

IDENTIFICATION

PRODUCT CODE: MAINDEC 15-D2DC-D (D)
PRODUCT NAME: PDP-15 HIGH SPEED PUNCH TEST
DATE REVISED: SEPT. 1, 1971
MAINTAINER: DIAGNOSTICS GROUP
AUTHOR: JOHN W. RICHARDSON/EARL L. BOUSE

COPYRIGHT © 1971
DIGITAL EQUIPMENT CORPORATION



PDP-15
PUNCH

ABSTRACT

THE PDP-15 HIGH SPEED PUNCH TEST IS DESIGNED TO TEST AND VERIFY THE OPERATIONAL STATUS OF THE PUNCH CONTROL LOGIC, AND THE MECHANICAL FUNCTIONS OF THE PUNCH. THE PROGRAM IS SEPARATED IN THREE PARTS. THE FIRST PART IS A SERIES OF FIVE TESTS ON THE PUNCH CONTROL LOGIC, PART TWO IS A SERIES OF NINE TESTS ON THE PUNCH ITSELF, AND PART THREE IS A READ VERIFICATION CHECK ON THE PUNCHED TAPE. PROVISION IS MADE TO CONTINUOUSLY LOOP ON THREE OF THE SIX PUNCH CONTROL TESTS, AND ANY ONE OF THE PUNCH DATA TESTS.

2. REQUIREMENTS

A STANDARD PDP-15 EQUIPPED WITH A HIGH SPEED PUNCH AND HIGH SPEED READER.

STORAGE

THE PROGRAM OCCUPIES 4735 (OCTAL) WORDS OF CORE MEMORY FROM LOCATION 0 TO 4735.

PRELIMINARY PROGRAMS

THE PDP-15 HIGH SPEED BINARY LOADER MUST BE IN CORE MEMORY.

3. LOADING PROCEDURE

- A. PLACE THE BINARY TAPE IN THE READER.
B. SET THE ADDRESS SWITCHES TO 17700.
C. PLACE BANK MODE SWITCH ON A 1.
D. PRESS I/O RESET, AND THEN READ-IN.
E. AT THE COMPLETION OF LOADING REMOVE THE TAPE FROM THE READER.

4. STARTING PROCEDURE

CONTROL SWITCH SETTINGS

ALL ACS ON A 0.

STARTING ADDRESSES

CONTROL LOGIC TESTS - 200.

DATA CHECK TESTS - 1000.

VERIFY PUNCH TAPE - 3400.

RESTARTING ADDRESSES

RESTARTING ADDRESSES FOR INDIVIDUAL TESTS MAY BE FOUND IN TABLE 2, APPEARING AT THE END OF THIS DOCUMENT.

PROGRAM ACTION

STARTING FROM 200, THE PROGRAM WILL EXECUTE CONTROL LOGIC TESTS 1 THROUGH 4 IN SEQUENCE USING THE IOT PSA, AND THEN REPEAT TESTS 2 THROUGH 4 USING THE IOT PSB. AFTER COMPLETING TEST 4 THE MESSAGE 'REMOVE TAPE' WILL BE TYPED OUT AND A HALT WILL OCCUR WITH THE MO=523. AT THIS POINT THE TAPE IS TO BE REMOVED FROM THE PUNCH. PRESS CONTINUE AND THE 'NO-TAPE' LOGIC IS TESTED. IF THE 'NO-TAPE' LOGIC IS OK, A 'REPLACE TAPE' MESSAGE IS TYPED OUT AND THE PROGRAM WILL HALT WITH THE MO=547.

AFTER THE TAPE IS REPLACED, PRESS CONTINUE TO EXECUTE THE DATA CHECK TESTS. THERE ARE NINE DATA TESTS IN ALL, EACH PUNCHING A DIFFERENT PATTERN. AS ONE TEST IS COMPLETED, THE NEXT TEST IS AUTOMATICALLY STARTED. WHEN TEST 9 IS COMPLETED, BLANK LEADER IS PUNCHED AND THE PROGRAM HALTS WITH THE MO=2426. THE PUNCHED TAPE CAN THEN BE VERIFIED BY PLACING IT IN THE READER AND PRESSING CONTINUE. IF NO ERRORS ARE FOUND A 'DONE' MESSAGE IS TYPED OUT AND THE PROGRAM WILL HALT WITH THE MO=4427. PRESS CONTINUE TO RESTART THE PUNCH DATA CHECKS.

5.

OPERATING PROCEDURES

OPERATOR ACTION

- A. PLACE THE TAPE IN THE READER.
- B. PLACE ALL ACS ON A 0, AND SET THE ADDRESS SWITCHES TO 17700.
- C. PLACE BANK MODE SWITCH ON A 1.
- D. PRESS I/O RESET, AND THEN READ-IN.
- E. AFTER COMPLETION OF LOAD SET THE ADDRESS SWITCHES TO 200.
- F. PRESS I/O RESET, AND THEN START. IF NO ERRORS, THE PROGRAM WILL HALT WITH MO = 523.
- G. REMOVE THE TAPE FROM THE PUNCH.
- H. PRESS CONTINUE. IF NO ERRORS, THE PROGRAM WILL HALT WITH MO = 547.
- I. PRESS CONTINUE. THE DATA CHECKS ARE THEN PERFORMED NEXT AND THE PROGRAM WILL HALT WITH THE MO = 2426.
- J. REMOVE THE TAPE FROM THE PUNCH AND PLACE IT IN THE READER TO VERIFY THE TAPE.
- K. PRESS CONTINUE. IF NO ERRORS ARE FOUND THE PROGRAM WILL HALT WITH THE MO = 4427.
- L. PRESS CONTINUE TO RESTART THE DATA CHECK TESTS.

DATA CHECK TESTS

ACS FUNCTIONS FOR EACH OF THE NINE TESTS ARE:

ACS ---	FUNCTION -----
1(1)	'SCOPE MODE
2(1)	LOOP ON CURRENT TEST
4-17	MAY BE USED TO VARY RATE OF PUNCHING

ACS 1 ON A 1 WILL CAUSE THE CURRENT TEST TO BE REPEATED UNTIL STOPPED BY PRESSING PROGRAM STOP. PLACING ACS 1 ON A 0 WILL ALLOW PROGRAM TO CONTINUE ON TO NEXT TEST AFTER COMPLETING THE PRESENT TEST.

ACS 2 ON A 1 WILL CAUSE THE CURRENT TEST TO BE REPEATED UNTIL STOPPED WITH PROGRAM STOP. PLACING ACS 2 ON A 0 WHILE RUNNING WILL LET THE PROGRAM GO ON TO THE NEXT TEST AFTER COMPLETING THE CURRENT ONE.

VERIFY PUNCH TEST

ACS FUNCTIONS FOR EACH OF THE NINE READ CHECKS ARE:

ACS ---	FUNCTION -----
0(2)	HALT AFTER EACH ERROR PRINTOUT
0(1)	CONTINUE AFTER EACH ERROR PRINTOUT
2(0)	NORMAL READ
2(1)	REPEAT THE CURRENT READ CHECK

ACS 2 ON A 1 WILL CAUSE THE CURRENT READ CHECK TO BE REPEATED. FOR ANY ONE TEST TO BE REPEATED, PLACE THE PATTERN TO BE VERIFIED IN READER AND REFER TO THE STARTING LOCATIONS IN SECTION 10.

(5. CONT'D)

OPERATING INSTRUCTIONS

- A. SET THE ADDRESS SWITCHES TO 1000.
- B. PRESS I/O RESET, AND THEN START.
- C. APPROXIMATELY 1-1/2 FT. OF LEADER WILL BE PUNCHED. THE LEADER IS BLANK EXCEPT FOR ONE FRAME OF ALL 1'S. THIS FRAME IS REFERRED TO AS THE MARK CHARACTER, AND HAS NOTHING TO DO WITH THE INTERNAL OPERATION OF THE PROGRAM.
- D. THE PROGRAM WILL PUNCH EACH TEST IN SEQUENCE.
- E. WHEN TEST 9 HAS FINISHED, BLANK LEADER IS PUNCHED AND THE PROGRAM WILL HALT WITH THE MO = 2426.
- F. PLACE THE PUNCHED TAPE IN THE READER AND PRESS CONTINUE TO VERIFY THE TAPE.
- H. IF NO ERRORS THE PROGRAM WILL HALT WITH THE MO = 4427.
- I. PRESS CONTINUE TO RESTART THE DATA CHECKS.

ERRORS

ERROR HALTS

ALL HALTS ARE DESCRIBED IN TABLE 1.

ERROR PRINTOUTS

ANY DATA TEST ERROR ENCOUNTERED WILL CAUSE AN ERROR PRINTOUT
IN THE FORMAT SHOWN BELOW:

TEST NO.	GOOD	BAD
N	XXX	XXX

WHERE:

N = TEST NUMBER (1 THROUGH 9)

GOOD = WHAT THE DATA READ WAS EXPECTED TO BE

BAD = THE DATA AS READ

PRESSING CONTINUE WILL ALLOW PROGRAM TO CONTINUE. AC SWØ
ON A '1' ALLOWS PROGRAM TO CONTINUE AFTER REPORTING AN ERROR.
ALSO, NO-TAPE CONDITIONS WILL GIVE A PRINTOUT THUS:

'NO TAPE IN PUNCH'

THE ACS HAVE NO CONTROL OVER THIS PRINTOUT. THE PROGRAM HALTS
AND THE TEST MUST BE RESTARTED.

'NO MARK CHAR'

THIS MESSAGE IS TYPED IF THE ALL 1'S FRAME IS NOT READ
WHEN THE TAPE IS VERIFIED. THIS COULD BE CAUSED BY THREE
DIFFERENT SITUATIONS. EITHER THE READER IS NOT READING
CORRECTLY, THE TEST TAPE WAS STARTED IN THE MIDDLE OF A
TEST OR IF THE LEADER WAS EXCESSIVELY LONG, IN WHICH CASE
PRESS CONTINUE TO RESTART THE VERIFICATION CHECK.

7. RESTRICTIONS

STARTING RESTRICTIONS

NONE.

OPERATING RESTRICTIONS

ANY DEVICE OTHER THAN THE READER, TELETYPE, OR PUNCH MUST BE TURNED OFF, TO AVOID UNWANTED INTERRUPTS.

8. MISCELLANECUS

EXECUTION TIME

IF LOOPING ON CONTROL LOGIC TESTS 2 THROUGH 4, THE TIME PER PASS IS APPROXIMATELY 7 SEC. DATA CHECK TESTS 1 THROUGH 9 WILL REQUIRE APPROXIMATELY 8 MIN.

APPLICATIONS - CONTROL LOGIC TESTS

SCOPE MODE

SCOPE MODE FOR ANY OF THE CONTROL LOGIC TESTS MAY BE ENTERED BY PLACING ACS 1 ON A 1 AFTER AN ERROR HALT AND PRESSING CONTINUE. RESTARTING A TEST WITH ACS 1 ON A 1 WILL ALSO PROVIDE 'SCOPE MODE'. THE STARTING ADDRESS FOR EACH TEST AND THE PROCEDURE TO FOLLOW IS GIVEN BELOW.

TEST #	SCOPE IOT	OPERATOR ACTION	STARTING ADDRESS
1		PRESS I/O RESET, THEN START	200
2	PSA	PRESS I/O RESET, THEN START	222
2	PSB	PLACE 700244 IN LOCATION 227.	224
3	PSA	PLACE 700204 IN LOCATION 227.	300
3	PSB	PLACE 700244 IN LOCATION 227.	300
3A	PCF	PLACE 700204 OF 700244 IN LOCATION 227.	326
4		SCOPE FOR PUNCH INTER- RUPTING BEFORE IT IS SELECTED.	400
4	PSA	SCOPE FOR NO INTERRUPT, PLACE 700204 IN LOCATION 227.	412
4	PSB	SCOPE FOR NO INTERRUPT, PLACE 700244 IN LOCATION 227.	412
5		SCOPE FOR NO TAPE ALWAYS SET	500
5		NO TAPE WILL NOT SET	524

FAST 'SCOPE MODE LOOP'

A SEPARATE ROUTINE IS PROVIDED WHICH WILL PUNCH ANY CHARACTER SPECIFIED BY ACS 10-17. THE LOOP USES PSA ONLY, BUT THIS MAY BE CHANGED BY INSERTING PSB (700244) INTO LOCATION 3102. THE LOOP CONSISTS OF SIX INSTRUCTIONS, OF WHICH THE FIRST IS CAF.

THE PURPOSE OF THE ROUTINE IS TO PROVIDE A VERY SHORT LOOP FOR 'SCOPING' IF THE METHODS PREVIOUSLY DESCRIBED ARE NOT SUITABLE.

(8. CONT'D)

INSTRUCTIONS:

- A. SET THE ADDRESS SWITCHES TO 3100.
- B. PLACE ANY CHARACTER IN ACS 10-17.
- C. PRESS I/O RESET, AND THEN START.
- D. THE LOOP MAY BE HALTED WITH PROGRAM STOP.
- E. ACS 10-17 MAY BE CHANGED WHILE THE LOOP IS RUNNING.

LOOPING ON CONTROL LOGIC TESTS 2-4

TEST 2 THROUGH 4 MAY BE CONTINUOUSLY EXECUTED TO FACILITATE TESTING THE CONTROL LOGIC.

LOOPING WITH EITHER THE PSA OR PSB IOT IS PROVIDED,

TO LOOP ON TESTS 2 THROUGH 4 USING PSA:

- A. PLACE ACS 2 ON A 1.
- B. SET THE ADDRESS SWITCHES TO 220.
- C. PRESS I/O RESET, AND THEN START.
- D. THE LOOP MAY BE HALTED WITH PROGRAM STOP.

TO LOOP ON TEST 2 THROUGH 4 USING PSB:

- A. PLACE ACS 2 ON A 1.
- B. SET THE ADDRESS SWITCHES TO 464
- C. PRESS I/O RESET, AND THEN START.
- D. THE LOOP MAY BE HALTED WITH PROGRAM STOP.

APPLICATION - DATA CHECK TESTS

VARIABLE PUNCH SPEED CONTROL

ACS 4 THROUGH 17 WILL PROVIDE SPEED CONTROL FOR ALL DATA CHECK TESTS. WITH ALL 14 ACS ON A 1, THE SPEED WILL BE THE SLOWEST. NORMAL SPEED IS RESTORED BY PLACING ACS 4 - 17 ON A 0. ANY COMBINATION OF THE 14 SWITCHES MAY BE USED, AND MAY BE CHANGED WHILE THE PROGRAM IS RUNNING.

THE TEST IS DESIGNED TO TEST THE FUNCTIONS OF THE PUNCH CONTROL LOGIC WITH MINIMUM OPERATOR INTERVENTION, A SCOPE LOOP IS INCLUDED IN THE PROGRAM TO AID IN MAKING ANY OTHER MECHANICAL OR TIMING ADJUSTMENTS NECESSARY, IF THE CONTROL LOGIC TESTS RUN, ANY REMAINING ERRORS WILL BE IN THE DATA PATHS.

THE DATA CHECK TESTS ARE DESIGNED TO AID IN FINDING MECHANICAL FAILURES IN THE PUNCH ITSELF. THERE ARE NINE DATA CHECK TESTS IN ALL, EACH PUNCHING A DIFFERENT PATTERN,

TABLE 1 ERROR HALTS AND IDENTIFICATION FOR DATA CHECKS

TEST NO.	C (MO)	TAG	IDENTIFICATION
1	221	PE01	PUNCH FLAG SET AFTER IOT OF 700110.
2	242	PA02	FLAG NOT SET AFTER PSA IOT.
3	245	PB02	FLAG NOT SET AFTER PSB IOT.
3	311	PA03	FLAG DID NOT CLEAR USING PSA.
3	312	PB03	FLAG DID NOT CLEAR USING PSB.
4	434	P05A	PUNCH CAUSED ILLEGAL INTERRUPT.
4	436	P05B	SPURIOUS INTERRUPT, TURN OFF I/O DEVICES OTHER THAN TTY, READER AND PUNCH.
4	424	PA05	NO INTERRUPT USING PSA.
	425	PB05	NO INTERRUPT USING PSB.
5	515	FLGNOT	NO TAPE SET WITH TAPE IN PUNCH. CHECK POWER SWITCH WIRING.
5	541	NOFLG	NO TAPE NOT SET WITH NO TAPE IN PUNCH. CHECK WIRING ON PUNCH NO TAPE SWITCH.
5	541	NOFLG	NO TAPE NOT SET WITH POWER OFF. CHECK WIRING.
5	523	PHLT10	REMOVE TAPE FROM PUNCH AND PRESS CONTINUE.
5	547	HLT10A	END OF NO TAPE TEST, PRESS CONTINUE TO START DATA CHECKS.

(9. CONT'D)

TABLE 1 (CONT'D)

TEST NO.	C (MO)	TAG	IDENTIFICATION
	2426		HALT AFTER COMPLETING DATA CHECKS. PRESS CONTINUE TO READ THE TAPE.
	4427		HALT AFTER VERIFYING THE TAPE. PRESS CONTINUE TO RESTART DATA CHECKS.

TABLE 2 ERROR HALTS AND IDENTIFICATION FOR READ CHECKS

TEST NO.	C (MO)	TAG	IDENTIFICATION
1	4535		NO MARK CHARACTER READ, PRESS CONTINUE TO RESTART.
1-9	4460		DATA ERROR, PRESS CONTINUE TO CONTINUE READ.

TABLE 2 RESTARTING ADDRESS

CONTROL LOGIC TESTS

TEST 1 - 200	ILLEGAL INSTRUCTION
TEST 2 - 222	SET FLAG WITH PSA AND PSB
TEST 3 - 300	CLEAR FLAG WITH PSA AND PSB
TEST 3A - 330	CLEAR FLAG WITH PCF
TEST 4 - 400	INTERRUPT TEST
TEST 5 - 500	NO TAPE TEST

DATA CHECK TESTS

TEST 1	-	1004	SKEW TEST
TEST 2	-	1100	ALL ZERO TEST
TEST 3	-	1200	ALL CHANNEL TEST
TEST 4	-	1300	SLIDING '1' TEST
TEST 5	-	1500	SLIDING '0' TEST
TEST 6	-	1700	ADJACENT CHANNEL TEST
TEST 7	-	2200	BINARY COUNT (PSA)
TEST 8	-	2300	BINARY COUNT (PSB)
TEST 9	-	2400	RANDOM STALL (0,377)

(10. CONT'D)

READ VERIFICATION CHECKS

TEST 1	3400	READ SKEW TEST
TEST 2	3500	READ ALL ZERO TEST
TEST 3	3600	READ ALL 1'S TEST
TEST 4	3700	READ SLIDING '1' TEST
TEST 5	4000	READ SLIDING '0' TEST
TEST 6	4100	READ ADJACENT CHANNEL
TEST 7	4200	READ BINARY COUNT (PSA)
TEST 8	4300	READ BINARY COUNT (PSB)
TEST 9	4400	READ RANDOM STALL TEST

11. LISTING

```

      ,TITLE PTP15
      /
      /PDP-15 PAPER TAPE PUNCH DIAGNOSTIC
      /MAINDEC 15-D2DC-D
      /COPYRIGHT AUG, 10, 1970, DIGITAL EQUIPMENT CORP. MAYNARD, MASS.
      /REVISED * SEPT, 1, 1971
      /PROGRAMMER; EARL L, BOUSE

```

```

      /
      ,ABS
700406   TLS=700406
700401   TSF=700401
700402   TCF=700402
700004   CLOF=700004
700201   PSF=700201
700202   PCF=700202
700204   PSA=700204
700244   PSB=700244
700101   RSF=700101
700102   RCF=700102
700104   RSA=700104
700112   RRB=700112
700144   RSB=700144

```

```

      /CONTROL SWITCH SETTINGS

```

```

      /
      /AC SW0 = 0, HALT AFTER ERROR TYPE OUT
      /AC SW0 = 1, CONTINUE AFTER ERROR TYPE OUT
      /AC SW1 = 0, INHIBIT SCOPE LOOP
      /AC SW1 = 1, RUN SCOPE LOOP
      /AC SW2 = 0, NORMAL PUNCH
      /AC SW2 = 1, REPEAT TEST
      /AC SW4-17 = DELAY FOR PUNCH

```

```

      /
      /
00000    ,LOC      0
00000    0
00001    600001    JMP
00002    777777    LAW      -1
00003    777777    LAW      -1
00004    777777    LAW      -1
00005    777777    LAW      -1
00006    740040    XX
00011    ,LOC      11
00011    000000    0          /INDEX 11
00016    ,LOC      16
00016    000000    0          /INDEX 16
00017    000000    0          /INDEX 17
      ,EJECT

```

```

00200      /TEST1, ILLEGAL INSTRUCTION TEST
           .LOC      200
           /
00200      BGNPCH  CLOF
00201      700004   CAF
00202      703302   JMS      CRLF
00203      104475   LAW      -2
00204      777776   DAC      13
00205      040013   700110   /FALSE IOT
00206      700110   JMS      STAL70 /WAIT
00207      103225   PSF
00210      700201   SKP      /TEST FOR FLAG SET
00211      741000   JMP      /SHOULD SKIP
00212      600217   PFERR    /ERROR
00213      440013   ISZ      13
00214      600205   JMP      BGNPCH+5
00215      103153   JMS      SCOPE      /CHECK FOR SCOPE LOOP
00216      600205   JMP      BGNPCH+5
00217      103153   JMS      TST2
00220      600205   JMP      SCOPE      /CHECK FOR SCOPING ERROR
00221      740040   PE01    HLT
           .EJECT    /ILLEGAL INSTRUCTION EXECUTED

```

```

/TEST 2, SET PUNCH FLAG WITH PSA AND PSB
/
00222 200466 TST2 LAC CKPSA /PSA IOT
00223 040227 DAC PSAB
00224 777776 PTST2 LAW -2
00225 040013 DAC 13
00226 750000 CLA
/
00227 000000 PSAB 0 /TO PSA OR PSB
00230 100317 JMS STAL4 /4 SEC STALL
00231 700201 PSF /FLAG SHOULD BE SET
00232 600240 JMP PER3 /ERROR, FLAG NOT SET
00233 440013 ISZ 13
00234 600227 JMP PSAB
00235 103153 JMS SCOPE /CHECK FOR SCOPE MODE
00236 600227 JMP PSAB /SCOPE LOOP
00237 600300 JMP PTST3 /EXIT
00240 103153 PER3 JMS SCOPE
00241 600227 JMP PSAB /SCOPE MODE
00242 200227 LAC PSAB
00243 540466 SAD CKPSA
00244 740040 PA02 HLT /FLAG NOT SETTING WITH PSA
00245 740040 PB02 HLT /FLAG NOT SETTING WITH PSB
00246 600227 JMP PSAB
,EJECT

```

```

/TEST 3, RESET PUNCH FLAG PSA,PSB AND PCF
00300      .LOC      300
/
00300      400227    PTST3  XCT      PSAB          /FIRST SET THE FLAG
00301      700201    PSF
00302      600301    JMP
00303      400227    XCT      PSAB          /FLAG SET, CLEAR WITH PSA,PSB
00304      600314    JMP      OK3          /OK, FLAG CLEARED
00305      103153    JMS      SCOPE        /ERROR, FLAG STILL SET
00306      600300    JMP      PTST3       /SCOPE LOOP
00307      200466    LAC      CKPSA
00310      540227    SAD      PSAB
00311      740040    PA03   HLT
00312      740040    PB03   HLT          /FLAG DID NOT CLEAR USING PSA
00313      600300    JMP      PTST3       /FLAG DID NOT CLEAR USING PSB
/RE=EXECUTE
00314      103153    OK3    JMS      SCOPE        /CHECK FOR SCOPE MODE
00315      600300    JMP      PTST3       /SCOPE MODE
00316      600326    JMP      PTST3A      /EXIT
/
/4 SEC STALL ROUTINE
/
00317      000000    STAL4  0
00320      777703    LAW      =75          /STALL 4 SEC
00321      044701    DAC      BLKLMT
00322      103225    JMS      STAL70
00323      444701    ISZ     BLKLMT
00324      600322    JMP
00325      620317    JMP*    STAL4
,EJECT

```

```

/CLEAR FLAG WITH PCF
/
00326 400227 PTST3A XCT PSAB /SET FLAG
00327 700201 PSF
00330 600327 JMP ,=1
00331 700202 PCF /CLEAR PUNCH FLAG
00332 700201 PSF
00333 600337 JMP OK3A /OK, FLAG CLEARED
00334 103153 JMS SCOPE /CHECK FOR SCOPE LOOP
00335 600326 JMP PTST3A /SCOPE MODE
00336 740040 PE04 HLT /ERROR, PCF DID NOT CLEAR FLAG
00337 103153 OK3A JMS SCOPE
00340 600326 JMP PTST3A /SCOPE MODE
00341 600400 JMP PTST4 /EXIT, NEXT TEST
/
/PUNCH INTERRUPT TEST
,LOC 400
/
00400 200470 PTST4 LAC JMP0
00401 040001 DAC 1
00402 700004 CLOF
00403 703302 CAF
00404 700042 ION
00405 103225 JMS STAL70 /WAIT 210 MS FOR ILLEGAL INTERRUPT
00406 103225 JMS STAL70
00407 103225 JMS STAL70
00410 103153 JMS SCOPE /CHECK FOR SCOPE MODE
00411 600400 JMP PTST4
00412 200471 PSRINT LAC JMP0
00413 040001 DAC 1
00414 703302 CAF
00415 700042 ION
00416 400227 XCT PSAB
00417 100317 JMS STAL4 /GET PUNCH GOING
00420 103153 JMS SCOPE /ERROR, NO INTERRUPT OCCURRED
00421 600412 JMP PSRINT /SCOPE
00422 200466 LAC CKPSA
00423 540227 SAD PSAB
00424 740040 PA05 HLT /NO INTERRUPT USING PSA
00425 740040 PB05 HLT /NO INTERRUPT USING PSB
00426 600412 JMP PSRINT
,EJECT

```

```

/INTERRUPT SERVICE ROUTINE
/
00427 103153 ILLEG JMS SCOPE
00430 600400 JMP PTST4 /RUN SCOPE LOOP
00431 700314 IORS /SEE IF PUNCH FLAG IS SET
00432 742010 RTL
00433 741100 SPA
00434 740040 P05A HLT /ERROR, PUNCH CAUSED ILLEGAL INTERRUPT
/CAF DIDN'T CLEAR FLAG
00435 700314 IORS /I/O STATUS
00436 740040 P05B HLT /SPURIOUS INTERT AC=I/O STATUS
00437 600400 JMP PTST4 /CONTINUE TO RE EXECUTE TEST
/
00440 103153 TSPFLG JMS SCOPE
00441 600412 JMP PSRINT /SCOPE MODE
00442 700314 IORS
00443 504711 AND (100000 /MASK PUNCH FLAG
00444 740200 SZA /MAKE SURE PUNCH CAUSED INTERRUPT
00445 600451 JMP OK4 /PUNCH FLAG UP
00446 700314 IORS
00447 740040 P05C HLT /SPURIOUS INTERT, AC=I/O STTUS
00450 600412 JMP PSRINT
/
00451 200446 OK4 LAC P05C-1
00452 040001 DAC 1
00453 700002 IOF
00454 750004 LAS /TEST FOR LOOP ON TESTS 2-4
00455 742010 RTL
00456 741100 SPA
00457 600224 JMP PTST2 /LOOP
00460 200467 LAC CKPSB
00461 540227 SAD PSAB
00462 600500 JMP NOTAPE /EXIT
00463 600223 JMP PTST2=1 /DO PSB IOT
/
00464 200467 PSBSRT LAC CKPSB /RESTART HERE IF LOOPING WITH PSB
00465 600223 JMP PTST2=1
/
00466 700204 CKPSA 700204 /PSA
00467 700244 CKPSB 700244 /PSB
00470 600427 JMP5 JMP ILLEG
00471 600440 JMP6 JMP TSPFLG
,EJECT

```

```

/
/TEST 5, NO TAPE TEST
/REMOVE ALL TAPE FROM PUNCH AFTER HALT AT LOCATION TAGGED PHLT10
00500      ,LOC      500
/
00500      703302    NOTAPE  CAF
00501      777766    LAW      -12
00502      040551    DAC      WORK
00503      750000    CLA
00504      700204    PSA
00505      700201    PSF
00506      600505    JMP      ,=1
00507      700314    IORS
00510      504712    AND      (400
00511      741200    SNA
00512      600516    JMP      OKNO
00513      103153    JMS     SCOPE
00514      600500    JMP     NOTAPE
00515      740040    FLGNOT HLT
/
00516      440551    OKNO   ISZ     WORK
00517      600503    JMP     NOTAPE*3
00520      103153    JMS     SCOPE
00521      600500    JMP     NOTAPE
00522      104506    JMS     REMTXT
00523      740040    PHLT10 HLT
/
00524      777766    LAW      =12
00525      040551    DAC      WORK
00526      703302    TSFLG  CAF
00527      750000    CLA
00530      700204    PSA
00531      700201    PSF
00532      600531    JMP      ,=1
00533      700314    IORS
00534      504712    AND      (400
00535      740200    SEA
00536      600542    JMP     OKFLG
00537      103153    JMS     SCOPE
00540      600526    JMP     TSFLG
00541      740040    NOFLG  HLT
/
00542      440551    OKFLG  ISZ     WORK
00543      600526    JMP     TSFLG
00544      103153    JMS     SCOPE
00545      600524    JMP     TSFLG=2
00546      104515    JMS     REPTXT
00547      740040    HLT10A HLT
00550      601000    JMP     PNSKEW
/
00551      000000    WORK   0
00552      000000    WORK1  0
,EJECT

```

/TEST NO TAPE FLA

/SEE IF FLAG SET
/OK, FLAG IS NOT SET/SCOPE LOOP
/ERROR, NO TAPE FLAG SET
/WITH TAPE IN PUNCH/TEST 10 TIMES
/CHECK FOR SCOPE MODE/TYPE: REMOVE TAPE
/REMOVE TAPE FROM PUNCH, PRESS
/CONTINUE TO TEST NO TAPE FLAG

/TEST FOR NO TAPE FLAG

/OK, FLAG SET

/RUN SCOPE MODE
/ERROR, NO TAPE FLAG DIDN'T SET

/TEST 10 TIMES

/SCOPE MODE
/TYPE: REPLACE TAPE
/END OF NO TAPE TEST
/HIT CONTINUE FOR PUNCH TEST

/SKEW TEST, PUNCH 512 ALTERNATE PATTERNS OF CHANNEL 1
/AND CHANNEL 8,

01000		/LOC	1000	
01000	103106	PNSKEW	JMS	LEADER /PUNCH LEADER
01001	103137		JMS	PNMARK /PUNCH THE MARK CHARACTER
01002	777000		LAW	=1000 /PUNCH 512 DECIMAL
01003	044701		DAC	BLKLMT
01004	044702		DAC	BLKLM2
01005	204713		LAC	(1 /CHANNEL 1
01006	103121		JMS	PUNCH
01007	444701		ISZ	BLKLMT
01010	601005		JMP	,=3
01011	204714		LAC	(200 /CHANNEL 8
01012	103121		JMS	PUNCH
01013	444702		ISZ	BLKLM2 /CHECK FOR BLOCK 512
01014	601011		JMP	,=3
01015	103153		JMS	SCOPE /CHECK SCOPE MODE
01016	601002		JMP	PNSKEW*2 /RUN SCOPE MODE
01017	103165		JMS	REPEAT
01020	601002		JMP	PNSKEW*2 /REPEAT TEST
01021	601100		JMP	PSACHK /RUN BASIC DATA CHECK

/BASIC DATA CHECKS
/PUNCH 1024 BLOCKS OF ZEROES

01100		/LOC	1100	
01100	776000	PSACHK	LAW	=2000 /PUNCH 1024 DECIMAL
01101	044701		DAC	BLKLMT
01102	750000		CLA	
01103	103121		JMS	PUNCH /PUNCH ZEROES
01104	444701		ISZ	BLKLMT /CHECK FOR BLOCK 1024
01105	601102		JMP	,=3
01106	103153		JMS	SCOPE /CHECK FOR SCOPE MODE
01107	601102		JMP	PSACHK*2 /RUN SCOPE MODE
01110	103165		JMS	REPEAT /CHECK FOR REPEAT
01111	601100		JMP	PSACHK /RUN REPEAT MODE
01112	601200		JMP	ALCHAN /PUNCH ALL CHANNEL TEST

,EJECT

```

/
/PUNCH ALL CHANNELS
/
01200      .LOC      1200
/
01200      776000    ALCHAN  LAW      -2000    /-1024 DECIMAL
01201      044701    DAC      BLKLMT
01202      204715    LAC      (377
01203      103121    JMS      PUNCH
01204      444701    ISZ      BLKLMT
01205      601202    JMP      ,=3
01206      103153    JMS      SCOPE    /CHECK FOR SCOPE MODE
01207      601202    JMP      ,=5      /RUN SCOPE MODE
01210      103165    JMS      REPEAT
01211      601200    JMP      ALCHAN   /REPEAT TEST
01212      601300    JMP      SLDONE   /SLIDING ONE TEST
/
/
/PUNCH A SLIDING ONE
/
01300      .LOC      1300
/
01300      776000    SLDONE  LAW      -2000    /-1024 DECIMAL
01301      044701    DAC      BLKLMT
01302      204716    LAC      (RAL
01303      041311    DAC      DIRONE
01304      754002    CLA!CLL!CML
01305      044673    DAC      STORE
01306      777770    LAW      -10
01307      044703    DAC      CHACNT
01310      204673    SLDA    LAC      STORE
01311      740010    DIRONE  RAL
01312      044673    DAC      STORE
01313      103121    JMS      PUNCH
01314      444701    ISZ      BLKLMT
01315      601323    JMP      CK8X
01316      103153    JMS      SCOPE    /CHECK SCOPE MODE
01317      601300    JMP      SLDONE   /RUN SCOPE MODE
01320      103165    JMS      REPEAT
01321      601300    JMP      SLDONE   /REPEAT TEST
01322      601500    JMP      SLDZERO  /SLIDE ZERO TEST
,EJECT

```

01323	444703	CK8X	ISZ	CHACNT	/CHECK FOR CHANNEL 8
01324	601310		JMP	SLDA	
01325	201311		LAC	DIRONE	
01326	544716		SAD	(RAL	/WAS 1 SLIDING LEFT?
01327	601335		JMP	CHGDIR	/YES, ROTATE RIGHT
01330	204716		LAC	(RAL	/NO, ROTATE LEFT
01331	041311		DAC	DIRONE	
01332	777771		LAW	=7	
01333	044703		DAC	CHACNT	
01334	601310		JMP	SLDA	
01335	204714	CHGDIR	LAC	(200	
01336	044673		DAC	STORE	
01337	204717		LAC	(RAR	
01340	041311		DAC	DIRONE	
01341	601332		JMP	CHGDIR=3	
			/		
			/		
01500			/PUNCH A SLIDING ZERO		
			,LOC	1500	
			/		
01500	776000	SLDZERO	LAW	=2000	/-1024 DECIMAL
01501	044701		DAC	BLKLMT	
01502	777770	SLDA0	LAW	=10	
01503	044703		DAC	CHACNT	
01504	204720		LAC	(370	
01505	044673		DAC	STORE	/STORE PATTERN
01506	103121		JMS	PUNCH	
01507	444701		ISZ	BLKLMT	/CHECK FOR BLOCK 1024
01510	601516		JMP	CHK0	
01511	103153		JMS	SCOPE	/CHECK FOR SCOPE MODE
01512	601500		JMP	SLDZERO	/RUN SCOPE MODE
01513	103165		JMS	REPEAT	
01514	601500		JMP	SLDZERO	/REPEAT TEST
01515	601700		JMP	ADJCH	/ADJACENT CHANNEL TEST
			/		
01516	444703	CHK0	ISZ	CHACNT	
01517	741000		SKP		
01520	601502		JMP	SLDA0	/RESET PATTERN
01521	204673		LAC	STORE	
01522	744002		STL		
01523	740010		RAL		
01524	601505		JMP	SLDA0+3	
			.EJECT		

```

01700      /PUNCH ADJACENT CHANNELS
           ,LOC 1700
           /
01700      776000      ADJCH  LAW  -2000      /-1024 DECIMAL
01701      044701      DAC  BLKLMT
01702      204716      LAC  (RAL
01703      041741      DAC  PATDIR+1
01704      777770      LAW  -10
01705      044703      DAC  CHACNT
01706      044704      DAC  PATCNT      /PUNCH 8 CLOUMN'S ALL 1'S
01707      204720      LAC  (376
01710      044705      DAC  PATERN
01711      204715      ADJ1  LAC  (377
01712      044673      DAC  STORE
01713      103121      JMS  PUNCH
01714      444701      ISZ  BLKLMT      /CHECK FOR 960 FRAMES
01715      601723      JMP  CKDROP      /TEST TO DROP A CHANNEL
01716      103153      ADJ2  JMS  SCOPE      /CHECK FOR SCOPE LOOP
01717      601700      JMP  ADJCH      /RUN SCOPE LOOP
01720      103165      JMS  REPEAT
01721      601700      JMP  ADJCH      /REPEAT THE TEST
01722      602200      JMP  PABNRY      /PUNCH BINARY COUNT TEST (PSA)

           /
01723      444703      CKDROP ISZ  CHACNT      /CHECK FOR 8 COLUMNS OF 377
01724      601711      JMP  ADJ1
01725      777770      LAW  -10
01726      044703      DAC  CHACNT      /RESET COL COUNT
01727      204705      LAC  PATERN
01730      103121      JMS  PUNCH
01731      444701      ISZ  BLKLMT
01732      741000      SKP
01733      601716      JMP  ADJ2      /TEST DONE
01734      444704      ISZ  PATCNT      /COUNT 8 COLUMNS
01735      741000      SKP
01736      601744      JMP  REVDIR      /CHANGE PATTERN DIRECTION
01737      204705      LAC  PATERN
01740      744002      PATDIR STL
01741      740010      RAL
01742      044705      DAC  PATERN
01743      601711      JMP  ADJ1      /PUNCH 7 MORE COL, OF 377
           ,EJECT

```

01744	201741	REVDIR	LAC	PATDIR+1	
01745	544717		SAD	(RAR	/WAS PATTERN SHIFTING RIGHT?
01746	601754		JMP	SHFTLT	/YES, SHIFT LEFT
01747	204717		LAC	(RAR	/NO, SHIFT RIGHT
01750	041741		DAC	PATDIR+1	
01751	777770		LAW	=10	
01752	044704		DAC	PATCNT	
01753	601711		JMP	ADJ1	
			/		
01754	204716	SHFTLT	LAC	(RAL	
01755	041741		DAC	PATDIR+1	
01756	601751		JMP	,=5	
			/		
			/		
02200		/PUNCH	BINARY COUNT WITH PSA		
			,LOC	2200	
			/		
02200	776000	PABNRY	LAW	=2000	/=1000 DECIMAL
02201	044701		DAC	BLKLMT	
02202	144673		DZM	STORE	
02203	444673	PLUS1	ISZ	STORE	
02204	204673		LAC	STORE	
02205	504715		AND	(377	
02206	103121		JMS	PUNCH	
02207	444701		ISZ	BLKLMT	
02210	602203		JMP	PLUS1	
02211	103153		JMS	SCOPE	/CHECK FOR SCOPE MODE
02212	602200		JMP	PABNRY	/RUN SCOPE MODE
02213	103165		JMS	REPEAT	
02214	602200		JMP	PABNRY	/REPEAT TEST
02215	602300		JMP	PBBNRY	/PUNCH BINARY COUNT (PSB)
			,EJECT		

```

/
/PUNCH BINARY COUNT WITH PSB
02300      ,LOC      2300
/
02300      776000    PBBNRY  LAW      -2000      /-1024 DECIMAL
02301      044701    DAC      BLKLMT
02302      144673    DZM      STORE
02303      444673    PLUS1B  ISZ      STORE
02304      204673    LAC      STORE
02305      504715    AND      (377)
02306      700244    PSB
02307      700201    PSF
02310      602307    JMP      ,=1
02311      444701    ISZ      BLKLMT
02312      602303    JMP      PLUS1B
02313      103153    JMS      SCOPE      /CHECK FOR SCOPE MODE
02314      602300    JMP      PBBNRY     /SCOPE MODE
02315      103165    JMS      REPEAT
02316      602300    JMP      PBBNRY     /REPEAT TEST
02317      602400    JMP      RANSTL     /RANDOM STALL TEST
/
/
/PUNCH RANDOM STALL AND BLOCK LENGTHS WITH FIXED DATA PATTERN
02400      ,LOC      2400
/
02400      777100    RANSTL  LAW      -700
02401      044701    DAC      BLKLMT
02402      103174    JMS      RANGEN
02403      504721    AND      (7
02404      740001    CMA
02405      044674    DAC      BLSTOR
02406      750000    NEWDAT  CLA
02407      103121    JMS      PUNCH
02410      204715    LAC      (377
02411      103121    JMS      PUNCH
02412      444674    ISZ      BLSTOR     /RANDOM BLOCK LENGTHS
02413      602406    JMP      NEWDAT
02414      444701    ISZ      BLKLMT
02415      741000    SKP
02416      602421    JMP      CHKSTS
02417      102430    JMS      STALL
02420      602402    JMP      RANSTL*2
/
02421      103153    CHKSTS  JMS      SCOPE      /CHECK FOR SCOPE MODE
02422      602402    JMP      RANSTL*2
02423      103165    JMS      REPEAT
02424      602400    JMP      RANSTL     /REPEAT TEST
02425      103106    JMS      LEADER     /PUNCH TRAILER
02426      740040    HLT      /TEST FINISHED
02427      603400    JMP      RDSKEW     /HIT CONTINUE TO READ TAPE
,EJECT

```

```

/RANDOM STALL ROUTINE
/
STALL 0
      JMS      RANGEN
      AND      (7777)
      CMA
      DAC      CHACNT
      LAW      =42
      DAC      WORK
      ISZ      WORK
      JMP      ,=1
      ISZ      CHACNT
      JMP      ,=5
      JMP*     STALL
/
/PUNCH CHARACTER IN ACS 10-17
      ,LOC     3100
/
PUNCHR CAF
      LAS
      PSA
      PSF
      JMP      ,=1
      JMP      PUNCHR
/
/PUNCH LEADER
LEADER 0
      LAW      =310
      DAC      LEDCNT
      JMS      TNOTAP
      CLA
      PSA
      PSF
      JMP      ,=1
      ISZ      LEDCNT
      JMP      ,=6
      JMP*     LEADER
      ,EJECT
/SET UP COUNTER
/PUNCH ALPHA

```

```

02430 000000
02431 103174
02432 504722
02433 740001
02434 044703
02435 777736
02436 040551
02437 440551
02440 602437
02441 444703
02442 602435
02443 622430

```

```

03100
03100 703302
03101 750004
03102 700204
03103 700201
03104 603103
03105 603100

```

```

03106 000000
03107 777470
03110 044675
03111 103145
03112 750000
03113 700204
03114 700201
03115 603114
03116 444675
03117 603111
03120 623106

```

```

/
/PUNCH ROUTINE
/
PUNCH 0
      DAC      DATSTR      /SAVE DATA
      JMS      TNOTAP     /TEST FOR NO TAPE
      LAS
      AND      (3777)     /SPEED CONTROL
      CMA
      DAC      WORK
      ISZ      WORK
      JMP      ,=1
      LAC      DATSTR     /DATA
      PSA
      PSF
      JMP      ,=1
      JMP*     PUNCH
/
/PUNCH AN ALL 1'S MARK CHARACTER
/
PNMARK 0
      LAC      (377
      PSA
      PSF
      JMP      ,=1
      JMP*     PNMARK
      ,EJECT

```

```

03121 000000
03122 044676
03123 103145
03124 750004
03125 504723
03126 740001
03127 040551
03130 440551
03131 603130
03132 204676
03133 700204
03134 700201
03135 603134
03136 623121

```

```

03137 000000
03140 204715
03141 700204
03142 700201
03143 603142
03144 623137

```

```

/TEST FOR NO TAPE IN PUNCH
/
03145 000000 TNQTAP 0
03146 700314 IORS
03147 504712 AND (400 /NO TAPE FLAG
03150 740200 SEA /TAPE OK
03151 603205 JMP PNOTAP /NO, EXIT
03152 623145 JMP* TNQTAP /YES, CONTINUE
/
/TEST FOR SCOPE MODE, AC SW1 = 1
/
03153 000000 SCOPE 0
03154 777777 LAW -1
03155 044701 DAC BLKLM1
03156 044702 DAC BLKLM2
03157 750004 LAS
03160 740010 RAL
03161 741100 SPA /SCOPE MODE?
03162 623153 JMP* SCOPE /YES
03163 443153 ISZ SCOPE /NO, CONTINUE
03164 623153 JMP* SCOPE
/
/TEST AC SW2 FOR REPEAT MODE
/
03165 000000 REPEAT 0
03166 750004 LAS
03167 742010 RTL
03170 741100 SPA /REPEAT MODE?
03171 623165 JMP* REPEAT /YES
03172 443165 ISZ REPEAT /NO, CONTINUE
03173 623165 JMP* REPEAT
/
/RANDOM NUMBER GENERATOR
/
03174 000000 RANGEN 0
03175 344671 TAD RANA
03176 344672 TAD RANB
03177 044671 DAC RANA
03200 750010 GLK
03201 344671 TAD RANA
03202 344672 TAD RANB
03203 044672 DAC RANB
03204 623174 JMP* RANGEN
,EJECT

```

/TYPE 'NO TAPE IN PUNCH'
/

03205 104475
03206 203213
03207 104624
03210 104475
03211 700402
03212 740040

PNOTAP JMS CRLF
LAC NTFLG
JMS INDX11
JMS CRLF
TCF
HLT

/CARRIAGE RETURN LINEFEED
/TEXT 'NO TAPE IN PUNCH'

/CONSTANTS FOR NO TAPE TEXT
/

03213 003213
03214 317316
03215 324240
03216 320301
03217 240305
03220 316311
03221 320240
03222 316325
03223 310303
03224 000000

NTFLG
317316 /OIN
324240 /TI
320301 /PIA
240305 /IE
316311 /NI
320240 /PI
316325 /NIU
310303 /HIC
000000

/70 MS STALL ROUTINE
/

03225 000000
03226 777772
03227 040551
03230 770000
03231 040552
03232 440552
03233 603232
03234 440551
03235 603230
03236 623225

STAL70 0
LAW =6
DAC WORK
LAW -10000
DAC WORK1
ISZ WORK1
JMP ,=1
ISZ WORK
JMP STAL70+3
JMP* STAL70
,EJECT

/READ ROUTINE

/THIS SUBROUTINE IS USED TO VERIFY THE TAPE PUNCHED
 /WITH THE PUNCH TEST, THE TAPE MUST BE PUNCHED WITH
 /THE 'SCOPE MODE AND REPEAT MODE' DISABLED TO ALLOW FOR
 /CORRECT READER SYNCING,
 /PLACE THE PUNCHED TAPE IN THE READER ANY PLACE IN THE
 /BLANK LEADER,

03400

.LOC 3400

/TEST 1
/READ SKEW TEST

03400	204713	RDSKEW	LAC	(1	/TEST 1
03401	044677		DAC	TSTNO	
03402	777200		LAW	-600	/CNTR FOR BLANK LEADER
03403	044701		DAC	BLKLMT	
03404	204713		LAC	(377	/MARK CHAR,
03405	044700		DAC	DATA	
03406	104431	RD MARK	JMS	READ	
03407	544700		SAD	DATA	
03410	603414		JMP	RDSK18	/MARK CHAR., START READ
03411	444701		ISZ	BLKLMT	
03412	603406		JMP	RD MARK	
03413	604532		JMP	NOREAD	/ERROR, NO MARK CHAR,
			/		
03414	777000	RDSK18	LAW	=1000	/=512 DECIMAL
03415	044701		DAC	BLKLMT	
03416	044702		DAC	BLKLM2	
03417	204713		LAC	(1	/COLUMN 1
03420	044700		DAC	DATA	/=TO GOOD DATA
03421	104431	SKEW1	JMS	READ	
03422	544700		SAD	DATA	/COMPARE GOOD TO READ DATA
03423	741000		SKP		
03424	104437		JMS	RDRERR	/READ ERROR
03425	444701		ISZ	BLKLMT	
03426	603421		JMP	SKEW1	
03427	204714		LAC	(200	/COLUMN 8
03430	044700		DAC	DATA	
03431	104431	SKEW8	JMS	READ	
03432	544700		SAD	DATA	/COMPARE DATA
03433	741000		SKP		
03434	104437		JMS	RDRERR	/DATA ERROR
03435	444702		ISZ	BLKLM2	
03436	603431		JMP	SKEW8	
03437	103165		JMS	REPEAT	/CHECK FOR REPEAT MODE
03440	603414		JMP	RDSK18	/REPEAT READ
03441	603500		JMP	RDZERO	/READ ZERO TEST

.EJECT

```

/TEST 2
/READ BASIC DATA CHECK
03500      ,LOC      3500
/
03500      204724    RDZERO  LAC      (2          /TEST 2
03501      044677    DAC      TSTNO
03502      144700    DZM      DATA      /REGISTER FOR GOOD DATA
03503      703302    CAF
03504      776000    LAW      =2000    /=1024 DECIMAL
03505      044701    DAC      BLKLMT
03506      104431    JMS      READ      /READ DATA
03507      741200    SNA      /SHOULD BE ALL 0'S
03510      741000    SKP
03511      104437    JMS      RDRERR    /READ ERROR
03512      444701    ISZ      BLKLMT
03513      603506    JMP      ,05      /READ NEXT COLUMN
03514      103165    JMS      REPEAT    /CHECK FOR REPEAT MODE
03515      603500    JMP      RDZERO    /REPEAT READ
03516      603600    JMP      RDALL     /READ ALL CHANNEL TEST
/
/TEST 3
/READ ALL CHANNEL TEST
03600      ,LOC      3600
/
03600      204725    RDALL  LAC      (3          /TEST 3
03601      044677    DAC      TSTNO
03602      776000    LAW      =2000    /=1024 DECIMAL
03603      044701    DAC      BLKLMT
03604      204715    LAC      (377
03605      044700    DAC      DATA
03606      104431    ALLCHA JMS      READ      /READ DATA
03607      544700    SAD      DATA      /COMPARE DATA
03610      741000    SKP
03611      104437    JMS      RDRERR    /READ ERROR
03612      444701    ISZ      BLKLMT
03613      603606    JMP      ALLCHA
03614      103165    JMS      REPEAT
03615      603600    JMP      RDALL     /REPEAT READ
03616      603700    JMP      ROSLD1    /READ SLIDING ONE
,EJECT

```

```

/TEST 4
/READ SLIDING '1' TEST
03700      ,LOC      3700
/
03700      204726   RSLD1  LAC      (4
03701      044677   DAC      TSTNO
03702      776000   LAW      -2000
03703      044701   DAC      BLKLMT
03704      754002   CLA:STL
03705      044700   DAC      DATA
03706      777770   LAW      -10
03707      044703   DAC      CHACNT
03710      204700   RSLDA1 LAC      DATA
03711      740010   SETDIR  RAL
03712      044700   DAC      DATA
03713      104431   JMS     READ
03714      544700   SAD      DATA
03715      741000   SKP
03716      104437   JMS     RDRERR
03717      444701   ISZ     BLKLMT
03720      741000   SKP
03721      603737   JMP     REPCHK
03722      444703   ISZ     CHACNT
03723      603710   JMP     RSLDA1
03724      203711   LAC     SETDIR
03725      544716   SAD     (RAL
03726      603734   JMP     REDDIR
03727      204716   LAC     (RAL
03730      043711   DAC     SETDIR
03731      777771   RESET  LAW     =7
03732      044703   DAC     CHACNT
03733      603710   JMP     RSLDA1
/
03734      204717   REDDIR LAC     (RAR
03735      043711   DAC     SETDIR
03736      603731   JMP     RESET
/
03737      103165   REPCHK JMS     REPEAT
03740      603700   JMP     RSLD1
03741      604000   JMP     RSLD0
,EJECT
/REPEAT READ
/READ SLIDING ZERO

```

/TEST 4

/-1024 DECIMAL

/READ COLUMN

/COMPARE TO GOOD DATA

/EXIT, CHECK FOR REPEAT

/CHECK FOR CHANNEL 8

/ROTATE CHANNEL

/HAS 1 SLIDING LEFT?

/YES, ROTATE RIGHT

/NO, ROTATE LEFT

```

/TEST 5
/READ SLIDING ZERO TEST
04000      ,LOC      4000
04000      204727   RDSLDB   LAC      (5           /TEST 5
04001      044677   DAC      TSTNO          /-1024 DECIMAL
04002      776000   LAW      =2000
04003      044701   DAC      BLKLMT
04004      777770   RSLDAB   LAW      =10
04005      044703   DAC      CHACNT
04006      204720   LAC      (376
04007      044700   DAC      DATA      /GOOD DATA
04010      104431   JMS      READ
04011      544700   SAD      DATA      /COMPARE DATA
04012      741000   SKP
04013      104437   JMS      RDRERR      /READ ERROR
04014      444701   ISZ      BLKLMT
04015      741000   SKP
04016      604027   JMP      REPCK2      /EXIT, CHECK FOR REPEAT
04017      444703   ISZ      CHACNT      /CHECK FOR COLUMN 8
04020      741000   SKP
04021      604004   JMP      RSLDAB      /RESET PATTERN
04022      204700   LAC      DATA
04023      744002   STL
04024      740010   RAL
04025      504715   AND      (377
04026      604007   JMP      RSLDAB+3
04027      103165   REPCK2  JMS      REPEAT
04030      604000   JMP      RDSLDB      /REPEAT READ
04031      604100   JMP      RDA0JC      /READ ADJACENT CHANNEL TEST
,EJECT

```

```

/TEST 6
/READ ADJACENT CHANNEL TEST
04100      ,LOC      4100
          /
04100      204730    RDADJC  LAC      (6          /TEST 6
04101      044677    DAC      TSTNO
04102      776000    LAW      =2000      /~1024 DECIMAL
04103      044701    DAC      BLKLMT
04104      204716    LAC      (RAL
04105      044147    DAC      PATRED*1
04106      777770    LAW      =10
04107      044703    DAC      CHACNT
04110      044704    DAC      PATCNT      /READ 8 COLUMN'S ALL 1'S
04111      204720    LAC      (376
04112      044705    DAC      PATERN
04113      204715    RADJ1  LAC      (377
04114      044700    DAC      DATA
04115      104431    JMS      READ
04116      544700    SAD      DATA      /COMPARE READ TO GOOD DATA
04117      741000    SKP
04120      104437    JMS      RDRERR      /READ ERROR
04121      444701    ISZ      BLKLMT
04122      741000    SKP
04123      604165    JMP      REPCK3
04124      444703    ISZ      CHACNT      /EXIT, CHECK FOR REPEAT
04125      604113    JMP      RADJ1      /CHECK FOR 8 COLUMNS OF 377
04126      777770    LAW      =10
04127      044703    DAC      CHACNT
04130      204705    LAC      PATERN
04131      504715    AND      (377
04132      044700    DAC      DATA
04133      104431    JMS      READ
04134      544700    SAD      DATA      /COMPARE READ TO GOOD DATA
04135      741000    SKP
04136      104437    JMS      RDRERR      /READ ERROR
04137      444701    ISZ      BLKLMT      /DONE?
04140      741000    SKP      /NO
04141      604165    JMP      REPCK3      /EXIT
04142      444704    ISZ      PATCNT      /COUNT 8 COLUMNS
04143      741000    SKP
04144      604152    JMP      REVRED
04145      204705    LAC      PATERN      /CHANGE PATTERN DIRECTION
04146      744002    PATRED STL
04147      740010    RAL
04150      044705    DAC      PATERN
04151      604113    JMP      RADJ1
          ,EJECT

```

04152	204147	REVRED	LAC	PATRED+1	
04153	544717		SAD	(RAR	/WAS PATTERN SHIFTING RIGHT
04154	604162		JMP	SHLEFT	/YES, SHIFT LEFT
04155	204717		LAC	(RAR	/NO, SHIFT RIGHT
04156	044147		DAC	PATRED+1	
04157	777770		LAW	=10	
04160	044704		DAC	PATCNT	
04161	604113		JMP	RADJ1	
			/		
04162	204716	SHLEFT	LAC	(RAL	
04163	044147		DAC	PATRED+1	
04164	604157		JMP	,=5	
			/		
04165	103165	REPCK3	JMS	REPEAT	
04166	604100		JMP	ROADJC	/REPEAT READ
04167	604200		JMP	RDRSA	/READ BINARY COUNT TEST
			/		
			/TEST 7		
			/READ BINARY COUNT PUNCHED WITH PSA		
04200			,LOC	4200	
			/		
04200	204721	RDRSA	LAC	(7	/TEST 7
04201	044677		DAC	TSTNO	
04202	776000		LAW	=2000	/-1024 DECIMAL
04203	044701		DAC	BLKLMT	
04204	144700		DEM	DATA	
04205	444700	RPLUS1	ISE	DATA	
04206	204700		LAC	DATA	
04207	504715		AND	(377	
04210	044700		DAC	DATA	
04211	104431		JMS	READ	/READ DATA
04212	544700		SAD	DATA	/COMPARE READ TO GOOD DATA
04213	741000		SKP		
04214	104437		JMS	RDRERR	/READ ERROR
04215	444701		ISZ	BLKLMT	
04216	604205		JMP	RPLUS1	/CONTINUE
04217	103165		JMS	REPEAT	
04220	604200		JMP	RDRSA	
04221	604300		JMP	RDRSB	/EXIT, READ BINARY COUNT
			,EJECT		

```

/TEST 8
/READ BINARY COUNT PUNCHED WITH PSB
04300      ,LOC      4300
/
04300      204731    RDRSB  LAC      (10      /TEST 8
04301      044677    DAC      TSTNO
04302      776000    LAW      -2000    /-3024 DECIMAL
04303      044701    DAC      BLKLMT
04304      144700    DZM      DATA
04305      444700    RPLUSB ISZ      DATA
04306      204700    LAC      DATA
04307      504732    AND      (77
04310      344714    TAD      (200
04311      044700    DAC      DATA
04312      104431    JMS      READ      /READ COLUMN
04313      544700    SAD      DATA      /COMPARE READ TO GOOD DATA
04314      741000    SKP
04315      104437    JMS      RDRERR
04316      444701    ISZ      BLKLMT    /READ ERROR
04317      604305    JMP      RPLUSB
04320      103165    JMS      REPEAT
04321      604300    JMP      RDRSB
04322      604400    JMP      RDRAN    /READ RANDOM STALL TEST
/
/TEST 9
/READ RANDOM STALL TEST
04400      ,LOC      4400
/
04400      204733    RDRAN  LAC      (11      /TEST 9
04401      044677    DAC      TSTNO
04402      770415    LAW      -7363
04403      044701    DAC      BLKLMT
04404      777777    LAW      -1
04405      044700    DAC      DATA
04406      204700    RAN1   LAC      DATA
04407      740001    CMA
04410      504715    AND      (377
04411      044700    DAC      DATA
04412      104431    JMS      READ      /READ COLUMN
04413      544700    SAD      DATA      /COMPARE READ TO GOOD DATA
04414      741000    SKP
04415      104437    JMS      RDRERR
04416      444701    ISZ      BLKLMT    /READ ERROR
04417      604406    JMP      RAN1
04420      103165    JMS      REPEAT
04421      604400    JMP      RDRAN
04422      604423    JMP      READY    /TEST DONE
.EJECT

```

```

/SET UP FOR ANOTHER TEST TAPE
/
04423 700104  READY  RSA  /CLEAR TAPE FROM READER
04424 700101  RSF
04425 604424  JMP      .-1
04426 104537  JMS     TSTOK  /TYPE DONE
04427 740040  HLT     /HIT CONTINUE TO PUNCH NEXT TAPE
04430 601000  JMP     PNSKEW
/
/READ SUBROUTINE, EXIT WITH DATA IN THE AC
/
04431 000000  READ    0
04432 700104  RSA
04433 700101  RSF
04434 604433  JMP     .-1
04435 700112  RRB
04436 624431  JMP*   READ
/
/PRINT DATA ERROR
/
04437 000000  RDRERR 0
04440 044706  DAC     SAVDAT  /STORE BAD DATA
04441 104462  JMS     TEXT    /TYPE OUT ERROR HEADER
04442 104522  JMS     TAB     /TYPE TAB
04443 204677  LAC     TSTNO
04444 344734  TAD     (200
04445 104664  JMS     TYPE
04446 104522  JMS     TAB     /TYPE TAB
04447 760240  LAW     240    /TYPE SPACE
04450 104664  JMS     TYPE
04451 204700  LAC     DATA
04452 104641  JMS     OCTPRT /PRINT GOOD DATA
04453 104522  JMS     TAB     /TYPE TAB
04454 700112  RRB
04455 104641  JMS     OCTPRT /PRINT BAD DATA
04456 750004  LAS
04457 740100  SMA     /AC SW0=1?
04460 740040  HLT     /NO, HALT
04461 624437  JMP*   RDRERR  /YES, CONTINUE
      .EJECT

```

/PRINT ERROR HEADER

```

04462 000000 TEXT /
04463 104475 JMS CRLF
04464 104475 JMS CRLF
04465 204553 LAC TSTTYP /TYPE TEST
04466 104624 JMS INDX11
04467 204562 LAC GOOD /TYPE GOOD
04470 104624 JMS INDX11
04471 204567 LAC BAD /TYPE BAD
04472 104624 JMS INDX11
04473 104475 JMS CRLF
04474 624462 JMP* TEXT

04475 000000 CRLF /
04476 760215 LAW 215 /CR
04477 700406 TLS
04500 700401 TSF
04501 604500 JMP ,=1
04502 544504 SAD ,+2
04503 624475 JMP* CRLF
04504 760212 LAW 212 /LF
04505 604477 JMP CRLF*2

/REMOVE TAPE FROM PUNCH
/
04506 000000 REMTXT /
04507 104475 JMS CRLF
04510 104475 JMS CRLF
04511 204573 LAC REPTAP
04512 104624 JMS INDX11
04513 104475 JMS CRLF
04514 624506 JMP* REMTXT

/REPLACE TAPE IN PUNCH
/
04515 000000 REPTXT /
04516 104475 JMS CRLF
04517 204603 LAC REPTAP
04520 104624 JMS INDX11
04521 624515 JMP* REPTXT

/TYPE TAB
/
04522 000000 TAB /
04523 777774 LAW =4
04524 044710 DAC TEMP1
04525 760240 LAW 240
04526 104664 JMS TYPE
04527 444710 ISZ TEMP1
04530 604525 JMP ,=3
04531 624522 JMP* TAB
,EJECT

```

/NO MARK CHARACTER

04532	104475	NOREAD	JMS	CRLF
04533	204613		LAC	NOMARK
04534	104624		JMS	INDX11
04535	740040		HLT	
04536	603400		JMP	RDSKEW

/TYPE DONE

04537	000000	TSTOK	0	
04540	104475		JMS	CRLF
04541	760304		LAW	304
04542	104664		JMS	TYPE
04543	760317		LAW	317
04544	104664		JMS	TYPE
04545	760316		LAW	316
04546	104664		JMS	TYPE
04547	760305		LAW	305
04550	104664		JMS	TYPE
04551	104475		JMS	CRLF
04552	624537		JMP	TSTOK

/CONSTANTS FOR TEST NO.

04553	004553	TSTTYP	:	
04554	305324		305324	/E T
04555	324323		324323	/T S
04556	316240		316240	/N
04557	256260		256260	/,JO
04560	240240		240240	/SPACE
04561	000000		000000	

/CONSTANTS FOR GOOD

04562	004562	GOOD	:	
04563	317307		317307	/O,G
04564	304317		304317	/D,O
04565	240240		240240	/SPACE
04566	000000		000000	

/CONSTANTS FOR BAD

04567	004567	BAD	:	
04570	302240		302240	/B,
04571	304301		304301	/D,A
04572	000000		000000	
			,EJECT	

/CONSTANTS FOR REMOVE TAPE

04573	004573	REMTAP	:	
04574	305322		305322	/E,R
04575	317315		317315	/O,M
04576	305326		305326	/E,V
04577	324240		324240	/T,
04600	320301		320301	/P,A
04601	240305		240305	/E
04602	000000		000000	

/CONSTANTS FOR REPLACE TAPE

04603	004603	REPTAP	:	
04604	305322		305322	/E,R
04605	314320		314320	/L,P
04606	303301		303301	/C,A
04607	240305		240305	/E
04610	301324		301324	/A,T
04611	305320		305320	/E,P
04612	000000		000000	

/CONSTANTS FOR NO MARK CHAR.

04613	004613	NOMARK	:	
04614	317316		317316	/O,N
04615	315240		315240	/M,
04616	322301		322301	/R,A
04617	240313		240313	/K
04620	310303		310303	/H,C
04621	322301		322301	/R,A
04622	000256		000256	/I,
04623	000000		000000	

04624	000000	INDX11	0	
04625	040011	DAC	11	
04626	220011	LAC*	11	
04627	741200	SNA		
04630	624624	JMP*	INDX11	
04631	104664	JMS	TYPE	
04632	742020	RTR		
04633	742020	RTR		
04634	742020	RTR		
04635	742020	RTR		
04636	740020	RAR		
04637	104664	JMS	TYPE	
04640	604626	JMP	INDX11+2	
		,EJECT		

/SET UP NUMBERS TO BE PRINTED
/

04641	000000	OCTPRT	0
04642	044707	DAC	SAVNUM
04643	742020	RTR	
04644	742020	RTR	
04645	742020	RTR	
04646	504721	AND	(7
04647	344734	TAD	(260
04650	104664	JMS	TYPE
04651	204707	LAC	SAVNUM
04652	742020	RTR	
04653	740020	RAR	
04654	504721	AND	(7
04655	344734	TAD	(260
04656	104664	JMS	TYPE
04657	204707	LAC	SAVNUM
04660	504721	AND	(7
04661	344734	TAD	(260
04662	104664	JMS	TYPE
04663	624641	JMP*	OCTPRT

/PRINT CHARACTER
/

04664	000000	TYPE	0
04665	700406	TL5	
04666	700401	T5F	
04667	604666	JMP	=1
04670	624664	JMP*	TYPE
04671	743217	RANA	743217
04672	340221	RANB	340221
04673	000000	STORE	0
04674	000000	BLSTOR	0
04675	000000	LEDCNT	0
04676	000000	DATSTR	0
04677	000000	TSTNO	0
04700	000000	DATA	0
04701	000000	BLKLM1	0
04702	000000	BLKLM2	0
04703	000000	CHACNT	0
04704	000000	PATCNT	0
04705	000000	PATERN	0
04706	000000	SAVDAT	0
04707	000000	SAVNUM	0
04710	000000	TEMP1	0

,EJECT

	000000	
04711	100000	*L
04712	000400	*L
04713	000001	*L
04714	000200	*L
04715	000377	*L
04716	740010	*L
04717	740020	*L
04720	000376	*L
04721	000007	*L
04722	007777	*L
04723	037777	*L
04724	000002	*L
04725	000003	*L
04726	000004	*L
04727	000005	*L
04730	000006	*L
04731	000010	*L
04732	000077	*L
04733	000011	*L
04734	000260	*L

,END

SIZE=04735

NO ERROR LINES