X+1,\X+2,\Y
                        ;*****************************************************************************
005362  000003                POT3:   3                       ; PRGO ROUTINE 3                        *
005364  005416                          POT4                    ;ADDRESS OF NEXT ROUTINE                *
005366  000144                          100.                    ;TEST ITERATION COUNT                   *
005370  005372                          POEA                    ;SCOPE ENTRY POINT                      *
        000003                          X=X+1
                        ;*****************************************************************************
                        ;TEST ABILITY TO CLEAR ID BIT (BIT 6) WITH RESET INSTRUCTION
005372  052777  000100  173600  POEA:   BIS     #BIT6,@PRS      ;SET ID BIT IN PRS
005400  104001                          SRESET                  ;RESET
005402  032777  000100  173570          BIT     #BIT6,@PRS      ;TEST ID BIT
005410  001401                          BEQ     .+4             ;BRANCH IF ID BIT IS CLEAR.
005412  104015                          ERROR                   ;ERROR. RESET INSTRUCTION FAILED TO
005414  104000                          SCOPE                   ;CLEAR ID BIT IN READER PRS.
005416                                  TSTA    POF,100.
005416                                  TSTAA   POF,100.,\X+1,\X+2,\Y
                        ;*****************************************************************************
005416  000004                POT4:   4                       ; PRGO ROUTINE 4                        *
005420  005450                          POT5                    ;ADDRESS OF NEXT ROUTINE                *
005422  000144                          100.                    ;TEST ITERATION COUNT                   *
005424  005426                          POFA                    ;SCOPE ENTRY POINT                      *
        000004                          X=X+1
                        ;*****************************************************************************
                        ;TEST THAT DONE BIT (BIT 7 OF PRS) IS SET NO LATER THAN 100 MSECS AFTER RDR ENB.
005426  005277  173546  POFA:   INC     @PRS                    ;ENABLE READER
005432  104031                          DELAY                   ;WAIT APPROX 100 MILLISECS.
005434  000144                          100.
005436  105777  173536                  TSTB    @PRS            ;TEST FOR DONE (BIT 7)
005442  100401                          BMI     POFB            ;BRANCH IF DONE BIT WAS SET..
005444  104015                          ERROR                   ;ERROR, 100 MSECS AFTER READER
                                                                ;ENABLE, DONE BIT WAS NOT SET.
005446  104000                POFB:   SCOPE                   ;SCOPE
005450                                  TSTA    POG,1000.
005450                                  TSTAA   POG,1000.,\X+1,\X+2,\Y
                        ;*****************************************************************************
005450  000005                POT5:   5                       ; PRGO ROUTINE 5                        *
005452  005502                          POT6                    ;ADDRESS OF NEXT ROUTINE                *
005454  001750                          1000.                   ;TEST ITERATION COUNT                   *
005456  005460                          POGA                    ;SCOPE ENTRY POINT                      *
        000005                          X=X+1
                        ;*****************************************************************************
                        ;TEST ABILITY TO READ DONE BIT (BIT 7 OF PRS) RELIABLY
005460  005277  173514  POGA:   INC     @PRS                    ;ENABLE READER
005464  104031                          DELAY                   ;WAIT APPROX 100 MILLISECS
005466  000144                          100.
005470  105777  173504                  TSTB    @PRS            ;TEST DONE BIT (BIT 7 OF PRS)
005474  100401                          BMI     .+4             ;BRANCH IF DONE BIT  SET
005476  104015                          ERROR                   ;ERROR. DONE BIT NOT SET, OR FAILED
005500  104000                          SCOPE                   ;TO READ IT.
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005502                          TSTA    POH,100.
005502                          TSTAA   POH,100.,\X+1,\X+2,\Y
                        ;*******************************************************************
005502  000006          POT6:   6                       ; PRGO ROUTINE 6                *
005504  005552                  POT7                    ;ADDRESS OF NEXT ROUTINE        *
005506  000144                  100.                    ;TEST ITERATION COUNT           *
005510  005512                  POHA                    ;SCOPE ENTRY POINT              *
        000006                  X=X+1
                        ;*******************************************************************
                        ;TEST THAT RESET COMMAND CLEARS DONE BIT (BIT 7 OF PRS)
005512  005277  173462  POHA:   INC     @PRS            ;ENABLE READER
005516  104031                  DELAY                   ;DELAY APPROX 50 MILLISECONDS
005520  000062                  50.
005522  105777  173452          TSTB    @PRS            ;TEST FOR DONE BIT
005526  100005                  BPL     POHB            ;BRANCH IF DONE BIT NOT SET
005530  000005                  RESET                   ;RESET
005532  105777  173442          TSTB    @PRS            ;TEST DONE BIT
005536  100403                  BMI     POHC            ;BRANCH IF DONE BIT STILL SET.
005540  104000                  SCOPE                   ;SCOPE
005542  104015          POHB:   ERROR                   ;ERROR 1. DONE BIT NOT SET.
005544  104000                  SCOPE
005546  104015          POHC:   ERROR                   ;ERROR 2. DONE BIT NOT RESET BY
005550  104000                  SCOPE                   ;RESET INSTRUCTION.
005552                          TSTA    POI,100.
005552                          TSTAA   POI,100.,\X+1,\X+2,\Y
                        ;*******************************************************************
005552  000007          POT7:   7                       ; PRGO ROUTINE 7                *
005554  005614                  POT10                   ;ADDRESS OF NEXT ROUTINE        *
005556  000144                  100.                    ;TEST ITERATION COUNT           *
005560  005562                  POIA                    ;SCOPE ENTRY POINT              *
        000007                  X=X+1
                        ;*******************************************************************
                        ;TEST THAT DONE BIT (BIT 7 OF PRS) IS CLEARED WHEN ENABLING THE READER
005562  104001          POIA:   SRESET                  ;RESET
005564  005277  173410          INC     @PRS            ;ENABLE READER
005570  105777  173404          TSTB    @PRS            ;TEST FOR DONE BIT
005574  100375                  BPL     .-4             ;BRANCH IF DONE BIT NOT SET
005576  005277  173376          INC     @PRS            ;ENABLE READER AGAIN
005602  105777  173372          TSTB    @PRS            ;TEST DONE BIT AGAIN
005606  100001                  BPL     .+4             ;BRANCH IF DONE BIT IS RESET
005610  104015                  ERROR                   ;READER ENABLE DID NOT CLEAR DONE BIT
005612  104000                  SCOPE                   ;SCOPE
005614                          TSTA    POJ,100.
005614                          TSTAA   POJ,100.,\X+1,\X+2,\Y
                        ;*******************************************************************
005614  000010          POT10:  10                      ; PRGO ROUTINE 10               *
005616  005654                  POT11                   ;ADDRESS OF NEXT ROUTINE        *
005620  000144                  100.                    ;TEST ITERATION COUNT           *
005622  005624                  POJA                    ;SCOPE ENTRY POINT              *
        000010                  X=X+1
                        ;*******************************************************************
                        ;TEST THAT DONE BIT IS CLEARED BY REFERENCING READER BUFFER (PRB)
005624  005277  173350  POJA:   INC     @PRS            ;ENABLE READER
005630  105777  173344          TSTB    @PRS            ;TEST FOR DONE BIT
005634  100375                  BPL     .-4             ;BRANCH IF DONE BIT NOT SET.
005636  005777  173340          TST     @PRB            ;REFERENCE READER BUFFER (PRB)
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005642  105777  173332                  TSTB    @PRS            ;TEST FOR DONE BIT
005646  100001                          BPL     .+4             ;BRANCH IF DONE BIT IS CLEAR.
005650  104015                          ERROR                   ;ERROR 1. DONE BIT WAS NOT CLEARED
005652  104000                          SCOPE                   ;BY REFERENCING READER BUFFER.
005654                                  TSTA    POM,100.
005654                                  TSTAA   POM,100.,\X+1,\X+2,\Y
                                ;*******************************************************************************
005654  000011                  POT11:  11                      ; PRGO ROUTINE 11                              *
005656  005756                          POT12                   ;ADDRESS OF NEXT ROUTINE                       *
005660  000144                          100.                    ;TEST ITERATION COUNT                          *
005662  005664                          POMA                    ;SCOPE ENTRY POINT                             *
        000011                          X=X+1
                                ;*******************************************************************************
                                ;TEST ABILITY TO READ READER BUFFER RELIABLY.
005664  012700  000144          POMA:   MOV     #100.,%0        ;SET COUNT TO 100 IN R0
005670  004737  003654                  JSR     %7,AREAD        ;GET CHARACTER
005674  017737  173302  001336          MOV     @PRB,CHR1       ;C(PRB) TO CHR1
005702  017737  173274  001340  POMB:   MOV     @PRB,CHR2       ;C(PRB) TO CHR2
005710  023737  001336  001340          CMP     CHR1,CHR2       ;COMPARE CHR1 AND CHR2.
005716  001003                          BNE     POMC            ;BRANCH IF R1 AND R2 DON'T MATCH
005720  005300                          DEC     %0
005722  001367                          BNE     POMB
005724  104000                          SCOPE                   ;SCOPE
005726  104017                  POMC:   OACNV                   ;CORRECT 1ST READ DATA TO ASCII
005730  001336                          CHR1
005732  015140                          ORGRD
005734  000004                          4
005736  104017                          OACNV
005740  001340                          CHR2
005742  015153                          SUBRD
005744  000004                          4
005746  104016                          ERRORN                  ;ERROR. REREAD OF PRB DID NOT MATCH
005750  015106                          EM2                     ;INITIAL DATA READ FROM PRB.
005752  177777                          -1
005754  104000                          SCOPE
005756                                  TSTA    PON,100.
005756                                  TSTAA   PON,100.,\X+1,\X+2,\Y
                                ;*******************************************************************************
005756  000012                  POT12:  12                      ; PRGO ROUTINE 12                              *
005760  006020                          POT13                   ;ADDRESS OF NEXT ROUTINE                       *
005762  000144                          100.                    ;TEST ITERATION COUNT                          *
005764  005766                          PONA                    ;SCOPE ENTRY POINT                             *
        000012                          X=X+1
                                ;*******************************************************************************
                                ;TEST THAT READER BUFFER (PRB) IS CLEARED BY READER ENABLE
005766  104001                  PONA:   SRESET                  ;RESET
005770  004737  003654                  JSR     %7,AREAD        ;GET CHARACTER
005774  005777  173202                  TST     @PRB            ;TEST CONTENTS OF READER BUFFER.
006000  001772                          BEQ     PONA            ;GO GET ANOUTHER CHAR IF 0.
006002  005277  173172                  INC     @PRS            ;NOT 0. ENABLE READER
006006  005777  173170                  TST     @PRB            ;CHECK PRB
006012  001401                          BEQ     .+4             ;BRANCH IF PRB IS  RESET
006014  104015                          ERROR                   ;ERROR. PRB NOT RESET BY READER ENABLE.
006016  104000                          SCOPE
006020                                  TSTA    POO,100.
006020                                  TSTAA   POO,100.,\X+1,\X+2,\Y
```

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                                        ;*****************************************************************************
006020  000013                  POT13:  13                      ; PRGO ROUTINE 13                                    *
006022  006070                          POT14                   ;ADDRESS OF NEXT ROUTINE                             *
006024  000144                          100.                    ;TEST ITERATION COUNT                                *
006026  006034                          POOA                    ;SCOPE ENTRY POINT                                   *
        000013                          X=X+1
                                        ;*****************************************************************************
                                        ;TEST THAT READER IS ABLE TO INTERRUPT. IF INTERRUPT IS SERVICED, IT WILL
                                        ;HAVE OCCURRED AT CORRECT VECTOR.
006030  104013                          STRDRV                  ;SET UP READER INTERRUPT VECTOR
006032  006066                          POOB
006034  012737  000000  177776  POOA:   MOV     #PRTY0,PSW      ;SET PROCESSOR PRIORITY TO 0
006042  042777  000100  173130          BIC     #BIT6,@PRS      ;DISABLE READER INTERRUPT.
006050  004737  003654                  JSR     %7,AREAD        ;GO READ CHARACTER.
006054  052777  000100  173116          BIS     #BIT6,@PRS      ;ENABLE READER INTERRUPT.
006062  000240                          NOP                     ;NO OP
006064  104015                          ERROR                   ;ERROR. READER FAILED TO INTERRUPT.
006066  104000                  POOB:   SCOPE                   ;SCOPE
006070                                  TSTA    POP,100.
006070                                  TSTAA   POP,100.,\X+1,\X+2,\Y
                                        ;*****************************************************************************
006070  000014                  POT14:  14                      ; PRGO ROUTINE 14                                    *
006072  006144                          POT15                   ;ADDRESS OF NEXT ROUTINE                             *
006074  000144                          100.                    ;TEST ITERATION COUNT                                *
006076  006104                          POPA                    ;SCOPE ENTRY POINT                                   *
        000014                          X=X+1
                                        ;*****************************************************************************
                                        ;TEST THAT READER DOES NOT INTERRUPT WITH PROCESSOR AT SAME PRIORITY
                                        ;LEVEL AS READER.
006100  104013                          STRDRV                  ;SET UP READER INTERRUPT VECTOR
006102  006140                          POPE
006104  013737  001212  177776  POPA:   MOV     RDRLVL,PSW      ;SET PROCESSOR PRIORITY SAME AS READER PRIORITY.
006112  005077  173062                  CLR     @PRS            ;DISABLE READER INTERRUPT.
006116  004737  003654                  JSR     %7,AREAD        ;GO READ A CHARACTER.
006122  052777  000100  173050          BIS     #BIT6,@PRS      ;ENABLE READER INTERRUPT.
006130  000240                          NOP                     ;OK IF NO INTERRUPT OCCURS.
006132  005077  173042                  CLR     @PRS            ;DISABLE READER INTERRUPT.
006136  104000                          SCOPE                   ;SCOPE
006140  104015                  POPE:   ERROR                   ;ERROR. READER ERRONEOUSLY INTERRUPTED
                                                                ;WITH PROCESSOR AT SAME PRIORITY LEVEL AS
                                                                ;THE READER, OR THE READER IS AT HIGHER
006142  104000                          SCOPE                   ;PRIORITY LEVEL THAN SPECIFIED AT RDRLVL.
006144                                  TSTA    POQ,100.
006144                                  TSTAA   POQ,100.,\X+1,\X+2,\Y
                                        ;*****************************************************************************
006144  000015                  POT15:  15                      ; PRGO ROUTINE 15                                    *
006146  006222                          POT16                   ;ADDRESS OF NEXT ROUTINE                             *
006150  000144                          100.                    ;TEST ITERATION COUNT                                *
006152  006160                          POQA                    ;SCOPE ENTRY POINT                                   *
        000015                          X=X+1
                                        ;*****************************************************************************
                                        ;TEST THAT READER INTERRUPTS WITH PROCESSOR AT PRIORITY 1 LEVEL LOWER
                                        ;THAN READER'S
006154  104013                          STRDRV                  ;SET UP READER INTERRUPT VECTOR
006156  006220                          POQB
006160  013737  001212  177776  POQA:   MOV     RDRLVL,PSW      ;SET PROCESSOR PRIORITY ONE LEVEL LOWER
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006166  162737  000040  177776          SUB     #40,PSW         ;THAN READER PRIORITY
006174  042777  000100  172776          BIC     #BIT6,@PRS      ;DISABLE READER INTERRUPT
006202  004737  003654                  JSR     %7,AREAD        ;GO READ A CHARACTER.
006206  052777  000100  172764          BIS     #BIT6,@PRS      ;ENABLE READER INTERRUPT
006214  000240                          NOP                     ;NOP
006216  104015                          ERROR                   ;READER FAILED TO INTERRUPT WITH
                                                                ;PROCESSOR PRIORITY ONE LEVEL LOWER THAN
                                                                ;READER.  THEREFORE, READER PRIORITY MUST BE
006220  104000                  POQB:   SCOPE                   ;LOWER THAN SPECIFIED AT RDRLVL
006222                                  TSTA    POR,100.
006222                                  TSTAA   POR,100.,\X+1,\X+2,\Y
                        ;*****************************************************************************
006222  000016                  POT16:  16                      ; PRGO ROUTINE 16                      *
006224  006314                          POT17                   ;ADDRESS OF NEXT ROUTINE               *
006226  000144                          100.                    ;TEST ITERATION COUNT                  *
006230  006232                          PORA                    ;SCOPE ENTRY POINT                     *
        000016                          X=X+1
                        ;*****************************************************************************
                        ;TEST THAT READER DOES NOT REINTERRUPT AFTER RTI WHEN DONE BIT IS NOT CLEARED
006232  104013                  PORA:   STRDRV                  ;SET READER INTERRUPT VECTOR
006234  006270                          PORC
006236  012737  000000  177776          MOV     #PRTY0,PSW      ;SET PROCESSOR TO PRIORITY 0
006244  005077  172730                  CLR     @PRS            ;DISABLE READER INTERRUPT.
006250  004737  003654                  JSR     %7,AREAD        ;GO READ A CHARACTER.
006254  052777  000100  172716          BIS     #BIT6,@PRS      ;ENABLE READER INTERRUPT
006262  000240                          NOP
006264  104015                          ERROR                   ;ERROR 1.  READER FAILED TO INTERRUPT
006266  104000                          SCOPE                   ;SCOPE
006270  012777  006310  172712  PORC:   MOV     #PORE,@RDRVTR   ;CHANGE INTERRUPT VECTOR TO PORE
006276  012716  006304                  MOV     #PORD,@%6
006302  000002                          RTI                     ;RETURN FROM INTERRUPT
006304  000240                  PORD:   NOP
006306  104000                          SCOPE
006310  104015                  PORE:   ERROR                   ;ERROR 2. READER REINTERRUPTED AFTER
006312  104000                          SCOPE                   ;RTI WITH DONE BIT LEFT ON
006314                                  TSTA    POS,1000.
006314                                  TSTAA   POS,1000.,\X+1,\X+2,\Y
                        ;*****************************************************************************
006314  000017                  POT17:  17                      ; PRGO ROUTINE 17                      *
006316  006364                          POT20                   ;ADDRESS OF NEXT ROUTINE               *
006320  001750                          1000.                   ;TEST ITERATION COUNT                  *
006322  006330                          POSA                    ;SCOPE ENTRY POINT                     *
        000017                          X=X+1
                        ;*****************************************************************************
                        ;TEST THAT READER INTERRUPTS IMMEDIATELY UPON LOWERING CP PRIORITY TO 0.
006324  104013                          STRDRV                  ;SET READER INTERRUPT VECTOR TO
006326  006362                          POSB
006330  005077  172644          POSA:   CLR     @PRS            ;DISABLE PTRI.
006334  004737  003654                  JSR     %7,AREAD        ;READ A CHARACTER.
006340  052777  000100  172632          BIS     #BIT6,@PRS      ;ENABLE PTRI
006346  005037  177776                  CLR     PSW             ;LOWER PRIORITY TO 0.
006352  012737  000340  177776          MOV     #PRTY7,PSW      ;RAISE PRIORITY BACK TO 7.
006360  104015                          ERROR                   ;ERROR. READER FAILED TO INTERRUPT IMMEDIATELY
                                                                ;AFTER LOWERING PRIORITY TO 0
006362  104000                  POSB:   SCOPE                   ;INTERRUPTS TO HERE IF SUCCESSFUL.
006364                                  TSTA    POT,10000.
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006364                                          TSTAA   POT,10000.,\X+1,\X+2,\Y
                                        ;*****************************************************************************
006364  000020                          POT20:  20                      ; PRGO ROUTINE 20                          *
006366  006412                                  POT21                   ;ADDRESS OF NEXT ROUTINE                   *
006370  023420                                  10000.                  ;TEST ITERATION COUNT                      *
006372  006400                                  POTA                    ;SCOPE ENTRY POINT                         *
        000020                                  X=X+1
                                        ;*****************************************************************************
                                        ;READ AND CHECK 10000 CHARACTERS OF SPECIAL BINARY COUNT PATTERN. FULL SPEED.
006374  004737  004312                          JSR     %7,BSYNC        ;SYNC READER; SET ERROR COUNTER.
006400  004737  004024                  POTA:   JSR     %7,BREAD        ;GO READ CHARACTER
006404  004737  004234                          JSR     %7,BCHECK       ;GO CHECK CHARACTER READ.
006410  104000                                  SCOPE                   ;SCOPE
006412                                          TSTA    POU,500.
006412                                          TSTAA   POU,500.,\X+1,\X+2,\Y
                                        ;*****************************************************************************
006412  000021                          POT21:  21                      ; PRGO ROUTINE 21                          *
006414  006450                                  POT22                   ;ADDRESS OF NEXT ROUTINE                   *
006416  000764                                  500.                    ;TEST ITERATION COUNT                      *
006420  006434                                  POUA                    ;SCOPE ENTRY POINT                         *
        000021                                  X=X+1
                                        ;*****************************************************************************
                                        ;READ AND CHECK 500 CHARACTERS OF SPECIAL BINARY COUNT PATTERN.
                                        ;RANDOM STALL BETWEEN CHARACTERS (0 TO 7 MSECS).
006422  012737  177770  004202                MOV     #177770,STLMSK
006430  004737  004312                          JSR     %7,BSYNC        ;SYNC READER; SET ERROR COUNTER
006434  104012                          POUA:   STALL                   ;RANDOM STALL (0 TO 7 MSECS)
006436  004737  004024                          JSR     %7,BREAD        ;GO READ CHARACTER
006442  004737  004234                          JSR     %7,BCHECK       ;GO CHECK CHARACTER READ
006446  104000                                  SCOPE                   ;SCOPE
006450                                          TSTA    POV,1000.
006450                                          TSTAA   POV,1000.,\X+1,\X+2,\Y
                                        ;*****************************************************************************
006450  000022                          POT22:  22                      ; PRGO ROUTINE 22                          *
006452  006522                                  POT23                   ;ADDRESS OF NEXT ROUTINE                   *
006454  001750                                  1000.                   ;TEST ITERATION COUNT                      *
006456  006472                                  POVA                    ;SCOPE ENTRY POINT                         *
        000022                                  X=X+1
                                        ;*****************************************************************************
                                        ;READ 1000 GROUPS OF 3 CHARS EACH. STALL (0 TO 31 MSECS) BEFORE EACH GROUP.
006460  012737  177740  004202                MOV     #177740,STLMSK  ;LIMIT STALLS TO 31 MSECS.
006466  004737  004312                          JSR     %7,BSYNC        ;SYNC READER.  SET ERROR COUNTER
006472  012737  000003  004232          POVA:   MOV     #3,RNCNT        ;SET CHAR COUNT TO 3.
006500  104012                                  STALL                   ;RANDOM STALL (0 TO 31 MSECS).
006502  004737  004024                  POVB:   JSR     %7,BREAD        ;GO READ CHARACTER.
006506  004737  004234                          JSR     %7,BCHECK       ;GO CHECK CHARACTER READ.
006512  005337  004232                          DEC     RNCNT           ;3 CHARS READ?
006516  001371                                  BNE     POVB            ;BR IF NOT 3 CHARS YET.
006520  104000                                  SCOPE                   ;SCOPE
006522                                          TSTA    POX,1000.
006522                                          TSTAA   POX,1000.,\X+1,\X+2,\Y
                                        ;*****************************************************************************
006522  000023                          POT23:  23                      ; PRGO ROUTINE 23                          *
006524  006600                                  POT24                   ;ADDRESS OF NEXT ROUTINE                   *
006526  001750                                  1000.                   ;TEST ITERATION COUNT                      *
006530  006552                                  POXA                    ;SCOPE ENTRY POINT                         *
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                000023                          X=X+1
                                        ;*****************************************************************************
                                        ;READ AND CHECK 1000 CHARACTER GROUPS OF RANDOM LENGTH (1 TO 15).
                                        ;RANDOM STALL (0 TO 31 MSECS) BETWEEN GROUPS.
006532  012737  177740  004202          MOV     #177740,STLMSK  ;LIMIT STALLS TO 31 MSECS.
006540  012737  177760  004230          MOV     #177760,RCMSK   ;LIMIT MAY CHAR COUNT TO 15 CHARS.
006546  004737  004312                  JSR     %7,BSYNC        ;SYNC READER.  SET ERROR COUNTER.
006552  004737  004204          POXA:   JSR     %7,GRCNT        ;GENERATE RANDOM CHAR COUNT.
006556  104012                          STALL
006560  004737  004024          POXB:   JSR     %7,BREAD        ;GO READ CHARACTER.
006564  004737  004234                  JSR     %7,BCHECK       ;GO CHECK CHARACTER.
006570  005337  004232                  DEC     RNCNT           ;ALL CHARS READ?
006574  001371                          BNE     POXB            ;BRANCH IF NOT.
006576  104000                          SCOPE                   ;SCOPE
006600                                  TSTAA   POY,1000.,\X+1,LST,\Y
                                        ;*****************************************************************************
006600  000024          POT24:  24                              ; PRG0 ROUTINE 24                               *
006602  177777                  POTLST                          ;ADDRESS OF NEXT ROUTINE                        *
006604  001750                  1000.                           ;TEST ITERATION COUNT                           *
006606  006630                  POYA                            ;SCOPE ENTRY POINT                              *
                000024                  X=X+1
                                        ;*****************************************************************************
                                        ;READ AND CHECK 1000 CHARACTER GROUPS OF SPECIAL BINARY COUNT PATTERN.
                                        ;RANDOM LENGTH
                                        ;GROUPS (BETWEEN 1 AND 77). RANDOM STALL BETWEEN GROUPS (0 TO 31 MSECS).
006610  012737  177740  004202          MOV     #177740,STLMSK
006616  012737  177700  004230          MOV     #177700,RCMSK
006624  004737  004312                  JSR     %7,BSYNC        ;SYNC READER; SET ERROR COUNTER.
006630  004737  004204          POYA:   JSR     %7,GRCNT        ;GENERATE RANDOM CHARACTER COUNT.
006634  104012                          STALL                   ;RANDOM STALL (0 TO 31MSECS)
006636  004737  004024          POYB:   JSR     %7,BREAD        ;GO READ CHARATER
006642  004737  004234                  JSR     %7,BCHECK       ;GO CHECK CHARACTER READ
006646  005337  004232                  DEC     RNCNT           ;DECREMENT RANDOM CHAR COUNT
006652  001371                          BNE     POYB            ;GO READ AGAIN IF COUNT NOT 0.
006654  104000                          SCOPE                   ;SCOPE
                                ;PRG1 - PUNCH TESTS
                177777                  X=-1
                000001                  Y=1
006656  012737  006700  001256  PRG1:   MOV     #P1T0,KSTART    ;ADDR OF 1ST ROUTINE TO KSTART
006664  104010                          TYPE                    ;TYPE TITLE.
006666  013111                          TITL1
006670  004737  004562                  JSR     PC,PCHSEL       ;SELECT PUNCH.
006674  000137  001640                  JMP     SRSET           ;GO GET STARTED.
006700                                  TSTA    P1A,1000.
006700                                  TSTAA   P1A,1000.,\X+1,\X+2,\Y
                                        ;*****************************************************************************
006700  000000          P1T0:   0                               ; PRG1 ROUTINE 0                                *
006702  006730                  P1T1                            ;ADDRESS OF NEXT ROUTINE                        *
006704  001750                  1000.                           ;TEST ITERATION COUNT                           *
006706  006716                  P1AA                            ;SCOPE ENTRY POINT                              *
                000000                  X=X+1
                                        ;*****************************************************************************
                                        ;TEST ABILITY TO REFERENCE THE PUNCH STATUS WORD (PPS)
006710  012737  006724  000004          MOV     #P1AB,MACHER
006716  005777  172262          P1AA:   TST     @PPS            ;REFERENCE PUNCH STATUS WORD
006722  104000                          SCOPE                   ;SCOPE
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006724  104015                  P1AB:   ERROR                   ;ERROR. TRAPPED WHEN REFERENCING PUNCH
006726  104000                          SCOPE                   ;STATUS WORD (PPS).
006730                                  TSTA    P1B,1000.
006730                                  TSTAA   P1B,1000.,\X+1,\X+2,\Y
                                ;*******************************************************************************
006730  000001                  P1T1:   1                       ; PRG1 ROUTINE 1                              *
006732  006760                          P1T2                    ;ADDRESS OF NEXT ROUTINE                      *
006734  001750                          1000.                   ;TEST ITERATION COUNT                         *
006736  006746                          P1BA                    ;SCOPE ENTRY POINT                            *
        000001                          X=X+1
                                ;*******************************************************************************
                                ;TEST ABILITY TO REFERENCE THE PUNCH BUFFER (PPB)
006740  012737  006754  000004          MOV     #P1BB,MACHER    ;SET UP MACHINE ERROR TRAP.
006746  005777  172234          P1BA:   TST     @PPB            ;REFERENCE PUNCH BUFFER.
006752  104000                          SCOPE                   ;SCOPE
006754  104015                  P1BB:   ERROR                   ;TRAPPED WHEN REFERENCING
006756  104000                          SCOPE                   ;PUNCH BUFFER (PPB)
006760                                  TSTA    P1C,1000.
006760                                  TSTAA   P1C,1000.,\X+1,\X+2,\Y
                                ;*******************************************************************************
006760  000002                  P1T2:   2                       ; PRG1 ROUTINE 2                              *
006762  007034                          P1T3                    ;ADDRESS OF NEXT ROUTINE                      *
006764  001750                          1000.                   ;TEST ITERATION COUNT                         *
006766  006770                          P1CA                    ;SCOPE ENTRY POINT                            *
        000002                          X=X+1
                                ;*******************************************************************************
                                ;TEST ABILITY TO SET AND CLEAR ID BIT (BIT 6) IN PPS
006770  052777  000100  172206  P1CA:   BIS     #BIT6,@PPS      ;SET ID BIT IN PPS (BIT 6)
006776  032777  000100  172200          BIT     #BIT6,@PPS      ;CHECK ID BIT IN PPS
007004  001002                          BNE     P1CB            ;BRANCH IF BIT SET
007006  104015                          ERROR                   ;ERROR. FAILED TO SET ID BIT (BIT 6) IN
007010  104000                          SCOPE                   ;PPS
007012  042777  000100  172164  P1CB:   BIC     #BIT6,@PPS      ;CLEAR ID BIT IN PPS
007020  032777  000100  172156          BIT     #BIT6,@PPS      ;CHECK ID BIT IN PPS
007026  001401                          BEQ     .+4             ;BRANCH IF BIT IS CLEAR
007030  104015                          ERROR                   ;ERROR. ID BIT IN PPS FAILED TO CLEAR
007032  104000                          SCOPE
007034                                  TSTA    P1D,100.
007034                                  TSTAA   P1D,100.,\X+1,\X+2,\Y
                                ;*******************************************************************************
007034  000003                  P1T3:   3                       ; PRG1 ROUTINE 3                              *
007036  007070                          P1T4                    ;ADDRESS OF NEXT ROUTINE                      *
007040  000144                          100.                    ;TEST ITERATION COUNT                         *
007042  007044                          P1DA                    ;SCOPE ENTRY POINT                            *
        000003                          X=X+1
                                ;*******************************************************************************
                                ;TEST ABILITY TO CLEAR ID BIT (6) IN PPS
007044  052777  000100  172132  P1DA:   BIS     #BIT6,@PPS      ;SET ID BIT IN PPS.
007052  104001                          SRESET                  ;RESET.
007054  032777  000100  172122          BIT     #BIT6,@PPS      ;TEST ID BIT IN PPS.
007062  001401                          BEQ     .+4             ;BRANCH IF ID BIT IS CLEAR.
007064  104015                          ERROR                   ;ERROR. RESET INSTRUCTION FAILED TO
007066  104000                          SCOPE                   ;CLEAR ID BIT (BIT 6) IN PPS.
007070                                  TSTA    P1E,1000.
007070                                  TSTAA   P1E,1000.,\X+1,\X+2,\Y
                                ;*******************************************************************************
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007070  000004                  P1T4:   4                       ; PRG1 ROUTINE 4                        *
007072  007112                          P1T5                    ;ADDRESS OF NEXT ROUTINE                *
007074  001750                          1000.                   ;TEST ITERATION COUNT                   *
007076  007100                          P1EA                    ;SCOPE ENTRY POINT                      *
        000004                          X=X+1
                                ;*******************************************************************
                                ;TEST THAT READY BIT (BIT 7) IS SET FOLLOWING A RESET INSTRUCTION, AND
                                ;THAT THE READY BIT CAN BE READ RELIABLY.
007100  105777  172100          P1EA:   TSTB    @PPS            ;TEST PPS
007104  100401                          BMI     .+4             ;BRANCH IF READY BIT  SET
007106  104015                          ERROR                   ;ERROR. RESET FAILED TO SET READY BIT,
007110  104000                          SCOPE                   ;OR FAILED TO READ READY BIT.
007112                                  TSTA    P1F,100.
007112                                  TSTAA   P1F,100.,\X+1,\X+2,\Y
                                ;*******************************************************************
007112  000005                  P1T5:   5                       ; PRG1 ROUTINE 5                        *
007114  007150                          P1T6                    ;ADDRESS OF NEXT ROUTINE                *
007116  000144                          100.                    ;TEST ITERATION COUNT                   *
007120  007122                          P1FA                    ;SCOPE ENTRY POINT                      *
        000005                          X=X+1
                                ;*******************************************************************
                                ;TEST THAT READY BIT (BIT 7) OF PPS IS RESET BY LOADING PUNCH BUFFER (PPB)
007122  104001                  P1FA:   SRESET                  ;RESET
007124  004737  004500                  JSR     %7,CPRDY        ;CHECK FOR PUNCH READY
007130  112777  000000  172050          MOVB    #0,@PPB         ;LOAD 0 INTO PUNCH BUFFER (PPB)
007136  105777  172042                  TSTB    @PPS            ;TEST PPS
007142  100001                          BPL     .+4             ;BRANCH IF READY BIT CLEAR
007144  104015                          ERROR                   ;ERROR. LOADING PUNCH BUFFER (PPB)
007146  104000                          SCOPE                   ;FAILED TO RESET READY BIT IN PPS
007150                                  TSTA    P1G,100.
007150                                  TSTAA   P1G,100.,\X+1,\X+2,\Y
                                ;*******************************************************************
007150  000006                  P1T6:   6                       ; PRG1 ROUTINE 6                        *
007152  007212                          P1T7                    ;ADDRESS OF NEXT ROUTINE                *
007154  000144                          100.                    ;TEST ITERATION COUNT                   *
007156  007160                          P1GA                    ;SCOPE ENTRY POINT                      *
        000006                          X=X+1
                                ;*******************************************************************
                                ;TEST THAT READY BIT (BIT 7) IS NOT RESET BY BYTE LOADING PPB+1.
007160  104001                  P1GA:   SRESET                  ;RESET
007162  004737  004500                  JSR     %7,CPRDY        ;CHECK FOR PUNCH READY.
007166  013700  001206                  MOV     PPB,%0
007172  005200                          INC     %0
007174  112710  000000                  MOVB    #0,@%0          ;LOAD PPB+1
007200  105777  172000                  TSTB    @PPS            ;TEST PPS
007204  100401                          BMI     .+4             ;BRANCH IF READY BIT NOT RESET.
007206  104015                          ERROR                   ;ERROR. LOADING PPB+1 CLEARED READY BIT.
007210  104000                          SCOPE                   ;SCOPE
007212                                  TSTA    P1H,1000.
007212                                  TSTAA   P1H,1000.,\X+1,\X+2,\Y
                                ;*******************************************************************
007212  000007                  P1T7:   7                       ; PRG1 ROUTINE 7                        *
007214  007260                          P1T10                   ;ADDRESS OF NEXT ROUTINE                *
007216  001750                          1000.                   ;TEST ITERATION COUNT                   *
007220  007226                          P1HA                    ;SCOPE ENTRY POINT                      *
        000007                          X=X+1
```

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                                ;*****************************************************************************
                                ;TEST THAT PUNCH (READY BIT) IS ABLE TO INTERRUPT. IF THE INTERRUPT IS
                                ;SERVICED, IT WILL HAVE OCCURRED AT CORRECT VECTOR.
007222  104014                          STPCHV                  ;SET UP PUNCH INTERRUPT VECTOR.
007224  007256                          P1HB
007226  005037  177776          P1HA:   CLR     PSW             ;SET PRTY TO 0.
007232  004737  004500                  JSR     %7,CPRDY        ;CHECK FOR PUNCH READY.
007236  042777  000100  171740          BIC     #BIT6,@PPS      ;DISABLE PUNCH INTERRUPT
007244  052777  000100  171732          BIS     #BIT6,@PPS      ;ENABLE PUNCH INTERRUPT
007252  000240                          NOP
007254  104015                          ERROR                   ;ERROR. FAILURE TO INTERRUPT WITH
                                                                ;PUNCH READY BIT SET.
007256  104000                  P1HB:   SCOPE                   ;INTERRUPT VECTOR POINTS HERE.
007260                                  TSTA    P1I,1000.
007260                                  TSTAA   P1I,1000.,\X+1,\X+2,\Y
                                ;*****************************************************************************
007260  000010                  P1T10:  10                      ; PRG1 ROUTINE 10                       *
007262  007352                          P1T11                   ;ADDRESS OF NEXT ROUTINE                *
007264  001750                          1000.                   ;TEST ITERATION COUNT                   *
007266  007270                          P1IA                    ;SCOPE ENTRY POINT                      *
        000010                          X=X+1
                                ;*****************************************************************************
                                ;TEST THAT PUNCH DOES NOT REINTERRUPT AFTER RTI WHEN READY BIT IS NOT RESET.
007270  104014                  P1IA:   STPCHV                  ;SET UP PUNCH INTERRUPT VECTOR
007272  007326                          P1IB
007274  005037  177776                  CLR     PSW             ;SET PRTY TO 0.
007300  004737  004500                  JSR     %7,CPRDY        ;CHECK FOR PUNCH READY.
007304  042777  000100  171672          BIC     #BIT6,@PPS      ;DISABLE PUNCH INTERRUPT
007312  052777  000100  171664          BIS     #BIT6,@PPS      ;ENABLE PUNCH INTERRUPT
007320  000240                          NOP
007322  104015                          ERROR                   ;ERROR. PUNCH FAILED TO INTERRUPT.
007324  104000                          SCOPE                   ;SCOPE
007326  012777  007346  171660  P1IB:   MOV     #P1ID,@PCHVTR   ;CHANGE INTERRUPT VECTOR TO P1ID
007334  012716  007342                  MOV     #P1IC,@%6       ;CHANGE INTERRUPT RETURN ADDRESS.
007340  000002                          RTI                     ;RETURN FROM INTERRUPT.
007342  000240                  P1IC:   NOP
007344  104000                          SCOPE
007346  104015                  P1ID:   ERROR                   ;ERROR2. PUNCH REINTERRUPTED AFTER RTI WITH
007350  104000                          SCOPE                   ;READY BIT LEFT ON. POP THE STOCK TWICE
007352                                  TSTA    P1J,1000.
007352                                  TSTAA   P1J,1000.,\X+1,\X+2,\Y
                                ;*****************************************************************************
007352  000011                  P1T11:  11                      ; PRG1 ROUTINE 11                       *
007354  007426                          P1T12                   ;ADDRESS OF NEXT ROUTINE                *
007356  001750                          1000.                   ;TEST ITERATION COUNT                   *
007360  007366                          P1JA                    ;SCOPE ENTRY POINT                      *
        000011                          X=X+1
                                ;*****************************************************************************
                                ;TEST THAT THE PUNCH DOES NOT INTERRUPT WITH PROCESSOR AT SAME PRIORITY
                                ;LEVEL AS THE PUNCH.
007362  104014                          STPCHV                  ;SET UP PUNCH INTERRUPT VECTOR.
007364  007422                          P1JB
007366  013737  001216  177776  P1JA:   MOV     PCHLVL,PSW      ;SET PROCESSOR PRIORITY SAME AS PUNCH.
007374  005077  171604                  CLR     @PPS            ;DISABLE PUNCH INTERRUPT.
007400  004737  004500                  JSR     %7,CPRDY        ;CHECK FOR PUNCH READY.
007404  052777  000100  171572          BIS     #BIT6,@PPS      ;ENABLE PUNCH INTERRUPT.
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007412  000240                          NOP                     ;OK IF NO INTERRUPT OCCURS.
007414  005077  171564                  CLR     @PPS            ;DISABLE PUNCH INTERRUPT.
007420  104000                          SCOPE                   ;SCOPE
007422  104015                  P1JB:   ERROR                   ;ERROR. PUNCH ERRONEOUSLY INTERRUPTED
                                                                ;WITH PROCESSOR AT SAME PRIORITY LEVEL
                                                                ;AS THE PUNCH, OR THE PUNCH IS AT HIGHER
007424  104000                          SCOPE                   ;PRIORITY LEVEL THAN SPECIFIED AT PCHLVL.
007426                                  TSTA    P1K,1000.
007426                                  TSTAA   P1K,1000.,\X+1,\X+2,\Y
                        ;*****************************************************************
007426  000012                  P1T12:  12                      ; PRG1 ROUTINE 12                       *
007430  007504                          P1T13                   ;ADDRESS OF NEXT ROUTINE                *
007432  001750                          1000.                   ;TEST ITERATION COUNT                   *
007434  007442                          P1KA                    ;SCOPE ENTRY POINT                      *
        000012                          X=X+1
                        ;*****************************************************************
                        ;TEST THAT PUNCH INTERRUPTS WITH PROCESSOR AT PRIORITY 1 LEVEL LOWER
                        ;THAN THE PUNCH PRIORITY.
007436  104014                          STPCHV                  ;SET UP PUNCH INTERRUPT VECTOR
007440  007502                          P1KB
007442  013737  001216  177776  P1KA:   MOV     PCHLVL,PSW      ;SET PROCESSOR PRIORITY ONE LEVEL LOWER
007450  162737  000040  177776          SUB     #40,PSW         ;THAN PUNCH PRIORITY.
007456  042777  000100  171520          BIC     #BIT6,@PPS      ;DISABLE PUNCH INTERRUPT
007464  004737  004500                  JSR     %7,CPRDY        ;CHECK FOR PUNCH READY.
007470  052777  000100  171506          BIS     #BIT6,@PPS      ;ENABLE PUNCH INTERRUPT.
007476  000240                          NOP
007500  104015                          ERROR                   ;PUNCH FAILED TO INTERRUPT WITH PROCESSOR
                                                                ;PRIORITY ONE LEVEL LOWER THAN PUNCH.
                                                                ;THEREFORE, PUNCH PRIORITY MUST
                                                                ;BE LOWER THAN SPECIFIED AT PCHLVL.
007502  104000                  P1KB:   SCOPE                   ;HERE IF INTERRUPT OCCURS.
007504                                  TSTA    P1L,1000.
007504                                  TSTAA   P1L,1000.,\X+1,\X+2,\Y
                        ;*****************************************************************
007504  000013                  P1T13:  13                      ; PRG1 ROUTINE 13                       *
007506  007556                          P1T14                   ;ADDRESS OF NEXT ROUTINE                *
007510  001750                          1000.                   ;TEST ITERATION COUNT                   *
007512  007520                          P1LA                    ;SCOPE ENTRY POINT                      *
        000013                          X=X+1
                        ;*****************************************************************
                        ;TEST THAT PUNCH INTERRUPTS IMMEDIATELY UPON LOWERING CP PRIORITY TO 0.
007514  104014                          STPCHV                  ;SET UP PUNCH INTERRUPT VECTOR
007516  007554                          P1LB
007520  004737  004500          P1LA:   JSR     %7,CPRDY        ;CHECK FOR PUNCH READY.
007524  042777  000100  171452          BIC     #BIT6,@PPS      ;DISABLE PUNCH INTERRUPT
007532  052777  000100  171444          BIS     #BIT6,@PPS      ;ENABLE PUNCH INTERRUPT
007540  005037  177776                  CLR     PSW             ;LOWER PRTY TO 0.
007544  012737  000340  177776          MOV     #PRTY7,PSW      ;RAISE CP PRIORITY BACK TO 7.
007552  104015                          ERROR                   ;ERROR. PUNCH FAILED TO INTERRUPT IMMEDIATELY
                                                                ;AFTER CP PRIORITY WAS LOWERED TO 0.
007554  104000                  P1LB:   SCOPE                   ;HERE IF INTERRUPT OCCURS.
007556                                  TSTA    P1M,5
007556                                  TSTAA   P1M,5,\X+1,\X+2,\Y
                        ;*****************************************************************
007556  000014                  P1T14:  14                      ; PRG1 ROUTINE 14                       *
007560  007622                          P1T15                   ;ADDRESS OF NEXT ROUTINE                *
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007562  000005                          5                       ;TEST ITERATION COUNT                   *
007564  007566                          P1MA                    ;SCOPE ENTRY POINT                      *
        000014                          X=X+1
                                ;*******************************************************************
                                ;PUNCH SPECIAL BINARY COUNT PATTERN IN PUNCH MODE 0 (FULL SPEED)
007566  012737  001000  001330  P1MA:   MOV     #512.,RCNT      ;SET CHARACTER COUNT TO 512
007574  004537  010062                  JSR     %5,PFRNT        ;GO PUNCH FRONT END AND MODE 0
007600  000000                          0                       ;INDICATOR
007602  104026                          INBIN           ;INITIALIZE SPECIAL BINARY COUNT
007604  104030                  P1MB:   GETBNP                  ;GET BINARY CHARACTER
007606  004737  004532                  JSR     %7,HSPCH        ;GO PUNCH THE CHARACTER
007612  005337  001330                  DEC     RCNT            ;DECREMENT CHAR COUNT.
007616  001372                          BNE     P1MB            ;BRANCH IF COUNT NOT YET 0 YET.
007620  104000                          SCOPE                   ;SCOPE
007622                                  TSTA    P1N,5
007622                                  TSTAA   P1N,5,\X+1,\X+2,\Y
                                ;*******************************************************************
007622  000015                  P1T15:  15                      ; PRG1 ROUTINE 15                       *
007624  007676                          P1T16                   ;ADDRESS OF NEXT ROUTINE                *
007626  000005                          5                       ;TEST ITERATION COUNT                   *
007630  007640                          P1NA                    ;SCOPE ENTRY POINT                      *
        000015                          X=X+1
                                ;*******************************************************************
                                ;PUNCH SPECIAL BINARY COUNT PATTERN IN PUNCH MODE 1 (RANDOM STALLS AFTER
                                ;PUNCHING EACH CHARACTER. MAXIMUM STALL 47 MILLISECONDS)
007632  012737  177720  004202          MOV     #177720,STLMSK  ;SET STALL MASK FOR 57(8) MAX
007640  012737  001000  001330  P1NA:   MOV     #512.,RCNT      ;SET CHARACTER COUNT TO 512.
007646  004537  010062                  JSR     %5,PFRNT        ;GO PUNCH FRONT END, AND MODE 1
007652  000001                          1                       ;INDICATOR
007654  104026                          INBIN           ;INITIALIZE SPECIAL BINARY COUNT.
007656  104030                  P1NB:   GETBNP                  ;GET BINARY CHARACTER.
007660  004737  004532                  JSR     %7,HSPCH        ;GO PUNCH THE CHARACTER.
007664  104012                          STALL                   ;RANDOM STALL.
007666  005337  001330                  DEC     RCNT            ;DECREMENT CHAR COUNT.
007672  001371                          BNE     P1NB            ;BRANCH IF COUNT NOT YET 0.
007674  104000                          SCOPE                   ;SCOPE
007676                                  TSTA    P10,5
007676                                  TSTAA   P10,5,\X+1,\X+2,\Y
                                ;*******************************************************************
007676  000016                  P1T16:  16                      ; PRG1 ROUTINE 16                       *
007700  007774                          P1T17                   ;ADDRESS OF NEXT ROUTINE                *
007702  000005                          5                       ;TEST ITERATION COUNT                   *
007704  007722                          P10A                    ;SCOPE ENTRY POINT                      *
        000016                          X=X+1
                                ;*******************************************************************
                                ;PUNCH SPECIAL BINARY COUNT PATTERN IN PUNCH MODE 2.
                                ;(RANDOM STALL BEFORE PUNCHING RANDOM LENGTH GROUP OF CHARACTERS).
                                ;MAXIMUM STALL 47 MILLISECONDS, MAXIMUM GROUP LENGTH -15)
007706  012737  177720  004202          MOV     #177720,STLMSK  ;SET STALL MASK FOR 57(8) MAX.
007714  012737  177760  004230          MOV     #177760,RCMSK   ;SET CHAR GROUP MASK FOR 17(8) MAX).
007722  012737  001000  001330  P10A:   MOV     #512.,RCNT      ;SET CHARACTER COUNT TO 512.
007730  004537  010062                  JSR     %5,PFRNT        ;GO PUNCH FRONT END AND MODE 2
007734  000002                          2                       ;INDICATOR
007736  104026                          INBIN           ;INITIALIZE SPECIAL BINARY COUNT.
007740  004737  004204          P10B:   JSR     %7,GRCNT        ;GENERATE RANDOM CHARACTER COUNT
007744  104012                          STALL                   ;RANDOM STALL.
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007746  104030                  P10C:   GETBNP                  ;GET BINARY CHARACTER.
007750  004737  004532                  JSR     %7,HSPCH        ;PUNCH THE CHARACTER.
007754  005337  001330                  DEC     RCNT            ;DECREMENT CHAR COUNT
007760  001404                          BEQ     P10D            ;BRANCH IF COUNT IS 0.
007762  005337  004232                  DEC     RNCNT           ;NOT 0. DECREMENT RANDOM CHAR COUNT.
007766  001367                          BNE     P10C            ;BRANCH IF COUNT NOT YET 0.
007770  000763                          BR      P10B            ;BRANCH IF COUNT 0.
007772  104000                  P10D:   SCOPE                   ;SCOPE
007774                                  TSTAA   P1P,1,\X+1,LST,\Y
                                ;*****************************************************************************
007774  000017                  P1T17:  17                      ; PRG1 ROUTINE 17                           *
007776  177777                          P1TLST                  ;ADDRESS OF NEXT ROUTINE                    *
010000  000001                          1                       ;TEST ITERATION COUNT                       *
010002  010004                          P1PA                    ;SCOPE ENTRY POINT                          *
        000017                          X=X+1
                                ;*****************************************************************************
                                ;PUNCH SPECIAL BINARY COUNT PATTERN IN PUNCH MODE 3.
                                ;STALL 10 SECONDS, PUNCH 32 CHARACTERS, UNTIL THE ENTIRE PATTERN IS
                                ;COMPLETED.
010004  012737  001000  001330  P1PA:   MOV     #512.,RCNT      ;SET CHARACTER COUNT TO 512.
010012  004537  010062                  JSR     %5,PFRNT        ;GO PUNCH FRONT END AND MODE 3
010016  000003                          3                       ;INDICATOR.
010020  104026                          INBIN           ;INITIALIZE SPECIAL BIN COUNT
010022  104031                  P1PB:   DELAY                   ;STALL 10 SECONDS
010024  023420                          10000.
010026  012737  000040  004232          MOV     #32.,RNCNT      ;SET GROUP COUNT TO 32.
010034  104030                  P1PC:   GETBNP                  ;GET BINARY CHARACTER
010036  004737  004532                  JSR     %7,HSPCH        ;PUNCH CHARACTER
010042  005337  001330                  DEC     RCNT            ;DECREMENT CHAR COUNT
010046  001404                          BEQ     P1PD            ;BRANCH IF COUN  IS 0
010050  005337  004232                  DEC     RNCNT           ;DECREMENT GROUP COUNT
010054  001367                          BNE     P1PC            ;BRANCH IF COUN  NOT YET 0.
010056  000761                          BR      P1PB            ;BRANCH IF COUN  0.
010060  104000                  P1PD:   SCOPE                   ;SCOPE

                                ;SUBROUTINE TO PUNCH FRONT END AND MODE CODE (USED BY PRG3).
010062  012701  000024          PFRNT:  MOV     #20.,%1         ;PUNCH 20 BLANK CHARACTERS (000)
010066  005037  001332                  CLR     PCHOUT          ;CLEAR PCHOUT.
010072  004737  004532                  JSR     %7,HSPCH        ;PUNCH CHAR.
010076  005301                          DEC     %1              ;DECREMENT R1
010100  001374                          BNE     .-6             ;BRANCH IF NOT 20 CHARCTERS YET.
010102  012737  000377  001332          MOV     #377,PCHOUT     ;PUNCH RUBOUT CHAR (SYNC CHAR).
010110  004737  004532                  JSR     %7,HSPCH
010114  012537  001332                  MOV     (5)+,PCHOUT     ;MOVE MODE CODE TO PCHOUT
010120  004737  004532                  JSR     %7,HSPCH        ;PUNCH MODE CODE.
010124  012701  000004                  MOV     #4,%1           ;PUNCH 4 BLANK CHARACTERS.
010130  005037  001332                  CLR     PCHOUT
010134  004737  004532                  JSR     %7,HSPCH
010140  005301                          DEC     %1
010142  001374                          BNE     .-6
010144  000205                          RTS     %5              ;EXIT

                                ;PRG2 - PUNCH VERIFY PROGRAM
                                ;THIS PROGRAM VERIFIES TAPE PRODUCED BY PRG1.
                                ;ANY ERRORS FOUND ARE REPORTED.
010146  104010                  PRG2:   TYPE                    ;TYPE TITLE
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                                                TITL2
010150  013454
010152  004737  004760                          JSR     PC,RDRSEL       ;SELECT READER.
010156  104011                                  TYPES
010160  013507                                  IM2
010162  013203                                  IM6
010164  014001                                  IM23
010166  177777                                  -1
010170  104024                                  CHALT                   ;WAIT FOR USER.
010172  012737  000372  001352  ETOA:   MOV     #250.,CTRA      ;250 TO CTRA.(TOTAL CHAR COUNT).
010200  012737  000012  001354  ETOB:   MOV     #10.,CTRB
010206  004737  004024          ETOC:   JSR     %7,BREAD        ;READ CHAR
010212  005737  001334                  TST     CRBUF
010216  001007                          BNE     ETOD            ;BRANCH IF NON-ZERO CHAR.
010220  005337  001354                  DEC     CTRB            ;0 CHAR. DECREMENT CTRB
010224  001413                          BEQ     ETOF            ;BRANCH IF 10 CONSECUTIVE 0'S READ.
010226  005337  001352                  DEC     CTRA            ;NO. DECREMENT CTRA.
010232  001365                          BNE     ETOC            ;BRANCH IF NOT YET 250 CHARS READ.
010234  000403                          BR      ETOE            ;250 CHARS READ. SYNE ERROR.
010236  005337  001352          ETOD:   DEC     CTRA            ;DECREMENT CTRA
010242  001356                          BNE     ETOB            ;BRANCH IF NOT 250 CHARS READ YET.
010244  104016                  ETOE:   ERRORN                  ;SYNC ERROR. 250 CHARS READ WITHOUT
010246  015160                          EM3                     ;A SUCCESSFUL SYNC.
010250  177777                          -1
010252  000747                          BR      ETOA            ;GO TRY AGAIN.
010254  004737  004024          ETOF:   JSR     %7,BREAD        ;READ CHAR
010260  005737  001334                  TST     CRBUF
010264  001004                          BNE     ETOG            ;BRANCH IF NON-ZERO CHAR.
010266  005337  001352                  DEC     CTRA            ;DECREMENT CTRA
010272  001370                          BNE     ETOF            ;BRANCH IF NOT 250 CHARS READ YET.
010274  000763                          BR      ETOE            ;250 CHARS READ. SYNC ERROR.
010276  012737  000377  001326  ETOG:   MOV     #377,ERRT
010304  043737  001350  001326          BIC     RDRMSK,ERRT
010312  023737  001326  001334          CMP     ERRT,CRBUF      ;COMPARE CHAR READ TO 377.
010320  001414                          BEQ     ETOH            ;377.OK.
010322  104017                          OACNV                   ;ERROR TYPEOUT.
010324  001326                          ERRT
010326  015222                          ESB
010330  000004                          4
010332  104017                          OACNV
010334  001334                          CRBUF
010336  015235                          EWAS
010340  000004                          4
010342  104016                          ERRORN                  ;LEADER ERROR. SHOULD BE 377.
010344  015175                          EM4
010346  177777                          -1
010350  000710                          BR      ETOA            ;START OVER
010352  004737  004024          ETOH:   JSR     %7,BREAD        ;READ CHAR.
010356  023727  001334  000003          CMP     CRBUF,#3        ;COMPARE CHAR READ TO 3.
010364  101410                          BLOS    ETOI            ;BRANCH IF SAME OR LOWER.
010366  104017                          OACNV                   ;ERROR. CONVERT DATA READ TO ASCII.
010370  001334                          CRBUF                   ;SET UP FOR TYPEOUT.
010372  015314                          FWAS
010374  000004                          4
010376  104016                          ERRORN                  ;LEADER ERROR. SHOULD BE BETWEEN
010400  015242                          EM5                     ;0 AND 3.
010402  177777                          -1
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010404  000672                          BR      ETOA            ;START OVER.
010406  012737  000004  001352  ETOI:   MOV     #4,CTRA         ;4 TO CTRA (CHAR COUNT)
010414  005037  003152                  CLR     BINR            ;CLEAR BINR. EXPECTED CHAR IS 0.
010420  004737  004024          ETOJ:   JSR     %7,BREAD        ;READ CHAR.
010424  004737  010470                  JSR     %7,ECHK         ;GO CHECK CHAR READ.
010430  005337  001352                  DEC     CTRA            ;DECREMENT CTRA
010434  001371                          BNE     ETOJ            ;BRANCH IF NOT 4 CHARS READ YET.
010436  104026                          INBIN           ;INITIALIZE SPECIAL BINARY COUNT.
010440  012737  001000  001352          MOV     #512.,CTRA      ;SET CHAR COUNT TO 512.
010446  004737  004024          ETOK:   JSR     %7,BREAD        ;READ CHAR.
010452  104027                          GETBNR                  ;GET BIN CHAR.
010454  004737  010470                  JSR     %7,ECHK         ;GO CHECK CHAR READ.
010460  005337  001352                  DEC     CTRA            ;DECREMENT CHAR COUNT
010464  001370                          BNE     ETOK            ;BRANCH IF NOT 512 CHARS READ YET.
010466  000641                          BR      ETOA            ;DONE. START OVER.
010470  023737  001334  003152  ECHK:   CMP     CRBUF,BINR      ;COMPARE CHAR READ AGAINST EXPECTED CHAR.
010476  001413                          BEQ     ECHKA           ;BRANCH IF EQUAL.
010500  104017                          OACNV                   ;CONVERT EXPECTED DATA TO ASCII.
010502  003152                          BINR
010504  015066                          ASB
010506  000004                          4
010510  104017                          OACNV                   ;CONVERT DATA READ TO ASCII.
010512  001334                          CRBUF
010514  015101                          AWAS
010516  000004                          4
010520  104016                          ERRORN                  ;ERROR. DATA ERROR.
010522  015043                          EM1
010524  177777                          -1
010526  000207                  ECHKA:  RTS     %7              ;EXIT
                                ;PRG3 - COMBINED READER-PUNCH TEST
                                ;USES SPECIAL BINARY COUNT PATTERN.
010530  104010                  PRG3:   TYPE                    ;TYPE TITLE.
010532  014445                          TITL3
010534  004737  004760                  JSR     PC,RDRSEL       ;SELECT READER
010540  004737  004562                  JSR     PC,PCHSEL       ;SELECT PUNCH.
010544  104011                          TYPES
010546  014511                          IM3
010550  013203                          IM6
010552  014001                          IM23
010554  177777                          -1
010556  104024                          CHAR_T
010560  104026                          INBIN           ;INITIALIZE BINARY COUNTS.
010562  012737  177620  004202          MOV     #177620,STLMSK  ;SET MAX. STALL DELAY.
010570  005037  011064                  CLR     PCHCNT          ;CLEAR PUNCH COUNT
010574  005037  011066                  CLR     RBUSY           ;CLEAR READER BUSY INDICATOR
010600  104013                          STRDRV                  ;SET PTRI VECTOR.
010602  011070                          WNZERO
010604  104014                          STPCHV                  ;SET PTPI VECTOR.
010606  010636                          PBIN
010610  104030                          GETBNP                  ;GET BIN CHARACTER
010612  013777  003154  170366          MOV     BINP,@PPB       ;PUNCH IT
010620  052777  000100  170356          BIS     #BIT6,@PPS      ;ENABLE PTPI
010626  005037  177776                  CLR     PSW             ;SET PRIORITY 0.
010632  104400                          TRAP                    ;TRAP CALL TO CAUSE NOISE.
010634  000776                          BR      .-2
010636  005777  170342          PBIN:   TST     @PPS            ;TEST FOR ERROR.
```

```
010642  100004                          BPL     PBNA            ;BRANCH IF NO ERROR.
010644  104010                          TYPE                    ;TYPE PUNCH NOT READY
010646  014647                          SM3                     ;MESSAGE.
010650  104024                          CHALT
010652  000771                          BR      PBIN            ;RECHECK FOR ERROR.
010654  105777  170324          PBNA:   TSTB    @PPS            ;CHECK FOR DONE.
010660  100403                          BMI     PBNB            ;BRANCH IF DONE SET.
010662  104016                          ERRORN                  ;ERROR.FALSE PUNCH INTERRUPT.
010664  015411                          EM11
010666  177777                          -1
010670  005237  011064          PBNB:   INC     PCHCNT          ;INCREMENT PUNCH COUNT.
010674  104030                          GETBNP                  ;GET BINARY CHARACTER
010676  013777  003154  170302          MOV     BINP,@PPB       ;ENABLE PUNCH
010704  023727  011064  000144          CMP     PCHCNT,#100.    ;NOT BUSY. PUNCH COUNT 100 YET?
010712  103001                          BHIS    .+4             ;BRANCH IF YES..
010714  000002                          RTI                     ;NOT YET. EXIT INTERRUPT
010716  105737  011066                  TSTB    RBUSY           ;READER BUSY?
010722  100406                          BMI     PBNC            ;BR IF YES.
010724  052737  000200  011066          BIS     #BIT7,RBUSY     ;SET READER BUSY
010732  052777  000101  170240          BIS     #101,@PRS       ;ENABLE PTRI AND READER.
010740  023727  011064  000146  PBNC:   CMP     PCHCNT,#102.    ;PUNCH COUNT 102?
010746  101402                          BLOS    PBND            ;BR IF NOT.
010750  005077  170230                  CLR     @PPS            ;STOP PUNCH.
010754  104012                  PBND:   STALL
010756  000002                          RTI                     ;EXIT INTERRUPT.
010760  005777  170214          CREAD:  TST     @PRS            ;CHECK FOR ERROR.
010764  100003                          BPL     CRDA            ;BRANCH IF NO ERROR.
010766  004737  003732                  JSR     %7,TSM2         ;ERROR.TYPE MESSAGE.
010772  000772                          BR      CREAD
010774  105777  170200          CRDA:   TSTB    @PRS            ;TEST FOR DONE.
011000  100403                          BMI     CRDAA           ;BRANCH IF DONE SET.
011002  104016                          ERRORN                  ;ERROR. FALSE READER INTERRUPT.
011004  015361                          EM10
011006  177777                          -1
011010  017737  170166  001334  CRDAA:  MOV     @PRB,CRBUF      ;CHARACTER READ TO CRBUF
011016  005337  011064                  DEC     PCHCNT
011022  001015                          BNE     CREADC          ;BR IF NOT 0.
011024  032777  000100  170152          BIT     #BIT6,@PPS      ;NO. PTPI ENABLED?
011032  001003                          BNE     CREADA          ;BR IF YES.
011034  052777  000100  170142          BIS     #BIT6,@PPS      ;NO. ENABLE PTPI.
011042  042737  000200  011066  CREADA: BIC     #BIT7,RBUSY     ;YES. CLEAR READER BUSY.
011050  005077  170124                  CLR     @PRS            ;DISABLE PTRI.
011054  000207                          RTS     %7              ;EXIT.
011056  005277  170116          CREADC: INC     @PRS            ;ENABLE READER
011062  000207                          RTS     %7              ;EXIT.
011064  000000                  PCHCNT: OPEN
011066  000000                  RBUSY:  OPEN
011070  004737  010760          WNZERO: JSR     %7,CREAD        ;READ CHARACTER
011074  005737  001334                  TST     CRBUF           ;CHECK CHARACTER
011100  001001                          BNE     .+4             ;BRANCH IF NON-ZERO CHAR.
011102  000002                          RTI                     ;ZERO. EXIT INTERRUPT.
011104  012777  011122  170076          MOV     #RBIN,@RDRVTR   ;SET READER VECTOR TO READ BINARY
011112  012737  000003  001344          MOV     #3,ERCTR        ;COUNT. SET ERROR COUNTER TO 3.
011120  000402                          BR      RBINA
011122  004737  010760          RBIN:   JSR     %7,CREAD        ;READ CHARACTER.
011126  104027                  RBINA:  GETBNR                  ;GET BINARY CHARACTER
```

```
011130  023737  003152  001334          CMP     BINR,CRBUF      ;COMPARE AGAINST CHAR READ.
011136  001001                          BNE     RBINB           ;BRANCH IF NOT SAME.
011140  000002                          RTI                     ;SAME EXIT INTERRUPT.
011142  104017                  RBINB:  OACNV                   ;CONVERT EXPECTED CHAR TO ASCII
011144  003152                          BINR
011146  015066                          ASB
011150  000004                          4
011152  104017                          OACNV                   ;CONVERT RECEIVED CHAR TO ASCII
011154  001334                          CRBUF
011156  015101                          AWAS
011160  000004                          4
011162  104016                          ERRORN                  ;ERROR MESSAGE. DATA ERROR.
011164  015043                          EM1
011166  177777                          -1
011170  005337  001344                  DEC     ERCTR           ;3RD ERROR?
011174  001001                          BNE     RBINC           ;YES.
011176  000002                          RTI                     ;NO. EXIT INTERRUPT.
011200  052737  100000  011066  RBINC:  BIS     #BIT15,RBUSY    ;DISABLE STALLS.
011206  012777  011230  167774          MOV     #RBIND,@RDRVTR  ;SET PTR VECTOR TO RBIND.
011214  012737  000004  001344          MOV     #4,ERCTR        ;USE ERCTR AS CHARACTER COUNTER.
011222  012700  001334                  MOV     #CRBUF,%0       ;ADDR OF CRBUF TO %0
011226  000002                          RTI                     ;EXIT INTERRUPT
011230  004737  010760          RBIND:  JSR     %7,CREAD        ;READ CHARACTER
011234  013720  001334                  MOV     CRBUF,(0)+      ;STORE CHARACTER STARTING AT CHR1
011240  005337  001344                  DEC     ERCTR           ;3RD CHARACTER?
011244  001401                          BEQ     .+4             ;YES.
011246  000002                          RTI                     ;EXIT INTERRUPT. NOT 3RD YET.
011250  004737  004400                  JSR     %7,SYNCA        ;GO SYNC THE READER.
011254  000751                          BR      RBINC           ;NO SYNC. TRY AGAIN.
011256  012777  011122  167724          MOV     #RBIN,@RDRVTR   ;SYNCED. SET READER VECTOR TO RBIN.
011264  012737  000003  001344          MOV     #3,ERCTR        ;SET ERROR COUNT TO 3.
011272  042737  100000  011066          BIC     #BIT15,RBUSY    ;ENABLE STALLS.
011300  000002                          RTI                     ;EXIT INTERRUPT.
                        ;PRG4 - PUNCHES 2 CHARACTERS SET IN SR.
011302  104010                  PRG4:   TYPE                    ;TYPE TITLE.
011304  013560                          TITL4
011306  004737  004562                  JSR     PC,PCHSEL       ;SELECT PUNCH.
011312  104011                          TYPES
011314  013623                          IM4
011316  013254                          IM16
011320  014001                          IM23
011322  177777                          -1
011324  104024                          CHALT                   ;COMMON HALT. WAIT FOR USER.
011326  113737  177570  001332  PRG4A:  MOVB    SR,PCHOUT       ;PUNCH FIRST CHARACTER.
011334  004737  004532                  JSR     %7,HSPCH
011340  113737  177571  001332          MOVB    SR+1,PCHOUT     ;PUNCH SECOND CHARACTER.
011346  004737  004532                  JSR     %7,HSPCH
011352  000765                          BR      PRG4A           ;REPEAT.
                        ;PRG5 - READS-CHECKS TAPE PUNCHED WITH CODES SET IN SR
011354  104010                  PRG5:   TYPE                    ;TYPE TITLE.
011356  013663                          TITL5
011360  004737  004760                  JSR     PC,RDRSEL       ;SELECT READER.
011364  104011                          TYPES
011366  013744                          IM5
011370  013203                          IM6
011372  014001                          IM23
```

```
011374  177777                                  -1
011376  104024                                  CHALT                   ;COMMON HALT. WAIT FOR USER.
011400  113737  177570  001356                  MOVB    SR,CTRC         ;STORE EXPECTED CHARACTERS.
011406  113737  177571  001360                  MOVB    SR+1,CTRD       ;IN CTRC AND CTRD.
011414  004737  004024          HTOA:   JSR     %7,BREAD        ;MATCH CHARS ON TAPE AGAINST EXPECTED CHARS.
011420  013737  001334  001336                  MOV     CRBUF,CHR1      ;READ CHAR INTO CHR1
011426  004737  004024                          JSR     %7,BREAD        ;READ CHAR
011432  013737  001334  001340                  MOV     CRBUF,CHR2      ;INTO CHR2
011440  023737  001336  001356                  CMP     CHR1,CTRC       ;(CHR1)=(CTRC)?
011446  001041                                  BNE     HTOE            ;NO.
011450  023737  001340  001360                  CMP     CHR2,CTRD       ;YES. (CHR2)=(CTRD)?
011456  001062                                  BNE     HTOG            ;NO. MATCH ERROR.
011460  005037  001354                          CLR     CTRB            ;YES. NEXT CHAR SHOULD = (CTRC) (CTRB=0)
011464  012737  000003  001344  HTOB:   MOV     #3,ERCTR        ;3 TO ERROR COUNTER.
011472  004737  004024          HTOC:   JSR     %7,BREAD        ;READ CHAR
011476  005137  001354                          COM     CTRB            ;COMPLEMENT CHAR INDICATOR
011502  001437                                  BEQ     HTOF            ;BRANCH IF EXPECTED CHAR SHOULD = (CTRD.
011504  023737  001334  001356                  CMP     CRBUF,CTRC      ;(CRBUF) = (CTRC)?
011512  001767                                  BEQ     HTOC            ;YES.
011514  104017                                  OACNV                   ;NO. (CTRC) TO ASB IN ASCII FORM.
011516  001356                                  CTRC
011520  015066                                  ASB
011522  000004                                  4
011524  104017                  HTOD:   OACNV                   ;(CRBUF) TO AWAS IN ASCII FORM.
011526  001334                                  CRBUF
011530  015101                                  AWAS
011532  000004                                  4
011534  104016                                  ERRORN                  ;ERROR 1 CALL. TYPE DATA ERROR MESSAGE.
011536  015043                                  EM1
011540  177777                                  -1
011542  005337  001344                          DEC     ERCTR           ;3 ERRORS?
011546  001722                                  BEQ     HTOA            ;YES. START ALL OVER.
011550  000750                                  BR      HTOC            ;NO. CONTINUE READING.
011552  023737  001336  001360  HTOE:   CMP     CHR1,CTRD       ;(CHR1) = (CTRD)?
011560  001021                                  BNE     HTOG            ;NO. MATCH ERROR.
011562  023737  001340  001356                  CMP     CHR2,CTRC       ;YES. (CHR2) = (CTRC)?
011570  001015                                  BNE     HTOG            ;NO. MATCH ERROR.
011572  012737  177777  001354                  MOV     #-1,CTRB        ;YES. NEXT CHAR SHOULD = (CTRD)
011600  000731                                  BR      HTOB            ;GO START READING.
011602  023737  001334  001360  HTOF:   CMP     CRBUF,CTRD      ;(CRBUF) = (CTRD)?
011610  001730                                  BEQ     HTOC            ;YES. OK. CONTINUE READING.
011612  104017                                  OACNV                   ;NO. (CTRD) TO ASB IN ASCII FORM.
011614  001360                                  CTRD
011616  015066                                  ASB
011620  000004                                  4
011622  000740                                  BR      HTOD            ;GO GENERATE ERROR MESSAGE.
011624  104016                  HTOG:   ERRORN                  ;MATCH ERROR. UNABLE TO MATCH UP
011626  015321                                  EM6                     ;2 CONSECUTIVE CHARACTERS FROM READER
011630  177777                                  -1
011632  000670                                  BR      HTOA            ;TO CHARACTERS READ FROM SR.

                                ;PRG6 - READ X CHARACTERS, STALL Y MILLISECONDS.
011634  104010                  PRG6:   TYPE                    ;TYPE TITLE AND INSTRUCTIONS.
011636  013277                                  TITL6
011640  004737  004760                          JSR     PC,RDRSEL       ;SELECT READER.
011644  104010                                  TYPE
```

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011646  013331                          IM17
011650  104024                          CHALT
011652  005037  011714          ITA:    CLR     ITY
011656  005037  011720                  CLR     ITX
011662  113737  177570  011714          MOVB    SR,ITY          ;MOVE STALL COUNT TO ITY.
011670  113737  177571  011720          MOVB    SR+1,ITX        ;MOVE CHAR COUNT TO ITX.
011676  001405                          BEQ     ITC             ;BR IF COUNT 0.
011700  004737  003654          ITB:    JSR     %7,AREAD        ;FETCH CHARACTER.
011704  105337  011720                  DECB    ITX             ;DECREMENT CHAR COUNT.
011710  001373                          BNE     ITB             ;BRANCH IF COUNT NOT 0.
011712  104031                  ITC:    DELAY                   ;READ CHARS. STALL NOW.
011714  000000                  ITY:    OPEN                    ;STALL COUNT IN MSECS.
011716  000755                          BR      ITA             ;REPEAT
011720  000000                  ITX:    OPEN
                                ;PRG7. PUNCH SPECIAL BINARY COUNT PATTERN TEST TAPE
011722  104010                  PRG7:   TYPE                    ;TYPE TITLE.
011724  013135                          TITL7
011726  004737  004562                  JSR     PC,PCHSEL       ;SELECT PUNCH.
011732  104011                          TYPES
011734  013254                          IM16
011736  177777                          -1
011740  104024                          CHALT                   ;WAIT FOR USER.
011742  012746  000024                  MOV     #20.,-(6)       ;PUNCH 20 BLANK CHAR. LEADER
011746  005037  001332                  CLR     PCHOUT
011752  004737  004532          PRG7A:  JSR     %7,HSPCH
011756  005316                          DEC     @%6
011760  001374                          BNE     PRG7A
011762  104026                          INBIN           ;INITIALIZE SPECIAL BINARY COUNT
011764  104030                  PRG7B:  GETBNP                  ;GET BINARY CHARACTER.
011766  004737  004532                  JSR     %7,HSPCH        ;PUNCH CHARACTER
011772  000774                          BR      PRG7B           ;REPEAT.
                                ;PRG10 - READER SPEED PRINT LOOP
011774  104010                  PRG10:  TYPE                    ;TYPE TITLE
011776  014022                          TITL10
012000  004737  004760                  JSR     PC,RDRSEL       ;SELECT READER.
012004  104011                          TYPES
012006  014053                          IM10
012010  014242                          IM24A
012012  177777                          -1
012014  104024                          CHALT                   ;HALT. WAIT FOR USER.
012016  005037  001356          KTA:    CLR     CTRC            ;CLEAR WORK REGISTERS
012022  005037  001354                  CLR     CTRB
012026  032737  040000  177570          BIT     #BIT14,SR       ;DETERMINE WHETHER 30 OR
012034  001403                          BEQ     KTB             ;300 SECOND TIMING IS DESIRED
012036  012737  000416  001356          MOV     #270.,CTRC      ;SET UP FOR DESIRED TIME BASE.
012044  062737  000036  001356  KTB:    ADD     #30.,CTRC
012052  000407                          BR      KTD
012054  004737  004024          KTC:    JSR     %7,BREAD        ;READ CHARACTER.
012060  005337  001352                  DEC     CTRA            ;DECREMENT CTRA
012064  001005                          BNE     KTE             ;BRANCH IF CTRA NOT 0.
012066  005237  001354                  INC     CTRB            ;CTRA0.+1 TO CTRB.
012072  013737  001356  001352  KTD:    MOV     CTRC,CTRA       ;RELOAD CTRA.
012100  005737  177570          KTE:    TST     SR              ;TIME UP?
012104  100363                          BPL     KTC             ;NO.
012106  004537  012214          KTF:    JSR     %5,CPKPL        ;GO TYPE OUT DEVICE SPEED.
012112  014672                          SM4
```

```
012114  000737                          BR      KTA-2           ;GO HALT.
                        ;PRG11 - PUNCH SPEED PRINT LOOP
012116  104010          PRG11:  TYPE                            ;TYPE TITLE.
012120  014414                  TITL11
012122  004737  004562          JSR     PC,PCHSEL       ;SELECT PUNCH.
012126  104011                  TYPES
012130  013254                  IM16
012132  014242                  IM24A
012134  177777                  -1
012136  104024                  CHALT                   ;HALT. WAIT FOR USER.
012140  005037  001354  LTA:    CLR     CTRB            ;CLEAR WORK AREAS.
012144  005037  001332          CLR     PCHOUT
012150  000407                  BR      LTC
012152  004737  004532  LTB:    JSR     %7,HSPCH        ;PUNCH A 0
012156  005337  001352          DEC     CTRA            ;DECREMENT CTRA
012162  001005                  BNE     LTD             ;BRANCH IF CTRA NOT 0
012164  005237  001354          INC     CTRB            ;INCREMENT CTRB.
012170  012737  000074  001352  LTC:    MOV     #60.,CTRA       ;MOVE 60 TO CTRA
012176  005737  177570  LTD:    TST     SR              ;TIME UP?
012202  100363                  BPL     LTB             ;NO.
012204  004537  012214  LTE:    JSR     %5,CPKPL        ;GO TYPE OUT DEVICE SPEED.
012210  014714                  SMS
012212  000751                  BR      LTA-2           ;GO HALT AND READY UP FOR NEXT TIME.
012214  012537  012232  CPKPL:  MOV     (5)+,CPKPLA     ;MOVE ADDR OF 1ST MESSAGE TO CPKPLA.
012220  104020                  BDCNV                   ;CONVERT (CTRB) TO DECIMAL ASCII.
012222  001354                  CTRB
012224  014735                  ACPS
012226  000003                  3
012230  104011                  TYPES                   ;TYPE DEVICE SPEED.
012232  000000  CPKPLA: OPEN
012234  014735                  ACPS
012236  177777                  -1
012240  000205                  RTS     %5              ;EXIT.
                        ;
```

```
                                ;PA611 ADDITIONAL CODE TO CHECK PUNCH LOGIC AND READER LIGHTS
                                ;
                                ;MODIFIED:      MARCH 15, 1975
                                ;PROGRAMMER:    MIKE MITCHELL
                                ;
                                ;PROBLEM CORRECTED: PUNCH GETS HUNG WHEN RUNNING OUT OF TAPE
                                ;                   AND OPERATOR TURNS PUNCH OFF.  THIS PREVENTS
                                ;                   THE PUNCH FROM FINISHING THE PUNCH CYCLE
                                ;                   BY KEEPING READY LOW.
                                ;
                                ;PROBLEM FIX:   ADDITIONAL LOGIC ALLOWS PUNCH TO BE
                                ;               RE-INITED UNDER PROGRAM CONTROL.
                                ;
                                ;
                                ;THIS CODE RUNS UNDER OPERATOR INTERVENTION.
                                ;
                                ;

012242  177777                 MONE:   177777                  ;BINARY ONE PATTERN
012244  000000                 ZERO:   0                       ;ZERO PATTERN
                                ;
                                ;PROGRAM 12---HIGH SPEED PUNCH PROGRAMMABLE INIT TEST
                                ;

012246  104010                  PRG12:  TYPE
012250  015645                          TITL12                  ;TEXT "%%PRG12--PROGRAMMABLE INIT TEST@"
012252  004737  004562                  JSR     PC,PCHSEL       ;SELECT THE PUNCH
012256  104011                          TYPES
012260  013254                          IM16                    ;TEXT "MAKE PUNCH READY"
012262  014001                          IM23                    ;TEXT "HIT CONTINUE"
012264  177777                          -1
012266  104024                          CHALT                   ;WAIT FOR OPERATOR.

012270  042777  000006  166706  PG12B:  BIC     #6,@PPS         ;DISABLE PUNCH INTERRUPT.
012276  004737  012404                  JSR     PC,TSTPUN       ;CHECK FOR PUNCH READY.
012302  113737  012242  001332  PG12A:  MOVB    MONE,PCHOUT     ;PUNCH BINARY 1 PATTERN.
012310  004737  012332                  JSR     PC,HSPCH1       ;DO IT HERE.
012314  113737  012244  001332          MOVB    ZERO,PCHOUT     ;PUNCH BINARY ZERO PATTERN.
012322  004737  012332                  JSR     PC,HSPCH1
012326  000137  012302                  JMP     PG12A           ;LOOP
                                ;
                                ;HIGH SPEED PUNCH ROUTINE
                                ;
                                ;

012332  000240                  HSPCH1: NOP                     ;DEBUG.
                                ;PUNCH THE CHARACTER
012334  043737  001346  001332          BIC     PCHMSK,PCHOUT
012342  013777  001332  166636          MOV     PCHOUT,@PPB     ;LOAD PUNCH BUFFER.
                                                                ;WAIT FOR DONE
012350  004737  012436                  JSR     PC,TIMER        ;IN A TIMEOUT LOOP.
012354  000000                          HALT                    ;TIMED-OUT RETURN
012356  052777  000400  166620  1$:     BIS     #400,@PPS       ;RE-INIT PUNCH.
012364  032737  040000  177570          BIT     #BIT14,SR               ;SCOPE LOOP ENABLED???
012372  001371                          BNE     1$              ;YES,LOOP UNTIL SR14=0.
```

```
012374  004737  012436                  JSR PC, TIMER           ;RE-CHECK THE DONE BIT.
012400  000000                          HALT                    ;FATAL ERROR: DONE BIT WAS NO
                                                                ;RESET BY THE INIT INSTRUCTION.

                                                                ;ELSE RETURN IS TO THE NEXT INSTRUCTION.


012402  000207                          RTS     PC              ;EXIT
                                ;OUTPUT ERROR MESSAGE OF PUNCH NOT READY

                                ;IF ERROR BIT 15 SET OR BIT 7 NOT SET.
                                ;
012404  005777  166574          TSTPUN: TST     @PPS
012410  100404                          BMI     HSPCH2
012412  105777  166566                  TSTB    @PPS
012416  100001                          BPL     HSPCH2
012420  000207                          RTS     PC
012422  104011                  HSPCH2: TYPES
012424  014647                          SM3                     ;"PUNCH NOT READY"
012426  013254                          IM16                    ;"MAKE PUNCH READY"
012430  177777                          -1                      ;TERMINATOR
012432  104024                          CHALT
012434  000763                          BR      TSTPUN          ;LOOP AGAIN
                                ;
                                ;TIMER ROUTINE FOR HIGH SPEED PUNCH
                                ;
                                ;WAITS FOR READY FLAG IN  LOOP
                                ;IF READY COMES UP WITHIN ALLOWABLE TIME ; RETURN IS TO CALL+2
                                ;ELSE INIT IS ISSUED TO HSP AND PROGRAM HALTS AT CALL+1

012436  012737  177200  001354  TIMER:  MOV     #-600,CTRB              ;MAXIMUM=600 MS DELAY
012444  000240                  TIMER1: NOP
012446  005237  001354                  INC     CTRB            ;UP COUNTER
012452  001406                          BEQ     TIMER2          ;TIMED-OUT...ERROR..
012454  105777  166524                  TSTB    @PPS            ;READY BIT SET?
012460  100405                          BMI     TIMER3          ;YES, OK

                                ;READY NOT SET, SO DELAY 10 MS AND CHECK AGAIN.
012462  104031                          DELAY
012464  000012                          10.                     ;10 MILLI SE DELAY.
012466  000766                          BR      TIMER1          ;GO CHECK AGAIN.

012470  000240                  TIMER2: NOP
012472  000207                          RTS     PC              ;RETURN TO CALL+1

012474  062716  000002          TIMER3: ADD     #2,(SP)         ;RETURN TO CALL+2 IF NO ERROR
012500  000207                          RTS     PC
                                ;
                                ;
                                ;ADDITIONAL CODE TO PROVIDE READER LIGHT TEST UNDER OPERATOR
                                ;INTERVENTION.
                                ;USE SWITCH 8 TO TURN READER LIGHT OFF.
                                ;USE SWITCH 12(1) TO SELECT NEW READER TO TEST.

                                ;
                                ;
```

```
012502  104010                  PRG13:  TYPE                    ;OUTPUT TEST HEADER.
012504  015713                          TITL13                  ;TEXT "PRG13--READER LIGHT TEST"
012506  004737  004760          PRG13C: JSR     PC,RDRSEL       ;SELECT READER VIA SWR.
012512  104011                  PRG13B: TYPES                   ;OUTPUT MESSAGE:
012514  015745                          IM13A                   ;TEXT "TURN LIGHT ON VIA RDR SWITCH"
012516  016026                          IM13B                   ;TEXT "USE SW8 TO TURN LIGHT
012520  177777                          -1                      ;       OFF"
                                ;SW8=1 TO TURN LIGHT OFF.
012522  013700  177570          PG13A:  MOV     SR,R0
012526  032700  000400                  BIT     #400,R0         ;CHECK BIT 8.
012532  001773                          BEQ     PG13A           ;SWITCH DOWN, NO ACTION REQUIRED.
012534  052777  000400  166436  1$:     BIS     #400,@PRS       ;ELSE TURN LIGHT OFF.
012542  032737  040000  177570          BIT     #BIT14,SR               ;IS SCOPE LOOP SET?
012550  001371                          BNE     1$              ;YES, LOOP UNTIL SR14=0.
012552  000000                          HALT                    ;WAIT FOR OPR TO HIT CONTINUE
012554  032737  010000  177570          BIT     #10000,SR       ;CHECK FOR SELECT NEW READER.
012562  001351                          BNE     PRG13C          ;YES, SELECT NEW READER.
012564  000752                          BR      PRG13B
```

```
        012566  022445     120          APGEND: .ASCII  '%%P'
```

```
012571     040  020040  047105  APN:    .ASCII  '   END.@'
012576  027104     100
012601     045  037445  047111  CM2:    .ASCII  '%%?INVALID PROGRAM@'
012606  040526  044514  020104
012614  051120  043517  040522
012622  040115
012624  022445  044477  053116  CM3:    .ASCII  '%%?INVALID TEST@'
012632  046101  042111  052040
012640  051505  040124
012644  022445  042523  020124  ASETSR: .ASCII  '%%SET SR OPTIONS. NORMAL SR IS 000000@'
012652  051123  047440  052120
012660  047511  051516  020056
012666  047516  046522  046101
012674  051440  020122  051511
012702  030040  030060  030060
012710  040060
012712  022445  054524  042520  PGTIT:  .ASCII  '%%TYPESET 11 READER-PUNCH TESTS%@'
012720  042523  020124  030461
012726  051040  040505  042504
012734  026522  052520  041516
012742  020110  042524  052123
012750  022523     100
012753     045  042522  052123  RUNINS: .ASCII  '%RESTART PROGRAM.@'
012760  051101  020124  051120
012766  043517  040522  027115
012774     100
012775     045  042523  020124  MSVCTR: .ASCII  '%SET SR WITH RDRQ VECTOR.@'
013002  051123  053440  052111
013010  020110  042122  030122
013016  053040  041505  047524
013024  027122     100
013027     045  042523  020124  SELRDR: .ASCII  '%SET # OF READERS IN SR.@'
013034  020043  020117  051040
013042  040505  042504  051522
013050  044440  020116  051123
013056  040056
013060  051445  052105  021440  SELPCH: .ASCII  '%SET # OF PUNCHES IN SR.@'
013066  047440  020106  052520
013074  041516  042510  020123
013102  047111  051440  027122
013110     100
013111     045  052045  043522  TITL1:  .ASCII  '%%PRG1. PUNCH TEST.@'
013116  027061  020040  047125
013124  044103  052040  051505
013132  027124     100
013135     045  052045  043522  TITL7:  .ASCII  '%%PRG7. COUNT PATTERN TAPE GENERATOR.@'
013142  027067  041440  052517
013150  052116  050040  052101
013156  042524  047122  052040
013164  050101  020105  042507
013172  042516  040522  047524
013200  027122     100
013203     045  040515  042513  IM6:    .ASCII  '%MAKE READER READY.@'
013210  051040  040505  042504
013216  020122  042522  042101
013224  027131     100
```

```
013227     045  050045  043522  TITL0:  .ASCII  '%%PRG0. READER TEST.@'
013234  027060  051040  040505
013242  042504  020122  042524
013250  052123  040056
013254  046445  045501  020105  IM16:   .ASCII  '%MAKE PUNCH READY.@'
013262  052520  041516  020110
013270  042522  042101  027131
013276     100
013277     045  050045  043522  TITL6:  .ASCII  '%%PRG6 - READ X, STALL Y.@'
013304  020066  020055  042522
013312  042101  054040  020054
013320  052123  046101  020114
013326  027131     100
013331     045  042523  020124  IM17:   .ASCII  '%SET SR15 TO SR8 TO NO. OF CHARS TO READ,'
013336  051123  032461  052040
013344  020117  051123  020070
013352  047524  047040  027117
013360  047440  020106  044103
013366  051101  020123  047524
013374  051040  040505  026104
013402  051445  052105  051440          .ASCII  '%SET SR7 TO SR0 TO NO. OF MSECS TO STALL.@'
013410  033522  052040  020117
013416  051123  020060  047524
013424  047040  027117  047440
013432  020106  051515  041505
013440  020123  047524  051440
013446  040524  046114  040056
013454  022445  051120  031107  TITL2:  .ASCII  '%%PRG2. PUNCH VERIFY TEST.@'
013462  020056  052520  041516
013470  020110  042526  044522
013476  054506  052040  051505
013504  027124     100
013507     045  047514  042101  IM2:    .ASCII  '%LOAD READER WITH TAPE PRODUCED '
013514  051040  040505  042504
013522  020122  044527  044124
013530  052040  050101  020105
013536  051120  042117  041525
013544  042105     040
013547     102  020131  051120          .ASCII  'BY PRG1.@'
013554  030507  040056
013560  022445  051120  032107  TITL4:  .ASCII  '%%PRG4. PUNCHES 2 CODES SET IN SR.@'
013566  020056  052520  041516
013574  042510  020123  020062
013602  047503  042504  020123
013610  042523  020124  047111
013616  051440  027122     100
013623     045  042523  020124  IM4:    .ASCII  '%SET CODES TO BE PUNCHED IN SR.@'
013630  047503  042504  020123
013636  047524  041040  020105
013644  052520  041516  042510
013652  020104  047111  051440
013660  027122     100
013663     045  050045  043522  TITL5:  .ASCII  '%%PRG5. READS TAPE PUNCHED WITH CODES SET IN SR.@'
013670  027065  051040  040505
013676  051504  052040  050101
013704  020105  052520  041516
```

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013712  042510  020104  044527
013720  044124  041440  042117
013726  051505  051440  052105
013734  044440  020116  051123
013742  040056
013744  051445  052105  041440  IM5:    .ASCII  '%SET CODES TO BE READ IN SR.@'
013752  042117  051505  052040
013760  020117  042502  051040
013766  040505  020104  047111
013774  051440  027122     100
014001     040  051120  051505  IM23:   .ASCII  ' PRESS CONTINUE.@'
014006  020123  047503  052116
014014  047111  042525  040056
014022  022445  051120  030507  TITL10: .ASCII  '%%PRG10. RDR SPEED TEST.@'
014030  027060  051040  051104
014036  051440  042520  042105
014044  052040  051505  027124
014052     100
014053     045  047514  042101  IM10:   .ASCII  '%LOAD ANY TAPE LOOP IN READER '
014060  040440  054516  052040
014066  050101  020105  047514
014074  050117  044440  020116
014102  042522  042101  051105
014110     040
014111     101  042116  046440          .ASCII  'AND MAKE READY.'
014116  045501  020105  042522
014124  042101  027131
```

E06


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014130  051445  052105  051440          .ASCII  '%SET SR14 TO A 1 FOR 300 SEC '
014136  030522  020064  047524
014144  040440  030440  043040
014152  051117  031440  030060
014160  051440  041505     040
014165     124  046511  047111          .ASCII  'TIMING, OR SET IT TO 0 FOR 30 '
014172  026107  047440  020122
014200  042523  020124  052111
014206  052040  020117  020060
014214  047506  020122  030063
014222     040
```

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014223     123  041505  047117          .RSCII  'SECOND TIMING.@'
014230  020104  044524  044515
014236  043516  040056
```

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014242  050045  042522  051523  IM24A:  .ASCII  '%PRESS CONTINUE TO START TIMING.'
014250  041440  047117  044524
014256  052516  020105  047524
014264  051440  040524  052122
014272  052040  046511  047111
014300  027107
014302  051445  052105  051440          .ASCII  '%SET SR 15 TO A 1 AT END OF '
014310  020122  032461  052040
014316  020117  020101  020061
014324  052101  042440  042116
014332  047440  020106
014336  044524  044515  043516          .ASCII  'TIMING PERIOD TO OBTAIN DEVICE SPEED '
014344  050040  051105  047511
014352  020104  047524  047440
014360  052102  044501  020116
014366  042504  044526  042503
014374  051440  042520  042105
014402     040
014403     124  050131  047505          .ASCII  'TYPEOUT.@'
014410  052125  040056
014414  022445  051120  030507  TITL11: .ASCII  '%%PRG11. PCH SPEED TEST.@'
014422  027061  050040  044103
014430  051440  042520  042105
014436  052040  051505  027124
014444     100
014445     045  050045  043522  TITL3:  .ASCII  '%%PRG3. COMBINED READER-PUNCH TEST.@'
014452  027063  041440  046517
014460  044502  042516  020104
014466  042522  042101  051105
014474  050055  047125  044103
014502  052040  051505  027124
014510     100
014511     045  040515  042513  IM3:    .ASCII  '%MAKE PUNCH READY, PUNCH BLANK LEADER, '
014516  050040  047125  044103
014524  051040  040505  054504
014532  020054  052520  041516
014540  020110  046102  047101
014546  020113  042514  042101
014554  051105  020054
014560  047514  042101  051040          .ASCII  'LOAD READER.@'
014566  040505  042504  027122
014574     100
014575     045  042522  042101  SM1:    .ASCII  '%READER ERROR BIT SET.@'
014602  051105  042440  051122
014610  051117  041040  052111
014616  051440  052105  040056
014624  051045  040505  042504  SM2:    .ASCII  '%READER NOT READY.@'
014632  020122  047516  020124
014640  042522  042101  027131
014646     100
```

```
014647     045  050045  047125  SM3:    .ASCII  '%%PUNCH NOT READY.@'
014654  044103  047040  052117
014662  051040  040505  054504
014670  040056
014672  022445  042522  042101  SM4:    .ASCII  '%%READER SPEED : @'
014700  051105  051440  042520
014706  042105  035040  040040
014714  022445  052520  041516  SM5:    .ASCII  '%%PUNCH SPEED : @'
014722  020110  050123  042505
014730  020104  020072     100
014735     040  020040  020040  ACPS:   .ASCII  '     CHARS PER SEC.@'
014742  044103  051101  020123
014750  042520  020122  042523
014756  027103     100
014761     045  050045          EM0:    .ASCII  '%%P'
014764  020040  020040     124  APNUMB: .ASCII  '    T'
014771     040  020040  020040  ATNUMB: .ASCII  '     PC'
014776  041520
015000  020040  020040  020040  APC:    .ASCII  '        ICNT '
015006  020040  041511  052116
015014     040
015015     040  020040  020040  AICNT:  .ASCII  '     .@'
015022  040056
015024  020040  050106  020103  FPCMSG: .ASCII  '  FPC '
015032  020040  020040  020040  AFPC:   .ASCII  '       %@'
015040  022440     100
015043     040  042040  052101  EM1:    .ASCII  '  DATA ERROR  S/B: '
015050  020101  051105  047522
015056  020122  051440  041057
015064  020072
015066  020040  020040  020040  ASB:    .ASCII  '      WAS: '
015074  040527  035123     040
015101     040  020040  040040  AWAS:   .ASCII  '    @'
015106  051040  051105  040505  EM2:    .ASCII  ' REREAD ERROR.  1ST READ: '
015114  020104  051105  047522
015122  027122  020040  051461
015130  020124  042522  042101
015136  020072
015140  020040  020040  020040  ORGRD:  .ASCII  '      WAS: '
015146  040527  035123     040
015153     040  020040  040040  SUBRD:  .ASCII  '    @'
015160  051440  047131  020103  EM3:    .ASCII  ' SYNC ERROR.@'
015166  051105  047522  027122
015174     100
015175     045  042514  042101  EM4:    .ASCII  '%LEADER ERROR.  S/B: '
015202  051105  042440  051122
015210  051117  020056  051440
015216  041057  020072
015222  020040  020040  020040  ESB:    .ASCII  '      WAS: '
015230  040527  035123     040
015235     040  020040  040040  EWAS:   .ASCII  '    @'
015242  046045  040505  042504  EM5:    .ASCII  '%LEADER ERROR. S/B BETWEEN '
015250  020122  051105  047522
015256  027122  051440  041057
015264  041040  052105  042527
015272  047105     040
```

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015275      060  040440  042116          .ASCII  'O AND 3. WAS : '
015302  031440  020056  040527
015310  020123  020072
015314  020040  020040     100  FWAS:    .ASCII  '    @'
015321      040  040515  041524  EM6:     .ASCII  ' MATCH ERROR.@'
015326  020110  051105  047522
015334  027122     100
015337      045  047516  051040  EM7:     .ASCII  '%NO RDR RESPONSE.@'
015344  051104  051040  051505
015352  047520  051516  027105
015360     100
015361      040  040506  051514  EM10:    .ASCII  ' FALSE READER INTERRUPT@'
015366  020105  042522  042101
015374  051105  044440  052116
015402  051105  052522  052120
015410     100
015411      040  040506  051514  EM11:    .ASCII  ' FALSE PUNCH INTERRUPT@'
015416  020105  052520  041516
015424  020110  047111  042524
015432  051122  050125  040124
015440  051445  052105  051040  SRDRM:   .ASCII  '%SET RDR # IN SR. SET SR15 IF 6 LEVEL.@'
015446  051104  021440  044440
015454  020116  051123  020056
015462  042523  020124  051123
015470  032461  044440  020106
015476  020066  042514  042526
015504  027114     100
015507      045  042523  020124  SPCHM:   .ASCII  '%SET PCH # IN SR. SET SR15 IF 6 LEVEL.@'
015514  041520  020110  020043
015522  047111  051440  027122
015530  051440  052105  051440
015536  030522  020065  043111
015544  033040  046040  053105
015552  046105  040056
015556  037445  047111  040526  INVRP:   .ASCII  '%?INVALID RDR/PCH.@'
015564  044514  020104  042122
015572  027522  041520  027110
015600     100
015601      045  042122  020122  RDRIDM:  .ASCII  '%RDR '
015606  020040  051440  046105  ARDRID:  .ASCII  '   SELECTED.@'
015614  041505  042524  027104
015622     100
015623      045  041520  020110  PCHIDM:  .ASCII  '%PCH '
015630  020040  051440  046105  APCHID:  .ASCII  '   SELECTED.@'
015636  041505  042524  027104
015644     100
015645      045  050045  043522  TITL12:  .ASCII  '%%PRG12--PROGRAMMABLE INIT PUNCH TEST@'
015652  031061  026455  051120
015660  043517  040522  046515
015666  041101  042514  044440
015674  044516  020124  052520
015702  041516  020110  042524
015710  052123     100
015713      045  051120  030507  TITL13:  .ASCII  '%PRG13--READER LIGHT TEST@'
015720  026463  051055  040505
015726  042504  020122  044514
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015734  044107  020124  042524
015742  052123     100
015745     045  052045  051125  IM13A:  .ASCII  '%%TURN LIGHT OF READER ON VIA RDR CONTROL SWITCH@'
015752  020116  044514  044107
015760  020124  043117  051040
015766  040505  042504  020122
015774  047117  053040  040511
016002  051040  051104  041440
016010  047117  051124  046117
016016  051440  044527  041524
016024  040110
016026  050045  052125  051440  IM13B:  .ASCII  '%PUT SW8 TO 1 TO TURN LIGHT OFF.@'
016034  034127  052040  020117
016042  020061  047524  052040
016050  051125  020116  044514
016056  044107  020124  043117
016064  027106     100
        001450                          .END    START
```

```
A      = 100000  1096#
ACPS     014735  3002    3006    3355#
ADTENP   003540  1556    1582#
AFPC     015032  1406    3369#
AICNT    015015  1425    3366#
APC      015000  1413    3363#
APCHID   015630  1806    3444#
APGENO   012566  1292    3141#
APN      012571  1289    3142#
APNUMB   014764  1417    3360#
ARDB     003714  1616    1620    1625#
ARDC     003724  1626    1628#
ARDRID   015606  1838    3440#
AREAD    003654  1612#   1624    1629    2039    2070    2093    2113    2138    2159    2184    2927
ASB      015066  1705    2715    2813    2885    2907    3375#
ASETSR   012644  1246    3151#
ATNUMB   014771  1421    3361#
AWAS     015101  1709    2719    2817    2889    3377#
B      = 040000  1097#
BCHECK   004234  1699#   2203    2220    2237    2258    2279
BDCNV  = 104020  1193#   1423    3000
BDCNVA   003430  1558#   1561
BDCNVB   003460  1563#   1565#
BDCNVC   003462  1554#   1566#
BDCNVD   003464  1555#   1562    1567#
BDCNVV   003376  1192    1551#
BELL   = 000007  1090#
BINP     003154  1500#   1509#   2746    2764
BINR     003152  1499#   1520#   1700    1704    1735    1737    1739    2698#   2711    2714    2808    2812
BIT0   = 000001  1068#
BIT1   = 000002  1067#
BIT10  = 002000  1058#   1279
BIT11  = 004000  1057#   1275
BIT12  = 010000  1056#
BIT13  = 020000  1055#   1098    1428
BIT14  = 040000  1054#   1097    1272    2962    3064    3135
BIT15  = 100000  1052    1053#   1096    2825    2839
BIT2   = 000004  1066#
BIT3   = 000010  1065#
BIT4   = 000020  1064#
BIT5   = 000040  1063#
BIT6   = 000100  1062#   1099    1380    1906    1907    1912    1913    1927    1929    2092    2094    2114    2137
                 2139    2160    2185    2331    2332    2336    2337    2351    2353    2423    2424    2443    2444
                 2471    2494    2496    2516    2517    2747    2789    2791
BIT7   = 000200  1061#   1384    2770    2792
BIT8   = 000400  1060#
BIT9   = 001000  1059#   1255    1283
BMOVA    003364  1545#   1547
BMOVE  = 104023  1196#   1564
BMOVV    003354  1195    1541#
BRCTR    004150  1654#   1655#   1677#
BREAD    004024  1650#   1661    1670    1676    1720    1721    1722    1724    1726    2202    2219    2236    2257
                 2278    2650    2664    2686    2699    2705    2868    2870    2878    2967
BREADA   004072  1662#   1672
BREADB   004106  1651    1665#
BREADC   004132  1668    1671#
```

DZPAAA.CMB 04-NOV-76 12:11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
BSYNC   004312          1716    1719#   1729    2201    2217    2233    2254    2275
C     = 020000          1098#
CHAINN  001752          1176    1268#
CHALT = 104024          1197#   1212    1218    1224    1229    1239    1249    1266    1766    1780    1816    2647    2736
                        2755    2850    2865    2921    2941    2959    2985    3042    3087
CHLT    002502          1196    1390#
CHNA    002004          1273    1275#
CHNAA   002022          1276    1279#
CHNAB   002000          1274#   1278
CHNAC   001770          1270    1272#
CHNB    002040          1280    1283#
CHR1    001336          1163#   1723#   1740    2040#   2042    2048    2869#   2872    2897
CHR2    001340          1164#   1725#   1742    2041#   2042    2052    2871#   2874    2899
CHR3    001342          1165#   1727#   1744
CLNUP   005134          1232    1843#
CLNUPA  005162          1848#   1853
CLNUPB  005202          1851    1854#
CM2     012601          1238    3144#
CM3     012624          1265    3148#
CNVCTR  003532          1557#   1560#   1579#
CPKPL   012214          2974    2996    2999#
CPKPLA  012232          2999#   3005#
CPRDY   004500          1757#   1767    1769    2383    2400    2422    2442    2470    2495    2515
CPRDYA  004516          1758    1760    1762#
CRBUF   001334          1162#   1663#   1700    1708    1723    1725    1727    2651    2665    2672    2679    2687    2690
                        2711    2718    2786#   2800    2808    2816    2828    2831    2869    2871    2881    2888    2903
CRDA    010774          2778    2781#
CRDAA   011010          2782    2786#
CREAD   010760          2777#   2780    2799    2806    2830
CREADA  011042          2790    2792#
CREADC  011056          2788    2795#
CTRA    001352          1169#   2648#   2655#   2658#   2667#   2697#   2701#   2704#   2708#   2968#   2971#   2990#   2993#
CTRB    001354          1170#   2649#   2653#   2876#   2879#   2901#   2961#   2970#   2986#   2992#   3001    3096#   3098#
CTRC    001356          1171#   2866#   2872    2881    2884    2899    2960#   2964#   2965#   2971
CTRD    001360          1172#   2867#   2874    2897    2903    2906
CURTST  001260          1138#   1257    1299#
DECVAL  003552          1552    1587#
DELAY = 104031          1202#   1613    1617    1685    1944    1962    1979    2607    2930    3104
DIGIT   003534          1570#   1573#   1576#   1577    1580#
DLCNT   003064          1471#   1474    1483#
DLCTR   003066          1484#
DLYAN   003044          1476#   1480
DLYBN   003050          1477#   1478
DLYCN   003060          1475    1481#
DLYN    003024          1201    1471#
ECHK    010470          2700    2707    2711#
ECHKA   010526          2712    2724#
EHALT = 104025          1198#   1436
EHLT    002514          1197    1396#
EHLTA   002524          1397    1399#
EMTINT  002136          1038    1303#
EMTTAB  001364          1175#   1307
EMTV    000030          1038#
EMTX  = 000032          1100#   1177#   1178#   1179#   1180#   1181#   1182#   1183#   1184#   1185#   1186#   1187#   1188#
                        1189#   1190#   1191#   1192#   1193#   1194#   1195#   1196#   1197#   1198#   1199#   1200#   1201#
                        1202#
```

CROSS REFERENCE TABLE -- USER SYMBOLS

```
EM0      014761            1427    3359#
EM1      015043            1712    2722    2820    2892    3371#
EM10     015361            1674    2784    3412#
EM11     015411            2760    3417#
EM2      015106            2056    3378#
EM3      015160            1752    2661    3386#
EM4      015175            2683    3389#
EM5      015242            2694    3396#
EM6      015321            2911    3405#
EM7      015337            1622    1659    3408#
ERCTR    001344            1166#   1714*   1730*   1845*   2804*   2822*   2827*   2832*   2838*   2877*   2894*
ERR      002526            1189    1400#
ERRB     002654            1409*   1410*   1412    1427*   1431#   1433*   1434
ERRN     002536            1190    1401    1402#
ERRNA    002642            1428#   1435
ERRNB    002656            1400*   1402*   1429    1432#
ERRNC    002674            1436#
ERROR =  104015            1190#   1878    1893    1909    1915    1931    1948    1966    1987    1989    2008    2026    2076
                           2096    2118    2141    2162    2169    2188    2304    2319    2334    2339    2355    2370    2387
                           2406    2426    2446    2453    2475    2498    2520
ERRORN=  104016            1191#   1621    1630    1658    1673    1711    1751    2055    2660    2682    2693    2721    2759
                           2783    2819    2891    2910
ERRT     001326            1159#   2670*   2671*   2672    2675
ESB      015222            2676    3393#
ETOA     010172            2648#   2663    2685    2696    2710
ETOB     010200            2649#   2659
ETOC     010206            2650#   2656
ETOD     010236            2652    2658#
ETOE     010244            2657    2660#   2669
ETOF     010254            2654    2664#   2668
ETOG     010276            2666    2670#
ETOH     010352            2673    2686#
ETOI     010406            2688    2697#
ETOJ     010420            2699#   2702
ETOK     010446            2705#   2709
EWAS     015235            2680    3395#
FORWD    002076            1254    1294#
FORWDA   002122            1299#
FPC      001362            1173#   1403*   1405
FPCMSG   015024            3368#
FSTPCH   001222            1123#   1789
FSTRDR   001220            1122#   1825
FSTVCT   001244            1132#   1213*   1799    1831
FWAS     015314            2691    3404#
GETBNP=  104030            1201#   2537    2558    2584    2610    2745    2763    2948
GETBNR=  104027            1200#   1699    1734    1736    1738    2706    2807
GETRDY   001652            1250#   1267    1284    1293
GORUN    001710            1257#   1261
GRCNT    004204            1690#   1693    2255    2276    2582
GRCNTA   004206            1691#   1692*   1694
GTBINP   003156            1200    1502#
GTBINR   003234            1199    1513#
GTRDYA   001674            1254#   1263
GTRDYB   001700            1255#
GTRDYC   001714            1256    1258#
GTRDYD   001732            1262#
```

```
GTRDYX  001660          1251#   1286
HSPCH   004532          1769#   2538    2559    2585    2611    2622    2626    2628    2631    2852    2854    2944    2949
                        2989
HSPCH1  012332          3047    3049    3056#
HSPCH2  012422          3079    3081    3083#
HTDA    011414          2868#   2895    2913
HTDB    011464          2877#   2902
HTDC    011472          2878#   2882    2896    2904
HTDD    011524          2887#   2909
HTDE    011552          2873    2897#
HTDF    011602          2880    2903#
HTDG    011624          2875    2898    2900    2910#
I       = 000040        1095#
ICNT    001266          1141#   1269*   1271*   1300*   1424    1843*
ICTR    001270          1142#   1277*   1297*
IE      = 000100        1099#
IM10    014053          2956    3272#
IM13A   015745          3127    3459#
IM13B   016026          3128    3468#
IM16    013254          1764    2847    2939    2982    3039    3085    3202#
IM17    013331          2920    3211#
IM2     013507          2643    3230#
IM23    014001          1210    1216    1222    1247    1778    1814    2645    2734    2848    2863    3040    3264#
IM24A   014242          2957    2983    3295#
IM3     014511          2732    3327#
IM4     013623          2846    3244#
IM5     013744          2861    3259#
IM6     013203          1632    2644    2733    2862    3194#
INBIN   = 104026        1199#   1719    2536    2557    2581    2606    2703    2737    2947
INBIMN  003070          1198    1486#
INITD   001252          1111*   1135#   1204    1226*
INRND   = 104022        1195#
INRNDN  003636          1194    1608#
INVRP   015556          1784    1820    3435#
IOTV    000020          1034#
ITA     011652          2922#   2932
ITB     011700          2927#   2929
ITC     011712          2926    2930#
ITX     011720          2923*   2925*   2928*   2933#
ITY     011714          2922*   2924*   2931#
KBSVC   002450          1104    1383#   1384*   1385
KSTART  001256          1137#   1250    1860*   2286*
KTA     012016          2960#   2976
KTB     012044          2963    2965#
KTC     012054          2967#   2973
KTD     012072          2966    2971#
KTE     012100          2969    2972#
KTF     012106          2974#
LTA     012140          2986#   2998
LTB     012152          2989#   2995
LTC     012170          2988    2993#
LTD     012176          2991    2994#
LTE     012204          2996#
MACHER  000004          1028#   1875*   1890*   2301*   2316*
MANUAL= 100000          1052#
MONE    012242          3029#   3046
```

```
MSVCTR  012775          1209    3168#
NOP   = 000240          1050#   1315    1402
NXTST   001264          1140#   1250*   1262    1285    1294    1296*
OACNV = 104017          1132#   1287    1404    1411    1415    1419    1703    1707    1804    1836    2047    2051    2674
                        2678    2689    2713    2717    2811    2815    2883    2887    2905
OACNVA  003316          1528#   1537
OACNVV  003304          1191    1523#
OPEN  = 000000          1051#   1114    1115    1116    1117    1118    1120    1132    1133    1134    1135    1136    1137
                        1138    1139    1140    1141    1142    1143    1144    1159    1160    1161    1162    1163    1164
                        1165    1166    1167    1168    1169    1170    1171    1172    1173    1431    1432    1468    1483
                        1484    1493    1494    1495    1496    1497    1498    1499    1500    1565    1566    1567    1579
                        1580    1581    1639    1646    1677    1681    1686    1688    1691    1696    1697    2797    2798
                        2931    2933    3005
ORGRD   015140          2049    3383#
PBIN    010636          2744    2751#   2756
PBNA    010654          2752    2757#
PBNB    010670          2758    2762#
PBNC    010740          2769    2772#
PBND    010754          2773    2775#
PCHCNT  011064          2739*   2762*   2765    2772    2787*   2797#
PCHIDM  015623          1809    3443#
PCHLIM  001250          1134#   1225*   1781
PCHLVL  001216          1121#   1647    2468    2492
PCHMSK  001346          1167#   1507    1770    1800*   1803*   3058
PCHOUT  001332          1161#   1510*   1770*   1771    2621*   2625*   2627*   2630*   2851*   2853*   2943*   2987*   3046*
                        3048*   3058*   3059
PCHSEL  004562          1776#   1785    2289    2730    2844    2937    2980    3037
PCHSLA  004612          1782    1786#
PCHSLB  004742          1802    1804#
PCHVTR  001214          1120#   1645    1792*   1793*   1794*   1795*   1796*   1797*   1798*   1799*   2448*
PFRNT   010062          2534    2555    2579    2604    2620#
PGTIT   012712          1207    3158#
PG12A   012302          3046#   3050
PG12B   012270          3044#
PG13A   012522          3131#   3133
PIND    003140          1487*   1494#   1504*
POPSP = 005726          1080#
POPSP2= 022626          1081#   1334    1345    1365    1665
PPB     001206          1117#   1771*   1790*   1791*   2317    2384*   2401    2746*   2764*   3059*
PPS     001204          1116#   1757    1759    1772    1786*   1787*   1788*   1789*   1790    2302    2331*   2332    2336*
                        2337    2351*   2353    2368    2385    2404    2423*   2424*   2443*   2444*   2469*   2471*   2473*
                        2494*   2496*   2516*   2517*   2747*   2751    2757    2774*   2789    2791*   3044*   3063*   3078
                        3080    3100
PRB     001202          1115#   1663    1826*   1827*   1891    2023    2040    2041    2071    2074    2786
PRGID   001274          1144#
PRGNUM  001254          1136#   1241*   1288    1416
PRGTAB  001275          1145#   1244
PRG0    005204          1145    1360#
PRG1    006656          1146    2286#
PRG10   011774          1153    2952#
PRG11   012116          1154    2978#
PRG12   012246          1156    3035#
PRG13   012502          1157    3123#
PRG13B  012512          3126#   3140
PRG13C  012506          3125#   3139
PRG2    010146          1147    2639#
```

```
PRG3     010530           1148    2727#
PRG4     011302           1149    2842#
PRG4A    011326           2851#   2855
PRG5     011354           1150    2857#
PRG6     011634           1151    2916#
PRG7     011722           1152    2935#
PRG7A    011752           2944#   2946
PRG7B    011764           2948#   2950
PRS      001200           1114#   1612*  1615   1619   1625   1652*  1657*  1662*  1667   1671   1822*  1823*  1824*
                          1825*  1826   1876   1906*  1907   1912*  1913   1927*  1929   1943*  1946   1961*  1964
                          1978*  1981   1984   2002*  2003   2005*  2006   2020*  2021   2024   2073*  2092*  2094*
                          2112*  2114*  2116*  2137*  2139*  2158*  2160*  2183*  2185*  2771*  2777   2781   2793*
                          2795*  3134*
PRTY0  =  000000          1089#  2091   2157
PRTY1  =  000040          1088#
PRTY2  =  000100          1087#
PRTY3  =  000140          1086#
PRTY4  =  000200          1085#  1119   1121   1129   1131
PRTY5  =  000240          1084#
PRTY6  =  000300          1083#
PRTY7  =  000340          1033   1035   1039   1082#  1105   1231   1251   1666   2187   2519
PSW    =  177776          1048#  1231*  1251*  1653*  1666*  2091*  2111*  2135*  2136*  2157*  2186*  2187*  2421*
                          2441*  2468*  2492*  2493*  2518*  2519*  2748*
PTO      003142           1498*  1495#  1502   1508*
PT1      003144           1489*  1496#  1502*  1503*  1506*  1507*  1508   1509   1510
PUSH   =  005746           1078#
PUSH2  =  024646           1079#  1327   1359
POAA     005244           1871   1876#
POAE     005252           1875   1878#
POBA     005274           1886   1891#
POBB     005302           1890   1893#
PODA     005316           1901   1906#
PODB     005340           1908   1912#
POEA     005372           1923   1927#
POFA     005426           1939   1943#
POFB     005446           1947   1950#
POGA     005460           1957   1961#
POHA     005512           1974   1978#
POHB     005542           1982   1987#
POHC     005546           1985   1989#
POIA     005562           1997   2001#
POJA     005624           2016   2020#
POMA     005664           2034   2038#
POMB     005702           2041#  2045
POMC     005726           2043   2047#
PONA     005766           2065   2069#  2072
POOA     006034           2084   2091#
POOB     006066           2090   2097#
POPA     006104           2104   2111#
POPE     006140           2110   2118#
POQA     006160           2128   2135#
POQB     006220           2134   2144#
PORA     006232           2151   2155#
PORC     006270           2156   2164#
PORD     006304           2165   2167#
PORE     006310           2164   2169#
```

```
POSA    006330          2177    2183#
POSB    006362          2182    2190#
POTA    006400          2197    2202#
POTLST= 177777          1091#   2265
POT0    005226          1860    1868#
POT1    005256          1869    1883#
POT10   005614          .995    2013#
POT11   005654          2014    2031#
POT12   005756          2032    2062#
POT13   006020          2063    2081#
POT14   006070          2082    2101#
POT15   006144          2102    2125#
POT16   006222          2126    2148#
POT17   006314          2149    2174#
POT2    005306          1884    1898#
POT20   006364          2175    2194#
POT21   006412          2195    2208#
POT22   006450          2209    2225#
POT23   006522          2226    2244#
POT24   006600          2245    2264#
POT3    005362          1899    1920#
POT4    005416          1921    1936#
POT5    005450          1937    1954#
POT6    005502          1955    1971#
POT7    005552          1972    1994#
POUA    006434          2211    2218#
POVA    006472          2228    2234#
POVB    006502          2236#   2239
POXA    006552          2247    2255#
POXB    006560          2257#   2260
POYA    006630          2267    2276#
POYB    006636          2278#   2281
P1AA    006716          2297    2302#
P1AB    006724          2301    2304#
P1BA    006746          2312    2317#
P1BB    006754          2316    2319#
P1CA    006770          2327    2331#
P1CB    007012          2333    2336#
P1DA    007044          2347    2351#
P1EA    007100          2363    2368#
P1FA    007122          2378    2382#
P1GA    007160          2395    2399#
P1HA    007226          2414    2421#
P1HB    007256          2420    2428#
P1IA    007270          2435    2439#
P1IB    007326          2440    2448#
P1IC    007342          2449    2451#
P1ID    007346          2448    2453#
P1JA    007366          2461    2468#
P1JB    007422          2467    2475#
P1KA    007442          2485    2492#
P1KB    007502          2491    2502#
P1LA    007520          2509    2515#
P1LB    007554          2514    2522#
P1MA    007566          2529    2533#
P1MB    007604          2537#   2540
```

```
P1NA    007640          2548    2554#
P1NB    007656          2558#   2562
P1QA    007722          2570    2578#
P1QB    007740          2582#   2590
P1QC    007746          2584#   2589
P1QD    007772          2587    2591#
P1PA    010004          2597    2603#
P1PB    010022          2607#   2616
P1PC    010034          2610#   2615
P1PD    010060          2613    2617#
P1TLST= 177777          1092#   2595
P1T0    006700          2286    2294#
P1T1    006730          2295    2309#
P1T10   007260          2412    2432#
P1T11   007352          2433    2458#
P1T12   007426          2459    2482#
P1T13   007504          2483    2506#
P1T14   007556          2507    2526#
P1T15   007622          2527    2545#
P1T16   007676          2546    2567#
P1T17   007774          2568    2594#
P1T2    006760          2310    2324#
P1T3    007034          2325    2344#
P1T4    007070          2345    2360#
P1T5    007112          2361    2375#
P1T6    007150          2376    2392#
P1T7    007212          2393    2411#
RBIN    011122          2803    2806#   2837
RBINA   011126          2805    2807#
RBINB   011142          2809    2811#
RBINC   011200          2823    2825#   2836
RBIND   011230          2826    2830#
RBUSY   011066          2740*   2768    2770*   2792*   2798#   2825*   2839*
RCMSK   004230          1692    1696#   2253*   2274*   2577*
RCNT    001330          1160#   2533*   2539*   2554*   2561*   2578*   2586*   2603*   2612*
RDRIDM  015601          1841    3439#
RDRLIM  001246          1133#   1219*   1792    1817
RDRLVL  001212          1119#   1640    2111    2135
RDRMSK  001350          1168#   1518    1832*   1835*   2671
RDRSEL  004760          1812#   1821    1863    2641    2729    2859    2918    2954    3125
RDRSLA  005010          1818    1822#
RDRSLB  005116          1834    1836#
RDRVTR  001210          1118#   1638    1828*   1829*   1830*   1831*   2164*   2803*   2826*   2837*
RIND    003136          1486*   1487    1488    1489    1490    1491    1493#   1515*
RNCNT   004232          1694*   1697#   2234*   2238*   2259*   2280*   2588*   2609*   2614*
RNDNUM= 104021          1194#   1680    1690
RNGEN   003560          1193    1590#
RP1     003632          1591    1595*   1602    1605#   1608*
RP2     003634          1594    1598    1601*   1606#   1609*
RST03 = 104003          1180#   1481
RST05 = 104005          1182#   1377    1746    1754
RST05S= 104007          1184#   1393    1445    1538    1548    1568    1603
RST5S = 000004          1102#   1437    1465
RS03    002256          1179    1334#
RS05    002306          1181    1345#
RS05S   002302          1183    1343#
```

```
RSSS     002366          1034    1364#
RTNNO    001262          1139#   1260    1281    1295*   1420    1844*
RTO      003146          1490*   1497#   1513    1519*
RTI      003150          1491*   1498#   1513*   1514*   1517*   1518*   1519    1520
RUNINS   012753          1228    3164#
SAV03 =  104002          1179#   1473
SAV05 =  104004          1181#   1372    1732
SAV05S=  104006          1183#   1390    1440    1523    1541    1551    1590
SAV55 =  000003          1101#   1408    1461
SCOPE =  104000          1177#   1877    1879    1892    1894    1911    1916    1932    1950    1967    1986    1988    1990
                         2009    2027    2046    2058    2077    2097    2117    2121    2144    2163    2168    2170    2190
                         2204    2221    2240    2261    2282    2303    2305    2318    2320    2335    2340    2356    2371
                         2388    2407    2428    2447    2452    2454    2474    2478    2502    2522    2541    2563    2591
                         2617
SCOPTR   001272          1143#   1274    1298*
SELPCH   013060          1221    3178#
SELRDR   013027          1215    3173#
SM1      014575          1631    3337#
SM2      014624          3341#
SM3      014647          1763    2754    3084    3345#
SM4      014672          2975    3349#
SM5      014714          2997    3352#
SPBOT =  001200          1049#   1203    1252    1268
SPCHM    015507          1777    3428#
SR    =  177570          1047#   1213    1219    1225    1233    1255    1258    1272    1275    1279    1283    1396    1428
                         1781    1786    1796    1801    1805    1817    1822    1828    1833    1837    2851    2853    2866
                         2867    2924    2925    2962    2972    2994    3064    3131    3135    3138
SRORM    015440          1813    3421#
SRESET=  104001          1178#   1243    1253    1928    2001    2069    2352    2382    2399
SRSET    001640          1245#   1864    2290
SRSETA   002446          1379    1381#
SRSETT   002412          1177    1372#   1375*
STAL     004152          1186    1680#
STALA    004176          1684*   1686#
STALB    004200          1683    1687#
STALL =  104012          1187#   2218    2235    2256    2277    2560    2583    2775
START    001450          1107    1112    1203#   3474
STLA     004154          1681#   1682*   1684
STLMSK   004202          1682    1688#   2216*   2232*   2252*   2273*   2553*   2576*   2738*
STPCHV=  104014          1189#   2419    2439    2466    2490    2513    2743
STPPA    004012          1643*   1646#
STPRA    003762          1636*   1639#
STPTPV   003774          1188    1643#
STPTRV   003744          1187    1636#
STRDRV=  104013          1188#   1650    2089    2109    2133    2155    2181    2741
STRTA    001564          1205    1231#   1240
STRTB    001624          1236    1241#
SUBRO    015153          2053    3385#
SUBTEN   003472          1559    1570#
SUBTNA   003476          1571#   1574
SUBTNB   003512          1572    1575#
SV03     002156          1178    1310#
SV05     002206          1180    1318#
SV05A    002214          1316    1319#
SV05B    002230          1313    1323#
SV05C    002242          1312*   1315*   1318*   1328#
```

```
SVOSS   002176          1182    1315#
SVSS    002336          1032    1355#
SYNCA   004400          1728    1732#   2835
SYNCB   004406          1734#   1750
SYNCC   004462          1741    1743    1745    1749#
TEMPWR  003536          1558*   1571    1575    1581#
TIMER   012436          3061    3066    3096#
TIMER1  012444          3097#   3106
TIMER2  012470          3099    3108#
TIMER3  012474          3101    3111#
TITL0   013227          1862    3198#
TITL1   013111          2288    3183#
TITL10  014022          2953    3267#
TITL11  014414          2979    3315#
TITL12  015645          3036    3447#
TITL13  015713          3124    3454#
TITL2   013454          2640    3225#
TITL3   014445          2728    3320#
TITL4   013560          2843    3238#
TITL5   013663          2858    3250#
TITL6   013277          2917    3206#
TITL7   013135          2936    3187#
TKB     001226          1125#   1383
TKLVL   001236          1129#
TKS     001224          1124#   1380*
TKVTR   001234          1128#
TLAST = 177777          1093#
TPB     001232          1127#   1451*
TPLVL   001242          1131#
TPS     001230          1126#   1452
TPVTR   001240          1130#
TRC   = 000003          1094#
TRCV    000014          1032#
TRPV    000034          1040#
TSM2    003732          1628    1630#   1669    2779
TSTPUN  012404          3045    3078#   3088
TYP     002702          1184    1440#
TYPA    002706          1442#   1450    1459
TYPC    002722          1444    1447#
TYPD    002736          1449    1451#   1456    1458
TYPE  = 104010          1185#   1206    1227    1237    1264    1291    1430    1467    1783    1808    1819    1840    1861
                        2287    2639    2727    2753    2842    2857    2916    2919    2935    2952    2978    3035    3123
TYPES = 104011          1186#   1208    1214    1220    1245    1762    1776    1812    2642    2731    2845    2860    2938
                        2955    2981    3004    3038    3083    3126
TYPF    002752          1448    1455#
TYPG    002762          1457#
TYPS    002774          1185    1461#   1469
TYPSA   003006          1464    1467#
TYPSB   003020          1462#   1463    1468#
WNZERO  011070          2742    2799#
X     = 010017          1858#   1866    1872#   1881    1887#   1896    1902#   1918    1924#   1934    1940#   1952    1958#
                        1969    1975#   1992    1998#   2011    2017#   2029    2035#   2060    2066#   2079    2085#   2099
                        2105#   2123    2129#   2146    2152#   2172    2178#   2192    2198#   2206    2212#   2223    2229#
                        2242    2248#   2262    2268#   2284#   2292    2298#   2307    2313#   2322    2328#   2342    2348#
                        2358    2364#   2373    2379#   2390    2396#   2409    2415#   2430    2436#   2456    2462#   2480
                        2486#   2504    2510#   2524    2530#   2543    2549#   2565    2571#   2592    2598#
```

H07


```
Y       = 000001        1859*  1866   1881   1896   1918   1934   1952   1969   1992   2011   2029   2060   2079
                        2099   2123   2146   2172   2192   2206   2223   2242   2262   2285*  2292   2307   2322
                        2342   2358   2373   2390   2409   2430   2456   2480   2504   2524   2543   2565   2592
ZERO    012244          3030*  3048
.       = 016067        1025*  1026   1028   1030   1036   1040   1042*  1045   1103*  1106*  1108*  1113*  1230
                        1386   1453   1505   1516   1656   1701   1715   1773   1914   1930   1965   2004   2007
                        2022   2025   2075   2338   2354   2369   2386   2405   2624   2633   2750   2766   2801
                        2833
```

I07

```
PA611   MACY11 27(1006)  04-NOV-76  12:14  PAGE 88
DZPAAA.CMB    04-NOV-76 12:11          CROSS REFERENCE TABLE -- MACRO NAMES

EMTDEF   1025#  1176  1177  1178  1179  1180  1181  1182  1183  1184  1185  1186  1187  1188  1189
         1190   1191  1192  1193  1194  1195  1196  1197  1198  1199  1200  1201
TITLE    1025#
TSTA     1025#  1865  1880  1895  1917  1933  1951  1968  1991  2010  2028  2059  2078  2098  2122
         2145   2171  2191  2205  2222  2241  2291  2306  2321  2341  2357  2372  2389  2408  2429
         2455   2479  2503  2523  2542  2564
TSTAA    1025#  1866  1881  1896  1918  1934  1952  1969  1992  2011  2029  2060  2079  2099  2123
         2146   2172  2192  2206  2223  2242  2262  2292  2307  2322  2342  2358  2373  2390  2409
         2430   2456  2480  2504  2524  2543  2565  2592


. ABS.  016067     000


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 .NOW.SEQ/SOL/CRF/NL:TOC=DZPAAA.CMB
 RUN-TIME: 11 21 3 SECONDS
 RUN-TIME RATIO: 111/36=3.0
 CORE USED:  10K  (19 PAGES)
```

J07

Spooler runtime 12 Seconds, 52 KCS, 305 disk reads, 3 disk writes, 86 pages