

IDENTIFICATION

SEQ 0001

PRODUCT CODE: AC-9006C-MC
PRODUCT NAME: CZPAAC0 TYP-11 READER-PUNCH TESTS
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THIS DIAGNOSTIC OBSOLETES MAINDEC - 11 - D2EA

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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 FOLLOWING 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 POCEND. 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.

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:

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 INSTRUCTIONS 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 PERIOD 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:

J 1

OUT THE ADDITIONAL LOGIC ADDED TO THE PUNCH CONTROLLER THAT
ALLOWS THE PROGRAMMER TO ISSUE 'PUNCH RESET' UNDER SOFTWARE
CONTROL.

SEQ 0009

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

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,
TTYV 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 PRGO 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

(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 PRG0 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 PRG2 WHEN IT IS 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,<

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 ITER

- 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 TA

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:

SEQ 0018

- 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 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.

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

SEQ 0021

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.

1
2
3
4
5
6
7
8
9

```
;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
```

```
.LIST SRC
;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 - SCOPF.
;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 000000
000000 000002
000002 000000
000004 000006
000006 000000
000010 000012
000012 000000
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CZPAAC.P11 13-JUN-78 12:38

K 5

SEQ 0062

012626 022445 120 APGEND: .ASCII '%%P'

