



EQUIPMENT
CORPORATION
MAYNARD, MASSACHUSETTS

CHECKLIST NUMBER:

ZJ110-RB

SOFTWARE CHECKLIST

MAINTAINER: SOFTWARE DISTRIBUTION CENTER
MAYNARD, MASSACHUSETTS 01754

CHECKLIST TITLE: CM11-F DIAGNOSTIC

PAGE 1 OF 1

DATE: 3/26/76

HARDWARE DESIGNATIONS:

CENTRAL PROCESSOR UNIT(S)

OPTION(S)

SOFTWARE ASSEMBLY POINT:

☐ ML

☐ GA

☐ MR

☐ WM

CHECKLIST DISTRIBUTION:

☒ ML

☐ GA

☐ MR

☐ WM

PROGRAM TITLE

PROGRAM CODE

MCO REQ.

CHECK OFF

CM11F DIAGNOSTIC TEST

MAINDEC-11-DZCMB-B-D
MAINDEC-11-DZCMB-B-PB

MARK SENSE ALPHA CARD DECK
(100 CARDS, 80 COL.)

MAINDEC-00-DZCMA-A-CA

MARK SENSE BINARY CARD DECK
(100 CARDS, 80 COL.)

MAINDEC-00-DZCMA-A-CB

MARK SENSE OPTICAL CARD DECK
(100 CARDS, 80 COL.)

MAINDEC-00-DZCMB-A-CO

M.C. 1347

MAINDEC-11-DZCMB-00002

THE FOLLOWING SHOULD BE INCLUDED IF THIS KIT IS SHIPPING
WITH "ADD ON" HARDWARE

DEC/X11 GENERAL PRODUCTS MODULE LIBRARY #2

NOTES: KIT CONTENTS:

1 MANUAL

1 PAPERTAPE

1 MCO

3 CARD DECKS

MOO NO. 11-22-24P-002
SHEET OF _____
DATE RECEIVED 11-3-25
FIRST ISSUE _____
FINAL ISSUE _____

The SXT at location 1106 wipes out the vector address held by R0.

LEGION TO BE CHANGED

12045

DISP CODE

OPTIONS AFFORDED

CORRECTION

Do the SXI on a scratch register, R5.

PRODUCT LINES AFFECTED

2021

DISPOSITION CODES

APPROVAL SIGNATURES

DIAGNOSTIC ENGR. K. Lind/
MFG. ENGR. W. Kellicker/
FIELD SERVICE S. Johnson/
PRODUCT ENGR. R. Flater/

R. Lind

W. Kelliker/

S. Johnson

.REM *

MAIN DEC CHANGE NOTICE
MAY BE REQUIRED FOR
PROGRAM TO OPERATE

~~ZCM B B 1~~

Change Order
Incorporated
as ZCM B B 1

IDENTIFICATION

PRODUCT CODE: MA1DEC-11-DZCMB-B-D

PRODUCT NAME: CM11F CARD READER DIAGNOSTIC TEST

DATE CREATED: DECEMBER 21, 1974

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHORS: RICK FADDEN
RAYMOND SHOOP

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1. ABSTRACT

THIS TEST IS TO BE USED AS A CARD READER DIAGNOSTIC FOR THE PDP-11 WITH THE CM11F CARD READER. IT TESTS ALL LOGIC FUNCTIONS OF THE CARD READER, AND INCLUDES AN EXERCISER FOR PUNCH ALPHANUMERIC, ADDRESS PUNCH BINARY, AND MARKSENSE BINARY TEST DECKS. A SEPARATE STARTING ADDRESS ALLOWS THE ERROR SENSING FUNCTIONS OF THE READER TO BE CHECKED. ANOTHER STARTING ADDRESS TESTS SPECIAL DECKS WHICH HAVE ALL COLUMNS AND CARDS PUNCHED OR MARKED IDENTICALLY, TO AID IN DIAGNOSING SPECIAL PROBLEMS.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 STANDARD COMPUTER
CM-11F CARD CONTROLLER
CM-11FA,FB CARD READER DOCUMENTATION MODEL OM-200 <80 COLUMN>

2.2 TEST DECKS

MAINDEC-00-DECMA-A,CA PUNCHED ALPHANUMERIC TEST DECK
MAINDEC-00-DECMA-A,CB PUNCHED BINARY TEST DECK
MAINDEC-00-DECMB-A,CO MARKSENSE BINARY TEST DECK
SPARE CARDS FOR THE ERROR FUNCTION TEST

2.3 STORAGE

THE ROUTINE USES MEMORY 0 TO 16000.

3. LOADING PROCEDURE

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

BASIC SWITCH REGISTER SETTINGS ARE:

SW15=1 OR JP---HALT ON ERROR
 SW14=1 OR JP---SCOPE LOOP
 SW13=1 OR JP---INHIBIT PRINT OUT
 SW12=1 OR JP---INHIBIT TRACE TRAPPING
 SW11=1 OR JP---INHIBIT SUB-PROGRAM ITERATION
 (NOTE THAT IF SW11 IS SET, THE CARD COUNT
 WILL BE ALTERED, CAUSING FAILURES IN THE
 DATA TEST SECTION.)
 SW07=1 OR JP---LOOP THRU THE INSTRUCTION TEST PORTION
 (NOTE THAT THE PROGRAM MAY HANG LEGITIMATELY
 WHEN THE INPUT HOPPER GOES EMPTY IF SW7 IS SET)
 SW06=1 OR JP---RETURN TO THE BEGINNING OF THE INSTRUCTION TEST
 WHEN CONTINUING FROM ONE DECK TO ANOTHER
 SW05=1 OR JP---HALT BETWEEN TEST DECKS
 (SEE 5.2.1 FOR EXPLANATION OF SW5=0)
 SW04=1 OR JP---RUN THE PUNCHED BINARY TEST DECK (UNLESS SW03 IS SET)
 SW03=1 OR JP---RUN THE MARKSENSE BINARY TEST DECK (OPTICAL —

LSR = 20 →
 LSR = 10 →

REQUIRES "INDEX MARKS" SW

SET TO "CLOCK" TO PREVENT ERRORS
 DUE TO DELIBERATE OFFSET MARKS
 ON TEST DECK.

4.2 STARTING ADDRESSES

200 = INSTRUCTION AND DATA TEST
 210 = PICK SUBTEST LOOP
 220 = ERROR FUNCTION TEST
 240 = SINGLE SUBTEST LOOP
 250 = READ SINGLE DATA PATTERN TEST

4,3 PROGRAM AND/OR OPERATOR ACTION

4,3,1 INSTRUCTION AND DATA RELIABILITY TEST (SA 200)

LOAD PROGRAM INTO MEMORY.
LOAD ONE TEST DECK IN THE CARD READER INPUT HOPPER.
PRESS RESET ON THE CARD READER, WAIT FOR RESET LIGHT.
SET SWITCH REGISTER TO STARTING ADDRESS.
LOAD ADDRESS.
SET SWITCHES (SEE 4.1)--ALL DOWN FOR WORST CASE, ALPHA TEST DECK.
PRESS START.
WHEN THE INPUT HOPPER IS EMPTY THE PROGRAM WILL HANG WAITING
FOR AN INTERRUPT FROM THE CARD READER. LOAD ONE OR MORE
TEST DECKS INTO THE INPUT HOPPER. PRESSING "RESET"
ON THE CARD READER SHOULD CAUSE PROGRAM EXECUTION
TO RESUME.
THIS ENTIRE SEQUENCE IS NECESSARY TO RUN THE FULL TEST ON THE CARD
READER.

4,3,2 PICK SUBTEST LOOP (SA 210)

LOAD CARDS (SPARE CARDS OR A TEST DECK) INTO THE INPUT HOPPER.
PRESS "RESET" ON THE CARD READER, WAIT FOR THE RESET LIGHT.
LOAD THE STARTING ADDRESS.
PRESS START
AT THE HALT - LOAD SWITCH REGISTER WITH MOTION DELAY SIZE.

4,3,3 ERROR FUNCTION TEST (SA 220)

LOAD A FEW SPARE CARDS INTO THE INPUT HOPPER
PRESS "RESET" ON THE CARD READER, WAIT FOR RESET LIGHT.
LOAD THE STARTING ADDRESS, THEN SET THE DESIRED SWITCH OPTIONS.
PRESS START.
FOLLOW THE INSTRUCTIONS AS THEY ARE PRINTED OUT.

4,3,4 SINGLE SUBTEST LOOP (SA 240)

LOAD CARDS (SPARE CARDS OR A TEST DECK) INTO THE INPUT HOPPER.
PRESS "RESET" ON THE CARD READER, WAIT FOR RESET LIGHT.
LOAD THE STARTING ADDRESS.
PRESS START.
AT THE 1ST HALT, LOAD THE STARTING ADDRESS OF THE DESIRED TEST
(ADDRESS OF THE SCOPE INSTRUCTION AT THE BEGINNING OF
THE TEST.)
PRESS CONTINUE!
AT THE 2ND HALT SET THE SWITCH REGISTER OPTIONS (BIT 11 MUST=0).
PRESS CONTINUE.

4.3.5 SINGLE DATA PATTERN TEST (SA 250)

A SPECIAL JECK (1 OR MORE CARDS) MUST BE PUNCHED OR MARKED TO RUN THIS TEST. ANY DATA PATTERN MAY BE USED, BUT IT MUST BE IDENTICAL IN ALL 80 COLUMNS OF ALL THE CARDS (I.E. ONLY ONE PIECE OF DATA).

LOAD THIS PREPARED DECK INTO THE INPUT HOPPER.
PRESS CARD READER "RESET", WAIT FOR RESET LIGHT.
LOAD SA 250.

PRESS START.
AT THE INITIAL HALT SET THE CARD IMAGE OF THE DATA PATTERN USED IN SW11-SW00.

PRESS CONTINUE.
WHEN THE CARD READER RUNS OUT OF CARDS IT WILL RING THE BELL.
RELOADING THE DECK AND PRESSING "RESET" ON THE CARD READER WILL CONTINUE THE TEST.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

5.1.1 AT SA 200 (INSTRUCTION AND DATA RELIABILITY TEST)

SEE 4.1

5.1.2 AT SA 210 (PICK SUBTEST LOOP)

AT THE HALT - LOAD THE DELAY BETWEEN CARD MOTION IN THE SWITCH REGISTER.

5.1.3 AT SA 220 (ERROR FUNCTION TEST FOR CH11F)

SW14=1 TO LOOP THRU THE CURRENT SUBTEST
SW15=1 TO HALT ON ERROR

5.1.4 AT SA 240 (SINGLE SUBTEST LOOP)

1ST HALT - LOAD STARTING ADDRESS OF DESIRED TEST
2ND HALT - SET SR OPTIONS (BIT 11 MUST=0)
SEE 4.1 FOR SR OPTIONS
NOTE THAT T-BIT IS NOT SET WHEN USING THIS STARTING POINT.

5.1.5 AT SA 250 (SINGLE DATA PATTERN TEST)

AT THE HALT-LOAD THE CARD-IMAGE OF THE DATA PATTERN IN SW11-SW00.

5.2 SUBROUTINE ABSTRACTS

5.2.1 BEGIN SA 200

THE INSTRUCTION TESTS ARE RUN FIRST, FOLLOWED BY THE DATA RELIABILITY TESTS ON THE REMAINING CARDS IN THE FIRST TEST DECK. AT THE END OF THE DECK THE BELL WILL RING, AND IF SW5=1 THE PROGRAM HALTS. IF SW5=0, PROGRAM ACTION DEPENDS ON THE NUMBER OF TEST DECKS LOADED. IF THERE ARE STILL CARDS IN THE INPUT HOPPER, THE PROGRAM WILL RUN THE DATA RELIABILITY TEST ON THE ENTIRE DECK. IF THE INPUT HOPPER IS EMPTY AT THE END OF A DECK, THE PROGRAM WILL RUN A SET OF TESTS OF OFF-LINE OPERATIONS. AT THE END OF THESE TESTS, IT WAITS FOR THE CARD READER TO BE PUT BACK ON-LINE. FURTHER CHECKS ARE MADE OF THE OFF-LINE TO ON-LINE OPERATIONS, AND THEN THE DATA RELIABILITY TEST IS RUN ON THE ENTIRE DECK. IF SW5=1, HITTING CONTINUE WILL RESUME PROGRAM OPERATION AFTER THE HALT. IF ALL OTHER SWITCHES WERE DOWN, FOR EXAMPLE, THE DATA RELIABILITY TEST WOULD THEN BE RUN ON THE NEXT DECK. THE OTHER SWITCHES AFFECT PROGRAM FLOW AS NOTED IN 4.1.

5.2.2 SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST IN THE INSTRUCTION SECTION. IT RECORDS THE STARTING ADDRESS OF EACH SUBTEST AS IT IS BEING ENTERED. IF A SCOPE LOOP IS REQUESTED, IT WILL JUMP TO THE START OF THE SUBTEST THAT THE SCOPE LOOP IS REQUESTED FOR. IF SCOPE LOOP IS NOT REQUESTED, THERE WILL BE 1 ITERATION ON THAT SUBTEST BEFORE THE NEXT SUBTEST IS ENTERED. SWITCH 11 ON A 1 INHIBITS ITERATION OF SUBTESTS:

5.2.3 HLT

THIS SUBROUTINE PRINTS OUT THE LOCATION COUNTER AT THE TIME OF FAILURE, AND THE CONTENTS OF THE PROCESSOR STATUS REGISTER. NOTE THAT THE LOCATION COUNTER WILL BE THE ADDRESS OF THE HLT PLUS TWO.

5.2.4 TTRAP

THIS ROUTINE ALLOWS THE TRACE BIT TO BE SET AFTER THE FIRST LOOP OF THE PROGRAM. THE TRACE BIT WILL BE SET ON ALTERNATE LOOPS OF THE INSTRUCTION AND DATA TEST UNLESS SW12 IS SET. THE FIRST INSTRUCTION EXECUTED UPON TRAPPING IS AN "RTI" (OR "RTT") WHICH RETURNS TO THE INTERRUPTED SEQUENCE. THIS CONTINUES UNTIL THE END OF THE PROGRAM LOOP IS REACHED.

5.2.5 TRAPCATCHER

THIS IS A SERIES OF INSTRUCTIONS STARTING AT LOCATION 0 DESIGNED TO DETECT AND ISOLATE UNEXPECTED TRAPS AND INTERRUPTS TO THE TRAP AND INTERRUPT VECTOR AREA OF MEMORY.

EACH VECTOR ENTRANCE ADDRESS IS LOADED WITH THE ADDRESS OF THE NEXT LOCATION. THE NEXT LOCATION IS LOADED WITH A HALT (000000). THUS AN ILLEGAL TRAP OR INTERRUPT WILL CAUSE A HALT AT THE TRAP LOCATION PLUS TWO.

IF A HALT OCCURS IN THE TRAP OR INTERRUPT AREA, EXAMINE REGISTER SIX. IT WILL CONTAIN THE CURRENT STACK ADDRESS. THE CONTENTS OF THE CURRENT STACK ADDRESS IS THE VALUE OF THE LOCATION COUNTER WHEN THE TRAP OR INTERRUPT OCCURRED.

5.2.6 ERCM11 (ERROR FUNCTION TEST)

THIS TEST CHECKS OPERATION OF THE VARIOUS ERROR SENSING FEATURES OF THE DOCUMENTATION OM-200 CARD READER. CARD READER OFF-LINE, INPUT HOPPER EMPTY, OUTPUT STACKER FULL, FEED ERROR AND MOTION ERROR ARE CHECKED.

5.2.7 TESTX (SINGLE TEST LOOP)

THIS ROUTINE ALLOWS A SINGLE SUBTEST TO BE RUN CONTINUOUSLY FOR SCOPE LOOP PURPOSES. WHILE A SCOPE LOOP SWITCH OPTION EXISTS, IT REQUIRES THAT YOU ARE WITHIN THE TEST IN WHICH YOU WISH TO LOOP. IN SOME CASES (SUCH AS WITH INTERMITTENT FAILURES) THAT'S NOT EASY TO DO. THIS SUBROUTINE ALLOWS YOU TO LOAD THE ADDRESS OF ANY TEST FROM TEST0 THRU TEST24 AND TESTA THRU TESTG AT THE HALT AND THEN GO DIRECTLY TO THAT TEST.

5.2.8 CKSAME (SINGLE DATA PATTERN TEST)

THIS TEST IS DESIGNED TO AID IN THE DIAGNOSIS OF DIFFICULT DATA ERROR PROBLEMS AND FACILITATE SOME CARD READER ADJUSTMENTS. IT CONTINUOUSLY READS CARDS WHICH HAVE ALL COLUMNS PUNCHED OR MARKED IDENTICALLY (AND ALL CARDS MUST BE IDENTICAL). CHECKING THE DATA AGAINST A PATTERN SET UP ON THE SWITCHES INITIALLY, ANY ERRORS ARE PRINTED OUT, ALONG WITH A COUNT OF THE TOTAL NUMBER OF CARDS READ AND THE TOTAL NUMBER OF DATA ERRORS WHICH HAVE OCCURRED SINCE THE TEST WAS STARTED.

5.2.9 DELAY (PICK SUBTEST LOOP)

THIS TEST IS DESIGNED TO AID IN THE DIAGNOSIS OF DIFFICULT JICK PROBLEMS AND FACILITATE REPAIR. IT CONTINUOUSLY MOVES CARDS THRU THE CARD READER AT A RATE DETERMINED BY THE SWITCH REGISTER VALUE. NEITHER DATA OR STATUS REGISTER ARE CHECKED FOR ERRORS. THE PROGRAM WILL CONTINUALLY LOOP UNTIL STOPPED BY THE OPERATOR

5.3 PROGRAM AND/OR OPERATOR ACTION

5.3.1

LOADING AND STARTING AT 200 WITH ALL SWITCHES DOWN IS WORST CASE TESTING. A SINGLE ALPHANUMERIC DECK SHOULD BE RUN. THIS EXECUTES AN INSTRUCTION TEST FOLLOWED BY A DATA RELIABILITY TEST. AT THE END OF THE DECK CHECKS ARE MADE OF THE FLAG SETTINGS WHICH SHOULD BE AFFECTED, AND THE PROGRAM WAITS FOR AN INTERRUPT FROM THE READER COMING BACK ON-LINE. AT THE END OF THE FIRST DECK THE OPERATOR SHOULD LOAD ONE OR MORE DECKS IN THE INPUT HOPPER AND PRESS "RESET" ON THE CARD READER. IF THE CARD READER IS WORKING PROPERLY, THE BELL WILL RING ONCE WHEN "RESET" IS PRESSED AND THE ENTIRE DECK WILL BE RUN THRU THE DATA RELIABILITY PORTION OF THE TEST. IF, AFTER READING 80 CARDS, THE INPUT HOPPER IS NOT EMPTY, THE PROGRAM WILL CONTINUE TO THE NEXT DECK. SWITCH OPTIONS MAY BE USED TO ALTER THIS FLOW AS NOTED IN SECTION 4.1.

5.3.2

TO GO DIRECTLY TO A SINGLE SUBTEST AND RUN IT CONTINUOUSLY, USE SA 240. AT THE FIRST HALT, SET THE SWITCH REGISTER TO THE STARTING ADDRESS OF THE DESIRED SUBTEST (I.E. THE ADDRESS OF THE SCOPE INSTRUCTION AT THE START OF THE TEST), AND CONTINUE. AT THE SECOND HALT, SET THE DESIRED SWITCH REGISTER OPTIONS AND CONTINUE (SW11 MUST BE = 0). THE PROGRAM WILL CONTINUOUSLY LOOP THRU THE DESIRED SUBTEST UNTIL SW11 IS SET OR THE PROCESSOR IS HALTED.

6, ERRORS

6.1.1.1 STANDARD PRINTOUT

PRINTOUTS ARE IN A TWO-WORD FORMAT. THE FIRST IS THE PC+2 OF THE DETECTED ERROR. THE SECOND IS THE CONTENTS OF THE PROCESSOR STATUS REGISTER WHEN THE ERROR WAS DETECTED.

6.1.1.2 DATA ERROR PRINTOUT

THE HEADING IS PRINTED OUT ONCE PER TEST DECK. THE COLUMNS HAVE THE FOLLOWING SIGNIFICANCE:

DECK - EITHER PUNCHED ALPHANUMERIC, PUNCHED BINARY, OR MARKSENSE BINARY DECK, DEPENDING ON SWITCHES 3 AND 4
CARD - THE CARD NUMBER WHERE THE FAILURE OCCURRED <DEC.>
COLUMN - THE COLUMN NUMBER WHERE THE FAILURE OCCURRED <DEC.>
PATTERN - THE CORRECT CARD IMAGE DATA THAT SHOULD HAVE BEEN READ
READ1 - THE CARD IMAGE DATA IS READ TWICE. THIS IS WHAT WAS READ THE FIRST TIME FROM CRB1
READ2 - THIS IS WHAT WAS IN CRB1 AFTER A BRIEF TIMING LOOP. IT SHOULD BE THE SAME AS THE PREVIOUS READING.
CODED - THIS IS WHAT THE DATA SHOULD BE IN ENCODED FORM
READ - THIS IS WHAT WAS READ BY ADDRESSING THE ENCODED BUFFER

DATA ERRORS NOT TRACED TO CARD READER HARDWARE INCLUDE:
A. SW03 AND SW04 NOT SET TO TYPE OF DECK USED
B. CARD MISSING
C. DAMAGED CARD

6.1.1.3 SINGLE DATA PATTERN PRINTOUT

THE SINGLE DATA PATTERN TEST PRINTS OUT A HEADING WITH EACH ERROR PRINTOUT. THE COLUMNS HAVE THE FOLLOWING SIGNIFICANCE:

COLUMN - THE COLUMN NUMBER WHERE THE FAILURE OCCURRED.
READ1 - DATA IS READ TWICE. THIS IS THE FIRST READING.
READ2 - THIS IS WHAT WAS READ THE SECOND TIME.
CARDS - THE TOTAL NUMBER OF CARDS (IN OCTAL) THAT HAVE BEEN RUN SINCE THE TEST WAS STARTED.
ERRORS - THE TOTAL NUMBER OF ERRORS DETECTED (IN OCTAL) SINCE THE TEST WAS STARTED.

6.2 ERROR RECOVERY

IN GENERAL, TEST FAILURES WILL PRINTOUT AN ERROR MESSAGE AND CONTINUE. IF THE "HALT ON ERROR" SWITCH IS SET, HITTING CONTINUE WILL RECOVER. IF THE PROGRAM HANGS UP IN A LOOP, THE ERROR IS LIKELY TO BE A SIGNAL WHICH WAS NEVER RECEIVED. IF A HALT OCCURS IN THE TRAP AND VECTOR AREA THE PROGRAM MUST BE RESTARTED. IF THE PROGRAM HALTS IN THE MAIN FLOW, CONSULT THE LISTING IF NO MESSAGE IS TYPED OUT.

6.3 ERRORS INVOLVING BIT 8 OF THE CSR

THE CM11 HAS A DELAY WHICH OCCASIONALLY WILL CAUSE AN ERROR PRINTOUT REFERRING TO BIT 8 TO OCCUR, SOMETIMES ON-LINE TRANSITION WILL SET BEFORE OFF-LINE CLEARS; ALSO, THE OFF-LINE BIT WILL NOT SET IMMEDIATELY WHEN AN ERROR OCCURS WHICH PUTS THE READER OFF-LINE.

7. RESTRICTIONS

7.1 STARTING PROCEDURE

NONE

7.2 OPERATIONAL RESTRICTIONS

7.2.1 COMBINED INSTRUCTION AND DATA RELIABILITY TEST (SA 200)

IF A STANDARD TEST DECK IS NOT BEING USED, SW7 MUST BE SET TO INHIBIT RUNNING THE DATA RELIABILITY PORTION OF THE TEST. THE PROCESSOR MAY HANG WHEN THE INPUT HOPPER GOES EMPTY, AND THIS IS NOT TO BE REGARDED AS A FAILURE.

WHEN USING THE STANDARD TEST DECKS, THEY MUST BE IN GOOD CONDITION, IT IS A GOOD IDEA TO LABEL THE CARDS DECKS AS SOON AS THE DECK IS RECEIVED.

7.2.2 PICK SUBTEST LOOP (SA 210)

THE PICK SUBTEST LOOP REQUIRES SPARE CARDS OR TEST DECKS. THE TEST WILL INITILIZE CARD MOTION AT A RATE DETERMINED BY THE SWITCH REGISTER.

7.2.3 ERROR FUNCTION TEST (SA 220)

THE ERROR FUNCTION TEST REQUIRES SPARE CARDS. THE TEST WILL TYPE OUT A REQUEST FOR THE CARDS WHEN THEY ARE NEEDED.

7.2.4 SINGLE DATA PATTERN TEST (SA 250)

A SPECIAL DECK (ONE OR MORE CARDS) MUST BE PREPARED. ALL COLUMNS OF ALL CARDS ARE PUNCHED OR MARKED IDENTICALLY, USING A DATA PATTERN WHICH WILL TEST THE PROBLEM BEING DIAGNOSED.

8. MISCELLANEOUS

8.1 EXECUTION TIME

NOT APPLICABLE

8.2 CARD DECK DESCRIPTION

8.2.1 PUNCHED ALPHANUMERIC

REFERENCE THE ALPHANUMERIC TABLE BEGINNING AT THE TAG ALPCD IN THE LISTING FOR THE CODES PUNCHED FOR EACH OF 80 COLUMNS ON THE CARD). THE FIRST VALUE GIVEN FOR A COLUMN IS THE CARD IMAGE OF THAT COLUMN, WHILE THE SECOND VALUE IS THE ENCODED FORM OF THE SAME PATTERN. EACH SUCCESSIVE CARD IN THE DECK USES THE SAME SEQUENCE OF CODES.

8.2.2 PUNCHED BINARY

REFERENCE THE BINARY DATA TABLE BEGINNING AT THE TAG BINCD IN THE LISTING FOR THE CODES PUNCHED FOR EACH OF THE 80 COLUMNS OF THE CARD. AS WITH THE ALPHANUMERIC DECK EACH SUCCESSIVE CARD HAS THE SAME SEQUENCE OF CODES.

8.2.3 MARKSENSE BINARY DECK

REFERENCE THE MARKSENSE DATA TABLE BEGINNING AT THE TAG MRKCD IN THE LISTING FOR THE CODES PRINTED FOR EACH OF THE 80 COLUMNS ON THE CARD. THEY ARE PRINTED RATHER THAN PUNCHED. AS WITH THE ALPHA AND BINARY DECKS EACH SUCCESSIVE CARD HAS THE SAME SEQUENCE OF CODES.

8.3 SPECIAL NOTES

IF THE CARD READER GOES OFF-LINE BEFORE THE END OF A CARD, BUSY REMAINS SET UNTIL THE CARD ACTUALLY CLEARS THE READER.

"CARD DONE" FROM THE LAST CARD IN THE INPUT HOPPER WILL OCCUR BEFORE THE CARD READER GOES OFF-LINE DUE TO "INPUT HOPPER EMPTY," CLEARING BIT 0 OF THE CRS AFTER SETTING IT CAN CAUSE THE READER TO NOT READ A CARD IF IT IS DONE RAPIDLY ENOUGH.

8.4 TESTING CM11F'S WITH NON-STANDARD ADDRESSES

BY SUBSTITUTING INTO THE LOCATIONS KCRS, KCRB1, AND CRB2 THE ADDRESSES OF THE CRS, CRB1, AND CRB2 OF A CARD READER ASSIGNED A NON-STANDARD ADDRESS, AND SUBSTITUTING ITS INTERRUPT VECTOR ADDRESS INTO INTVC, A CM11 MAY BE TESTED AT ANY ADDRESS ASSIGNED TO IT.

9. PROGRAM DESCRIPTION

THIS SET OF TESTS IS DESIGNED TO CHECK ALL OPERATIONS OF THE CM11 CARD READER, WITH THE NECESSARY EXCEPTION THAT TIMING IN MOST CASES IS ONLY PARTIALLY TESTED. A SPECIAL TEST IS INCLUDED TO CHECK OUT THE ERROR FUNCTIONS OF THE DOCUMENTATION OM-200 READER, WHICH PRINTS OUT DIRECTIONS AS IT GOES ALONG. A TEST IS ALSO INCLUDED TO ISOLATE DIFFICULT DATA ERRORS USING A SPECIAL TEST DECK MADE UP BY THE USER. A TEST IS ALSO INCLUDED TO ISOLATE

DIFFICULT PICK ERRORS USING ANY TEST DECK. IN THIS TEST THE SWITCH REGISTER IS USED AS A DELAY CONSTANT FOR INITIALIZING CARD MOTION. NO DATA IS CHECKED IN THE THIS TEST.

10.

LISTING

SEE FOLLOWING PAGES.

11.

FLOWCHART

NOT APPLICABLE.


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      .ABS
537      .LIST      SEQ,BIN
538      .NLIST     MD,MC,END
539      .TITLE     MD=11=DECM-B CH11F DOCUMENTATION <80 COLUMN> CARD READER
540      .COPYRIGHT 1973,1974 DIGITAL EQUIPMENT CORP., MAYNARD, MASS, 01754
541
542      177570      SR=177570
543      177776      PSR=177776
544      000240      NOP=240
545      104000      HLT=EMT
546      104400      SCOPE=TRAP
547      000006      RTT=6
548      000000      ADINT=X0
549      000001      COUNT=X1
550      000002      R2=X2
551      000003      CR3=X3
552      000004      CRB1=X4
553      000005      R5=X5
554      000006      SP=X6
555      000007      PC=X7
556
557      ILOAD TRAP CATCHER INTO LOCATIONS 0 THRU 377
558      ILOAD TRAP VECTORS FOR HLT AND SCOPE ROUTINES
559
560      000014      TRTRAP
561      000016      340
562      000030      PRINT
563      000032      340
564      000034      SCOPE
565      000036      340
566      000046      LOGICAL
567
568      ILOAD STARTING ADDRESS AREA
569      000200      012706 001000
570      000204      000167 000740
571      000210      012706 001000
572      000214      000167 011054
573      000220      012706 001000
574      000224      000167 007244
575      000240      012706 001000
576      000244      000167 010344
577
578      000250      012706 001000
579      000254      000167 010410
580
581      ILOAD POINTERS AND GENERAL STORAGE
582      001000      001000
583      001000      000000
584      001012      001012
585
586      STACKI 0
587      001012      001012
588
589      MOV #STACK,SP
590      JMP BEGIN
591      MOV #STACK,SP
592      JMP DELAY
593      MOV #STACK,SP
594      JMP EROM11
595      MOV #STACK,SP
596      JMP TESTX
597      MOV #STACK,SP
598      JMP OKSAME
599
600      INFLGI 0
601      INTVCI 230
602      TCRI 177564
603      YDBRI 177566
604      KCRSI 177160
605      KCRB1 177162
606      CRB2 177164
607      TRTRAP RTI
608      TRPLGI 0
609      PROC 0
610      ERPLGI 0
611      PIRQI 177772
612
613      INITIALIZE CSR AND DBR POINTERS
614      SETUP: MOV #1,THAX
615      MOV KCRS,GRS
616      MOV KCRB1,CRB1
617      MOV INTVC,ADINT
618      MOV INTFLG
619      CLR TRPLG
620      MOV #TRET,0#10
621      CLR #12
622      SXT R0
623      NOP
624      MOV #RTT,0#TRTRAP
625      BR #12
626      MOV #RTI,0#TRTRAP
627      CMP (SP)+,(SP)+
628      MOV #12,0#10
629      MOV #340,PSR
630      RTS
631      BEGIN: JSR #7,SETUP
632      BR TEST
633      RESTRT: MOV #340,(SP)
634      MOV #TEST,(SP)
635      TST TRPLG
636      BPL PSSET
637      BIT #10000,SR
638      BNE PSSET
639      MOV #360,2(SP)
640      PSSET: RTI
641
642      TEST FOR CORRECT INITIALIZATION OF STATUS REGISTER
643      TEST1: MOV #TEST1A,RETURN
644      TEST1A: SCOPE
645      JSR #7,CMBIT0
646      CLR #7,CLNTR
647      CLR COUNT
648      INC COUNT
649      BNE #2
650      INC COUNT
651      BNE #2
652
653      ICONTAINS ADDRESS OF INTERRUPT VECTOR
654      IUSED FOR TIMING, ETC.
655      ISCRATCH
656      ICONTAINS ADDRESS OF CARD READ STATUS REGISTER
657      ICONTAINS ADDRESS OF CARD READER BUFFER (12 BIT DATA)
658      ISCRATCH
659      ISTACK POINTER
660      IPROGRAM COUNTER
661
662      INORMAL STARTING ADDRESS FOR DOCUMENTATION ON=200 READER
663      IPICK DELAY TEST
664      ISTARTING ADDRESS FOR CH11F ERROR FUNCTION TEST
665      ISTARTING ADDRESS FOR LOOP WHICH CONTINUALLY RUNS
666      IANY SINGLE SUBTEST
667      ISTARTING ADDRESS OF TEST TO READ A SINGLE DATA
668      IPATTERN CONTINUOUSLY
669
670      ISTACK POINTER INITIALIZED TO POINT HERE
671      IIN CASE OF STACK OVERFLOW
672
673      ICONTAINS LEVEL THAT INTERRUPT IS FOUND AT
674      IADDRESS OF CARD READER INTERRUPT VECTOR
675      IADDRESS OF TELETYPE STATUS REGISTER
676      IADDRESS OF TELETYPE DATA BUFFER
677      IADDRESS OF CARD READER STATUS REGISTER
678      IADDRESS OF CARD READER DATA BUFFER
679      IADDRESS TO READ ENCODED DATA
680      IRETURN FROM TRACE LOOP (CHANGED TO RTT FOR AN 11/45)
681      ITOGGLED TO SWITCH BETWEEN TRACE TRAPPING AND NORMAL FLO
682      ISTORES PROCESSOR STATUS WHEN TRACE TRAP MUST BE CLEARED
683      IIN A SUBTEST
684      ISET TO ZERO TO OUTPUT DATA ERROR HEADING
685      IADDRESS OF PDP 11/45 PIRQ REGISTER
686
687      ISET ITERATION MAXIMUM TO 1 ITERATION
688      ISET UP REGISTER POINTERS
689      ILOAD ADDRESS OF INTERRUPT VECTOR
690      IINITIALIZE INTERRUPT FLAG
691      IINITIALIZE TRACE FLAG
692      ISETUP RESVD INST TRAP RETURN
693      ISIGN EXTEND INST,
694      IIF NO TRAP THIS IS AN 11/45 OR 11/40
695      IIF TRAP, NOT AN 11/45 OR 11/40
696      IRESTORE STACK POINTER
697      ISETUP PROCESSOR STATUS TO LEVEL 7
698      IRETURN
699      IINITIALIZE POINTERS AND FLAGS
700      IGO TO INSTRUCTION TESTS
701      IPUSH STATUS ON STACK
702      IPUSH PC ON STACK
703      ICHECK FLAG
704      IIF IT IS POSITIVE, CLEAR T BIT
705      ITRACE TRAPPING INHIBITED?
706      IBRANCH IF YES
707      ISET T BIT ON STACK
708
709      ISETUP SCOPE LOOP RETURN ADDRESS
710      ISO ALL TESTS START WITH SCOPE
711      ICHECK FOR OFF-LINE SET
712      ISTORE PROCESSOR STATUS AND CLEAR TRACE BIT
713      IINITIALIZE COUNTER
714      IWAIT TO BE CERTAIN
715      ITHAT ALL CARDS ARE
716      ITHRU BEFORE ISSUING
717      IINIT

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594 001012 000000 INTFLGI 0
595 001014 000230 INTVCI 230
596 001016 177564 TCRI 177564
597 001020 177566 YDBRI 177566
598 001022 177160 KCRSI 177160
599 001024 177162 KCRB1 177162
600 001026 177164 CRB2 177164
601 001030 000002 TRTRAP RTI
602 001032 000000 TRPLGI 0
603 001034 000000 PROC 0
604
605 001036 000000 ERPLGI 0
606 001040 177772 PIRQI 177772
607
608
609
610 001042 012767 000001 011092 INITIALIZE CSR AND DBR POINTERS
611 001050 016703 177746 SETUP: MOV #1,THAX
612 001054 016704 177744 MOV KCRS,GRS
613 001060 016700 177730 MOV KCRB1,CRB1
614 001064 005067 177722 MOV INTVC,ADINT
615 001070 005067 177736 MOV INTFLG
616 001074 012737 001122 CLR TRPLG
617 001102 005037 000012 MOV #TRET,0#10
618 001106 006700 000012 CLR #12
619 001110 000240 000000 001030 MOV #RTT,0#TRTRAP
620 001112 012737 000002 001030 BR #12
621 001120 000404 000002 001030 MOV #RTI,0#TRTRAP
622 001122 012737 000012 000010 CMP (SP)+,(SP)+
623 001130 022626 000012 000010 MOV #12,0#10
624 001132 012737 000012 000010 MOV #340,PSR
625 001140 012767 000340 176630 RTS
626 001146 000207 000000 000000 BEGIN: JSR #7,SETUP
627 001150 004767 177666 BR TEST
628 001154 000417 000340 001214 RESTRT: MOV #340,(SP)
629 001156 012746 000340 001214 MOV #TEST,(SP)
630 001162 012746 001214 177640 TST TRPLG
631 001166 005767 177640 BPL PSSET
632 001172 100007 010000 176366 BIT #10000,SR
633 001174 032767 001000 176366 BNE PSSET
634 001202 001003 000360 000002 MOV #360,2(SP)
635 001204 012766 000360 000002 PSSET: RTI
636 001212 000002
637
638
639 001214 012767 001224 012724 TEST FOR CORRECT INITIALIZATION OF STATUS REGISTER
640 001222 104400 TEST1: MOV #TEST1A,RETURN
641 001224 004767 010256 TEST1A: SCOPE
642 001230 004767 010136 JSR #7,CMBIT0
643 001234 005001 000000 CLR #7,CLNTR
644 001236 005201 000000 CLR COUNT
645 001240 001376 000000 INC COUNT
646 001242 005201 000000 BNE #2
647 001244 001376 000000 INC COUNT
648 001244 001376 000000 BNE #2
649
650      ICONTAINS LEVEL THAT INTERRUPT IS FOUND AT
651      IADDRESS OF CARD READER INTERRUPT VECTOR
652      IADDRESS OF TELETYPE STATUS REGISTER
653      IADDRESS OF TELETYPE DATA BUFFER
654      IADDRESS OF CARD READER STATUS REGISTER
655      IADDRESS OF CARD READER DATA BUFFER
656      IADDRESS TO READ ENCODED DATA
657      IRETURN FROM TRACE LOOP (CHANGED TO RTT FOR AN 11/45)
658      ITOGGLED TO SWITCH BETWEEN TRACE TRAPPING AND NORMAL FLO
659      ISTORES PROCESSOR STATUS WHEN TRACE TRAP MUST BE CLEARED
660      IIN A SUBTEST
661      ISET TO ZERO TO OUTPUT DATA ERROR HEADING
662      IADDRESS OF PDP 11/45 PIRQ REGISTER
663
664      ISET ITERATION MAXIMUM TO 1 ITERATION
665      ISET UP REGISTER POINTERS
666      ILOAD ADDRESS OF INTERRUPT VECTOR
667      IINITIALIZE INTERRUPT FLAG
668      IINITIALIZE TRACE FLAG
669      ISETUP RESVD INST TRAP RETURN
670      ISIGN EXTEND INST,
671      IIF NO TRAP THIS IS AN 11/45 OR 11/40
672      IIF TRAP, NOT AN 11/45 OR 11/40
673      IRESTORE STACK POINTER
674      ISETUP PROCESSOR STATUS TO LEVEL 7
675      IRETURN
676      IINITIALIZE POINTERS AND FLAGS
677      IGO TO INSTRUCTION TESTS
678      IPUSH STATUS ON STACK
679      IPUSH PC ON STACK
680      ICHECK FLAG
681      IIF IT IS POSITIVE, CLEAR T BIT
682      ITRACE TRAPPING INHIBITED?
683      IBRANCH IF YES
684      ISET T BIT ON STACK
685
686      ISETUP SCOPE LOOP RETURN ADDRESS
687      ISO ALL TESTS START WITH SCOPE
688      ICHECK FOR OFF-LINE SET
689      ISTORE PROCESSOR STATUS AND CLEAR TRACE BIT
690      IINITIALIZE COUNTER
691      IWAIT TO BE CERTAIN
692      ITHAT ALL CARDS ARE
693      ITHRU BEFORE ISSUING
694      IINIT

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648	001246	005201	INC	COUNT	
649	001250	001376	BNE	,=2	
650	001252	016746	MOV	PROC,=(SP)	RESTORE PROCESSOR STATUS
651	001256	012746	MOV	#TST1B,=(SP)	
652	001262	000002	RTI		
653	001264	000005	TS1B1	RESET	SEND OUT INIT
654	001266	005713	TS1	0CRS	CHECK FOR STATUS REGISTER ALL ZERO
655	001270	001401	BEQ	,+4	BRANCH IF OK
656	001272	104000	HLT		STATUS REGISTER NOT CORRECTLY INITIALIZED
657					ONLY BITS 1 AND 6 OF THE STATUS REGISTER SHOULD BE ABLE TO BE SET TO ONE
658					AND READ BACK AS ONE
659	001274	052713	BIS	#17776,0CRS	SET ALL BITS BUT 0
660	001300	022713	CMP	#102,0CRS	ONLY BITS 1 AND 6 SHOULD BE SET
661	001304	001402	BEQ	,+6	BRANCH IF OK
662	001306	104000	HLT		STATUS REGISTER DIDN'T CONTAIN 102
663	001310	000404	BR	TEST2	BRANCH AFTER FAILURE
664					CLEARING STATUS REGISTER SHOULD CLEAR BITS 1 AND 6
665	001312	005013	CLR	0CRS	CLEAR BITS 1 AND 6
666	001314	005713	TS1	0CRS	CHECK FOR ALL BITS CLEAR
667	001316	001401	BEQ	,+4	BRANCH IF OK
668	001320	104000	HLT		BIT 1 AND/OR BIT 6 DIDN'T CLEAR
669					
670	001322	104400	TEST21	SCOPE	
671					START SHOULD CAUSE CARD DONE WITHIN 1 SECOND
672					BIT 0 SHOULD ALWAYS READ AS BEING EQUAL TO ZERO
673	001324	004767	JSR	X7,CXB1B	CHECK FOR OFF-LINE SET
674	001330	004767	JSR	X7,CLRTR	STORE CURRENT PROCESSOR STATUS AND CLEAR TRACE BIT
675	001334	005213	INC	0CRS	START READING A CARD
676	001336	032713	BIT	#1,0CRS	CHECK BIT 0
677	001342	001401	BEQ	,+4	BRANCH IF NOT SET
678	001344	104000	HLT		BIT 0 READ AS A ONE
679	001346	005001	CLR	COUNT	INITIALIZE COUNTER
680	001350	005201	INC	COUNT	
681	001352	001376	BNE	,=2	WAIT
682	001354	005201	INC	COUNT	
683	001356	001376	BNE	,=2	
684	001360	005201	INC	COUNT	
685	001362	001376	BNE	,=2	
686	001364	005201	INC	COUNT	
687	001366	001376	BNE	,=2	
688	001370	016746	MOV	PROC,=(SP)	RESTORE PROCESSOR STATUS
689	001374	012746	MOV	#TST2A,=(SP)	
690	001400	000002	RTI		
691	001402	032713	TS2A1	BIT	#40000,0CRS
692	001406	001002	BNE	CONT2	CONTINUE IF SET
693	001410	104000	HLT		CARD DONE DIDN'T SET WITHIN 400 MS
694	001412	000406	BR	TEST3	NOTE THAT FAILURE COULD BE DUE TO READ
695					NOT BEING RESET
696	001414	052713	CONT21	BIS	#40000,0CRS
697	001420	032713	BIT	#40000,0CRS	DATA TO STATUS REGISTER SHOULD CLEAR
698	001424	001401	BEQ	,+4	CARD DONE
699	001426	104000	HLT		BRANCH IF IT DID
700					DATA DIDN'T CLEAR CARD DONE
701	001430	104400	TEST31	SCOPE	

702					IBUSY (BIT 9) SHOULD BE SET BY READING A CARD
703					IT SHOULD REMAIN SET UNTIL CARD DONE SETS, WHICH SHOULD CLEAR IT
704	001432	004767	JSR	X7,CXB1B	CHECK FOR OFF-LINE SET
705	001436	005013	CLR	0CRS	INITIALIZE STATUS REGISTER
706	001440	005213	INC	0CRS	READ A CARD
707	001442	032713	BIT	#1000,0CRS	CHECK BUSY
708	001446	001002	BNE	LOOP3	BRANCH IF SET
709	001450	104000	HLT		READING A CARD DIDN'T SET BUSY
710	001452	000417	BR	TEST4	
711	001454	032713	LOOP31	BIT	#40000,0CRS
712	001460	001010	BNE	DONE3	CHECK CARD DONE
713	001462	032713	BIT	#1000,0CRS	BRANCH IF SET
714	001466	001372	BNE	LOOP3	CHECK BUSY
715	001470	032713	BIT	#40000,0CRS	BRANCH IF STILL SET
716	001474	001006	BNE	TEST4	CHECK CARD DONE
717	001476	104000	HLT		GO TO NEXT TEST IF SET
718	001500	000404	BR	TEST4	BUSY CLEARED BEFORE CARD DONE SET
719	001502	032713	DONE31	BIT	#1000,0CRS
720	001506	001401	BEQ	TEST4	GO ON TO NEXT TEST IF CLEAR
721	001510	104000	HLT		CARD DONE DIDN'T CLEAR BUSY
722					
723	001512	104400	TEST41	SCOPE	
724					IA TIMING ERROR SHOULD OCCUR IF DATA IS NOT READ AND NEW DATA COMES IN
725					IA TIMING ERROR SHOULD SET THE SPECIAL CONDITION BIT WHEN CARD DONE OCCURS
726					COLUMN READY SHOULD BE CLEARED BY THE TIMING ERROR AND PREVENTED FROM RESETTING
727					IBITS 11,14, AND 15 SHOULD BE CLEARED BY A DATA TO THE STATUS REGISTER
728					
729	001514	004767	JSR	X7,INIT	INIT STATUS REGISTER
730	001520	005001	CLR	COUNT	INITIALIZE COUNTER
731	001522	005213	INC	0CRS	INITIATE READ
732	001524	032713	LOOP41	BIT	#140200, 0CRS
733					WAIT FOR SPECIAL CONDITION, CARD DONE,
734	001530	001775	BEQ	LOOP4	OR COLUMN READY
735	001532	032713	BIT	#140200, 0CRS	LOOP IF NONE OCCURRED
736	001536	001007	BNE	CK4	SPECIAL CONDITION OR CARD DONE?
737	001540	005201	INC	COUNT	YES, BRANCH
738	001542	105713	TS1B	0CRS	NO, COUNT COLUMN READYS
739	001544	100367	BPL	LOOP4	WAIT FOR COLUMN READY TO CLEAR
740	001546	032713	BIT	#140000, 0CRS	IF CLEAR, RETURN TO LOOP4
741	001552	001001	BNE	CK4	CHECK FOR SPECIAL CONDITION OR CARD DONE
742	001554	000772	BR	LOOP4B	BRANCH IF EITHER SET
743	001556	032713	CK41	BIT	OTHERWISE, CHECK AGAIN
744	001562	001002	BNE	,+6	CHECK CARD DONE
745	001564	104000	HLT		BRANCH IF SET
746	001566	000403	BR	CONT4	SPECIAL CONDITION SET BEFORE CARD DONE
747	001570	005713	TS1	0CRS	CHECK SPECIAL CONDITION
748	001572	100401	BMI	,+4	BRANCH IF SET
749	001574	104000	HLT		SPECIAL CONDITION WASN'T SET
750	001576	032713	CONT41	BIT	CHECK TIMING ERROR
751	001602	001001	BNE	,+4	BRANCH IF SET
752	001604	104000	HLT		TIMING ERROR WASN'T SET
753	001606	005301	DEC	COUNT	CHECK NUMBER OF COLUMN READYS
754	001610	100002	BPL	,+6	BRANCH IF ANY OCCURRED
755	001612	104000	HLT		COLUMN READY NEVER OCCURRED

756	001614	000402	BR	,+6	
757	001616	001401	BEQ	,+4	IBRANCH IF ONLY ONE OCCURRED
758	001620	104000	HLT		ICOLUMN READY OCCURRED MORE THAN ONCE
759	001622	105713	TSTB	%CRS	ICHECK COLUMN READY
760	001624	100001	BPL	,+4	IBRANCH IF NOT SET
761	001626	104000	HLT		ICOLUMN READY WASN'T CLEARED
762	001630	005013	CLR	%CRS	ICLEAR BITS 11,14, AND 15 VIA DATO
763	001632	032713	BIT	#144000, %CRS	ICHECK
764	001636	001401	BEQ	,+4	
765	001640	104000	HLT		IBITS 11,14, AND 15 WEREN'T ALL CLEARED
766					
767					
768	001642	104400	TEST5:	SCOPE	
769			ISSETTING READ SHOULD CAUSE COLUMN READY TO SET 80 TIMES BEFORE CARD DONE SETS		
770			IREADING THE DATA BUFFER SHOULD CLEAR COLUMN READY AND PREVENT A TIMING ERROR		
771	001644	004767	JSR	X7,INIT	INITIALIZE STATUS REGISTER
772	001650	005001	CLR	COUNT	INITIALIZE COUNTER
773	001652	005213	INC	%CRS	INITIATE READ
774	001654	032713	LOOP5:	BIT	#140200,%CRS
775	001660	001775	BEQ	,+4	WAIT FOR COLUMN READY, CARD DONE
776	001662	032713	BIT	#40000, %CRS	FOR SPECIAL CONDITION
777	001666	001015	BNE	CK5	CARD DONE?
778	001670	005713	TST	%CRS	YES, BRANCH
779	001672	100002	BPL	,+6	ICHECK BIT 15
780	001674	104000	HLT		ISKIP ERROR HALT IF NOT SET
781	001676	000437	BR	TEST6	BIT 15 WAS SET
782	001700	020127	CMP	COUNT,#79	GO TO NEXT TEST
783	001704	100363	BPL	LOOP5	ICHECK FOR 80
784	001706	005201	INC	COUNT	IBRANCH IF 80 OR MORE WITHOUT CLEARING READY
785	001710	005714	TST	%CRS	INCREMENT COUNTER
786	001712	105713	TSTB	%CRS	CLEAR READY
787	001714	100001	BPL	,+4	MAKE SURE IT CLEARED
788	001716	104000	HLT		IBRANCH IF IT DID
789	001720	000755	BR	LOOP5	IREADING DATA BUFFER DIDN'T CLEAR READY
790	001722	032713	CK9:	BIT	#4000, %CRS
791	001726	001401	BEQ	,+4	LOOP
792	001730	104000	HLT		ICHECK TIMING ERROR BIT
793					IBRANCH IF NOT SET
794					ITIMING ERROR WAS SET
795	001732	000421	NOTE THAT IF COLUMN READY SET MORE THAN 80 TIMES		
796	001734	020127	IA TIMING ERROR WILL OCCUR AND THE COUNT WILL BE 79		
797	001740	001401	BR	TEST4	IBRANCH AFTER ERROR
798	001742	104000	CMP	COUNT, #79	ICHECK COUNT
799			BEQ	,+4	IBRANCH IF 80 COLUMN READYS OCCURRED
800	001744	021327	HLT		ICOLUMN READY DIDN'T OCCUR 80 TIMES
801	001750	001401			BEFORE CARD DONE
802	001752	104000	CMP	%CRS,#40200	ONLY CARD DONE AND COLUMN READY SHOULD BE SET
803	001754	005013	BEQ	,+4	
804	001756	021327	HLT		ISTATUS REGISTER IN WRONG STATE
805	001762	001401	CLR	%CRS	ISHOULD CLEAR DONE BUT NOT READY
806	001764	104000	CMP	%CRS,#200	ICHECK FOR ONLY READY SET
807	001766	005714	BEQ	,+4	IBRANCH IF OK
808	001770	005713	HLT		ISTATUS REGISTER IN WRONG STATE
809	001772	001401	TST	%CRS	IREADING DATA BUFFER SHOULD CLEAR COLUMN READY
			BEQ	,+4	ICHECK STATUS REGISTER
					IBRANCH IF ALL BITS ZERO

810	001774	104000	HLT		ISTATUS REGISTER NOT EQUAL TO ZERO
811					
812	001776	104400	TEST6:	SCOPE	
813			ITIMING ERROR SHOULD SET BIT 11 BEFORE CARD DONE OCCURS, EVEN IF IT OCCURS AT COLUMN 80		
814			IA DATOB TO THE LOW BYTE OF THE		CRS SHOULD CLEAR BITS 15,14, AND 11
815	002000	004767	JSR	X7,INIT	INITIALIZE
816	002004	012701	MOV	#79,COUNT	SETUP COUNTER
817	002010	005213	INC	%CRS	ISTART READING A CARD
818	002012	105713	LOOP6:	TSTB	%CRS
819	002014	100376	BPL	,+2	WAIT FOR COLUMN READY
820	002016	005714	TST	%CRS	CLEAR COLUMN READY
821	002020	005301	DEC	COUNT	GO THRU LOOP FOR 1ST 78 COLUMN READYS
822	002022	100373	BPL	LOOP6	
823	002024	032713	BIT	#144200,%CRS	WAIT FOR CARD DONE OR TIMING ERROR
824	002030	001775	BEQ	,+4	FOR SPECIAL CONDITION
825	002032	032713	BIT	#40000,%CRS	CARD DONE SET?
826	002036	001026	BNE	ERR6	YES, 2 POSSIBLE TEST FAILURES
827	002040	032713	BIT	#4000,%CRS	ICHECK TIMING ERROR
828	002044	001416	BEQ	OFF6	IF NOT SET, READER IS PROBABLY OFF-LINE
829	002046	105713	TSTB	%CRS	ICHECK COLUMN READY
830	002050	100001	BPL	,+4	IBRANCH IF CLEAR
831	002052	104000	HLT		ITIMING ERROR DIDN'T CLEAR READY
832	002054	005713	TST	%CRS	WAIT FOR SPECIAL CONDITION
833	002056	100376	BPL	,+2	
834	002060	032713	BIT	#40000,%CRS	ICHECK CARD DONE
835	002064	001406	BEQ	OFF6	IF NOT SET, READER IS PROBABLY OFF-LINE
836	002066	105013	CLRB	%CRS	IDATOB TO LOW BYTE OF CRS
837	002070	032713	BIT	#144200,%CRS	ICHECK BITS 15,14,11
838	002074	001415	BEQ	TEST7	IBRANCH IF CLEAR TO NEXT TEST
839	002076	104000	HLT		IDATOB TO LOW BYTE OF CRS DIDN'T CLEAR
840					IBITS 15,14 AND/OR 11
841	002100	000413	BR	TEST7	GO TO NEXT TEST
842	002102	032713	BIT	#400,%CRS	ICHECK BIT 8
843	002106	001010	BNE	TEST7	IBRANCH IF SET
844	002110	104000	HLT		BIT 15 WAS SET, 8 WASN'T
845	002112	000406	BR	TEST7	GO TO NEXT TEST
846	002114	032713	BIT	#4000,%CRS	ITIMING ERROR SET?
847	002120	001402	BEQ	,+6	NO, BRANCH
848	002122	104000	HLT		ITIMING ERROR DIDN'T SET BEFORE CARD DONE
849	002124	000401	BR	TEST7	GO TO NEXT TEST AFTER ERROR
850	002126	104000	HLT		ITIMING ERROR WASN'T SET
851					
852	002130	104400	TEST7:	SCOPE	
853			INOT READING THE 80TH COLUMN OF DATA FROM THE BUFFER		
854			ISHOULD CAUSE A TIMING ERROR ON THE FIRST COLUMN OF THE NEXT CARD		
855			ISSETTING EJECT SHOULD CLEAR TIMING ERROR, AND BIT 15 SHOULDN'T SET		
856			INC8 SHOULD START A READ		
857					
858	002132	004767	JSR	X7,INIT	INITIALIZE
859	002136	005213	INC	%CRS	ISTART READ
860	002140	012701	MOV	#80,COUNT	INITIALIZE COUNTER
861	002144	032713	LOOP7:	BIT	#140200,%CRS
862	002150	001775	BEQ	LOOP7	TEST FOR ERROR, DONE OR READY
863	002152	005713	TST	%CRS	LOOP IF NONE SET
					ICHECK ERROR

864	002154	100002	BPL	,*6	IBRANCH IF NOT SET
865	002156	104000	HLT		IBIT 15 WAS SET
866	002160	000455	BR	TEST9	IGO TO NEXT TEST AFTER ERROR
867	002162	032713	BIT	#40000,*CRS	ICHECK FOR CARD DONE
868	002166	001013	BNE	DONE7	IBRANCH IF SET
869	002170	005301	DEC	COUNT	ICOUNT
870	002172	001402	BEQ	,*6	IF 80TH COLUMN READY, BRANCH
871	002174	005714	TST	*CRB1	ICLEAR DONE
872	002176	000762	BR	LOOP7	ILOOP
873	002200	032713	BIT	#140000,*CRS	IWAIT FOR DONE OR SPECIAL CONDITION
874	002204	001775	BEQ	,*4	
875	002206	005713	TST	*CRS	ICHECK SPECIAL CONDITION
876	002210	100002	BPL	DONE7	IBRANCH IF NOT SET
877	002212	104000	HLT		SPECIAL CONDITION WAS SET
878	002214	000437	BR	TEST9	IGO TO NEXT TEST AFTER ERROR
879	002216	005701	COUNT	COUNT	ITEST FOR 80 COLUMN READY'S
880	002220	001402	BEQ	,*6	IBRANCH IF OK
881	002222	104000	HLT		ICOLUMN READY DID NOT OCCUR 80 TIMES
882	002224	000433	BR	TEST9	IGO TO NEXT TEST AFTER ERROR
883	002226	105213	INCB	*CRS	ISTART READ
884	002230	105713	TSTB	*CRS	ICHECK COLUMN READY
885	002232	100401	BMI	,*4	IBRANCH IF STILL SET
886	002234	104000	HLT		READY DID NOT REMAIN SET
887	002236	032713	BIT	#40000,*CRS	ITEST FOR TIMING ERROR
888	002242	001775	BEQ	,*4	ILOOP IF NOT SET
889	002244	105713	TSTB	*CRS	ICHECK COLUMN READY
890	002246	100002	BPL	,*6	IBRANCH IF NOT SET
891	002250	104000	HLT		ITIMING ERROR DIDN'T CLEAR READY
892	002252	000420	BR	TEST9	
893	002254	112713	MOV8	#2,*CRS	ISSET EJECT
894	002260	032713	BIT	#40000,*CRS	ICHECK TIMING ERROR
895	002264	001402	BEQ	,*6	IBRANCH IF CLEARED
896	002266	104000	HLT		ITIMING ERROR NOT CLEARED BY DATOB
897	002270	000411	BR	TEST9	IGO TO NEXT TEST AFTER ERROR
898	002272	032713	BIT	#140000,*CRS	IWAIT FOR DONE OR SPECIAL CONDITION
899	002276	001775	BEQ	,*4	
900	002300	032713	BIT	#40000,*CRS	ICHECK BIT 8
901	002304	001003	BNE	TEST9	IBRANCH IF READER OFF=LINE
902	002306	005713	TST	*CRS	ISPECIAL CONDITION SHOULDN'T SET
903	002310	100001	BPL	,*4	SINCE DATOB CLEARED TIMING ERROR
904	002312	104000	HLT		IBIT 15 WAS SET, B WASN'T
905					
906					
907	002314	104400	TEST9	SCOPE	
908			DATA SHOULD BE	AVAILABLE IN THE DATA BUFFER FOR AT LEAST 1.0 MILLISECOND	
909	002316	004767	JSR	X7,INIT	INITIALIZE STATUS REGISTER
910	002322	004767	JSR	X7,CLRTR	STORE CURRENT PROCESSOR STATUS AND CLEAR TRACE BIT
911	002326	005213	INC	*CRS	ISTART READ
912	002330	032713	BIT	#140000,*CRS	IWAIT FOR COLUMN READY OR CARD DONE
913	002334	001775	BEQ	,*4	FOR SPECIAL CONDITION
914	002336	032713	BIT	#40000,*CRS	ICARD DONE?
915	002342	001023	BNE	DBRCK8	YES, GO TO CHECK STROBING OF DBR
916	002344	005713	TST	*CRS	INNO CHECK BIT 15
917	002346	100002	BPL	,*6	IBRANCH IF NOT SET

918	002350	104000	HLT		IBIT 15 WAS SET
919	002352	000443	BR	TEST9	IGO TO NEXT TEST AFTER ERROR
920	002354	005013	CLR	*CRS	IDATO TO CRS - SHOULDN'T CLEAR BUSY OR READY
921	002356	022713	CMF	#1200,*CRS	ICHECK FOR BUSY AND READY
922	002362	001402	BEQ	,*6	IBRANCH IF STILL SET
923	002364	104000	HLT		ICRS IN WRONG STATE
924	002366	000435	BR	TEST9	IGO TO NEXT TEST AFTER ERROR
925	002370	011405	MOV	*CRB1,R5	ISTORE DATA
926	002372	012701	MOV	#300,COUNT	INITIALIZE COUNTER
927	002376	005301	DEC	COUNT	IWAIT FOR 1 MILLISECOND OR LESS
928	002400	001376	BNE	,*2	
929	002402	021405	CMF	*CRB1,R5	IDATA UNCHANGED?
930	002404	001751	BEQ	LOOP8	OK, CONTINUE
931	002406	104000	HLT		IDATA NOT AVAILABLE FOR 1 MILLISECOND
932	002410	000424	BR	TEST9	IGO TO NEXT TEST AFTER FAILURE
933	002412	017702	MOV	*CRB2,R2	ISTORE ENCODED DATA IN REGISTER 2
934	002416	012701	MOV	#100,COUNT	ISSET UP COUNTER
935	002422	021405	CMF	*CRB1,R5	IREAD CARD-IMAGE DATA BUFFER
936	002424	001402	BEQ	,*6	IBRANCH IF UNCHANGED
937	002426	104000	HLT		ICRB1 READ INCORRECTLY
938	002430	000407	BR	REST8	IBRANCH TO RESTORE PROCESSOR STATUS AND EXIT
939	002432	027702	CMF	*CRB2,R2	IREAD ENCODED DATA BUFFER
940	002436	001402	BEQ	,*6	IBRANCH IF UNCHANGED
941	002440	104000	HLT		ICRB2 READ INCORRECTLY
942	002442	000402	BR	REST8	IBRANCH AFTER FAILURE
943	002444	005301	DEC	COUNT	ICOUNT DOWN
944	002446	001365	BNE	CONT8	ILOOP IF NOT DONE
945	002450	016746	MOV	PROC,= (SP)	IRESTORE PROCESSOR STATUS
946	002454	012746	MOV	#TEST9,= (SP)	
947	002460	000002	RTI		
948					
949					
950	002462	104400	TEST9	SCOPE	
951			EJECT SHOULD	PREVENT FURTHER COLUMN READY'S	
952			ICARD DONE SHOULD STILL OCCUR, AND TIMING ERRORS SHOULD BE		
953			IPREVENTED IF THE CURRENT COLUMN READY IS CLEARED		
954	002464	004767	JSR	X7,INIT	INITIALIZE STATUS REGISTER
955	002470	004767	JSR	X7,CLRTR	SAVE PROCESSOR STATUS AND CLEAR TRACE BIT
956	002474	005213	INC	*CRS	ISTART READ
957	002476	105713	TSTB	*CRS	IWAIT FOR COLUMN READY
958	002500	001776	BEQ	,*2	
959	002502	052713	BIS	#2,*CRS	ISSET EJECT
960	002506	005714	TST	*CRB1	ICLEAR COLUMN READY
961	002510	005001	CLR	COUNT	
962	002512	005201	INC	COUNT	IWAIT
963	002514	001376	BNE	,*2	
964	002516	005201	INC	COUNT	
965	002520	001376	BNE	,*2	
966	002522	032713	BIT	#44200,*CRS	ICARD DONE, TIMING ERROR, OR
967	002526	001002	BNE	CK9	ICOLUMN READY SET? BRANCH IF YES
968	002530	104000	HLT		INNO CARD DONE OCCURRED
969	002532	000411	BR	REST9	ICONTINUE AFTER FAILURE
970	002534	032713	BIT	#40000,*CRS	ICHECK FOR CARD DONE
971	002540	001006	BNE	REST9	

972	002542	032713	000200	BIF	#200,0CRS	ICHECK COLUMN READY
973	002546	001402		BEQ	,+6	IBRANCH IF NOT SET
974	002550	104000		HLF		ICOLUMN READY WAS SET
975	002552	000401		BR	REST9	
976	002554	104000		HLF		IEJECT DID NOT PREVENT A TIMING ERROR
977	002556	016746	174232	REST9	MOV	PROG,=(SP)
978	002562	012746	002970	MOV	#TEST10,=(SP)	IRESTORE PROCESSOR STATUS
979	002566	000002		RTI		
980						
981						
982	002570	104400		TEST10	SCOPE	
983				ICARD DONE SHOULD CAUSE AN INTERRUPT		
984	002572	004767	006546	JSR	X7,INIT	INITIALIZE
985	002576	012710	002602	MOV	#TINT10,ADINT	LOAD RETURN POINTER
986	002602	052767	000340	BIF	#340,PSR	SET PROCESSOR TO LEVEL 7
987	002610	016760	175162	MOV	PSR,2(ADINT)	LOAD RETURN PROCESSOR STATUS
988	002616	042767	000340	BIF	#340,PSR	SET PROCESSOR PRIORITY TO 0
989	002624	012713	000103	MOV	#103,0CRS	SET EJECT, INTERRUPT ENABLE, AND READ
990	002630	032713	040000	BIF	#40000,0CRS	WAIT FOR CARD DONE
991	002634	001775		BEQ	,+4	
992	002636	016067	000002	MOV	2(ADINT),PSR	RESTORE PROCESSOR TO HIGHEST PRIORITY
993	002644	105013		CLR	0CRS	CLEAR INTERRUPT ENABLE
994	002646	104000		HLF		NO INTERRUPT OCCURRED
995	002650	000414		BR	CONT10	
996	002652	032713	040000	TINT10	BIF	#40000,0CRS
997	002656	001001		ONE	,+4	ICHECK CARD DONE
998	002660	104000		HLF		IBRANCH IF SET
999	002662	022626		CHP	(SP),=(SP)+	ICARD DONE NOT SET
1000	002664	005713		TSF	0CRS	IRESTORE STACK POINTER
1001	002666	100001		BPL	,+4	MAKE SURE NO ERROR OCCURRED
1002	002670	104000		HLF		
1003	002672	105713		TSF	0CRS	IBIT 15 WAS SET
1004	002674	100001		BPL	,+4	ICHECK COLUMN READY
1005	002676	104000		HLF		IBRANCH IF NOT SET
1006	002700	005013		CLR	0CRS	ICOLUMN READY WAS SET
1007	002702	012710	000232	CONT10	MOV	#232,ADINT
1008	002706	000037	000232	CLR	#0002	DISABLE INTERRUPTS
1009						CHANGE INTERRUPT RETURN ADDRESS
1010	002712	104400		TEST11	SCOPE	TO CAUSE A HALT IF AN INTERRUPT OCCURS
1011				IEVERY COLUMN READY SHOULD CAUSE AN INTERRUPT		
1012	002714	004767	006424	JSR	X7,INIT	INITIALIZE
1013	002720	012701	000120	MOV	#01,0COUNT	ICHECK EACH COLUMN
1014	002724	012710	002776	MOV	#TINT11,ADINT	LOAD RETURN POINTER
1015	002730	052767	000340	BIF	#340,PSR	SET PROCESSOR STATUS TO LEVEL 7
1016	002736	016760	175034	MOV	PSR,2(ADINT)	LOAD RETURN PROCESSOR STATUS
1017	002744	042767	000340	BIF	#340,PSR	SET PROCESSOR PRIORITY TO 0
1018	002752	012713	000101	MOV	#101,0CRS	SET READ AND INTERRUPT ENABLE
1019	002756	105713		TSF	0CRS	WAIT FOR COLUMN READY
1020	002760	100376		BPL	,+2	
1021	002762	016067	000002	MOV	2(ADINT),PSR	RESTORE PROCESSOR TO HIGHEST PRIORITY
1022	002770	005013		CLR	0CRS	CLEAR INTERRUPT ENABLE
1023	002772	104000		HLF		ICOLUMN READY DID NOT INTERRUPT
1024	002774	000411		BR	CONT11	
1025	002776	000013		TINT11	CLR	CLEAR INTERRUPT ENABLE

1026	003000	022626		CHP	(SP),=(SP)+	IRESTORE STACK POINTER
1027	003002	105713		TSF	0CRS	MAKE SURE COLUMN READY IS SET
1028	003004	100402		BMF	,+6	IBRANCH IF SET
1029	003006	104000		HLF		ICOLUMN READY WASN'T SET
1030	003010	000403		BR	CONT11	
1031	003012	005714		TSF	0CRS1	CLEAR READY FLAG
1032	003014	005301		DEC	COUNT	FALL 40 DONE?
1033	003016	001302		BNE	LOOP11	NO
1034	003020	012710	000232	CONT11	MOV	#232,ADINT
1035	003024	000037	000232	CLR	#0032	YES-CHANGE INTERRUPT RETURN ADDRESS
1036						TO CAUSE A HALT IF ANOTHER INTERRUPT OCCURS
1037	003030	104400		TEST12	SCOPE	
1038				ICARD DONE SHOULDNT CAUSE AN INTERRUPT IF THE PROCESSOR IS AT LEVEL 7 PRIORITY		
1039	003032	004767	006306	JSR	X7,INIT	INITIALIZE
1040	003036	012710	003072	MOV	#TINT12,ADINT	SETUP RETURN
1041	003042	052767	000340	BIF	#340,PSR	SET PROCESSOR TO LEVEL 7 PRIORITY
1042	003050	016760	174722	MOV	PSR,2(ADINT)	LOAD RETURN PROCESSOR STATUS
1043	003056	012713	000103	MOV	#103,0CRS	SET EJECT, INTERRUPT ENABLE, AND READ
1044	003062	032713	040000	BIF	#40000,0CRS	WAIT FOR CARD DONE
1045	003066	001775		BEQ	,+4	
1046	003070	000402		BR	,+6	ICONTINUE IF NO INTERRUPT OCCURRED
1047	003072	104000		HLF		AN INTERRUPT OCCURRED
1048	003074	022626		CHP	(SP),=(SP)+	IRESTORE STACK POINTER
1049	003076	005013		CLR	0CRS	CLEAR INTERRUPT ENABLE AND EJECT
1050	003100	012710	000232	MOV	#232,ADINT	CHANGE INTERRUPT RETURN ADDRESS
1051	003104	000037	000232	CLR	#0032	TO CAUSE A HALT IF AN INTERRUPT OCCURS
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1110	003322	104400		TEST14	SCOPE	
1111	003324	004767	006014	JSR	X7,INIT	INITIALIZE
1112	003330	012710	003400	MOV	#TINT14,ADINT	SETUP RETURN ADDRESS
1113	003334	052767	000340	BIF	#340,PSR	SET PROCESSOR PRIORITY TO 7
1114	003342	016760	174430	MOV	PSR,2(ADINT)	SETUP RETURN PROCESSOR STATUS
1115	003350	042767	000340	BIF	#340,PSR	SET PROCESSOR PRIORITY TO 0
1116	003356	052767	000240	BIF	#240,PSR	SET PROCESSOR TO LEVEL 9 PRIORITY
1117	003364	012713	000103	MOV	#103,0CRS	SET EJECT, INTERRUPT ENABLE, AND READ
1118	003370	032713	040000	BIF	#40000,0CRS	WAIT FOR CARD DONE
1119	003374	001775		BEQ	,+4	
1120	003376	016067	000002	MOV	2(ADINT),PSR	RESTORE PROCESSOR TO HIGHEST PRIORITY
1121	003404	005013		CLR	0CRS	DISABLE INTERRUPTS
1122	003406	012710	000232	MOV	#232,ADINT	CHANGE INTERRUPT RETURN ADDRESS
1123	003412	000037	000232	CLR	#0032	TO CAUSE A HALT IF AN INTERRUPT OCCURS
1124	003416	005767	175370	TSF	INTFLG	CHECK TO SEE IF LEVEL ALREADY RECORDED
1125	003422	100034		BPL	TEST15	IF NO, GO TO NEXT TEST

1126	003424	026727	175362	100006	CHP	INTFLG,#100006	IF SO, CHECK TO SEE THAT THE
1127	003432	100430			BNI	TEST19	INTERRUPT LEVEL RECORDED IS BELOW
1128							THE CURRENT LEVEL
1129	003434	104000			HLI		INTERRUPT DIDN'T OCCUR WITH
1130							STATUS AT LEVEL 5
1131							BUT PREVIOUSLY OCCURRED AT OR ABOVE
1132							THIS LEVEL
1133	003436	000420			BR	TEST19	
1134	003440	032713	040000		TINT14	BIT	MAKE SURE CARD DONE IS SET
1135	003444	001001			BNE	#40000,0CRS	BRANCH IF SET
1136	003446	104000			HLI	,+4	CARD DONE WASN'T SET
1137	003450	005013			CLR	0CRS	DISABLE FURTHER INTERRUPTS
1138	003452	012710	000232		MOV	#232,0ADINT	CHANGE INTERRUPT RETURN ADDRESS
1139	003456	005037	000232		CLR	0#232	TO CAUSE A HALT IF AN INTERRUPT OCCURS
1140	003462	022626			CHP	(SP)+,(SP)+	RESTORE STACK POINTER
1141	003464	005767	175322		TSI	INTFLG	CHECK FOR PREVIOUS FLAG
1142	003470	100404			BNI	SET14	BRANCH IF FLAG SET
1143	003472	012767	100006	175312	MOV	#100006,INTFLG	SET FLAG AND LEVEL
1144	003500	000405			BR	TEST19	
1145	003502	026727	175304	100006	SET14	INTFLG,#100006	CHECK PREVIOUS LEVEL
1146	003510	100001			BPL	TEST19	
1147	003512	104000			HLI		INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1148							
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1151							
1152							
1153							
1154							
1155							
1156							
1157							
1158							
1159							
1160	004776	104400			TEST20	SCOPE	IA TIMING ERROR SHOULDN'T CAUSE AN INTERRUPT
1161	005000	004767	004340		JSR	X7,INIT	INITIALIZE
1162	005004	012710	005050		MOV	#TINT20,0ADINT	LOAD RETURN POINTER
1163	005010	092767	000340	172700	BIS	#340,PSR	SET PROCESSOR TO HIGHEST PRIORITY
1164	005016	016760	172794	000002	MOV	PSR,2(ADINT)	LOAD RETURN PROCESSOR STATUS
1165	005024	012713	000101		MOV	#101,0CRS	SET INTERRUPT ENABLE AND READ
1166	005030	032713	004000		BIT	#4000,0CRS	WAIT FOR TIMING ERROR TO SET
1167	005034	001775			BEQ	,#4	
1168	005036	042767	000340	172732	BIC	#340,PSR	MOVE PROCESSOR TO LOWEST PRIORITY
1169	005044	000240			NOP		CLOCK INTERRUPT IF IT OCCURRED
1170	005046	016067	000002	172722	MOV	2(ADINT),PSR	MOVE PROCESSOR BACK TO HIGHEST PRIORITY
1171	005054	000402			BR	,+6	
1172	005056	104000			TINT20	HLI	TIMING ERROR CAUSED AN INTERRUPT
1173	005060	022626			CHP	(SP)+,(SP)+	RESTORE STACK POINTER
1174	005062	012710	000232		MOV	#232,0ADINT	CHANGE INTERRUPT ADDRESS TO CAUSE A
1175	005066	005037	000232		CLR	0#232	HALT IF AN INTERRUPT OCCURS
1176	005072	032713	040000		BIT	#4000,0CRS	WAIT FOR CARD DONE
1177	005076	001775			BEQ	,#4	
1178	005100	005013			CLR	0CRS	CLEAR INTERRUPT ENABLE
1179							
1180	005102	104400			TEST21	SCOPE	TEST FOR NO INTERRUPT OCCURRING WITH INTERRUPT ENABLE SET AND REST CLEARED
1181							
1182	005104	004767	004234		JSR	X7,INIT	INITIALIZE CSR TO ZERO
1183	005110	012710	005100		MOV	#TINT1,0ADINT	SETUP RETURN ADDRESS
1184	005114	052767	000340	172694	BIS	#340,PSR	SET PROCESSOR TO LEVEL 7

1185	005122	016760	172650	000002	MOV	PSR,2(ADINT)	STORE PROCESSOR STATUS
1186	005130	005067	172642		CLR	PSR	SET PROCESSOR TO LEVEL 0
1187	005134	012713	000100		MOV	#100,0CRS	ENABLE INTERRUPTS
1188	005140	005001			CLR	COUNT	INITIALIZE COUNTER
1189	005142	005201			INC	COUNT	WAIT AWHILE
1190	005144	001376			BNE	,#0	
1191	005146	016067	000002	172622	MOV	2(ADINT),PSR	RESTORE PROCESSOR TO LEVEL 7
1192	005154	005013			CLR	0CRS	DISABLE FURTHER INTERRUPTS
1193	005156	000403			BR	CONT21	
1194	005160	104000			TINT1	HLI	AN INTERRUPT OCCURRED
1195	005162	022626			CHP	(SP)+,(SP)+	RESTORE STACK
1196	005164	005013			CLR	0CRS	DISABLE FURTHER INTERRUPTS
1197	005166	005037	000232		CONT21	CLR	CHANGE INTERRUPT RETURN ADDRESS TO
1198	005172	012710	000232		MOV	#232,0ADINT	CAUSE A HALT IF AN INTERRUPT OCCURS
1199							
1200	005176	104400			TEST22	SCOPE	CHECK FOR SIMULTANEOUS INTERRUPTS ON MORE THAN ONE LEVEL
1201							
1202	005200	004767	004140		JSR	X7,INIT	INITIALIZE CSR TO ZERO
1203	005204	012710	005242		MOV	#TINT1,0ADINT	SETUP RETURN ADDRESS
1204	005210	092767	000340	172500	BIS	#340,PSR	SET PROCESSOR TO LEVEL 7
1205	005216	016760	172554	000002	MOV	PSR,2(ADINT)	STORE PROCESSOR STATUS
1206	005224	042767	000340	172544	BIC	#340,PSR	SET PROCESSOR TO LEVEL 0
1207	005232	012713	000103		MOV	#103,0CRS	SET INTERRUPT ENABLE AND EJECT A CARD
1208	005236	000001			WAIT		WAIT FOR INTERRUPT
1209	005240	000776			BR	,#0	SET IF TRACE BIT IS SET
1210	005242	022626			CHP	(SP)+,(SP)+	RESTORE STACK POINTER
1211	005244	012710	005266		MOV	#TINT1,0ADINT	CHANGE RETURN ADDRESS
1212	005250	005067	172522		CLR	PSR	SET PROCESSOR TO LEVEL 0
1213	005254	000240			NOP		WAIT
1214	005256	016067	000002	172512	MOV	2(ADINT),PSR	RESTORE PROCESSOR TO LEVEL 7
1215	005264	000402			BR	CONT22	
1216	005266	022626			T2INT1	CHP	RESTORE STACK
1217	005270	104000			HLI	(SP)+,(SP)+	THE INTERRUPT OCCURRED AT 2 LEVELS
1218	005272	005013			CONT22	CLR	DISABLE INTERRUPTS
1219	005274	005037	000232		CLR	0#232	CHANGE INTERRUPT RETURN ADDRESS TO
1220	005300	012710	000232		MOV	#232,0ADINT	CAUSE A HALT IF AN INTERRUPT OCCURS
1221							
1222	005304	104400			TEST23	SCOPE	ALL MODES OF ADDRESSING CRB1 OR CRB2 (DATA,DATA0,DATA1) SHOULD CLEAR
1223							
1224							
1225	005306	004767	004032		JSR	X7,INIT	INITIALIZE
1226	005312	005213			INC	0CRS	START READING A CARD
1227	005314	105713			TSYB	0CRS	WAIT FOR COLUMN READY
1228	005316	100376			BPL	,#2	
1229	005320	005014			CLR	0CRB1	DATA TO CRB1
1230	005322	105713			TSYB	0CRS	CHECK COLUMN READY
1231	005324	100002			CONT23A		BRANCH IF CLEARED
1232	005326	104000			HLI		DATA TO CRB1 DIDN'T CLEAR READY
1233	005330	000467			BR	TEST24	GO TO NEXT TEST
1234	005332	105713			CONT23A	TSYB	WAIT FOR COLUMN READY
1235	005334	100376			BPL	,#2	
1236	005336	105014			CLRB	0CRB1	DATA0 TO LOW BYTE OF CRB1
1237	005340	105713			TSYB	0CRS	CHECK COLUMN READY
1238	005342	100002			BPL	CONT23B	BRANCH IF CLEARED

1239	005344	104000		HLT		!DATOB TO CRB1 LOW BYTE DIDN'T CLEAR READY
1240	005346	000460		BR	TEST24	!GO TO NEXT TEST
1241	005350	105713		CNT23B1	TSYB	!WAIT FOR COLUMN READY
1242	005352	100376		BPL	,=2	
1243	005354	105064	000001	CLRB	1(CRB1)	!DATOB TO HIGH BYTE OF CRB1
1244	005360	105713		PCRS		!CHECK COLUMN READY
1245	005362	100002		BPL	CNT23C	!BRANCH IF CLEARED
1246	005364	104000		HLT		!DATOB TO CRB1 HIGH BYTE DIDN'T CLEAR READY
1247	005366	000450		BR	TEST24	!GO TO NEXT TEST
1248	005370	105713		CNT23C1	TSYB	!WAIT FOR COLUMN READY
1249	005372	100376		BPL	,=2	
1250	005374	005714		TSY	PCRB1	!DATI TO CRB1
1251	005376	105713		TSYB	PCRS	!CHECK COLUMN READY
1252	005400	100002		BPL	CNT23D	!BRANCH IF CLEARED
1253	005402	104000		HLT		!DATI TO CRB1 DIDN'T CLEAR READY
1254	005404	000441		BR	TEST24	!GO TO NEXT TEST
1255	005406	105713		CNT23D1	TSYB	!WAIT FOR COLUMN READY
1256	005410	100376		BPL	,=2	
1257	005412	005077	173410	CLR	PCRB2	!DATO TO CRB2
1258	005416	105713		TSYB	PCRS	!CHECK COLUMN READY
1259	005420	100002		BPL	CNT23E	!BRANCH IF CLEARED
1260	005422	104000		HLT		!DATO TO CRB2 DIDN'T CLEAR READY
1261	005424	000431		BR	TEST24	!GO TO NEXT TEST
1262	005426	105713		CNT23E1	TSYB	!WAIT FOR COLUMN READY
1263	005430	100376		BPL	,=2	
1264	005432	105077	173370	CLRB	PCRB2	!DATOB TO LOW BYTE OF CRB2
1265	005436	105713		TSYB	PCRS	!CHECK COLUMN READY
1266	005440	100002		BPL	CNT23F	!BRANCH IF CLEARED
1267	005442	104000		HLT		!DATOB TO CRB2 LOW BYTE DIDN'T CLEAR READY
1268	005444	000421		BR	TEST24	!GO TO NEXT TEST
1269	005446	105713		CNT23F1	TSYB	!WAIT FOR COLUMN READY
1270	005450	100376		BPL	,=2	
1271	005452	016702	173350	MOV	CRB2,R2	!LOAD POINTER
1272	005456	105062	000001	CLRB	1(R2)	!DATOB TO HIGH BYTE OF CRB2
1273	005462	105713		TSYB	PCRS	!CHECK COLUMN READY
1274	005464	100002		BPL	CNT23G	!BRANCH IF CLEARED
1275	005466	104000		HLT		!DATOB TO CRB2 HIGH BYTE DIDN'T CLEAR READY
1276	005470	000407		BR	TEST24	!GO TO NEXT TEST
1277	005472	105713		CNT23G1	TSYB	!WAIT FOR COLUMN READY
1278	005474	100376		BPL	,=2	
1279	005476	005777	173324	TSY	PCRB2	!DATI TO CRB2
1280	005478	105713		TSYB	PCRS	!CHECK COLUMN READY
1281	005502	105713		BPL	TEST24	!BRANCH IF CLEARED
1282	005504	100001		HLT		!DATI TO CRB2 DIDN'T CLEAR READY
1283	005506	104000				
1284						
1285	005510	104400				TEST241 SCOPE
1286						!SETTING EJECT AFTER A COLUMN READY WITHOUT CLEARING THE COLUMN READY
1287						!SHOULD SET TIMING ERROR (WHICH IN TURN SHOULD CLEAR COLUMN READY)
1288	005512	004767	003626	JSR	X7,INIT	!INITIALIZE
1289	005516	005213		INC	PCRS	!START READING A CARD
1290	005520	105713		TSYB	PCRS	!CHECK COLUMN READY = WAIT
1291	005522	100376		BPL	,=2	
1292	005524	002713	000002	BIS	#6,PCRS	!SET EJECT

1293	005530	105713		TSYB	PCRS	!CHECK COLUMN READY
1294	005532	100402		BPL	CNT24A	!BRANCH IF STILL SET
1295	005534	104000		HLT		!SETTING EJECT CLEARED COLUMN READY
1296	005536	000421		BR	END24	!BRANCH TO WAIT FOR DONE AFTER ERROR
1297	005540	032713	004000	BIT	#4000,PCRS	!CHECK TIMING ERROR
1298	005544	001013		BNE	TIME24	!BRANCH IF SET
1299	005546	032713	040400	BIT	#4000,PCRS	!CHECK CARD DONE AND OFF-LINE
1300	005552	001772		BEQ	CNT24A	!LOOP IF NONE SET
1301	005554	032713	040000	BIT	#4000,PCRS	!CARD DONE SET?
1302	005560	001003		BNE	CNT24B	!YES = BRANCH TO ERROR PRINTOUT
1303	005562	004767	003720	JSR	X7,CKBITS	!NO = BIT 8 WAS SET SO OUTPUT MESSAGE
1304	005566	000419		BR	END0CK	!BRANCH AFTER COMING BACK ON-LINE
1305	005570	104000		CNT24B1	HLT	!CARD DONE SET BUT TIMING ERROR DIDN'T
1306	005572	000413		BR	END0CK	!BRANCH TO NEXT SECTION
1307	005574	105713		TIME241	TSYB	!CHECK COLUMN READY
1308	005576	100001		BPL	,=4	!BRANCH IF NOT SET
1309	005600	104000		HLT		!TIMING ERROR DIDN'T CLEAR READY
1310	005602	032713	040400	END241	BIT	!WAIT FOR CARD DONE OR OFF-LINE
1311	005606	001775		BEQ	END24	
1312	005610	032713	000400	BIT	#400,PCRS	!CHECK OFF LINE
1313	005614	001402		BEQ	END0CK	!BRANCH IF NOT SET
1314	005616	004767	003664	JSR	X7,CKBITS	!OUTPUT ERROR MESSAGE
1315						
1316						
1317						!CHECK SW7 AND RETURN TO TEST1 IF SET, AFTER RINGING BELL
1318	005622	104400				!OTHERWISE GO INTO THE DATA TEST
1319	005624	032767	000200	END0CK1	SCOPE	
1320	005632	001417		BIT	#200,SR	
1321	005634	004767	003560	BEQ	DATST	
1322	005640	000167	173166	JSR	X7,BELL	
1323	005644	000167	173306	COM	TRPLG	!TOGGLE TRACE FLAG
1324				JMP	RESTR	
1325						!FAKE LOGICAL END OF TEST
1326	005650	000240				!THIS PROGRAM SHOULD NOT BE EXECUTED IN CHAIN MODE
1327	005652	000240		LOGICAL1	NOF	
1328	005654	000240				
1329	005656	000240				
1330	005660	000240				
1331	005662	000240				
1332	005664	000240				
1333	005666	000167	173264	JMP	RESTR	!DO LOGIC TEST AGAIN
1334						
1335						
1336						
1337						
1338						
1339	005672	012767	000056	001202		!CHECK SR FOR TYPE OF DECK BEING TESTED, AND INITIALIZE POINTERS
1340	005700	000402		DATST1	MOV	!SETUP CARD COUNT TO ENTER TABLE CORRESPONDING TO NEXT C
1341	005702	005067	001174	BR	DATST2	!SKIP NEXT INSTRUCTION
1342	005706	005067	173124	DATST11	CLR	!SETUP CARD COUNT TO ENTER DATA TABLE AT BEGINNING
1343	005712	032767	000010	DATST21	CLR	!FLAG SET PREVENTS PRINTING OUT ERROR HEADING
1344	005720	001412		BIT	#10,SR	!CHECK FOR TYPE OF DECK
1345	005722	012767	014556	001146	BEQ	DATST3
1346	005730	012767	015260	001142	MOV	!MRKCD,TSTART
					MOV	!MRKEND,TEND

1347	005736	012767	013344	001130	MOV	#MSG20,DECK	
1348	005744	000427			BR	CONTD	
1349	005746	032767	000020	171614	BIT	#20,SR	ICHECK BIT 4 OF SR FOR TYPE OF DECK
1350	005754	001412			BEO	ALP1	IBRANCH IF NOT SET TO LOAD ALPHANUMERIC POINTERS
1351	005756	012767	014056	001112	MOV	#B1NCD,TSTART	IBIT 2 SET; LOAD BINARY TABLE POINTERS
1352	005764	012767	014554	001106	MOV	#B1NEND,TEND	
1353	005772	012767	013165	001074	MOV	#MSG19,DECK	
1354	006000	000411			BR	CONTD	IBRANCH AROUND ALPHANUMERIC POINTERS
1355	006002	012767	013356	001066	ALP11	MOV	IALPCD,TSTART
1356	006010	012767	014054	001002	MOV	IALPEND,TEND	ILoad ALPHANUMERIC TABLE POINTERS
1357	006016	012767	013154	001050	MOV	#MSG14,DECK	
1358	006024	012767	000340		CONTD1	MOV	#340,(SP)
1359	006030	012767	006062		MOV	#DCNT1,-(SP)	IPUSH STATUS ON STACK
1360	006034	005767	172772		TSF	TRFLG	IPUSH PC ON STACK
1361	006040	100007			BPL	PSSET1	ICHECK FLAG
1362	006042	032767	010000	171520	BIT	#10000,SR	IF IT IS POSITIVE, CLEAR Y BIT
1363	006050	001003			BNE	PSSET1	ITRACE TRAPPING INHIBITED?
1364	006052	012766	000360	000002	MOV	#360,2(SP)	IBRANCH IF YES
1365	006060	000002			PSSET11	RTI	ISSET Y BIT ON STACK
1366	006062	004767	003256		DCNT11	JSR	X7,INI?
1367							INITIALIZE CARD READER STATUS REGISTER
1368							
1369	006066	012710	006122		ISSET UP		INTERRUPT SERVICING, AND START READING
1370	006072	042767	000340	171676	MOV	#SRVC,ADINT	ISSETUP RETURN POINTER
1371	006100	016760	171672	000002	BIC	#340,PSR	ISSET PROCESSOR TO LEVEL 0
1372	006106	004767	000700		MOV	PSR,2(ADINT)	ISTORE CURRENT STATUS
1373	006112	002713	000100		JSR	X7,NXCRD	IADJUST POINTER AND START READING
1374	006116	000001			BIS	#100,PCRS	IENABLE INTERRUPTS
1375	006120	000776			WAIT		IWAIT FOR INTERRUPTS
1376					BR	102	
1377							
1378	006122	032713	000400		INTERRUPT SERVICE ROUTINE WHICH RUNS DATA RELIABILITY TEST		
1379	006126	001402			SRVCI	BIT	#100,PCRS
1380	006130	000167	001234		BEO	104	ITEST OFF-LINE
1381	006134	005713			JMP	OFFSET	IBRANCH IF NOT SET
1382	006136	100400			TSF	PCRS	IF SET, GO CHECK WHY
1383	006140	105713			BMI	ERSET	ICHECK SPECIAL CONDITION (BIT 15)
1384	006142	100402			TSFB	PCRS	IBRANCH IF SET
1385	006144	000167	000466		BMI	NOTCOL	ICHECK COLUMN READY
1386	006150	005267	000730		JMP	104	IBRANCH IF SET
1387	006154	011467	000720		CLONT	CLONT	IJUMP IF NOT SET
1388	006160	105713			MOV	CCRB1,DAT1	IKEEP TRACK OF COLUMN NUMBER
1389	006162	100000			TSFB	CCRS	ISTORE DATA OF FIRST READ
1390	006164	005267	000340	171604	BPL	SCONT1	IMAKE SURE COLUMN READY CLEARED
1391	006172	104000			BIS	#340,PSR	IBRANCH IF IT DID
1392	006174	000167	000456		HLT		ISSET PROCESSOR TO LEVEL 7
1393	006200	017767	172022	000704	JMP	LASTCK	IREADING DATA DIDN'T CLEAR COLUMN READY
1394	006206	012701	000010		MOV	CCRB2,DATENG	IGO TO NEXT CARD AFTER ERROR PRINTOUT
1395	006212	005301			MOV	#10,COUNT	ISTORE ENCODED DATA
1396	006214	001376			DEC	COUNT	IWAIT AWHILE
1397	006216	011467	000666		BNE	102	
1398	006222	005067	000666		MOV	CCRB1,DAT2	ISTORE DATA OF SECOND READ
1399	006226	026715	000694		CLR	PTOFF	ICLEAR POINTER OFFSET
1400	006232	001046			CMP	DAT1,CRS	ICHECK FIRST DATA READ
					BNE	FAIL	IPRINTOUT IF WRONG

1401	006234	012767	000002	000692	MOV	#2,PTOFF	ISSET POINTER OFFSET
1402	006242	026725	000642		CMP	DAT2,(RS)+	ICHECK SECOND READING OF SAME DATA
1403	006246	001040			BNE	FAIL	IBRANCH IF WRONG
1404	006250	012767	000004	002636	MOV	#4,PTOFF	ISSET POINTER OFFSET
1405	006256	026725	000630		CMP	DATENG,(RS)+	ICHECK ENCODED DATA
1406	006262	001032			BNE	FAIL	IBRANCH IF WRONG
1407	006264	020567	000610		CMP	RS,TEND	ICHECK FOR END OF TABLE
1408	006270	100402			BMI	104	IF NOT THERE, RTI
1409	006272	016705	000600		MOV	TSTART,RS	IMOVE POINTER TO LOOP THRU TABLE
1410	006276	000002			RTI		
1411							
1412							
1413							
1414	006300	052767	000340	171470	ISPECIAL CONDITION BIT 15 WAS SET BUT BIT 8 WASN'T WHEN INTERRUPT SERVICE ROUTINE		
1415	006306	104000			ERSET1	BIS	#340,PSR
1416	006310	032713	000400		HLT		IFLOCK OUT INTERRUPTS
1417	006314	001002			BIT	#400,PCRS	ISPECIAL CONDITION WAS SET AND OFF LINE WASN'T
1418	006316	000167	000334		BNE	104	IOFF-LINE SET NOW?
1419	006322	022767	000144	000592	JMP	LASTCK	IFYES-SKIP OVER
1420	006330	001002			CMP	#100,DCONT	INDO-GO START NEXT CARD
1421	006332	000167	000560		BNE	104	ICHECK FOR LAST CARD
1422	006336	004767	003144		JMP	ALLDON	IF NOT,PRINT OUT MESSAGE
1423	006342	004767	000492		JSR	X7,CXBITS	IOUTPUT MESSAGE,WAIT FOR ON-LINE
1424	006346	000002			JSR	X7,NXCRD	ISTART NEXT CARD
1425					RTI		
1426							
1427	006350	052767	000340	171420	DATA ERROR WAS DETECTED, OUTPUT ERROR PRINTOUT		
1428	006356	052713	000002		FAIL	BIS	#340,PSR
1429	006362	005714			BIS	#2,CCRS	IFLOCK OUT INTERRUPTS
1430	006364	032767	020000	171176	TSF	CCRB1	ISSET EJECT TO PREVENT TIMING ERROR
1431	006372	001002			BIT	#20000,SR	IMAKE CERTAIN COLUMN READY IS CLEAR
1432	006374	004767	000056		BNE	104	ICK SW13 FOR INHIBIT PRINTOUT
1433	006400	005767	171164		JSR	X7,FPRINT	
1434	006404	100001			SR	104	ICHECK FOR HALT ON ERROR
1435	006406	000000			BPL	104	IBRANCH IF HALT ON ERROR NOT SET
1436	006410	032713	000400		HALT		IHalt ON ERROR SET
1437	006414	001000			BIT	#400,PCRS	
1438	006416	032713	040000		BNE	FCNT	
1439	006422	001772			BIT	#40000,PCRS	ICHECK FOR CARD DONE
1440	006424	000167	000226		BEO	FTST	
1441	006430	022767	000144	000444	JMP	LASTCK	INHIBIT PRINTOUT AFTER CARD DONE SET
1442	006436	001002			CMP	#100,DCONT	
1443	006440	000167	000492		BNE	104	
1444	006444	004767	003036		JMP	ALLDON	
1445	006450	004767	000344		JSR	X7,CXBITS	
1446	006454	000002			JSR	X7,NXCRD	
1447					RTI		
1448							
1449	006456	005767	172354		DATA ERROR PRINTOUT ROUTINE		
1450	006462	001000			FPRINT1	TSF	ERPLG
1451	006464	005267	172346		BNE	NOWD	ITEST FLAG FOR PREVIOUS PRINTOUT
1452	006470	012702	013066		INC	ERPLG	IF SET, DON'T OUTPUT HEADING
1453	006474	004767	003430		MOV	#MSG13,R2	ISSET FLAG
1454	006500	016702	000370		JSR	X7,TOUT	IOUTPUT HEADING FOR DATA ERROR PRINTOUT
					NOHD1	MOV	DECK,R2
							IOUTPUT TYPE OF DECK

1455	006504	004767	003420	JSR	X7,TOUT	
1456	006510	004767	003026	JSR	X7,SPACE	
1457	006514	016702	000362	MOV	CCONT,R2	OUTPUT CARD NUMBER WHERE ERROR OCCURRED
1458	006520	004767	006536	JSR	X7,DECPR	
1459	006524	004767	003012	JSR	X7,SPACE	
1460	006530	016702	000350	MOV	CLONT,R2	OUTPUT COLUMN NUMBER WHERE ERROR OCCURRED
1461	006534	004767	006522	JSR	X7,DECPR	
1462	006540	004767	002776	JSR	X7,SPACE	
1463	006544	166705	000344	SUB	PTOFF,R5	SUBTRACT OFFSET FROM POINTER TO POINT TO ADDRESS OF DESIRED PATTERN
1464						
1465	006550	012502		MOV	(R5)+,R2	OUTPUT CORRECT DATA PATTERN (NOT ENCODED)
1466	006552	004767	003136	JSR	X7,PROCT	
1467	006556	004767	002760	JSR	X7,SPACE	
1468	006562	016702	000320	MOV	DATA1,R2	OUTPUT DATA READ ON FIRST READING OF BUFFER
1469	006566	004767	003122	JSR	X7,PROCT	
1470	006572	004767	002744	JSR	X7,SPACE	
1471	006576	016702	000306	MOV	DATA2,R2	OUTPUT DATA READ ONE MILLISECOND LATER
1472	006582	004767	003106	JSR	X7,PROCT	
1473	006586	004767	002730	JSR	X7,SPACE	
1474	006612	011502		MOV	OR5,R2	OUTPUT CORRECT DATA PATTERN (ENCODED FORM)
1475	006614	004767	003074	JSR	X7,PROCT	
1476	006620	004767	002716	JSR	X7,SPACE	
1477	006624	016702	000262	MOV	DATAENG,R2	OUTPUT DATA READ (ENCODED)
1478	006630	004767	003060	JSR	X7,PROCT	
1479	006634	000207		RTS	X7	
1480						
1481						
1482	006636	032713	040000	INTERRUPT NOT DUE TO ERROR OR COLUMN READY		
1483	006642	001500		NOTCDI BIT	#40000,CCRS	CHECK FOR CARD DONE
1484	006644	022767	000120	BEQ	NOTCD	BRANCH IF NOT SET
1485	006652	001401		CMR	#80,CLONT	CHECK COLUMN COUNT
1486	006654	104000		BEQ	++	SKIP ERROR HALT IF 80 COLUMNS WERE READ
1487	006656	022767	000144	HLT		LESS THAN 80 COLUMNS WERE READ
1488	006664	001403		LASTCKI CMP	#100,CCONT	CHECK FOR LAST CARD
1489	006666	004767	000126	BEQ	LASTWT	BRANCH IF LAST CARD
1490	006672	000002		JSR	X7,NXGRD	IF NOT LAST CARD
1491	006674	052767	000340	RTI		GO ON
1492	006702	005027	000000	BIS	#340,PSR	
1493		006704		CLR	#0	
1494	006706	005367	177772	LACNTB,=2		
1495	006712	001375		DEC	LACNT	
1496	006714	005367	177764	BNE	++	
1497	006720	001375		DEC	LACNT	
1498	006722	005367	177756	BNE	++	
1499	006726	001375		DEC	LACNT	
1500	006730	005367	177750	BNE	++	
1501	006734	001375		DEC	LACNT	
1502	006736	032713	000400	BNE	++	
1503	006742	001402		BIS	#400,CCRS	
1504	006744	000167	000146	BEQ	++	
1505				JMP	ALLOON	
1506	006750	022626		LASTCKI CMP	(SP)+,(SP)+	RESTORE STACK
1507	006752	004767	002442	JSR	X7,BELL	RING BELL TO SIGNIFY "PASS COMPLETE"
1508	006756	032767	000040	BIS	#40,SR	CHECK SR FOR CONTINUATION TO ANOTHER DECK

1509	006764	001002		BNE	++	BRANCH TO HALT IF SW5 SET
1510	006766	000167	000002	JMP	DECKCK	CONTINUE TO ANOTHER DECK
1511	006772	000000		HALT		DATA TEST DONE
1512						
1513						
1514						
1515	006774	005167	172032	WHEN CONTINUING FROM ONE DECK TO ANOTHER, CHECK SW6 FOR TYPE		
1516	007000	032767	000100	IF TESTING TO BE PERFORMED		
1517	007006	001402		DECKCKI COM	TRPL6	TOGGLE TRACE FLAG
1518	007010	000167	172142	BIS	#100,SR	CHECK SW6
1519	007014	000167	176662	BEQ	++	BRANCH IF NOT SET
1520				JMP	RESTRY	RERUN COMBINED INSTRUCTION AND DATA TEST
1521	007020	016705	000052	JMP	DATA1	
1522	007024	042713	000002	NXGRDI MOV	TSART,R5	YES - ALL CARDS IDENTICAL
1523	007030	005213		BIS	#2,CCRS	CLEAR EJECT IF SET
1524	007032	005267	000044	INC	CCRS	READ ANOTHER CARD
1525	007036	005067	000042	INC	CCONT	KEEP TRACK OF CARD NUMBER
1526	007042	000207		CLR	CLONT	INITIALIZE COLUMN COUNT
1527				RTS	X7	RETURN
1528						
1529	007044	052767	000340	INTERRUPT NOT CAUSED BY ERROR, COLUMN READY, OR CARD DONE		
1530	007052	032713	000000	NOTCDI BIS	#340,PSR	LOCK OUT FURTHER INTERRUPTS
1531	007056	001003		BIS	#2000,CCRS	TEST ON-LINE TRANSITION BIT
1532	007060	104000		BNE	NOTCDI	BRANCH IF SET
1533	007062	000167	177570	HLT		NO BITS SET TO CAUSE AN INTERRUPT
1534	007066	104000		JMP	LASTCK	START NEXT CARD
1535	007070	000167	177562	NOTCDI HLT		ON-LINE TRANSITION CAUSED AN INTERRUPT
1536				JMP	LASTCK	START NEXT CARD
1537	007074	000000		DECKI 0		POINTER TO LITERAL "ALPHA" OR "BINARY"
1538	007076	000000		TSARTI 0		STARTING ADDRESS OF DATA TABLE
1539	007100	000000		TENDI 0		END ADDRESS OF DATA TABLE
1540	007102	000000		CCONTI 0		NUMBER OF CARD BEING READ
1541	007104	000000		CLONTI 0		NUMBER OF COLUMN BEING CHECKED
1542	007106	000000		DATA1I 0		DATA ON FIRST READ FROM CRB1
1543	007110	000000		DATA2I 0		DATA ON SECOND READ OF CRB1
1544	007112	000000		DATAENCI 0		DATA READ FROM CRB2
1545	007114	000000		PTOFFI 0		OFFSET TO POINTER FOR DATA PRINTOUT
1546						
1547						
1548	007116	004767	002276	80 CARDS DONE		
1549	007122	032767	000040	ALLOONI JSR	X7,BELL	RING BELL
1550	007130	001403		BIS	#40,SR	CHECK SR FOR HALT AT END OF DECK
1551	007132	000000		BEQ	ALONT	CONTINUE IF NOT SET
1552	007134	000167	177634	HALT		END OF DECK,SW5 SET
1553	007140	005013		JMP	DECKCK	CHECK FOR TYPE OF TESTING
1554	007142	032713	156377	ALONTI CLR	CCRS	CLEAR ERROR
1555				BIS	#156377,CCRS	ONLY BITS 8, 9 AND 13 MAY STILL BE SET
1556						
1557						
1558	007146	001401		BIT 9 MAY BE SET SINCE CARD MAY NOT YET HAVE CLEARED THE READER TO CAUSE CARD DONE		
1559	007150	104000		BEQ	++	BRANCH IF OK
1560	007152	032713	020000	HLT		STATUS REGISTER INCORRECT
1561	007156	001001		BIS	#20000,CCRS	CHECK BIT 13
1562	007160	104000		BNE	++	
				HLT		BIT 13 NOT SET

1563	007162	052767	000340	170606	BIS	#340,PSR	SET PROCESSOR TO LEVEL 7
1564	007170	016760	170602	000022	MOV	PSR,2(ADINT)	SETUP RETURN STATUS
1565	007176	109213			INCB	PCRS	ATTEMPT TO READ- SHOULD RESET ERROR
1566	007200	005713			TSF	PCRS	CHECK BIT 15
1567	007202	100402			BMI	ALLOK	BRANCH IF OK
1568	007204	104000			HLT		SETTING READ DIDN'T RESET ERROR
1569	007206	000416			BR	ALWAIT	BRANCH TO WAIT FOR ON-LINE
1570	007210	012710	007242		MOV	#SRVC1,ADINT	LOAD INTERRUPT RETURN ADDRESS
1571	007214	005067	170556		CLR	PSR	SET PROCESSOR TO LEVEL 0
1572	007220	012713	000101		MOV	#101,PCRS	ENABLE INTERRUPTS, KEEP ERROR SET BY SETTING READ
1573	007224	000240			NOP		CLOCK IN INTERRUPT
1574	007226	016067	000002	170542	MOV	2(ADINT),PSR	SET PROCESSOR TO LEVEL 7
1575	007234	005013			CLR	PCRS	CLEAR INTERRUPT ENABLE AND ERROR
1576	007236	104000			HLT		BIT 15 DIDN'T CAUSE AN INTERRUPT
1577	007240	000401			BR	,+4	
1578	007242	022626			SRVC1 CMP	(SP), (SP)+	RESTORE STACK POINTER
1579	007244	005013			ALWAIT CLR	PCRS	CLEAR INTERRUPT ENABLE AND ERROR
1580	007246	032713	040000		BIT	#40000,PCRS	WAIT FOR CARD DONE
1581	007252	001775			BEQ	,+4	
1582	007254	012710	007312		MOV	#SRVC2,ADINT	CHANGE INTERRUPT RETURN ADDRESS
1583	007260	112713	000100		MOV	#100,PCRS	ENABLE INTERRUPTS
1584	007264	042767	000340	170504	BIC	#340,PSR	SET PROCESSOR TO LEVEL 0
1585	007272	032713	000400		BIT	#400,PCRS	CHECK OFF-LINE BIT
1586	007276	001375			BNE	,+4	LOOP UNTIL CLEAR
1587	007300	016067	000002	170470	MOV	2(ADINT),PSR	SET PROCESSOR TO LEVEL 7
1588	007306	104000			HLT		NO INTERRUPT OCCURRED
1589	007310	000403			BR	SRVC2A	BRANCH AROUND
1590	007312	004767	002102		JSR	X7,BELL	RING BELL
1591	007316	022626			CMP	(SP), (SP)+	RESTORE STACK POINTER
1592	007320	032713	002000		SRVC2A BIT	#2002,PCRS	CHECK BIT 10
1593	007324	001001			BNE	,+4	BRANCH IF SET
1594	007326	104000			HLT		BIT 10 NOT SET
1595	007330	032713	000400		BIT	#400,PCRS	CHECK BIT 8
1596	007334	001401			BEQ	,+4	BRANCH IF NOT SET
1597	007336	104000			HLT		BIT 8 WAS SET
1598	007340	032713	030000		BIT	#30000,PCRS	CHECK BITS 12 AND 13
1599	007344	001401			BEQ	,+4	BRANCH IF NOT SET
1600	007346	104000			HLT		BIT 12 AND/OR 13 STILL SET IN CRS
1601	007350	005013			CLR	PCRS	DATA TO CRS
1602	007392	032713	002000		BIT	#2000,PCRS	CHECK BIT 10
1603	007396	001401			BEQ	,+4	BRANCH IF NOT SET
1604	007360	104000			HLT		DATA DIDN'T CLEAR ON-LINE BIT
1605	007362	022626			CMP	(SP), (SP)+	RESTORE STACK FROM INITIAL INTERRUPT
1606	007364	000167	177404		JMP	DECKCK	RESTART
1607							
1608							
1609	007370	022767	000144	177504	WHEN INTERRUPT SERVICE WAS ENTERED, OFF-LINE (BIT 8) WAS SET		
1610	007376	001406			OFFSET1 CMP	#100,COCNT	LAST CARD?
1611	007400	104000			BEQ	OFFS1	YES=BRANCH
1612	007402	004767	002100		JSR	X7,CXBIT8	NO,OFF-LINE SET BUT NOT 100TH CARD
1613	007406	004767	177406		JSR	X7,NXCRO	
1614	007412	000002			RTI		
1615	007414	022767	000120	177402	OFFS11 CMP	#00,COCNT	LAST COLUMN?
1616	007422	001002			BNE	,+6	NO=SKIP OVER

1617	007424	000167	177466		JMP	ALLDON	YES=GO RUN END OF DECK ROUTINE
1618	007430	104000			HLT		OFF-LINE SET BEFORE LAST COLUMN OF LAST CARD
1619	007432	004767	001762		JSR	X7,BELL	
1620	007436	032767	000040	178124	BIT	#40,SR	
1621	007444	001403			BEQ	OFFS2	
1622	007446	000000			HALT		HALT AT END OF DECK SET
1623	007450	000167	177320		JMP	DECKCK	START NEW DECK
1624	007454	052767	000340	170314	BIS	#340,PSR	CLOCK OUT INTERRUPTS
1625	007462	016760	170310	000002	MOV	PSR,2(ADINT)	STORE RETURN STATUS
1626	007470	000167	177550		JMP	ALWAIT	
1627							
1628							
1629	007474	004767	171342		SETUP FOR ERROR FUNCTION TEST		
1630	007500	012767	007510	002420	FROM111 JSR	X7,SETUP	INITIALIZE REGISTERS
1631					MOV	#TESTA+2,RETURN	SETUP SCOPE LOOP RETURN ADDRESS
1632							
1633	007506	104400			THE CARD READER GOING OFF-LINE SHOULD SET SPECIAL CONDITION (BIT 15) AND OFF-LINE (B		
1634	007510	005067	002406		TESTA1 SCOPE		
1635	007514	004767	001624		CLR	ITMAX	RUN EACH ERROR TEST ONCE ONLY
1636	007520	012702	012414		JSR	X7,INIT	INITIALIZE STATUS REGISTER
1637	007524	004767	002400		MOV	#MSG3,R2	
1638	007530	012702	012347		JSR	X7,TOU	"PRESS CARD READER 'READ STOP!'"
1639	007534	004767	002370		MOV	#MSG2,R2	
1640	007540	004767	002442		JSR	X7,TOU	"THEN HIT 'CONTINUE' ON THE CONSOLE"
1641	007544	004767	002436		JSR	X7,CRLF	MOVE MESSAGE UP ON TTY
1642	007550	004767	002432		JSR	X7,CRLF	
1643	007554	004767	002426		JSR	X7,CRLF	
1644	007560	000000			HALT		
1645	007562	032713	000400		BIT	#400,PCRS	CHECK BIT 8
1646	007566	001001			BNE	,+4	BRANCH IF SET
1647	007570	104000			HLT		OFF-LINE (BIT 8) WASN'T SET
1648	007572	003713			TSF	PCRS	CHECK BIT 15
1649	007574	100401			BMI	,+4	BRANCH IF SET
1650	007576	104000			HLT		BIT 15 WASN'T SET
1651	007600	012702	012254		MOV	#MSG1,R2	
1652	007604	004767	002320		JSR	X7,TOU	"PRESS CARD READER 'RESET!'"
1653	007610	012702	012347		MOV	#MSG2,R2	
1654	007614	004767	002310		JSR	X7,TOU	"THEN HIT 'CONTINUE' ON THE CONSOLE"
1655	007620	004767	002362		JSR	X7,CRLF	MOVE MESSAGE UP ON TTY
1656	007624	004767	002356		JSR	X7,CRLF	
1657	007630	004767	002352		JSR	X7,CRLF	
1658	007634	004767	002346		JSR	X7,CRLF	
1659	007640	000000			HALT		
1660							
1661							
1662							
1663	007642	104400			INPUT HOPPER EMPTY SHOULD SET SPECIAL CONDITION		
1664	007644	004767	001474		IN THE 200 M/S CARD READER IT SHOULD ALSO SET CARD SUPPLY ERROR		
1665	007650	012702	012507		TESTB1 SCOPE		
1666	007654	004767	002250		JSR	X7,INIT	INITIALIZE STATUS REGISTER
1667	007660	012702	012347		MOV	#MSG3,R2	"REMOVE ALL CARDS FROM THE INPUT HOPPER"
1668	007664	004767	002240		JSR	X7,TOU	
1669	007670	004767	002312		MOV	#MSG2,R2	"THEN HIT 'CONTINUE' ON THE CONSOLE"
1670	007674	004767	002306		JSR	X7,TOU	
					JSR	X7,CRLF	MOVE MESSAGE UP ON TTY

1671	007700	004767	002302	JSR	X7,CRLF	
1672	007704	004767	002276	JSR	X7,CRLF	
1673	007710	000000		HALT		
1674	007712	032713	000400	BIT	#400,PCRS	ICHECK BIT8
1675	007716	001001		BNE	,+4	IBRANCH IF SET
1676	007720	104000		HLT		IOFF-LINE (BIT 8) WASN'T SET
1677	007722	005713		TSY	PCRS	ICHECK SPECIAL CONDITION BIT
1678	007724	100401		BMI	,+4	IBRANCH IF SET
1679	007726	104000		HLT		ISPECIAL CONDITION NOT SET
1680	007730	032713	020000	BIT	#20000,PCRS	YES, TEST BIT 13
1681	007734	001001		BNE	,+4	ICONTINUE IF SET
1682	007736	104000		HLT		ICARD SUPPLY ERROR WASN'T SET
1683	007740	012702	012560	RESETBI	MOV	#MSG6,R2
1684	007744	004767	002160	JSR	X7,TOUT	IRESTORE CARDS IN INPUT HOPPER"
1685	007750	012702	012254	MOV	#MSG1,R2	
1686	007754	004767	002150	JSR	X7,TOUT	"PRESS CARD READER 'RESET/'
1687	007760	012702	012347	MOV	#MSG2,R2	
1688	007764	004767	002140	JSR	X7,TOUT	"THEN HIT 'CONTINUE' ON THE CONSOLE"
1689	007770	004767	002212	JSR	X7,CRLF	
1690	007774	004767	002206	JSR	X7,CRLF	IMOVE MESSAGE UP ON TTY
1691	010000	004767	002202	JSR	X7,CRLF	
1692	010004	004767	002176	JSR	X7,CRLF	
1693	010010	000000		HALT		
1694						
1695						
1696	010012	104400		OUTPUT	STACKER	FULL SHOULD SET BIT 15, AND IN AN MS READER SHOULD ALSO SET BIT 13
1697	010014	004767	001324	TESTCI	SCOPE	
1698	010020	012702	012624	JSR	X7,INIT	INITIALIZE STATUS REGISTER
1699	010024	004767	002100	MOV	#MSG7,R2	LOWER THE OUTPUT STACKER PRESSURE ARM
1700	010030	012702	012347	JSR	X7,TOUT	
1701	010034	004767	002070	MOV	#MSG2,R2	"THEN HIT 'CONTINUE' ON THE CONSOLE"
1702	010040	004767	002142	JSR	X7,TOUT	
1703	010044	004767	002136	JSR	X7,CRLF	IMOVE MESSAGE UP ON TTY
1704	010050	004767	002132	JSR	X7,CRLF	
1705	010054	004767	002126	JSR	X7,CRLF	
1706	010060	000000		HALT		
1707	010062	032713	000400	BIT	#400,PCRS	ICHECK BIT 8
1708	010066	001001		BNE	,+4	IBRANCH IF SET
1709	010070	104000		HLT		IOFF-LINE (BIT 8) WASN'T SET
1710	010072	005713		TSY	PCRS	ICHECK SPECIAL CONDITION BIT
1711	010074	100401		BMI	,+4	IBRANCH IF SET
1712	010076	104000		HLT		ISPECIAL CONDITION NOT SET
1713	010100	032713	020000	BIT	#20000,PCRS	YES, TEST BIT 13
1714	010104	001001		BNE	,+4	ICONTINUE IF SET
1715	010106	104000		HLT		ICARD SUPPLY ERROR WASN'T SET
1716	010110	012702	012254	RESETCI	MOV	#MSG1,R2
1717	010114	004767	002010	JSR	X7,TOUT	"PRESS CARD READER 'RESET/'
1718	010120	012702	012347	MOV	#MSG2,R2	
1719	010124	004767	002000	JSR	X7,TOUT	"THEN HIT 'CONTINUE' ON THE CONSOLE"
1720	010130	004767	002052	JSR	X7,CRLF	
1721	010134	004767	002046	JSR	X7,CRLF	IMOVE MESSAGE UP ON TTY
1722	010140	004767	002042	JSR	X7,CRLF	
1723	010144	004767	002036	JSR	X7,CRLF	
1724	010150	000000		HALT		

1725						
1726						
1727						
1728	010152	104400		IA FEED ERROR SHOULD SET BIT 15, AND IN THE MS READER IT SHOULD ALSO SET BIT 12		
1729	010154	004767	001164	THIS ERROR OCCURS WHEN THE FEED MECHANISM FAILS TO DELIVER A CARD TO THE READ STATION		
1730	010160	012702	012507	TESTDI	SCOPE	
1731	010164	004767	001740	JSR	X7,INIT	REMOVE ALL CARDS FROM THE INPUT HOPPER"
1732	010170	012702	012347	MOV	#MSG5,R2	
1733	010174	004767	001730	JSR	X7,TOUT	"THEN HIT 'CONTINUE' ON THE CONSOLE"
1734	010200	012702	012703	MOV	#MSG8,R2	"HOLD DOWN THE SWITCH AT THE BOTTOM
1735	010204	004767	001720	JSR	X7,TOUT	OF THE INPUT HOPPER"
1736	010210	012702	012254	MOV	#MSG1,R2	"PRESS CARD READER 'RESET/'
1737	010214	004767	001710	JSR	X7,TOUT	
1738	010220	004767	001762	JSR	X7,CRLF	IMOVE MESSAGE UP ON TTY
1739	010224	004767	001756	JSR	X7,CRLF	
1740	010230	004767	001752	JSR	X7,CRLF	
1741	010234	004767	001746	JSR	X7,CRLF	
1742	010240	000000		HALT		
1743	010242	032713	002000	BIT	#2000,PCRS	WAIT FOR CARD READER TO COME ON-LINE
1744	010246	001775		BEO	,+4	
1745	010250	004767	001070	JSR	X7,INIT	INITIALIZE STATUS REGISTER
1746	010254	012713	000003	MOV	#3,PCRS	SET EJECT AND READ
1747	010260	005001		CLR	COUNT	WAIT AWHILE
1748	010262	005201		INC	COUNT	
1749	010264	001376		BNE	,+8	
1750	010266	005201		INC	COUNT	
1751	010270	001376		BNE	,+2	
1752	010272	005201		INC	COUNT	
1753	010274	001376		BNE	,+2	
1754	010276	005201		INC	COUNT	
1755	010300	001376		BNE	,+8	
1756	010302	032713	000400	BIT	#400,PCRS	TEST OFF-LINE BIT
1757	010306	001001		BNE	,+4	IBRANCH IF SET
1758	010310	104000		HLT		IBIT 8 WAS NOT SET
1759	010312	005713		TSY	PCRS	ICHECK BIT 15
1760	010314	100401		BMI	,+4	IBRANCH IF SET
1761	010316	104000		HLT		IBIT 15 WAS NOT SET
1762	010320	032713	010000	BIT	#10000,PCRS	TEST CARD READER CHECK BIT ON MS READERS
1763	010324	001001		BNE	,+4	IBRANCH IF SET
1764	010326	104000		HLT		IBIT 12 WASN'T SET
1765	010330	012702	012560	RESETDI	MOV	#MSG6,R2
1766	010334	004767	001570	JSR	X7,TOUT	IRESTORE CARDS IN THE INPUT HOPPER"
1767	010340	012702	012254	MOV	#MSG1,R2	
1768	010344	004767	001560	JSR	X7,TOUT	"PRESS CARD READER 'START/'
1769	010350	012702	012347	MOV	#MSG2,R2	"THEN HIT 'CONTINUE' ON THE CONSOLE"
1770	010354	004767	001550	JSR	X7,TOUT	
1771	010360	004767	001622	JSR	X7,CRLF	IMOVE MESSAGE UP ON TTY
1772	010364	004767	001616	JSR	X7,CRLF	
1773	010370	004767	001612	JSR	X7,CRLF	
1774	010374	004767	001606	JSR	X7,CRLF	
1775	010400	000000		HALT		
1776						
1777						
1778						

IA MOTION ERROR SHOULD SET BIT 15, AND IN THE MS READER IT SHOULD SET BIT 12
THIS ERROR OCCURS WHEN A CARD JAM OCCURS AT THE READ STATION

1826 ROUTINE TO LOOP THRU A SINGLE INSTRUCTION TEST

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1833 010640 005067 001260 CLR ITCNT JCLEAR ITERATION COUNTER
1834 010644 012767 004000 MOV #4000,ITMAX
1835 010652 012767 010664 001290 MOV #XLOOP,RETURN JLOAD RETURN ADDRESS
1836 010660 000177 000010 JMP RETRNX IJUMP TO TEST
1837 010664 005067 001234 XLOOP1 CLR ITCNT IKEEP ITERATION COUNTER AT ZERO
1838 010670 000177 000000 JMP RETRNX IJUMP TO TEST
1839 010674 000000 RETRNX 0
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855 010676 004767 170140 CKSAME1 JSR X7,SETUP IINITIALIZE POINTERS
1856 010702 000000 HALT IWAIT FOR CARD IMAGE PATTERN
1857 010704 016767 166600 003300 MOV SR,CARDIM ISTORE PATTERN
1858 010712 042767 170000 003320 BIT #170000,CARDIM ICOMPARE UPPER BITS OF PATTERN
1859 010720 005067 000344 CLR TOTCRD IINITIALIZE CARD COUNT
1860 010724 005067 000336 CLR TOTERR IINITIALIZE ERROR COUNT
1861 010730 005067 170102 CLR ERPLG ISET CLEAR FLAG FOR PRINTING ERROR HEADING
1862 010734 005067 174144 CKLOOP1 CLR CLCNT IINITIALIZE COLUMN COUNT
1863 010740 032713 000400 BIT #400,0CRS ICHECK BIT 8
1864 010744 001017 000000 BNE CKBIT IBRANCH IF SET TO WAIT FOR READER TO COME ON-LINE
1865 010746 005213 INC 0CRS ISTART READING CARD
1866 010750 005267 000314 INC TOTCRD IINCREMENT CARD COUNT
1867 010754 105713 CKLPL1 TS#B 0CRS ICHECK COLUMN READY
1868 010756 100426 BMT CKCOL IBRANCH IF SET
1869 010760 032713 040000 BIT #40000,0CRS ICHECK CARD DONE
1870 010764 001013 BNE CKCRD IBRANCH IF SET
1871 010766 005713 TS#B 0CRS ICHECK SPECIAL CONDITION
1872 010770 100371 BPL CKLPL1 ILOOP IF NOT SET
1873 010772 032713 000400 BIT #400,0CRS ICHECK BIT 8
1874 010776 001002 BNE CKBIT IBRANCH IF SET TO WAIT FOR READER ON-LINE
1875 011000 104000 HLT ISPECIAL CONDITION SET, BIT 8 CLEAR
1876 011002 000734 BR CKLOOP
1877
1878 011004 004767 000410 CKSIT1 JSR X7,BELL IRING BELL TO SIGNIFY READER OFF-LINE
1879 011010 032713 000400 CKSIT1 BIT #400,0CRS ICHECK BIT 8
1880 011014 001375 BNE CKSIT1 ILOOP IF STILL SET
1881 011016 000746 BR CKLOOP ISTART NEXT CARD
1882 011020 022767 000120 170036 CKCRD1 CMP #00,CLCNT ICHECK FOR 80 COLUMNS READ
1883 011026 001742 BEQ CKLOOP ISTART NEXT CARD IF OK
1884 011030 104000 HLT IFINAL COLUMN COUNT WASN'T 80
1885 011032 000740 BR CKLOOP ISTART NEXT CARD
1886 011034 011467 170046 CKCOL1 MOV 0CRS1,DAT1 IREAD DATA BUFFER

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1887	011040	005267	176040		INC	CLCNT		ICOUNT COLUMNS
1888	011044	105713			TSB	PCRS		ICHECK COLUMN READY
1889	011046	100002			BPL	,+4		IBRANCH IF OK
1890	011050	104000			HLT			IREADING DBR DIDN'T CLEAR READY
1891	011052	000730			BR	CKLOOP		ISTART NEXT CARD AFTER ERROR
1892	011054	012701	000200		MOV	#200,COUNT		IWAIT AWHILE
1893	011060	005301			DEC	COUNT		
1894	011062	001370		CKLP2	BNE	CKLP2		
1895	011064	011467	176020		MOV	CRB1,DAT2		IREAD CRB1 AGAIN
1896	011070	026767	176012	000174	CHP	DAT1,CARDIM		ICOMPARRE FIRST DATA TO PATTERN
1897	011076	001000			BNE	CKPAIL		IBRANCH IF FAILURE
1898	011100	026767	176004	000164	CHP	DAT2,CARDIM		ICOMPARRE SECOND READING TO PATTERN
1899	011106	001001			BNE	CKPAIL		IBRANCH IF FAILURE
1900	011110	000721			BR	CKLP1		IWAIT FOR NEXT COLUMN OR END OF CARD
1901	011112	005267	000150		INC	TOTERR		ICOUNT ERRORS
1902	011116	032767	020000	160444	BIT	#20000,SR		ICHECK FOR INHIBITING PRINTOUT
1903	011124	001047			BNE	CKHLT		IBRANCH AROUND PRINTOUT IF SET
1904	011126	005767	167704		TSB	ERPLG		ITEST FLAG TO PRINT HEADING
1905	011132	001000			BNE	CKNOHD		IBRANCH IF ALREADY DONE
1906	011134	005267	167676		INC	ERPLG		IPRINT HEADING ONCE ONLY
1907	011140	012702	013301		MOV	#MSG19,R2		IOUTPUT HEADING
1908	011144	004767	000760		JSR	X7,TOU		
1909	011150	004767	001032		JSR	X7,CRLF		IOUTPUT CARRIAGE RETURN, LINEFEED
1910	011154	016702	175724		MOV	CLCNT,R2		IPRINT COLUMN NUMBER
1911	011160	004767	004076		JSR	X7,DECPR		
1912	011164	004767	000392		JSR	X7,SPACE		
1913	011170	016702	175712		MOV	DAT1,R2		IPRINT FIRST READING
1914	011174	004767	000514		JSR	X7,PROCT		
1915	011200	004767	000336		JSR	X7,SPACE		
1916	011204	016702	175700		MOV	DAT2,R2		IPRINT SECOND READING
1917	011210	004767	000500		JSR	X7,PROCT		
1918	011214	004767	000322		JSR	X7,SPACE		
1919	011220	016702	000444		MOV	TOTCRD,R2		IPRINT TOTAL NUMBER OF CARDS READ
1920	011224	004767	000464		JSR	X7,PROCT		
1921	011230	004767	000306		JSR	X7,SPACE		
1922	011234	016702	000026		MOV	TOTERR,R2		IPRINT TOTAL NUMBER OF DATA ERRORS
1923	011240	004767	000450		JSR	X7,PROCT		
1924	011244	005767	166320		JSR	SR,PROCT		
1925	011250	100002			HALT			ICHECK SW15 TO HALT ON ERROR
1926	011252	000000			BR	CKOONE		IBRANCH IF NOT SET
1927	011254	000627			BR	CKLOOP		ICONTINUE
1928	011256	032713	140000		BIT	#140000,PCRS		IWAIT FOR SPECIAL CONDITION OR DONE
1929	011262	001775			BEQ	CKOONE		
1930	011264	000623			BR	CKLOOP		ISTART NEXT CARD AFTER CHECKING BIT 8
1931	011266	000000			TOTCRD			
1932	011270	000000			CARDIM			
1933	011272	000000						
1934								
1935								
1936								
1937	011274	004767	167542		DELAY	X7,SETUP		ISSETUP POINTERS
1938	011300	000000			HALT			IWAIT FOR OPR
1939	011302	016767	166262	000030	15	SR,DELAY		IREAD SR
1940	011310	005213			INC	PCRS		IMOVE CARD

1941	011312	005267	000022		INC	DELAY		ICLEAR SECOND COUNTER
1942	011316	005007	000020		CLR	DELAY		IDELAY
1943	011322	005367	000014	25	DEC	DELAY		
1944	011326	001375			BNE	25		IDELAY FINISHED ?
1945	011330	005367	000004		DEC	DELAY		IBR IF NOT
1946	011334	001372			BNE	25		IBR IF YES
1947	011336	000761			BR	15		
1948								
1949	011340	000001			DELAY	1		
1950	011342	000000			DELAY	0		
1951								
1952								
1953								
1954								
1955	011344	004767	000136		INIT	JSR	X7,CB10	ISSEE IF OFF-LINE BIT IS SET
1956	011350	032713	001000		BIT	#1000,PCRS		IWAIT FOR BUSY TO CLEAR, IN CASE
1957	011354	001375			BNE	,+4		IA CARD IS STILL BEING READ
1958	011356	005013			CLR	PCRS		INITIALIZE STATUS REGISTER
1959	011360	005714			TSB	CRB1		IREAD DATA BUFFER TO CLEAR COLUMN READY
1960	011362	005713			TSB	PCRS		IMAKE SURE INITIALIZATION OK
1961	011364	001401			BEQ	,+4		IBRANCH IF ALL BITS ZERO
1962	011366	104000			HLT			INOT ALL BITS OF STATUS REGISTER ARE ZERO
1963	011370	000207			RTS	X7		IRETURN
1964								
1965								
1966	011372	016767	166400	167434	ISUBROUTINE TO SAVE STATUS AND CLEAR T BIT			
1967	011400	011646			CLRTRI	MOV	PSR,PROG	ISAVE STATUS
1968	011402	016766	166370	000002		MOV	(SP),=(SP)	IPUSH RETURN PC
1969	011410	042766	000020	000002		MOV	PSR,2(SP)	ISSETUP STATUS WITH T BIT CLEAR
1970	011416	000002				BIC	#20,2(SP)	
1971						RTI		IRETURN
1972								
1973	011420	105777	167372		IBELL ON PASS COMPLETE			
1974	011424	100375			BELL	TSB	PCSR	IWAIT FOR TTY READY
1975	011426	012777	000207	167364		BPL	,+4	
1976	011434	013702	000042			MOV	#207,OTDBR	IRING BELL
1977	011440	001416				MOV	#42,R2	
1978	011442	105777	167350			BEQ	END	
1979	011446	100375				TSB	PCSR	
1980	011450	012777	000000	167342		BPL	,+4	
1981	011456	105777	167334			MOV	#0,OTDBR	
1982	011462	100375				TSB	PCSR	
1983	011464	000005				BPL	,+4	
1984	011466	004712				RESET		
1985	011470	000240			LOGICI	JSR	X7,(R2)	
1986	011472	000240				NOP		
1987	011474	000240				NOP		
1988	011476	012767	000001	002416	END	MOV	#1,ITMAX	IMAKE CERTAIN ITERATION MAXIMUM IS CORRECT
1989	011504	000207				RTS	X7	IRETURN
1990								
1991								
1992								
1993	011506	032713	000400		ISUBROUTINE TO CHECK FOR BIT 8 (OFF-LINE) BEING SET IN CARD			
1994	011512	001001			IREADER CSR, AND PRINT OUT A MESSAGE IF IT IS			
					CKBIT8	BIT	#400,PCRS	ICHECK BIT 8
						BNE	,+4	IBRANCH IF SET

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1995 011514 000207      RTS      X7      ;RETURN IF NOT SET
1996 011516 012702 013261    MOV      #MSG18,R2    ;OUTPUT MESSAGE
1997 011522 004767 000402    JSR      X7,TOUT    ;"BIT 8 WAS SET"
1998 011526 012702 013176    MOV      #MSG17,R2    ;"REMEDY THE ERROR CONDITION
1999 011532 004767 000372    JSR      X7,TOUT    ;AND PRESS 'CONTINUE'"
2000 011536 000000          HALT          ;WAIT FOR CONTINUE
2001 011540 000762          BR      CKBIT8    ;CHECK AGAIN
2002
2003
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2007 011542 105777 167250    ;SUBROUTINE TO ISSUE N SPACES
2008 011546 100375          ;N IS ONE PLUS VALUE CONTAINED IN SPACEX
2009 011550 012777 000240 167242 ;SPACEX IS CLEARED WITHIN THE SUBROUTINE, SO THAT A CALL ON
2010 011556 005367 000010    ;SPACE WITHOUT LOADING SPACEX ISSUES ONLY ONE SPACE
2011 011562 100367          SPACEI TS#B  #TCSR    ;WAIT FOR TTY READY
2012 011564 005067 000002    BPL      #4      ;4
2013 011570 000207          MOV      #240,#TDBR    ;OUTPUT A SPACE
2014 011572 000000          DEC      SPACEX    ;DECREMENT COUNT
2015
2016
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2020 011574 036727 165770 022000 ;ENTERED WITH SYSTEM TRAP CALL (HLT)
2021 011602 001401          ;PRINT OUT THE ERROR PC AND STATUS REGISTER
2022 011604 000431          PRINTI BIT      SR,      #20000    ;TEST FOR INHIBIT PRINT OUT
2023 011606 012667 000076    BEQ      #4      ;BRANCH TO PRINT
2024 011612 012667 000074    BR      B,CK      ;INHIBIT, CHECK FOR HALT
2025 011616 024646          MOV      (6)+, SAVPC    ;IPC OF FAILING ROUTINE
2026 011620 004767 000362    MOV      (6)+, SAVPSR   ;IPSR OR ERROR CONDITION
2027 011624 010267 000052    CMP      #6,      #6      ;RESTORE STACK
2028 011630 016702 000054    JSR      X7,CRLF    ;OUTPUT CARRIAGE RETURN, LINEFEED
2029 011634 004767 000054    MOV      X2,      SAVR2    ;SAVE R2
2030 011640 105777 167152    MOV      SAVPC, X2    ;SAVPC, X2
2031 011644 100375          JSR      X7,      PROCT    ;PRINT PC+2 IN OCTAL
2032 011646 012777 000240 167144    TS#B  #TCSR    ;WAIT FOR TTY READY
2033 011654 016702 000032    BPL      #4      ;4
2034 011660 004767 000030    MOV      #240,#TDBR    ;OUTPUT A SPACE
2035 011664 016702 000012    MOV      SAVPSR, X2    ;SAVPSR, X2
2036 011670 005767 165674    JSR      X7,      PROCT    ;PRINT PROCESSOR STATUS AT TIME OF FAILURE
2037 011674 100001          MOV      SAVR2, X2    ;RESTORE REGISTER 2
2038 011676 000000          B,CKI      SR      ;CHECK SR FOR HALT SWITCH
2039 011700 000002          BPL      #4      ;BRANCH IF NOT SET
2040 011702 000000          HALT          ;HALT ON ERROR UP
2041 011704 000000          RTI      ;RETURN TO MAIN LINE
2042 011706 000000          SAVR2I 0
2043 011710 000000          SAVR3I 0
2044 011712 000000          SAVR4I 0
2045 011714 010367 177764    SAVPCI 0
2046 011720 010467 177762    SAVPSRI 0
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2049 011726 005001          CLR      COUNT    ;CLEAR COUNT TO USE AS CARRY FLAG
2050 011730 012703 000260    MOV      #240, X3    ;SETUP ASCII ZERO IN R3
2051 011734 005702          TS#B  X2      ;CHECK BIT 15 OF DESIRED NUMBER
2052 011736 100001          BPL      #4      ;BRANCH IF NOT SET
2053 011740 009203          INC      X3      ;CHANGE TO ASCII ONE
2054 011742 006102          ROL      X2      ;ROTATE INTO RIGHTMOST BIT
2055 011744 006102          ROL      X2      ;TO PREPARE FOR LOOP
2056 011746 005501          ADD     COUNT    ;STORE CARRY
2057 011750 105777 167042    C,WAITI TS#B  #TCSR    ;WAIT FOR TTY READY
2058 011754 100375          BPL      C,WAIT    ;C,WAIT
2059 011756 010377 167036    MOV      X3,      #TDBR    ;OUTPUT ASCII
2060 011762 009204          INC      X4      ;COUNT CHARACTERS OUTPUT
2061 011764 020427 000006    CMP      X4,      #6      ;CHECK FOR DONE
2062 011770 001005          BNE      C,CONT    ;BRANCH IF NOT DONE
2063 011772 016703 177706    MOV      SAVR3,X3    ;RESTORE REGISTER 3
2064 011776 016704 177704    MOV      SAVR4,X4    ;RESTORE REGISTER 4
2065 012002 000207          RTS      X7      ;RETURN
2066 012004 000241          C,CONTI CLC      ;CLEAR CARRY
2067 012006 005701          TS#B  COUNT    ;TEST CARRY FLAG
2068 012010 001402          BEQ      #6      ;BRANCH IF NOT SET
2069 012012 005001          CLR      COUNT    ;CLEAR FLAG
2070 012014 000261          SEC      ;SET CARRY
2071 012016 006102          ROL      X2      ;ROTATE NEXT 3 BITS INTO RIGHTMOST 3
2072 012020 006102          ROL      X2
2073 012022 006102          ROL      X2
2074 012024 005501          ADD     COUNT    ;STORE CARRY
2075 012026 010203          MOV      X2,      X3      ;MOVE DATA FOR OUTPUT
2076 012030 042703 177770    BIC      #17777,X3    ;CLEAR ALL BUT RIGHTMOST 3 BITS
2077 012034 052703 000260    BIS      #240, X3    ;SET TO ASCII EQUIVALENT
2078 012040 000743          BR      C,WAIT    ;LOOP
2079
2080 012042 032767 040000 165520    ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST 2 TIMES
2081 012050 001012          SCOPECI BIT      #40020, SR    ;TEST SR FOR SCOPE
2082 012052 032767 004000 165510    BNE      D,1      ;YES,SCOPE
2083 012060 001013          BIT      #4000,SR    ;NO- TEST FOR ITERATION
2084 012062 026767 000036 000032    BNE      D,2      ;INHIBIT ITERATION
2085 012070 100007          CMP      ITONT,ITMAX    ;CHECK FOR ITERATIONS COMPLETE
2086 012072 005267 000026    BPL      D,2      ;EXIT=DONE
2087 012076 022606          INC      ITONT    ;INCREMENT COUNT
2088 012100 012667 165672          CMP      (6)+, X6      ;REPOSITION STACK POINTER
2089 012104 000177 000016    MOV      (6)+, PSR    ;RESTORE PROCESSOR STATUS
2090 012110 005067 000010    JMP      @RETURN    ;RETURN TO HERUN TEST
2091 012114 011667 000006    CLR      ITONT    ;CLEAR COUNTER
2092 012120 000002          MOV      #X6, RETURN    ;SAVE SCOPE RETURN POINTER
2093 012122 000001          RTI      ;RETURN INLINE-NEXT TEST
2094 012124 000000          ITMAXI 1
2095 012126 001224          ITONTI 0
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2099 012130 142777 000177 166600    ;MOV ADDRESS OF MESSAGE TO REGISTER 2
2100 012136 111267 000042    THEN JSR X7, TOUT    ;TOUTI
2101 012142 005202          TOUTI  BIC      #177,  #TCSR    ;CLEAR INT FLAG
2102 012144 121267 000034          MOV      #X2, L,EOBK    ;MOVE IN EOM MARKER
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2103	012150	001001		BNE	,04		IBRANCH IF NOT END OF MESSAGE
2104	012152	000207		RTS	X7		IRETURN IF EOM
2105	012154	121227	000100	CHPB	0X2,	#10	ICHECK FOR CR,LF REQUEST
2106	012160	001003		BNE	,+10		IBRANCH IF NOT
2107	012162	004767	000020	JSR	X7,CRLF		IOUTPUT CARRIAGE RETURN, LINEFEED
2108	012166	000765		BR	L,INC		ILOOP
2109	012170	105777	166022	TSB	0TCSR		IWAIT FOR TTY
2110	012174	100375		BPL	,04		
2111	012176	112277	166616	MOVB	(2)+,	0TDBR	IOUTPUT NEXT CHARACTER
2112	012202	000760		BR	L,TOJT		ICONTINUE
2113	012204	000000		L,ROMKI	0		
2114							
2115				ISUBROUTINE TO			ISSUE CARRIAGE RETURN AND LINEFEED
2116	012206	105777	166004	CRLF	TSB	0TCSR	IWAIT FOR TTY READY
2117	012212	100375		BPL	,04		
2118	012214	112777	000215	MOVB	0215,	0TDBR	ISEND CARRIAGE RETURN
2119	012222	105777	166070	TSB	0TCSR		IWAIT FOR TTY
2120	012226	100375		BPL	,04		
2121	012230	112777	000212	MOVB	0212,	0TDBR	ISEND LINE FEED
2122	012236	105777	166054	TSB	0TCSR		
2123	012242	100375		BPL	,04		
2124	012244	112777	000000	MOV	00,0TDBR		IOUTPUT FILLER
2125	012252	000207		RTS	X7		IRETURN
2126							
2127							
2128	012254	040057	051120	MS011	,ASCII	I/PRESS CARD READER 'RESET' AND WAIT FOR THE 'RESET' LIGHT/I	
	012262	020123	040503				
	012270	051040	040505				
	012276	020122	051047				
	012304	052105	020047				
	012312	020104	040527				
	012320	043040	051117				
	012326	042510	023440				
	012334	042523	023524				
	012342	043511	052110				
2129	012347	057	052100	MS021	,ASCII	I/WHEN HIT 'CONTINUE' ON THE CONSOLE/I	
	012354	020116	044510				
	012362	041447	047117				
	012370	052516	023505				
	012376	020116	044124				
	012404	047503	051516				
	012412	027505					
2130	012414	040057	051120	MS031	,ASCII	I/PRESS CARD READER 'READ STOP'/I	
	012422	020123	040503				
	012430	051040	040505				
	012436	020122	051047				
	012444	020104	052123				
	012452	027447					
2131	012454	040057	044124	MS041	,ASCII	I/WHEN THE INTERRUPT LEVEL WAS /I	
	012462	047111	042524				
	012470	050125	020124				
	012476	042526	020114				
	012504	020123	057				
2132	012507	057	051100	MS051	,ASCII	I/WHEN REMOVE ALL CARDS FROM THE INPUT HOPPER/I	

	012514	053117	020105				
	012522	020114	040503				
	012530	020123	051106				
	012536	052040	042510				
	012544	050116	052125				
	012552	050117	042520				
2133	012560	040057	042522	MS061	,ASCII	I/WHEN RESTORE CARDS IN THE INPUT HOPPER/I	
	012566	051117	020105				
	012574	042122	020123				
	012602	052040	042510				
	012610	050116	052125				
	012616	050117	042520				
2134	012624	040057	047514	MS071	,ASCII	I/WHEN LOWER THE OUTPUT HOPPER STACKER PRESSURE ARM/I	
	012632	020122	044124				
	012640	052517	050124				
	012646	044040	050117				
	012654	020122	052123				
	012662	042513	020122				
	012670	051505	052523				
	012676	040440	046522				
2135	012703	057	052100	MS081	,ASCII	I/WHEN GENTLY DEPRESS THE HOPPER EMPTY SWITCH/I	
	012710	020116	042507				
	012716	054514	042040				
	012724	042522	051523				
	012732	042510	044040				
	012740	042520	020122				
	012746	052120	020131				
	012754	052111	044103				
2136	012761	057	052100	MS091	,ASCII	I/WHEN FIRMLY HOLD THE BOTTOM CARD TO PREVENT A CARD GOING THRU, AND/I	
	012766	020116	044506				
	012774	054514	044040				
	013002	020104	044124				
	013010	047502	052124				
	013016	041440	051101				
	013024	047524	050040				
	013032	042526	052116				
	013040	041440	051101				
	013046	047507	047111				
	013054	044124	052522				
	013062	047101	027504				
2137	013066	040057	042504	MS0131	,ASCII	I/WHEN DECK CARD COLUMN PATTERN READ1 READ2 CODED READ/I	
	013074	020040	041440				
	013102	020104	047503				
	013110	047115	050040				
	013116	042524	047122				
	013124	040505	030504				
	013132	040505	031104				
	013140	047503	042504				
	013146	051040	040505				
2138	013154	040057	046101	MS0141	,ASCII	I/WHEN ALPHA /I	
	013162	020101	057				
2139	013165	057	041100	MS0151	,ASCII	I/WHEN BINARY/I	
	013172	051101	027531				
2140	013176	040057	042522	MS0171	,ASCII	I/WHEN REMEDY THE ERROR CONDITION AND PRESS 'CONTINUE'/I	

	013204	054504	052040	042510		
	013212	042440	051122	051117		
	013220	041440	047117	044504		
	013226	044524	047117	043440		
	013234	042116	050040	042522		
	013242	051523	023440	047503		
	013250	052116	047111	042525		
	013256	040047	057			
2141	013261	057	041100	052111	MSG181	,ASCII 1/0BIT 8 WAS SET/1
	013266	034040	053440	051301		
	013274	051440	052105	057		
2142	013301	057	041300	045117	MSG191	,ASCII 1/0COLUMN READ1 READ2 CARDS ERRORS/1
	013306	046525	020116	042522		
	013314	042101	020061	042522		
	013322	042101	020062	041440		
	013330	051101	051304	042440		
	013336	051122	051117	027523		
2143	013344	040057	045503	041122	MSG201	,ASCII 1/0CKRBRD/1
	013352	042122	057			
2144		013356				,EVEN

		DATA TABLES FOR DATA RELIABILITY TESTS			
		ALPHANUMERIC DECK DATA TABLE			
		FIRST VALUE FOR A COLUMN IS THE DIRECT			
		CARD IMAGE FOR THAT COLUMN ON CARD 1			
		THE SECOND VALUE IS THE ENCODED FORM OF THAT DATA			
		COLUMN CHAR HOLLERITH			
	ALPCDI	4000	11	8	12
2146		200			
2147		4400			
2148		201	12	A	12 1
2149		4200	13	B	12 2
2150		202			
2151		4100	14	C	12 3
2152		203			
2153		4040	15	D	12 4
2154	013356	204			
2155	013360	4020	16	E	12 5
2156	013362	205			
2157	013364	4010	17	F	12 6
2158	013366	206			
2159	013370	4004	18	G	12 7
2160	013372	207			
2161	013374	4002	19	H	12 8
2162	013376	210			
2163	013400	4001	110	I	12 9
2164	013402	220			
2165	013404	4202	111	CENT	12 8 2
2166	013406	212			
2167	013410	4102	112	,	12 8 3
2168	013412	213			
2169	013414	4042	113	<	12 8 4
2170	013416	214			
2171	013420	4022	114	(	12 8 5
2172	013422	215			
2173	013424	4012	115	+	12 8 6
2174	013426	216			
2175	013430	4006	116	1	12 8 7
2176	013432	217			
2177	013434	2000	117	=	11
2178	013436	100			
2179	013440	2400	118	J	11 1
2180	013442	101			
2181	013444	2200	119	K	11 2
2182	013446	102			
2183	013450	2100	120	L	11 3
2184	013452	103			
2185	013454	2040	121	M	11 4
2186	013456	104			
2187	013460	2020	122	N	11 5
2188	013462	105			
2189	013464	2010	123	O	11 6
2190	013466	106			
2191	013470				
2192	013472				
2193	013474				
2194	013476				
2195	013500				
2196	013502				
2197	013504				
2198	013506				
2199	013510				

2200	013512	002004	2004	124	P	11 7
2201	013514	000107	107			
2202	013516	002002	2002	125	Q	11 8
2203	013520	000110	110			
2204	013522	002001	2001	126	R	11 9
2205	013524	000120	120			
2206	013526	002202	2202	127	I	11 8 2
2207	013530	000112	112			
2208	013532	002102	2102	128	S	11 8 3
2209	013534	000113	113			
2210	013536	002042	2042	129	A	11 8 4
2211	013540	000114	114			
2212	013542	002022	2022	130	J	11 8 5
2213	013544	000115	115			
2214	013546	002012	2012	131	I	11 8 6
2215	013550	000116	116			
2216	013552	002006	2006	132	BLANK	11 8 7
2217	013554	000117	117			
2218	013556	001000	1000	133	B	0
2219	013560	000040	40			
2220	013562	001400	1400	134	/	0 1
2221	013564	000041	41			
2222	013566	001200	1200	135	9	0 2
2223	013570	000042	42			
2224	013572	001100	1100	136	T	0 3
2225	013574	000043	43			
2226	013576	001040	1040	137	U	0 4
2227	013600	000044	44			
2228	013602	001020	1020	138	V	0 5
2229	013604	000045	45			
2230	013606	001010	1010	139	W	0 6
2231	013610	000046	46			
2232	013612	001004	1004	140	X	0 7
2233	013614	000047	47			
2234	013616	001002	1002	141	Y	0 8
2235	013620	000050	50			
2236	013622	001001	1001	142	Z	0 9
2237	013624	000060	60			
2238	013626	001202	1202	143		0 8 2
2239	013630	000052	52			
2240	013632	001102	1102	144	,	0 8 3
2241	013634	000053	53			
2242	013636	001042	1042	145	K	0 8 4
2243	013640	000054	54			
2244	013642	001022	1022	146	-	0 8 5
2245	013644	000055	55			
2246	013646	001012	1012	147	>	0 8 6
2247	013650	000056	56			
2248	013652	001006	1006	148	?	0 8 7
2249	013654	000057	57			
2250	013656	000000	0000	149	BLANK	
2251	013660	000000	0			
2252	013662	000400	0400	150	I	1
2253	013664	000001	1			

2254	013666	000200	0200	151	2	2
2255	013670	000002	2			
2256	013672	000100	0100	152	3	3
2257	013674	000003	3			
2258	013676	000040	0040	153	4	4
2259	013700	000004	4			
2260	013702	000020	0020	154	5	5
2261	013704	000005	5			
2262	013706	000010	0010	155	6	6
2263	013710	000006	6			
2264	013712	000004	0004	156	7	7
2265	013714	000007	7			
2266	013716	000002	0002	157	8	8
2267	013720	000010	10			
2268	013722	000001	0001	158	9	9
2269	013724	000020	20			
2270	013726	000202	0202	159	I	8 2
2271	013730	000012	12			
2272	013732	000102	0102	160	#	8 3
2273	013734	000013	13			
2274	013736	000042	0042	161	A	8 4
2275	013740	000014	14			
2276	013742	000022	0022	162	/	8 5
2277	013744	000015	15			
2278	013746	000012	0012	163	"	8 6
2279	013750	000016	16			
2280	013752	000006	0006	164	"	8 7
2281	013754	000017	17			
2282	013756	004000	4000	165	&	12
2283	013760	000200	200			
2284	013762	004000	4000	166	A	12 1
2285	013764	000201	201			
2286	013766	004200	4200	167	B	12 2
2287	013770	000202	202			
2288	013772	004100	4100	168	C	12 3
2289	013774	000203	203			
2290	013776	004040	4040	169	D	12 4
2291	014000	000204	204			
2292	014002	004020	4020	170	E	12 5
2293	014004	000205	205			
2294	014006	004010	4010	171	F	12 6
2295	014010	000206	206			
2296	014012	004004	4004	172	G	12 7
2297	014014	000207	207			
2298	014016	004002	4002	173	H	12 8
2299	014020	000210	210			
2300	014022	004001	4001	174	I	12 9
2301	014024	000220	220			
2302	014026	004202	4202	175	CENT	12 8 2
2303	014030	000212	212			
2304	014032	004102	4102	176	,	12 8 3
2305	014034	000213	213			
2306	014036	004042	4042	177	<	12 8 4
2307	014040	000214	214			

2308	014042	004022	4022			
2309	014044	000215	215		178	12 8 5
2310	014046	004012	4012			
2311	014050	000216	216		179	12 8 6
2312	014052	004006	4006			
2313	014054	000217	217		180	12 8 7
2314						
2315						
2316	014056	002577	2577	BINCDI	11	CARD COLUMN
2317	014060	000137	137			
2318	014062	007252	7252		12	
2319	014064	000356	356			
2320	014066	005777	5777		13	
2321	014070	000277	277			
2322	014072	006777	6777		14	
2323	014074	000337	337			
2324	014076	000000	0000		15	
2325	014100	000000	0			
2326	014102	003777	3777		16	
2327	014104	000177	177			
2328	014106	005777	5777		17	
2329	014110	000277	277			
2330	014112	007737	7737		18	
2331	014114	000377	377			
2332	014116	007757	7757		19	
2333	014120	000377	377			
2334	014122	007767	7767		110	
2335	014124	000377	377			
2336	014126	003773	3773		111	
2337	014130	000177	177			
2338	014132	006775	6775		112	
2339	014134	000327	327			
2340	014136	007776	7776		113	
2341	014140	000357	357			
2342	014142	002001	2001		114	
2343	014144	000120	120			
2344	014146	003002	3002		115	
2345	014150	000150	150			
2346	014152	004404	4404		116	
2347	014154	000207	207			
2348	014156	004210	4210		117	
2349	014160	000206	206			
2350	014162	002120	2120		118	
2351	014164	000107	107			
2352	014166	002040	2040		119	
2353	014170	000104	104			
2354	014172	004120	4120		120	
2355	014174	000207	207			
2356	014176	004210	4210		121	
2357	014200	000206	206			
2358	014202	002404	2404		122	
2359	014204	000107	107			
2360	014206	003002	3002		123	
2361	014210	000150	150			

2362	014212	007777	7777		124	
2363	014214	000377	377			
2364	014216	000000	0000		125	
2365	014220	000000	0			
2366	014222	006000	6000		126	
2367	014224	000300	300			
2368	014226	003001	3001		127	
2369	014230	000160	160			
2370	014232	004402	4402		128	
2371	014234	000211	211			
2372	014236	004204	4204		129	
2373	014240	000207	207			
2374	014242	002110	2110		130	
2375	014244	000107	107			
2376	014246	002060	2060		131	
2377	014250	000105	105			
2378	014252	004060	4060		132	
2379	014254	000205	205			
2380	014256	004110	4110		133	
2381	014260	000207	207			
2382	014262	002204	2204		134	
2383	014264	000107	107			
2384	014266	002402	2402		135	
2385	014270	000111	111			
2386	014272	005001	5001		136	
2387	014274	000200	200			
2388	014276	007777	7777		137	
2389	014300	000377	377			
2390	014302	007777	7777		138	
2391	014304	000377	377			
2392	014306	000000	0000		139	
2393	014310	000000	0			
2394	014312	000577	0577		140	
2395	014314	000037	037			
2396	014316	007252	7252		141	
2397	014320	000356	356			
2398	014322	000777	0777		142	
2399	014324	000037	37			
2400	014326	001000	1000		143	
2401	014330	000040	40			
2402	014332	006000	6000		144	
2403	014334	000300	300			
2404	014336	002477	2477		145	
2405	014340	000137	137			
2406	014342	001777	1777		146	
2407	014344	000077	77			
2408	014346	006537	6537		147	
2409	014350	000337	337			
2410	014352	005757	5757		148	
2411	014354	000277	277			
2412	014356	002767	2767		149	
2413	014360	000137	137			
2414	014362	005773	5773		150	
2415	014364	000277	277			

2416	014366	002775	2775	151
2417	014370	000127	127	
2418	014372	005776	5776	152
2419	014374	000257	257	
2420	014376	002001	2001	153
2421	014400	000120	120	
2422	014402	005002	5002	154
2423	014404	000250	250	
2424	014406	002404	2404	155
2425	014410	000107	107	
2426	014412	005210	5210	156
2427	014414	000246	246	
2428	014416	002120	2120	157
2429	014420	000107	107	
2430	014422	005040	5040	158
2431	014424	000244	244	
2432	014426	002120	2120	159
2433	014430	000107	107	
2434	014432	005210	5210	160
2435	014434	000246	246	
2436	014436	002404	2404	161
2437	014440	000107	107	
2438	014442	003002	3002	162
2439	014444	000150	150	
2440	014446	007777	7777	163
2441	014450	000377	377	
2442	014452	000000	0000	164
2443	014454	000000	0	
2444	014456	000000	0000	165
2445	014460	000300	300	
2446	014462	000300	300	166
2447	014464	000160	160	
2448	014466	004402	4402	167
2449	014470	000211	211	
2450	014472	004204	4204	168
2451	014474	000207	207	
2452	014476	002110	2110	169
2453	014500	000107	107	
2454	014502	002000	2000	170
2455	014504	000105	105	
2456	014506	004000	4000	171
2457	014510	000205	205	
2458	014512	004110	4110	172
2459	014514	000207	207	
2460	014516	002204	2204	173
2461	014520	000107	107	
2462	014522	002402	2402	174
2463	014524	000111	111	
2464	014526	005001	5001	175
2465	014530	000260	260	
2466	014532	007777	7777	176
2467	014534	000377	377	
2468	014536	007777	7777	177
2469	014540	000377	377	

2470	014542	002525	2525	178
2471	014544	000127	127	
2472	014546	005252	5252	179
2473	014550	000256	256	
2474	014552	007777	7777	180
2475	014554	000377	377	
2476				
2477				
2478				
2479	014556	007777	7777	
2480	014560	000377	377	
2481	014562	007777	7777	
2482	014564	000377	377	
2483	014566	004000	4000	
2484	014570	000200	200	
2485	014572	002000	2000	
2486	014574	000100	100	
2487	014576	001000	1000	
2488	014600	000040	40	
2489	014602	000400	400	
2490	014604	000001	1	
2491	014606	000200	200	
2492	014610	000002	2	
2493	014612	000100	100	
2494	014614	000003	3	
2495	014616	000040	40	
2496	014620	000004	4	
2497	014622	000020	20	
2498	014624	000005	5	
2499	014626	000010	10	
2500	014630	000006	6	
2501	014632	000004	4	
2502	014634	000007	7	
2503	014636	000002	2	
2504	014640	000010	10	
2505	014642	000001	1	
2506	014644	000020	20	
2507	014646	003777	3777	
2508	014650	000177	177	
2509	014652	005777	5777	
2510	014654	000277	277	
2511	014656	006777	6777	
2512	014660	000337	337	
2513	014662	007377	7377	
2514	014664	000377	377	
2515	014666	005777	5777	
2516	014670	000377	377	
2517	014672	007677	7677	
2518	014674	000377	377	
2519	014676	007737	7737	
2520	014700	000377	377	
2521	014702	007757	7757	
2522	014704	000377	377	
2523	014706	007767	7767	

MARK SENSE CARD TABLE

MRKCDI 7777

2524	014710	000377	377
2525	014712	007773	7773
2526	014714	000377	377
2527	014716	007775	7775
2528	014720	000367	367
2529	014722	007776	7776
2530	014724	000357	357
2531	014726	005252	5252
2532	014730	000256	256
2533	014732	002525	2525
2534	014734	000127	127
2535	014736	005252	5252
2536	014740	000256	256
2537	014742	002525	2525
2538	014744	000127	127
2539	014746	005252	5252
2540	014750	000256	256
2541	014752	002525	2525
2542	014754	000127	127
2543	014756	005252	5252
2544	014760	000256	256
2545	014762	002525	2525
2546	014764	000127	127
2547	014766	005252	5252
2548	014770	000256	256
2549	014772	002525	2525
2550	014774	000127	127
2551	014776	005252	5252
2552	015000	000256	256
2553	015002	002525	2525
2554	015004	000127	127
2555	015006	005252	5252
2556	015010	000256	256
2557	015012	002525	2525
2558	015014	000127	127
2559	015016	007777	7777
2560	015020	000377	377
2561	015022	007777	7777
2562	015024	000377	377
2563	015026	004000	4000
2564	015030	000200	200
2565	015032	002000	2000
2566	015034	000100	100
2567	015036	001000	1000
2568	015040	000040	40
2569	015042	000400	400
2570	015044	000001	1
2571	015046	000200	200
2572	015050	000002	2
2573	015052	000100	100
2574	015054	000003	3
2575	015056	000040	40
2576	015060	000004	4
2577	015062	000020	20

2578	015064	000005	5
2579	015066	000010	10
2580	015070	000006	6
2581	015072	000004	4
2582	015074	000007	7
2583	015076	000002	2
2584	015100	000010	10
2585	015102	000001	1
2586	015104	000020	20
2587	015106	003777	3777
2588	015110	000177	177
2589	015112	005777	5777
2590	015114	000277	277
2591	015116	006777	6777
2592	015120	000337	337
2593	015122	007377	7377
2594	015124	000377	377
2595	015126	007577	7577
2596	015130	000377	377
2597	015132	007677	7677
2598	015134	000377	377
2599	015136	007737	7737
2600	015140	000377	377
2601	015142	007757	7757
2602	015144	000377	377
2603	015146	007767	7767
2604	015150	000377	377
2605	015152	007773	7773
2606	015154	000377	377
2607	015156	007775	7775
2608	015160	000367	367
2609	015162	007776	7776
2610	015164	000357	357
2611	015166	005252	5252
2612	015170	000256	256
2613	015172	002525	2525
2614	015174	000127	127
2615	015176	005252	5252
2616	015200	000256	256
2617	015202	002525	2525
2618	015204	000127	127
2619	015206	005252	5252
2620	015210	000256	256
2621	015212	002525	2525
2622	015214	000127	127
2623	015216	005252	5252
2624	015220	000256	256
2625	015222	002525	2525
2626	015224	000127	127
2627	015226	005252	5252
2628	015230	000256	256
2629	015232	002525	2525
2630	015234	000127	127
2631	015236	005252	5252

2632	015240	000256
2633	015242	002525
2634	015244	000127
2635	015246	005252
2636	015250	000256
2637	015252	002525
2638	015254	000127
2639	015256	000000
2640	015260	000000

256
2525
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MRKEND: 0

END MARK SENSE DIAG TABLE

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2644 015262 012767 177773 000146 IPRINT DECIMAL VALUE IN R2
2645 015270 012767 015444 DECPRI MOV #9,DIGCNT
2646 015276 012767 000040 MOV #DECPT*2,DECPNT
2647 015304 012767 177777 000122 TYPT1 MOV #0,ZERO
2648 015312 005267 000118 TYPT2 INC #0,DIGIT
2649 015316 167702 000120 SUB #DECPT*2
2650 015322 100373 BPL TYPT2
2651 015324 167702 000112 ADD #DECPT*2
2652 015330 004767 000020 JSR #7,DEGOUT
2653 015334 005267 000076 INC DIGCNT
2654 015340 001001 BNE TYPT3
2655 015342 000207 RTS #7
2656 015344 062767 000002 000070 TYPT3 ADD #2,DECPNT
2657 015352 000754 BR TYPT1
2658 015354 005767 000054 DEGOUT1 TST DIGIT
2659 015360 001010 BNE DEC1
2660 015362 022767 177777 000046 CMP #0,DIGCNT
2661 015370 001404 BEQ DEC1
2662 015372 016767 000042 000034 MOV ZERO,DIGIT
2663 015400 000406 BR DEC2
2664 015402 012767 000000 000030 DEC1 MOV #0,ZERO
2665 015410 052767 000000 000016 BNE #0,DIGIT
2666 015416 105777 163374 DEC2 TSTB #0,DIGIT
2667 015422 100375 BPL #4
2668 015424 016777 000004 163366 MOV DIGIT,*TODBR
2669 015432 000207 RTS #7
2670 015434 000000 DIGIT1 0
2671 015436 000000 DIGCNT1 0
2672 015440 000040 ZERO1 0
2673 015442 015444 DECPNT1 +2
2674 015444 023420 100000
2675 015446 001750 1000
2676 015450 000144 100
2677 015452 000012 10
2678 015454 000001 1
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ADINT	0000000	ALCNT	007140	ALLDON	007110	ALLOK	007210
ALPCO	013356	ALPEND	014054	ALP1	006002	ALWAIT	007244
BEGIN	001150	BELL	011420	BINGD	014050	BINEND	014554
BCK	011670	CARDIM	011272	CCONT	007132	CKBIT8	011506
CKCOL	011034	CKCRD	011020	CKDOONE	011250	CKFAIL	011112
CKHLT	011244	CKLOOP	010734	CKLP1	010754	CKLP2	011000
CKNOHD	011130	CKSAME	010670	CKSIT	011004	CKSIT1	011010
CKA	001356	CKP	001722	CK9	000334	CLCNT	007104
CLRT	011372	CNT23A	000332	CNT23B	000330	CNT23C	000370
CNT23D	000406	CNT23E	000426	CNT23F	000446	CNT23G	000472
CNT24A	000540	CNT24B	000570	CONTD	000024	CONT10	002702
CONT11	000020	CONT	001414	CONT21	000154	CONT22	000272
CONT4	001376	CONTB	002422	COUNT	000000	CRB1	000004
CRB2	001026	CRUF	012206	CRS	000000	C,CONT	012004
C,WAIT	011750	DATENC	007112	DATST	000072	DATST1	000702
DATST2	000706	DATST3	000746	DAT1	000710	DAT2	000710
DBRCK8	002412	DCNT1	000002	DECO	000704	DECKCK	000774
DECOU	010334	DEOPNT	010442	DEBPR	010242	DECI	010402
DEO2	010416	DELAY	011274	DIGCNT	010436	DIGIT	010434
DLAY0	011340	DLAY1	011342	DONE3	000402	DONE7	002216
D,1	012076	D,2	012110	END	011470	ENDCK	000622
END24	000602	ERCH11	007474	ERPLG	000030	ERR0	002114
SET	000300	ER1	000322	FAIL	000350	FCNT	000430
FPRINT	000436	FTEST	000410	HLT	004000	INIT	011344
INTFLG	001012	INTVC	001014	ITCNT	012124	ITMAX	012122
KCRB1	001024	KCRS	001022	LACNT	000704	LASTCD	000750
LASTCK	000656	LASTWT	000674	LOGIC	011400	LOGICA	000650
LOOP11	002744	LOOPS	001454	LOBP4	001324	LOBP4B	001542
LOOPS	001654	LOOP6	002012	LOOP7	002144	LOOP8	002330
L,EDMK	012204	L,INC	012142	L,OUT	012144	MRKCD	014556
MRKEND	010200	MSG1	012224	MSG13	013006	MSG14	013134
MSG15	013106	MSG17	013176	MSG18	013204	MSG19	013304
MSG2	012347	MSG20	013344	MSG3	012414	MSG4	012454
MSG5	012507	MSG6	012500	MSG7	012624	MSG8	012702
MSG9	012761	NOMO	000000	NOP	000240	NOTCD	007044
NOTCD1	007066	NOTCOL	000636	NXCRD	000700	OFFSET	007370
OFFS1	007414	OFFS2	007454	OFF6	002102	PC	000000
PIRG	001040	PRINT	011974	PRC0	001034	PROCT	011714
PSR	017776	PSSET	001212	PSSET1	000000	PTOFF	007114
RESETB	007740	RESTB	001196	RESTB	002430	REST9	002556
RETRNX	010674	RETURN	012126	RSETC	010110	RSETD	010330
RSETC	010530	RTT	000000	R0	000000	R1	000000
R2	000002	R3	000000	R4	000000	R5	000000
SAVPC	011710	SAVPSR	011712	SAVR2	011732	SAVR3	011704
SAVR4	011706	SCONT1	000200	SCOPE	010440	SCOPEC	012042
SETUP	001042	SET1	004704	SET14	003502	SET2	004552
SET3	004340	SET4	004126	SET5	003714	SET7	003310
SP	000000	SPACE	011542	SPACEX	011572	SR	017570
SRVC	006122	SRVC1	007242	SRVC2	007312	SRVC2A	007320
STACK	001000	TCSR	001016	TDBR	001020	TEND	007100
TEST	001214	TESTA	007506	TESTB	007642	TESTC	010012
TESTD	010152	TESTE	010402	TESTG	010072	TESTX	010614
TEST1	001222	TEST1A	001224	TEST10	002570	TEST11	002712
TEST12	000300	TEST13	000310	TEST14	003322	TEST15	003514

TEST16	003726	TEST17	004140	TEST18	004352	TEST19	004564
TEST2	001322	TEST20	004776	TEST21	000102	TEST22	005176
TEST23	000304	TEST24	000510	TEST3	001430	TEST4	001512
TEST5	001642	TEST6	001776	TEST7	002130	TEST8	002314
TEST9	002462	TIM24	000574	TINT10	000052	TINT11	002776
TINT12	003072	TINT13	003226	TINT14	003440	TINT15	003632
TINT16	004044	TINT17	004296	TINT18	004470	TINT19	004702
TINT20	005056	TINT	005100	TOTCRD	011270	TOTERR	011266
TOUT	012130	TRET	001122	TRPLG	001032	TRTRAP	001030
TSTART	007076	TST18	001204	TST2A	001402	TYPT1	010304
TYPT2	010312	TYPT3	010344	T2INT	000242	T2INTA	000266
WAIT9	000222	XLOOP	010604	ZERO	010440		010456

ERRORS DETECTED: 0

*CHBBB,CHBBB,DECHBB
RUN=TIME: 9 18 0 SECONDS
CORE USED: 4K