CR11

CR11 DIAG TSTS
CZCRACO

AH-8413C-MC
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MADE IN USA

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IDENTIFICATION

PRODUCT CODE: AC-8412C-MC

PRODUCT NAME: CZCRACO CR11 DIAG TSTS

PRODUCT DATE: OCTOBER, 1979

MAINTAINER: DIAGNOSTIC ENGINEERING

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1. ABSTRACT

THIS TEST IS TO BE USED AS A CARD READER DIAGNOSTIC FOR THE PDP-11 WITH THE CR11 CARD READER. IT TESTS ALL LOGIC FUNCTIONS OF THE CARD READER, AND INCLUDES AN EXERCISER FOR ALPHANUMERIC AND BINARY TEST DECKS. A SEPARATE STARTING ADDRESS ALLOWS THE ERROR SENSING FUNCTIONS OF THE G.D.I. OR DOCUMATION READER TO BE CHECKED. ANOTHER STARTING ADDRESS TESTS SPECIAL DECKS WHICH HAVE ALL COLUMNS AND CARDS PUNCHED IDENTICALLY, TO AID IN DIAGNOSING SPECIAL PROBLEMS.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 COMPUTER WITH 4K MEMORY
CR11 CARD READER

2.2 TEST DECKS

MAINDEC-89-D2A1-C ALPHANUMERIC TEST DECK
MAINDEC-89-D2A2-C BINARY TEST DECK
EXTRA CARDS (FOR ERROR FUNCTION TEST)

3. LOADING PROCEDURE

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

THIS PROGRAM HAS BEEN MODIFIED TO RUN ON A PROCESSOR WITH OR WITHOUT A HARDWARE SWITCH REGISTER. WHEN FIRST EXECUTED THE PROGRAM TESTS THE EXISTENCE OF A HARDWARE SWITCH REGISTER. IF NOT FOUND A SOFTWARE SWITCH REGISTER LOCATION (SWREG=LOC. 176) IS DEFAULTED TO. IF THIS IS THE CASE, UPON EXECUTION THE CONTENTS OF THE SWREG ARE DUMPED IN OCTAL ON THE CONSOLE TTY AND ANY CHANGES ARE REQUESTED

(IE) SWR=XXXXXX NEW=

POSSIBLE RESPONSES ARE:

1.	<CR>	IF NO CHANGES ARE TO BE MADE
2.	6 DIGITS 0-7	TO REPRESENT IN OCTAL THE NEW SWITCH REGISTER VALUE ;LAST DIGIT FOLLOWED BY <CR>.
3.	^U	TO ALLOW REENTERING VALUE IF ERROR IS COMMITTED KEYING IN SWREG VALUE.

BUILT INTO THE PROGRAM IS THE ABILITY TO DYNAMICALLY CHANGE THE CONTENTS OF SWREG DURING PROGRAM EXECUTION. BY STRIKING ^G (CNTL G) ON CONSOLE TTY THE OPERATOR SETS A REQUEST FLAG TO CHANGE THE CONTENTS OF SWREG, WHICH IS PROCESSED IN KEY AREAS OF THE PROGRAM CODE (IE) ERROR ROUTINES, AFTER HALTS END OF PASS, AND OTHER APPLICABLE AREAS.

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4.1     CONTROL SWITCH SETTINGS

        BASIC SWITCH REGISTER SETTINGS ARE:

        SW15=1 OR UP---HALT ON ERROR
        SW14=1 OR UP---SCOPE LOOP
        SW13=1 OR UP---INHIBIT PRINT OUT
        SW12=1 OR UP---INHIBIT TRACE TRAPPING
        SW11=1 OR UP---INHIBIT SUB-PROGRAM ITERATION
                       (NOTE THAT IF SW11 IS SET, THE CARD COUNT
                       WILL BE ALTERED, CAUSING FAILURES IN THE
                       DATA TEST SECTION.)
        SW10=1 OR UP---CR11 CONTROLLER USES THE M829 MODULE
                       (IF DOWN, ASSUMES THE M8290 MODULE)
        SW07=1 OR UP---LOOP THRU THE INSTRUCTION TEST PORTION
        NOTE:   DATA ERRORS MAY OCCUR IF SW7 IS SET, THEN CLEARED.
                ALSO THE TEST MAY HANG WHEN THE INPUT HOPPER GOES EMPTY
                IF SW7 WAS SET.
        SW06=1 OR UP---RETURN TO THE BEGINNING OF THE INSTRUCTION TEST
                       WHEN CONTINUING FROM ONE DECK TO ANOTHER
        SW05=1 OR UP---HALT BETWEEN TEST DECKS
                       (SEE 5.2.1 FOR EXPLANATION OF SW5=0)
        SW04-1 OR UP---RUN THE BINARY TEST DECK
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4.2     STARTING ADDRESSES

        200 = INSTRUCTION AND DATA TEST
        210 = ERROR FUNCTION TEST (WITH G.D.I. READER)
        220 = ERROR FUNCTION TEST (WITH DOCUMATION READER)
        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 MOTOR START AND READ START ('RESET'' ON DOCUMATION READER).
        SET SWITCH REGISTER TO STARTING ADDRESS.
        LOAD ADDRESS.
        IF HARDWARE SWITCH REGISTER IS AVAILABLE SET SWITCHE
        SETTINGS BEFORE PRESSING START. IF SWITCH-LESS MACHINE SIMPLY
        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 'MOTOR START'' AND
                'READ START'' ('RESET'' ON DOCUMATION READER) ON THE CARD
                READER SHOULD CAUSE PROGRAM EXECUTION TO RESUME.
        THIS ENTIRE SEQUENCE IS NECESSARY TO RUN THE FULL TEST ON THE CARD
                READER.
        ALL PRINTOUTS INDICATE FAILURE, INCLUDING THOSE SAYING
                THAT BIT 8 OR BIT 15 WAS SET.

4.3.2   ERROR FUNCTION TEST (SA 210 OR 220)

        LOAD A FEW SPARE CARDS INTO THE INPUT HOPPER (DO NOT LOAD A
                TEST DECK-THIS TEST IS DESTRUCTIVE!)
        PRESS 'MOTOR START'' AND 'READ START'' ('RESET'' ON DOCUMATION READER)
                ON THE CARD READER.
        LOAD THE STARTING ADDRESS.
        IF HARDWARE SWITCH REGISTER IS AVAILABLE SET SWITCHE
        SETTINGS BEFORE PRESSING START. IF SWITCH-LESS MACHINE SIMPLY
        PRESS START.
        FOLLOW THE INSTRUCTIONS AS THEY ARE PRINTED OUT.

4.3.3   SINGLE SUBTEST LOOP (SA 240)

        LOAD CARDS (SPARE CARDS OR A TEST DECK) INTO THE INPUT HOPPER.
        PRESS 'MOTOR START'' AND 'READ START'' ('RESET'' ON DOCUMATION READER)
                ON THE CARD READER.
        LOAD THE STARTING ADDRESS.
        IF HARDWARE SWITCH REGISTER IS AVAILABLE SET SWITCHE
        SETTINGS BEFORE PRESSING START. IF SWITCH-LESS MACHINE SIMPLY
        PRESS START.
        WHEN ASKED,ENTER THE STARTING ADDRESS OF DESIRED TEST
                (ADDRESS OF THE TESTXX TAG, WHERE XX MAY BE 1 THRU 24
                OR A THRU G).
```

4.3.4 SINGLE DATA PATTERN TEST (SA 250)

A SPECIAL DECK (1 OR MORE CARDS) MUST BE PUNCHED 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 "MOTOR START" AND "READ START" ("RESET" ON
DOCUMATION READER).
LOAD SA 250.
IF HARDWARE SWITCH REGISTER IS AVAILABLE SET SWITCHE
SETTINGS BEFORE PRESSING START. IF SWITCH-LESS MACHINE SIMPLY
PRESS START.
WHEN THE CARD READER RUNS OUT OF CARDS IT WILL RING THE BELL.
RELOADING THE DECK AND PRESSING "READ START" ("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 OR 220 (ERROR FUNCTION TEST FOR CR11)

SW00=1 TO INHIBIT TESTING THE DARK-LIGHT ERROR.
SW14=1 TO LOOP THRU THE CURRENT SUBTEST
SW15=1 TO HALT ON ERROR

5.1.3 AT SA 240 (SINGLE SUBTEST LOOP)

SEE 4.1 FOR SR OPTIONS

5.1.4 AT SA 250 (SINGLE DATA PATTERN TEST)

SW15=1 TO HALT ON ERROR
SW13=1 TO INHIBIT PRINTOUTS

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 NEXT 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 SUB-TEST 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 TEST, AND ON ALL LOOPS OF THE CHANNEL TEST UNLESS SW12 IS SET. THE FIRST INSTRUCTION EXECUTED UPON TRAPPING IS AN "RTI" 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 LOACATION COUNTER WHEN THE TRAP OR INTERRUPT OCCURRED.

5.2.6 ERCR11 (ERROR FUNCTION TEST)

THIS TEST CHECKS OPERATION OF THE VARIOUS ERROR SENSING FEATURES OF THE G.D.I. OR THE DOCUMATION CARD READER. CARD READER OFF-LINE, INPUT HOPPER EMPTY, OUTPUT STACKER FULL, FEED ERROR, MOTION ERROR, STACK FAIL, AND DARK-LIGHT ERROR ARE ALL 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 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.

5.3 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 MOTOR START AND READ START (RESET ON THE DOCUMATION READER). IF THE CARD READER IS WORKING PROPERLY, THE BELL WILL RING ONCE WHEN READ START 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. SEE 4.3.3 FOR DETAILS.
THE PROGRAM WILL CONTINUOUSLY LOOP THRU THE DESIRED SUBTEST.

6. ERRORS

6.1 ERROR PRINTOUT

6.1.1 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.

6.1.2 DATA ERROR PRINTOUT

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

```
DECK    -EITHER ALPHANUMERIC OR BINARY , DEPENDING ON SW4
CARD    -THE CARD NUMBER WHERE THE FAILURE OCCURRED
COLUMN  -THE COLUMN NUMBER WHERE THE FAILURE OCCURRED
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. SW04 NOT SET TO TYPE OF DECK USED
B. CARD MISSING
C. CARD DECK OUT OF PROPER SEQUENCE
D. DAMAGED CARD

6.1.3 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.
```

6.1.4 "BIT 8 WAS SET"

AT THE BEGINNING OF MOST SUBTESTS, BIT 8 (OFF-LINE) IS CHECKED TO MAKE SURE THAT THE READER IS NOT OFF-LINE. IT IS ALSO CHECKED IN THE DATA TEST WHEN AN INTERRUPT OCCURS DUE TO BIT 15 BEING SET. IF BIT 8 IS SET WHEN IT WAS NOT SUPPOSED TO BE, THE ERROR MESSAGE "BIT 8 WAS SET. REMEDY THE ERROR CONDITION AND PRESS 'CONTINUE'." IS PRINTED OUT. THE PROCESSOR THEN HALTS. SINCE THE CARD READER GOES OFF-LINE WHEN A CARD READER FUNCTION ERROR OCCURS (CARD JAM, PICK FAIL, ETC.), THE CARD READER ERROR MUST BE FIXED AND THE READER MUST BE PUT BACK ON-LINE BEFORE THE PROGRAM CAN BE CONTINUED.

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.

7. RESTRICTIONS

7.1 STARTING PROCEDURE

NONE

7.2 OPERATIONAL RESTRICTIONS

7.2.1 COMBINED INSTRUCTION AND DATA RELIABILITY TEST (SA200)

IF A STANDARD TEST DECK IS NOT BEING USED, SW7 MUST BE SET TO INHIBIT RUNNING THE DATA RELIABILITY PORTION OF THE TEST.

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

IF THE CR11 USES AN M829 MODULE SW10 MUST BE SET IN THE SWITCH REGISTER.

7.2.2 ERROR FUNCTION TEST (SA 210 FOR G.D.I. READER - SA 220 FOR DOCUMATION READER)

THE ERROR FUNCTION TEST REQUIRES SPARE CARDS, AS IT BENDS SEVERAL. ALSO, TO RUN THE DARK-LIGHT CHECK 2 CARDS MUST BE SPECIALLY PREPARED. THE TEST WILL TYPE OUT A REQUEST FOR THESE CARDS WHEN THEY ARE NEEDED. TO MAKE THEM:

1. TEAR A SMALL PIECE FROM THE LEADING EDGE OF ONE CARD.
2. TAPE 2 OTHER CARDS TOGETHER TO MAKE ONE "LONG" CARD - IT ONLY NEEDS TO BE ABOUT 1/2 INCH LONGER THAN A REGULAR CARD

7.2.3 SINGLE DATA PATTERN TEST (SA 250)

A SPECIAL DECK (ONE OR MORE CARDS) MUST BE PREPARED. ALL COLUMNS OF ALL CARDS ARE PUNCHED 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 ALPHANUMERIC

REFERENCE THE ALPHANUMERIC TABLE BEGINNING AT THE TAG ALPCD IN THE LISTING FOR THE CODES PUNCHED FOR EACH OF 80 COLUMNS OF THE FIRST 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 ROTATED ONE COLUMN TO THE LEFT.

8.2 2 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 1ST CARD. AS WITH THE ALPHANUMERIC DECK EACH SUCCESSIVE CARD HAS THE SAME SEQUENCE OF CODES ROTATED ONE COLUMN TO THE LEFT.

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.

THE CARD READER GOES OFF-LINE DUE TO ''INPUT HOPPER EMPTY'' AFTER THE 80TH COLUMN OF THE LAST CARD IS READ, BUT BEFORE CARD DONE OCCURS. THUS, THE SPECIAL CONDITION BIT IN THE CSR WILL BE SET BEFORE CARD DONE ON THE LAST CARD.

IF THE CARD READER USES AN M829 MODULE, SW10 MUST BE SET IN THE SWITCH REGISTER. WITH THE M829 MODULE, CARD DONE NEVER OCCURS AFTER THE LAST CARD IN THE INPUT HOPPER IS READ. IF THE CARD READER USES AN M8290 MODULE, SW10 MUST NOT BE SET. WITH THE M8290 MODULE, CARD DONE IS ISSUED AFTER THE LAST CARD IN THE INPUT HOPPER IS READ.

IF BIT 0 OF THE CRS IS CLEARED IMMEDIATELY AFTER BEING SET, THE READING OF A CARD MAY NOT OCCUR. SINCE THIS BIT IS WRITE ONLY, A BIS OR BIC DONE AFTER SETTING BIT 0 MAY CLEAR THE BIT AND PREVENT THE READ FROM OCCURRING.

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                        8.4     TESTING CR11'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 ADINT, A CR11 MAY BE TESTED AT ANY
                                ADDRESS ASSIGNED TO IT.

                        9.      PROGRAM DESCRIPTION

                                THIS SET OF TESTS IS DESIGNED TO CHECK ALL OPERATIONS OF THE CR11
                                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 G.D.I. 100 READER, WHICH
                                PRINTS OUT DIRECTIONS AS IT GOES ALONG.  A TEST IS ALSO INCLUDED
                                TO ISOLATE DIFFICULT DATA ERRORS USING A SPECIAL TEST DECK
                                PUNCHED BY THE USER.

                        10.     LISTING%



                        .ABS
                        .TITLE  CZCRACO CR11 DIAG TSTS
                        .NLIST  MD,MC,CND
                        .LIST   ME
                        ;DIAGNOSTIC FOR CR11 CARD READER
                        ;COPYRIGHT 1970,1979, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                        ;BY RICK FADDEN

                        ;CHANGE HISTORY
                        ;(MODIFIED AUGUST-71 FOR DOCUMATION CARD READER (JOHN RODENHISER))
                        ;(MODIFIED APRIL-72 FOR HARDWARE ECO)
                        ;MODIFIED MARCH 1976 FOR SWITCH-LESS PROCESSORS BY RON PLATUKIS
                        ;REV.C0, OCTOBER 1979 TO BE ASSEMBLED USING CZCRAC.SML, WHICH
                        ;               WILL ENABLE ABSOLUTE MODE ADDRESSING (AMA).

                        ;STARTING ADDRESSES ARE:
                        ;       200=INSTRUCTION AND DATA TEST FOR THE CR11
                        ;       210=ERROR FUNCTION TEST OF CR11 (GDI)
                        ;       220=ERROR FUNCTION TEST OF CR11 USING DOCUMATION READER.
                        ;       240=SINGLE TEST LOOP
                        ;       250=READ SINGLE DATA PATTERN TEST

                        ;SWITCH REGISTER SETTINGS FOR THE INSTRUCTION AND DATA TEST ARE:
                        ;       SW04=1 FOR THE BINARY TEST DECK
                        ;       SW05=1 TO HALT AT THE END OF A STANDARD 80 CARD
                        ;               TEST DECK.
                        ;               =0 TO CONTINUE FROM ONE DECK TO THE NEXT.
                        ;                       AFTER THE LAST DECK IN THE HOPPER IS
                        ;                       RUN, THE PROGRAM WAITS FOR THE CARD READER
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                                        TO COME BACK ON-LINE,AND RUNS THRU
                                        A SERIES OF CHECKS OF OFF-LINE AND
                                        COMING ON-LINE OPERATIONS OF THE READER.
                                        WHEN THE READER IS BACK ON-LINE AND THE
                                        CHECKS ARE COMPLETE, THE DATA TEST IS RESUMED.
                                SW06=1 TO RUN THE COMBINED INSTRUCTION AND DATA TEST
                                       WHEN CONTINUING FROM ONE DECK TO THE NEXT
                                    =0 TO RUN ONLY THE DATA TEST ON EVERY DECK AFTER THE FIRST
                                SW07=1 TO RUN ONLY THE INSTRUCTION TEST CONTINUALLY
                                        SETTING SW06 AND SW07 AT THE END OF A DECK WILL
                                        CAUSE THE INSTRUCTION TEST TO BE RUN CONINUOUSLY FROM THEN ON
                                        NOTE:  IF SW7 IS SET, CHECKED BY PROGRAM, AND THEN
                                        CLEARED, THE DATA TEST WILL BE INCORRECT.  THIS IS
                                        TRUE BECAUSE THE FIRST CARD IN THE DATA TEST WILL NOT
                                        BE THE ONE EXPECTED.  WITH SW7 SET THE TEST MAY HANG
                                        WHEN THE INPUT HOPPER RUNS OUT OF CARDS.
                                SW10=1 TO INDICATE THAT THE CR11 BEING TESTED USES THE
                                        M829 MODULE
                                    =0 TO INDICATE THAT THE CR11 BEING TESTED USES THE
                                        M8290 MODULE
                                SW11=1 TO INHIBIT SUBPROGRAM ITERATION
                                        (NOTE THAT IF PROGRAM FLOW IS ALLOWED TO ENTER THE
                                        DATA SUBTEST, DATA ERRORS WILL OCCUR SINCE THE
                                        CARD COUNT WILL BE INCORRECT.)
                                SW12=1 TO INHIBIT TRACE TRAPPING
                                SW13=1 TO INHIBIT PRINTOUT
                                SW14=1 FOR SCOPE LOOP
                                SW15=1 TO HALT ON ERROR


        177776                  PSR=177776
        000240                  NOP=240
        104000                  HLT=EMT
        104001                  SCOPE=EMT+1
        104002                  CNTLU=EMT+2
        104003                  KBINTT=EMT+3
        104004                  READC=EMT+4
        104005                  SUSWRR=EMT+5
        104006                  CKU=EMT+6
        104007                  TIT=EMT+7
        000000                  ADINT=%0                ;CONTAINS ADDRESS OF INTERRUPT VECTOR
        000001                  COUNT=%1                ;USED FOR TIMING, ETC.
        000002                  R2=%2                   ;SCRATCH
        000003                  CRS=%3                  ;CONTAINS ADDRESS OF CARD READ STATUS REGISTER
        000004                  CRB1=%4                 ;CONTAINS ADDRESS OF CARD READER BUFFER (12 BIT DATA)
        000005                  R5=%5                   ;SCRATCH
        000006                  SP=%6                   ;STACK POINTER
        000007                  PC=%7                   ;PROGRAM COUNTER
                        ;LOAD TRAP CATCHER INTO LOCATIONS 0 THRU 377
                        ;LOAD TRAP VECTORS
        000014                  .=14
000014  000642                  TRTRAP
000016  000340                  340
        000030                  .-30
000030  012752                  EMTSRV
000032  000340                  340
```

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                                                .=46
000046  006466                                  LOGIC


                                ;SOFTWARE SWITCH REGISTER LOCATIONS

        000174                                  .=174
000174  000000                  DISPREG:0
000176  000000                  SWREG:  0

                                ;LOAD STARTING ADDRESS AREA
        000200                                  .=200
000200  012706  000600                          MOV     #STACK,SP
000204  000137  000726                          JMP     BEGIN           ;NORMAL STARTING ADDRESS FOR G.D.I. 100 READER
000210  012706  000600                          MOV     #STACK,SP
000214  000137  007200                          JMP     ERCR11          ;STARTING ADDRESS FOR CR11 ERROR FUNCTION TEST (G.D.I)
000220  012706  000600                          MOV     #STACK,SP
000224  000137  007206                          JMP     ERCM11          ;STARTING ADDRESS FOR CR11 ERROR FUNCTION TEST (DOCUMATI

        000240                                  .=240
000240  012706  000600                          MOV     #STACK,SP
000244  000137  010676                          JMP     TESTX           ;STARTING ADDRESS FOR LOOP WHICH CONTINUALLY RUNS
                                                                        ;ANY SINGLE SUBTEST
000250  012706  000600                          MOV     #STACK,SP
000254  000137  011014                          JMP     CKSAME          ;STARTING ADDRESS OF TEST TO READ A SINGLE DATA
                                                                        ;PATTERN CONTINUOUSLY
                                ;LOAD POINTERS AND GENERAL STORAGE
        000600                                  .=600
000600  000000                  STACK:  0                               ;STACK POINTER INITIALIZED TO POINT HERE
000602  000000                  INTFLG: 0                               ;CONTAINS LEVEL THAT INTERRUPT IS FOUND AT
000604  000230                  INTVC:  230                             ;ADDRESS OF CARD READER INTERRUPT VECTOR
000606  177560                  KBCSR:  177560
000610  177562                  KBDBR:  177562
000612  177564                  TCSR:   177564                          ;ADDRESS OF TELETYPE STATUS REGISTER
000614  177566                  TDBR:   177566                          ;ADDRESS OF TELETYPE DATA BUFFER
000616  177570                  SWR:    177570
000620  177570                  DISPLAY:177570
000622  000000                  TMP1:   0
000624  177777                  TIFLG:  -1
000626  000000                  TIB:    0
000630  000000                  CSNT:   0
000632  000000                  FLAG:   0                               ;SET TO ONE FOR MARK-SENSE CARD READER
000634  177160                  KCRS:   177160                          ;ADDRESS OF CARD READER STATUS REGISTER
000636  177162                  KCRB1:  177162                          ;ADDRESS OF CARD READER DATA BUFFER
000640  177164                  CRB2:   177164                          ;ADDRESS TO READ ENCODED DATA
000642  000002                  TRTRAP: RTI                             ;RETURN FROM TRACE LOOP
000644  000000                  TRFLG:  0                               ;TOGGLED TO SWITCH BETWEEN TRACE TRAPPING AND NORMAL FLO
000646  000000                  PROC:   0                               ;STORES PROCESSOR STATUS WHEN TRACE TRAP MUST BE CLEARED
                                                                        ;IN A SUBTEST
000650  000000                  ERFLG:  0                               ;SET TO ZERO TO OUTPUT DATA ERROR HEADING


                                ;INITIALIZE CSR AND DBR POINTERS
000652  004737  012152          SETUP:  JSR     %7,TOUT
000656  104005                          SUSWRR
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000660  104002                          CNTLU
000662  104006                          CKU
000664  012737  000001  012144          MOV     #1,ITMAX        ;SET ITERATION MAXIMUM TO 1 ITERATION
000672  013703  000634                  MOV     KCRS,CRS        ;SET UP REGISTER POINTERS
000676  013704  000636                  MOV     KCRB1,CRB1
000702  013700  000604                  MOV     INTVC,ADINT     ;LOAD ADDRESS OF INTERRUPT VECTOR
000706  005037  000602                  CLR     INTFLG          ;INITIALIZE INTERRUPT FLAG
000712  005037  000644                  CLR     TRFLG           ;INITIALIZE TRACE FLAG
000716  012737  000340  177776          MOV     #340,PSR        ;SETUP PROCESSOR STATUS
000724  000207                          RTS     %7              ;RETURN
000726  104007                  BEGIN:  TIT
000730  012702  016205                  MOV     #SUBT1,R2
000734  004737  000652                  JSR     %7,SETUP        ;INITIALIZE POINTERS AND FLAGS
000740  000424                          BR      TEST            ;GO TO INSTRUCTION TESTS
000742  022737  000176  000616  RESTRT: CMP     #SWREG,SWR
000750  001002                          BNE     1$
000752  104002                          CNTLU
000754  104006                          CKU
000756  005737  000644          1$:     TST     TRFLG           ;CHECK FOR TRACE TRAPPING
000762  001004                          BNE     TRAPX           ;IF SET, TRACE TRAP
000764  012737  000340  177776  NOTRP:  MOV     #340,PSR        ;IF ZERO, CLEAR TRACE BIT
000772  000407                          BR      TEST            ;GO TO INSTRUCTION TESTS
000774  032777  010000  177614  TRAPX:  BIT     #10000,@SWR     ;CHECK SW12
001002  001370                          BNE     NOTRP           ;BRANCH IF SET TO CLEAR TRACE BIT
001004  012737  000360  177776          MOV     #360,PSR        ;SET TRACE BIT

                                ;TEST FOR CORRECT INITIALIZATION OF STATUS REGISTER
001012  012737  001022  012150  TEST:   MOV     #TEST1A,RETURN  ;SETUP SCOPE LOOP RETURN ADDRESS
001020  104001                  TEST1:  SCOPE
001022  004737  011506          TEST1A: JSR     %7,CKBIT8       ;CHECK FOR OFF-LINE SET
001026  013737  177776  000646          MOV     PSR,PROC        ;STORE PROCESSOR STATUS
001034  005037  177776                  CLR     PSR             ;CLEAR TRACE BIT
001040  005001                          CLR     COUNT           ;INITIALIZE COUNTER
001042  005201                          INC     COUNT           ;WAIT TO BE CERTAIN
001044  001376                          BNE     .-2             ;THAT ALL CARDS ARE
001046  005201                          INC     COUNT           ;THRU BEFORE ISSUING
001050  001376                          BNE     .-2             ;INIT
001052  013737  000646  177776          MOV     PROC,PSR        ;RESTORE PROCESSOR STATUS
001060  000005                          RESET                   ;SEND OUT INIT
001062  005713                          TST     @CRS            ;CHECK FOR STATUS REGISTER ALL ZERO
001064  001401                          BEQ     .+4             ;BRANCH IF OK
001066  104000                          HLT                     ;STATUS REGISTER NOT CORRECTLY INITIALIZED
                                        ;ONLY BITS 1 AND 6 OF THE STATUS REGISTER SHOULD BE ABLE TO BE SET TO ONE
                                        ;AND READ BACK AS ONE
001070  052713  177776                  BIS     #177776,@CRS    ;SET ALL BITS BUT 0
001074  022713  000102                  CMP     #102,@CRS       ;ONLY BITS 1 AND 6 SHOULD BE SET
001100  001402                          BEQ     .+6             ;BRANCH IF OK
001102  104000                          HLT                     ;STATUS REGISTER DIDN'T CONTAIN 102
001104  000404                          BR      TEST2           ;BRANCH AFTER FAILURE
                                        ;CLEARING STATUS REGISTER SHOULD CLEAR BITS 1 AND 6
001106  005013                          CLR     @CRS            ;CLEAR BITS 1 AND 6
001110  005713                          TST     @CRS            ;CHECK FOR ALL BITS CLEAR
001112  001401                          BEQ     .+4             ;BRANCH IF OK
001114  104000                          HLT                     ;BIT 1 AND/OR BIT 6 DIDN'T CLEAR

001116  104001                  TEST2:  SCOPE
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                                        ;START SHOULD CAUSE CARD DONE WITHIN 1 SECOND
                                        ;BIT 0 SHOULD ALWAYS READ AS BEING EQUAL TO ZERO
001120  004737  011506                          JSR     %7,CKBIT8       ;CHECK FOR OFF-LINE SET
001124  013737  177776  000646                  MOV     PSR,PROC        ;STORE CURRENT PROCESSOR STATUS
001132  005037  177776                          CLR     PSR             ;CLEAR TRACE BIT
001136  005213                                  INC     @CRS            ;START READING A CARD
001140  032713  000001                          BIT     #1,@CRS         ;CHECK BIT 0
001144  001401                                  BEQ     .+4             ;BRANCH IF NOT SET
001146  104000                                  HLT                     ;BIT 0 READ AS A ONE
001150  005227  000000                          INC     #0              ;WAIT
001154  001375                                  BNE     .-4
001156  005227  000000                          INC     #0
001162  001375                                  BNE     .-4
001164  005227  000000                          INC     #0
001170  001375                                  BNE     .-4
001172  005227  000000                          INC     #0
001176  001375                                  BNE     .-4
001200  005227  000000                          INC     #0
001204  001375                                  BNE     .-4
001206  013737  000646  177776                  MOV     PROC,PSR        ;RESTORE PROCESSOR STATUS
001214  032713  040000                          BIT     #40000,@CRS     ;CHECK CARD DONE
001220  001002                                  BNE     CONT2           ;CONTINUE IF SET
001222  104000                                  HLT                     ;CARD DONE DIDN'T SET WITHIN 400 MS
001224  000406                                  BR      TEST3           ;NOTE THAT FAILURE COULD BE DUE TO READ
                                                                        ;NOT BEING RESET
001226  052713  040000                  CONT2:  BIS     #40000,@CRS     ;DATO TO STATUS REGISTER SHOULD CLEAR
001232  032713  040000                          BIT     #40000,@CRS     ;CARD DONE
001236  001401                                  BEQ     .+4             ;BRANCH IF IT DID
001240  104000                                  HLT                     ;DATO DIDN'T CLEAR CARD DONE

001242  104001                          TEST3:  SCOPE
                                        ;BUSY (BIT 9) SHOULD BE SET BY READING A CARD
                                        ;IT SHOULD REMAIN SET UNTIL CARD DONE SETS, WHICH SHOULD CLEAR IT
001244  004737  011506                          JSR     %7,CKBIT8       ;CHECK FOR OFF-LINE SET
001250  005013                                  CLR     @CRS            ;INITIALIZE STATUS REGISTER
001252  005213                                  INC     @CRS            ;READ A CARD
001254  032713  001000                          BIT     #1000,@CRS      ;CHECK BUSY
001260  001002                                  BNE     LOOP3           ;BRANCH IF SET
001262  104000                                  HLT                     ;READING A CARD DIDN'T SET BUSY
001264  000417                                  BR      TEST4
001266  032713  040000                  LOOP3:  BIT     #40000,@CRS     ;CHECK CARD DONE
001272  001010                                  BNE     DONE3           ;BRANCH IF SET
001274  032713  001000                          BIT     #1000,@CRS      ;CHECK BUSY
001300  001372                                  BNE     LOOP3           ;BRANCH IF STILL SET
001302  032713  040000                          BIT     #40000,@CRS     ;CHECK CARD DONE
001306  001006                                  BNE     TEST4           ;GO TO NEXT TEST IF SET
001310  104000                                  HLT                     ;BUSY CLEARED BEFORE CARD DONE SET
001312  000404                                  BR      TEST4
001314  032713  001000                  DONE3:  BIT     #1000,@CRS      ;CHECK BUSY
001320  001401                                  BEQ     TEST4           ;GO ON TO NEXT TEST IF CLEAR
001322  104000                                  HLT                     ;CARD DONE DIDN'T CLEAR BUSY

001324  104001                          TEST4:  SCOPE
                                        ;A TIMING ERROR SHOULD OCCUR IF DATA IS NOT READ AND NEW DATA COMES IN
                                        ;A TIMING ERROR SHOULD SET THE SPECIAL CONDITION BIT WHEN CARD DONE OCCURS
                                        ;COLUMN READY SHOULD BE CLEARED BY THE TIMING ERROR AND PREVENTED FROM RESETTING
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                                        ;BITS 11,14, AND 15 SHOULD BE CLEARED BY A DATO TO THE STATUS REGISTER
001326  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
001332  005001                          CLR     COUNT           ;INITIALIZE COUNTER
001334  005213                          INC     @CRS            ;INITIATE READ
001336  032713  140200          LOOP4:  BIT     #140200, @CRS   ;WAIT FOR SPECIAL CONDITION, CARD DONE,
                                                                ;OR COLUMN READY
001342  001775                          BEQ     LOOP4           ;LOOP IF NONE OCCURRED
001344  032713  140000                  BIT     #140000, @CRS   ;SPECIAL CONDITION OR CARD DONE?
001350  001007                          BNE     CK4             ;YES, BRANCH
001352  005201                          INC     COUNT           ;NO, COUNT COLUMN READYS
001354  105713                  LOOP4B: TSTB    @CRS            ;WAIT FOR COLUMN READY TO CLEAR
001356  100367                          BPL     LOOP4           ;IF CLEAR, RETURN TO LOOP4
001360  032713  140000                  BIT     #140000, @CRS   ;CHECK FOR SPECIAL CONDITION OR CARD DONE
001364  001001                          BNE     CK4             ;3RANCH IF EITHER SET
001366  000772                          BR      LOOP4B          ;OTHERWISE, CHECK AGAIN
001370  032713  040000          CK4:    BIT     #40000, @CRS    ;CHECK CARD DONE
001374  001002                          BNE     .+6             ;BRANCH IF SET
001376  104000                          HLT                     ;SPECIAL CONDITION SET BEFORE CARD DONE
001400  000403                          BR      CONT4
001402  005713                          TST     @CRS            ;CHECK SPECIAL CONDITION
001404  100401                          BMI     .+4             ;BRANCH IF SET
001406  104000                          HLT                     ;SPECIAL CONDITION WASN'T  SET
001410  032713  004000          CONT4:  BIT     #4000,  @CRS    ;CHECK TIMING ERROR
001414  001001                          BNE     .+4             ;BRANCH IF SET
001416  104000                          HLT                     ;TIMING ERROR WASN'T SET
001420  005301                          DEC     COUNT           ;CHECK NUMBER OF COLUMN READYS
001422  100002                          BPL     .+6             ;BRANCH IF ANY OCCURRED
001424  104000                          HLT                     ;COLUMN READY NEVER OCCURRED
001426  000402                          BR      .+6
001430  001401                          BEQ     .+4             ;BRANCH IF ONLY ONE OCCURRED
001432  104000                          HLT                     ;COLUMN READY OCCURRED MORE THAN ONCE
001434  105713                          TSTB    @CRS            ;CHECK COLUMN READY
001436  100001                          BPL     .+4             ;BRANCH IF NOT SET
001440  104000                          HLT                     ;COLUMN READY WASN'T CLEARED
001442  005013                          CLR     @CRS            ;CLEAR BITS 11,14, AND 15 VIA DATO
001444  032713  144000                  BIT     #144000, @CRS   ;CHECK
001450  001401                          BEQ     .+4
001452  104000                          HLT                     ;BITS 11,14, AND 15 WEREN'T ALL CLEARED


001454  104001                  TEST5:  SCOPE
                                        ;SETTING READ SHOULD CAUSE COLUMN READY TO SET 80 TIMES BEFORE CARD DONE SETS
                                        ;READING THE DATA BUFFER SHOULD CLEAR COLUMN READY AND PREVENT A TIMING ERROR
001456  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
001462  005001                          CLR     COUNT           ;INITIALIZE COUNTER
001464  005213                          INC     @CRS            ;INITIATE READ
001466  032713  140200          LOOP5:  BIT     #140200,@CRS    ;WAIT FOR COLUMN READY, CARD DONE
001472  001775                          BEQ     .-4             ;OR SPECIAL CONDITION
001474  032713  040000                  BIT     #40000, @CRS    ;CARD DONE?
001500  001015                          BNE     CK5             ;YES, BRANCH
001502  005713                          TST     @CRS            ;CHECK BIT 15
001504  100002                          BPL     .+6             ;SKIP ERROR HALT IF NOT SET
001506  104000                          HLT                     ;BIT 15 WAS SET
001510  000437                          BR      TEST6           ;GO TO NEXT TEST
001512  020127  000117                  CMP     COUNT,  #79.    ;CHECK FOR 80
001516  100363                          BPL     LOOP5           ;BRANCH IF 80 OR MORE WITHOUT CLEARING READY
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001520  005201                          INC     COUNT           ;INCREMENT COUNTER
001522  005714                          TST     @CRB1           ;CLEAR READY
001524  105713                          TSTB    @CRS            ;MAKE SURE IT CLEARED
001526  100001                          BPL     .+4             ;BRANCH IF IT DID
001530  104000                          HLT                     ;READING DATA BUFFER DIDN'T CLEAR READY
001532  000755                          BR      LOOP5           ;LOOP
001534  032713  004000          CK5:    BIT     #4000, @CRS     ;CHECK TIMING ERROR BIT
001540  001401                          BEQ     .+4             ;BRANCH IF NOT SET
001542  104000                          HLT                     ;TIMING ERROR WAS SET
                                        ;NOTE THAT IF COLUMN READY SET MORE THAN 80 TIMES
                                        ;A TIMING ERROR WILL OCCUR AND THE COUNT WILL BE 79 (=117 OCTAL)
001544  000421                          BR      TEST6           ;BRANCH AFTER ERROR
001546  020127  000117                  CMP     COUNT, #79.     ;CHECK COUNT
001552  001401                          BEQ     .+4             ;BRANCH IF 80 COLUMN READYS OCCURRED
001554  104000                          HLT                     ;COLUMN READY DIDN'T OCCUR 80 TIMES
                                                                ;BEFORE CARD DONE
001556  021327  040200                  CMP     @CRS,#40200     ;ONLY CARD DONE AND COLUMN READY SHOULD BE SET
001562  001401                          BEQ     .+4
001564  104000                          HLT                     ;STATUS REGISTER IN WRONG STATE
001566  005013                          CLR     @CRS            ;SHOULD CLEAR DONE BUT NOT READY
001570  021327  000200                  CMP     @CRS,#200       ;CHECK FOR ONLY READY SET
001574  001401                          BEQ     .+4             ;BRANCH IF OK
001576  104000                          HLT                     ;STATUS REGISTER IN WRONG STATE
001600  005714                          TST     @CRB1           ;READING DATA BUFFER SHOULD CLEAR COLUMN READY
001602  005713                          TST     @CRS            ;CHECK STATUS REGISTER
001604  001401                          BEQ     .+4             ;BRANCH IF ALL BITS ZERO
001606  104000                          HLT                     ;STATUS REGISTER NOT EQUAL TO ZERO

001610  104001                  TEST6:  SCOPE
                                ;A TIMING ERROR SHOULD SET BIT 11 BEFORE CARD DONE OCCURS, EVEN IF IT OCCURS AT COLUMN 8

                                ;A DATOB TO THE LOW BYTE OF THE CRS SHOULD CLEAR BITS 15,14, AND 11
001612  004737  011434                  JSR     %7,INIT         ;INITIALIZE
001616  012701  000115                  MOV     #77.,COUNT      ;SETUP COUNTER
001622  005213                          INC     @CRS            ;START READING A CARD
001624  105713                  LOOP6:  TSTB    @CRS            ;WAIT FOR COLUMN READY
001626  100376                          BPL     .-2
001630  005714                          TST     @CRB1           ;CLEAR COLUMN READY
001632  005301                          DEC     COUNT           ;GO THRU LOOP FOR 1ST 78 COLUMN READY'S
001634  100373                          BPL     LOOP6
001636  032713  144000                  BIT     #144000,@CRS    ;WAIT FOR CARD DONE OR TIMING ERROR
001642  001775                          BEQ     .-4             ;OR SPECIAL CONDITION
001644  032713  040000                  BIT     #40000,@CRS     ;CARD DONE SET?
001650  001026                          BNE     ERR6            ;YES, 2 POSSIBLE TEST FAILURES
001652  032713  004000                  BIT     #4000,@CRS      ;CHECK TIMING ERROR
001656  001416                          BEQ     OFF6            ;IF NOT SET, READER IS PROBABLY OFF-LINE
001660  105713                          TSTB    @CRS            ;CHECK COLUMN READY
001662  100001                          BPL     .+4             ;BRANCH IF CLEAR
001664  104000                          HLT                     ;TIMING ERROR DIDN'T CLEAR READY
001666  005713                          TST     @CRS            ;WAIT FOR SPECIAL CONDITION
001670  100376                          BPL     .-2
001672  032713  040000                  BIT     #40000,@CRS     ;CHECK CARD DONE
001676  001406                          BEQ     OFF6            ;IF NOT SET, READER IS PROBABLY OFF-LINE
001700  105013                          CLRB    @CRS            ;DATOB TO LOW BYTE OF CRS
001702  032713  144000                  BIT     #144000,@CRS    ;CHECK BITS 15,14,11
001706  001415                          BEQ     TEST7           ;BRANCH IF CLEAR TO NEXT TEST
001710  104000                          HLT                     ;DATOB TO LOW BYTE OF CRS DIDN'T CLEAR
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                                                                        ;BITS 15,14 AND/OR 11
001712  000413                          BR      TEST7                   ;GO TO NEXT TEST
001714  032713  000400          OFF6:   BIT     #400,@CRS               ;CHECK BIT 8
001720  001010                          BNE     TEST7                   ;BRANCH IF SET
001722  104000                          HLT                             ;BIT 15 WAS SET, 8 WASN'T
001724  000406                          BR      TEST7                   ;GO TO NEXT TEST
001726  032713  004000          ERR6:   BIT     #4000,@CRS              ;TIMING ERROR SET?
001732  001402                          BEQ     .+6                     ;NO, BRANCH
001734  104000                          HLT                             ;TIMING ERROR DIDN'T SET BEFORE CARD DONE
001736  000401                          BR      TEST7                   ;GO TO NEXT TEST AFTER ERROR
001740  104000                          HLT                             ;TIMING ERROR WASN'T SET

001742  104001                  TEST7:  SCOPE
                                ;NOT READING THE EIGHTIETH COLUMN OF DATA FROM THE BUFFER
                                ;SHOULD CAUSE A TIMING ERROR ON THE FIRST COLUMN OF THE NEXT CARD
                                ;SETTING EJECT SHOULD CLEAR TIMING ERROR, AND BIT 15 SHOULDN'T SET
                                ;INCB SHOULD START A READ

001744  004737  011434                  JSR     %7,INIT                 ;INITIALIZE
001750  005213                          INC     @CRS                    ;START READ
001752  012701  000120                  MOV     #80.,COUNT              ;INITIALIZE COUNTER
001756  032713  140200          LOOP7:  BIT     #140200,@CRS            ;TEST FOR ERROR, DONE OR READY
001762  001775                          BEQ     LOOP7                   ;LOOP IF NONE SET
001764  005713                          TST     @CRS                    ;CHECK ERROR
001766  100002                          BPL     .+6                     ;BRANCH IF NOT SET
001770  104000                          HLT                             ;BIT 15 WAS SET
001772  000455                          BR      TEST8                   ;GO TO NEXT TEST AFTER ERROR
001774  032713  040000                  BIT     #40000,@CRS             ;CHECK FOR CARD DONE
002000  001013                          BNE     DONE7                   ;BRANCH IF SET
002002  005301                          DEC     COUNT                   ;COUNT
002004  001402                          BEQ     .+6                     ;IF 80TH COLUMN READY, BRANCH
002006  005714                          TST     @CRB1                   ;CLEAR DONE
002010  000762                          BR      LOOP7                   ;LOOP
002012  032713  140000                  BIT     #140000,@CRS            ;WAIT FOR DONE OR SPECIAL CONDITION
002016  001775                          BEQ     .-4
002020  005713                          TST     @CRS                    ;CHECK SPECIAL CONDITION
002022  100002                          BPL     DONE7                   ;BRANCH IF NOT SET
002024  104000                          HLT                             ;SPECIAL CONDITION WAS SET
002026  000437                          BR      TEST8                   ;GO TO NEXT TEST AFTER ERROR
002030  005701                  DONE7:  TST     COUNT                   ;TEST FOR 80 COLUMN READY'S
002032  001402                          BEQ     .+6                     ;BRANCH IF OK
002034  104000                          HLT                             ;COLUMN READY DID NOT OCCUR 80 TIMES
002036  000433                          BR      TEST8                   ;GO TO NEXT TEST AFTER ERROR
002040  105213                          INCB    @CRS                    ;START READ
002042  105713                          TSTB    @CRS                    ;CHECK COLUMN READY
002044  100401                          BMI     .+4                     ;BRANCH IF STILL SET
002046  104000                          HLT                             ;READY DID NOT REMAIN SET
002050  032713  004000                  BIT     #4000,@CRS              ;TEST FOR TIMING ERROR
002054  001775                          BEQ     .-4                     ;LOOP IF NOT SET
002056  105713                          TSTB    @CRS                    ;CHECK COLUMN READY
002060  100002                          BPL     .+6                     ;BRANCH IF NOT SET
002062  104000                          HLT                             ;TIMING ERROR DIDN'T CLEAR READY
002064  000420                          BR      TEST8
002066  112713  000002                  MOVB    #2,@CRS                 ;SET EJECT
002072  032713  004000                  BIT     #4000,@CRS              ;CHECK TIMING ERROR
002076  001402                          BEQ     .+6                     ;BRANCH IF CLEARED
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002100  104000                          HLT                     ;TIMING ERROR NOT CLEARED BY DATOB
002102  000411                          BR      TEST8           ;GO TO NEXT TEST AFTER ERROR
002104  032713  140000                  BIT     #140000,@CRS    ;WAIT FOR DONE OR SPECIAL CONDITION
002110  001775                          BEQ     .-4
002112  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
002116  001003                          BNE     TEST8           ;BRANCH IF READER OFF-LINE
002120  005713                          TST     @CRS            ;SPECIAL CONDITION SHOULDN'T SET
002122  100001                          BPL     .+4             ;SINCE DATOB CLEARED TIMING ERROR
002124  104000                          HLT                     ;BIT 15 WAS SET, 8 WASN'T


002126  104001                  TEST8:  SCOPE
                                ;DATA SHOULD BE AVAILABLE IN THE DATA BUFFER FOR AT LEAST 1.0 MILLISECOND
002130  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
002134  013737  177776  000646          MOV     PSR,PROC        ;STORE CURRENT PROCESSOR STATUS
002142  005037  177776                  CLR     PSR             ;CLEAR TRACE BIT
002146  005213                          INC     @CRS            ;START READ
002150  032713  140200          LOOP8:  BIT     #140200,@CRS    ;WAIT FOR COLUMN READY OR CARD DONE
002154  001775                          BEQ     .-4             ;OR SPECIAL CONDITION
002156  032713  040000                  BIT     #40000,@CRS     ;CARD DONE?
002162  001023                          BNE     DBRCK8          ;YES, GO TO CHECK STROBING OF DBR
002164  005713                          TST     @CRS            ;NO, CHECK BIT 15
002166  100002                          BPL     .+6             ;BRANCH IF NOT SET
002170  104000                          HLT                     ;BIT 15 WAS SET
002172  000441                          BR      TEST9           ;GO TO NEXT TEST AFTER ERROR
002174  005013                          CLR     @CRS            ;DATO TO CRS - SHOULDN'T CLEAR BUSY OR READY
002176  022713  001200                  CMP     #1200,@CRS      ;CHECK FOR BUSY AND READY
002202  001402                          BEQ     .+6             ;BRANCH IF STILL SET
002204  104000                          HLT                     ;CRS IN WRONG STATE
002206  000433                          BR      TEST9           ;GO TO NEXT TEST AFTER ERROR
002210  011405                          MOV     @CRB1,R5        ;STORE DATA
002212  012701  000300                  MOV     #300,COUNT      ;INITIALIZE COUNTER
002216  005301                          DEC     COUNT           ;WAIT FOR 1 MILLISECOND (APPROX.)
002220  001376                          BNE     .-2
002222  021405                          CMP     @CRB1,R5        ;DATA UNCHANGED?
002224  001751                          BEQ     LOOP8           ;OK, CONTINUE
002226  104000                          HLT                     ;DATA NOT AVAILABLE FOR 1.0 MILLISECONDS
002230  000422                          BR      TEST9           ;GO TO NEXT TEST AFTER FAILURE
002232  017702  176402          DBRCK8: MOV     @CRB2,R2        ;STORE ENCODED DATA IN REGISTER 2
002236  012701  000100                  MOV     #100,COUNT      ;SET UP COUNTER
002242  021405                  CONT8:  CMP     @CRB1,R5        ;READ CARD-IMAGE DATA BUFFER
002244  001402                          BEQ     .+6             ;BRANCH IF UNCHANGED
002246  104000                          HLT                     ;CRB1 READ INCORRECTLY
002250  000407                          BR      REST8           ;BRANCH TO RESTORE PROCESSOR STATUS AND EXIT
002252  027702  176362                  CMP     @CRB2,R2        ;READ ENCODED DATA BUFFER
002256  001402                          BEQ     .+6             ;BRANCH IF UNCHANGED
002260  104000                          HLT                     ;CRB2 READ INCORRECTLY
002262  000402                          BR      REST8           ;BRANCH AFTER FAILURE
002264  005301                          DEC     COUNT           ;COUNT DOWN
002266  001365                          BNE     CONT8           ;LOOP IF NOT DONE
002270  013737  000646  177776  REST8:  MOV     PROC,PSR        ;RESTORE PROCESSOR STATUS


002276  104001                  TEST9:  SCOPE
                                ;EJECT SHOULD PREVENT FURTHER COLUMN READY'S
                                ;CARD DONE SHOULD STILL OCCUR, AND TIMING ERRORS SHOULD BE
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                                        ;PREVENTED IF THE CURRENT COLUMN READY IS CLEARED
002300  004737  011434                          JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
002304  013737  177776  000646                  MOV     PSR,PROC        ;SAVE PROCESSOR STATUS
002312  005037  177776                          CLR     PSR             ;CLEAR TRACE BIT
002316  005213                                  INC     @CRS            ;START READ
002320  105713                                  TSTB    @CRS            ;WAIT FOR COLUMN READY
002322  001776                                  BEQ     .-2
002324  052713  000002                          BIS     #2,@CRS         ;SET EJECT
002330  005714                                  TST     @CRB1           ;CLEAR COLUMN READY
002332  005001                                  CLR     COUNT           ;LOOP TAKES 11.4 MICROSECONDS ONCE THRU
002334  032713  044200                  WAIT9:  BIT     #44200,@CRS     ;WAIT FOR CARD DONE, TIMING ERROR, OR
002340  001004                                  BNE     CK9             ;COLUMN READY
002342  005201                                  INC     COUNT           ;TIME FOR ABOUT 3/4 SECOND
002344  001373                                  BNE     WAIT9           ;CONTINUE WAITING
002346  104000                                  HLT                     ;NO CARD DONE OCCURRED WITHIN 3/4 SECOND
002350  000411                                  BR      REST9           ;CONTINUE AFTER FAILURE
002352  032713  040000                  CK9:    BIT     #40000,@CRS     ;CHECK FOR CARD DONE
002356  001006                                  BNE     REST9
002360  032713  000200                          BIT     #200,@CRS       ;CHECK COLUMN READY
002364  001402                                  BEQ     .+6             ;BRANCH IF NOT SET
002366  104000                                  HLT                     ;COLUMN READY WAS SET
002370  000401                                  BR      REST9
002372  104000                                  HLT                     ;EJECT DID NOT PREVENT A TIMING ERROR
002374  013737  000646  177776          REST9:  MOV     PROC,PSR        ;RESTORE PROCESSOR STATUS


002402  104001                          TEST10: SCOPE
                                        ;CARD DONE SHOULD CAUSE AN INTERRUPT
002404  004737  011434                          JSR     %7,INIT         ;INITIALIZE
002410  012710  002464                          MOV     #TINT10,@ADINT  ;LOAD RETURN POINTER
002414  052737  000340  177776                  BIS     #340,PSR        ;SET PROCESSOR TO LEVEL 7
002422  013760  177776  000002                  MOV     PSR,2(ADINT)    ;LOAD RETURN PROCESSOR STATUS
002430  042737  000340  177776                  BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
002436  012713  000103                          MOV     #103,@CRS       ;SET EJECT, INTERRUPT ENABLE, AND READ
002442  032713  040000                          BIT     #40000,@CRS     ;WAIT FOR CARD DONE
002446  001775                                  BEQ     .-4
002450  016037  000002  177776                  MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
002456  105013                                  CLRB    @CRS            ;CLEAR INTERRUPT ENABLE
002460  104000                                  HLT                     ;NO INTERRUPT OCCURRED
002462  000414                                  BR      CONT10
002464  032713  040000                  TINT10: BIT     #40000,@CRS     ;CHECK CARD DONE
002470  001001                                  BNE     .+4             ;BRANCH IF SET
002472  104000                                  HLT                     ;CARD DONE NOT SET
002474  022626                                  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
002476  005713                                  TST     @CRS            ;MAKE SURE NO ERROR OCCURRED
002500  100001                                  BPL     .+4
002502  104000                                  HLT                     ;BIT 15 WAS SET
002504  105713                                  TSTB    @CRS            ;CHECK COLUMN READY
002506  100001                                  BPL     .+4             ;BRANCH IF NOT SET
002510  104000                                  HLT                     ;COLUMN READY WAS SET
002512  005013                                  CLR     @CRS            ;DISABLE INTERRUPTS
002514  012710  000232                  CONT10: MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
002520  005037  000232                          CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS

002524  104001                          TEST11: SCOPE
                                        ;COLUMN READY SHOULD CAUSE AN INTERRUPT
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002526  004737  011434                   JSR     %7,INIT          ;INITIALIZE
002532  012710  002604                   MOV     #TINT11,@ADINT   ;LOAD RETURN POINTER
002536  052737  000340  177776           BIS     #340,PSR         ;SET PROCESSOR STATUS TO LEVEL 7
002544  013760  177776  000002           MOV     PSR,2(ADINT)     ;LOAD RETURN PROCESSOR STATUS
002552  042737  000340  177776           BIC     #340,PSR         ;SET PROCESSOR PRIORITY TO 0
002560  012713  000101                   MOV     #101,@CRS        ;SET READ AND INTERRUPT ENABLE
002564  105713                           TSTB    @CRS             ;WAIT FOR COLUMN READY
002566  100376                           BPL     .-2
002570  016037  000002  177776           MOV     2(ADINT),PSR     ;RESTORE PROCESSOR TO HIGHEST PRIORITY
002576  005013                           CLR     @CRS             ;CLEAR INTERRUPT ENABLE
002600  104000                           HLT                      ;COLUMN READY DID NOT INTERRUPT
002602  000405                           BR      CONT11
002604  005013                  TINT11:  CLR     @CRS             ;CLEAR INTERRUPT ENABLE
002606  105713                           TSTB    @CRS             ;MAKE SURE COLUMN READY IS SET
002610  100401                           BMI     .+4              ;BRANCH IF SET
002612  104000                           HLT                      ;COLUMN READY WASN'T SET
002614  022626                           CMP     (SP)+,(SP)+      ;RESTORE STACK POINTER
002616  012710  000232          CONT11:  MOV     #232,@ADINT      ;CHANGE INTERRUPT RETURN ADDRESS
002622  005037  000232                   CLR     @#232            ;TO CAUSE A HALT IF ANOTHER INTERRUPT OCCURS

002626  104001                  TEST12:  SCOPE
                                ;CARD DONE SHOULDN'T CAUSE AN INTERRUPT IF THE PROCESSOR IS AT LEVEL 7 PRIORITY
002630  004737  011434                   JSR     %7,INIT          ;INITIALIZE
002634  012710  002670                   MOV     #TINT12,@ADINT   ;SETUP RETURN
002640  052737  000340  177776           BIS     #340,PSR         ;SET PROCESSOR TO LEVEL 7 PRIORITY
002646  013760  177776  000002           MOV     PSR,2(ADINT)     ;LOAD RETURN PROCESSOR STATUS
002654  012713  000103                   MOV     #103,@CRS        ;SET EJECT, INTERRUPT ENABLE, AND READ
002660  032713  040000                   BIT     #40000,@CRS      ;WAIT FOR CARD DONE
002664  001775                           BEQ     .-4
002666  000402                           BR      .+6              ;CONTINUE IF NO INTERRUPT OCCURRED
002670  104000                  TINT12:  HLT                      ;AN INTERRUPT OCCURRED
002672  022626                           CMP     (SP)+,(SP)+      ;RESTORE STACK POINTER
002674  005013                           CLR     @CRS             ;CLEAR INTERRUPT ENABLE AND EJECT
002676  012710  000232                   MOV     #232,@ADINT      ;CHANGE INTERRUPT RETURN ADDRESS
002702  005037  000232                   CLR     @#232            ;TO CAUSE A HALT IF AN INTERRUPT OCCURS

                                ;FIND THE LEVEL AT WHICH AN INTERRUPT OCCURS
                                ;PRINT OUT A MESSAGE STATING THIS LEVEL IF IT IS OTHER THAN THE STANDARD (LEVEL 6)
                                ;MAKE CERTAIN THAT IT ALWAYS OCCURS AT THIS LEVEL
                                ;THE MESSAGE STATING THE LEVEL IS PRINTED ONLY ONCE, AND THE PROGRAM MUST
                                ;BE STARTED OVER AT LOCATION 200 FOR IT TO BE PRINTED AGAIN


                                ;TEST FOR AN INTERRUPT ON LEVEL 7
002706  104001                  TEST13:  SCOPE
002710  004737  011434                   JSR     %7,INIT          ;INITIALIZE
002714  012710  003024                   MOV     #TINT13,@ADINT   ;SETUP RETURN ADDRESS
002720  052737  000340  177776           BIS     #340,PSR         ;SET PROCESSOR PRIORITY TO 7
002726  013760  177776  000002           MOV     PSR,2(ADINT)     ;SETUP RETURN PROCESSOR STATUS
002734  042737  000340  177776           BIC     #340,PSR         ;SET PROCESSOR PRIORITY TO 0
002742  052737  000300  177776           BIS     #300,PSR         ;SET PROCESSOR TO LEVEL 6 PRIORITY
002750  012713  000103                   MOV     #103,@CRS        ;SET EJECT INTERRUPT ENABLE, AND READ
002754  032713  040000                   BIT     #40000,@CRS      ;WAIT FOR CARD DONE
002760  001775                           BEQ     .-4
002762  016037  000002  177776           MOV     2(ADINT),PSR     ;RESTORE PROCESSOR TO HIGHEST PRIORITY
002770  005013                           CLR     @CRS             ;DISABLE INTERRUPTS
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002772  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
002776  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
003002  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
003006  100044                          BPL     TEST14          ;IF NO, GO TO NEXT TEST
003010  023727  000602  100007          CMP     INTFLG,#100007  ;IF SO, CHECK TO SEE
003016  100440                          BMI     TEST14          ;THAT THE INTERRUPT LEVEL RECORDED
                                                                ;IS BELOW THE CURRENT LEVEL
003020  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
                                                                ;AT LEVEL 7, BUT PREVIOUSLY OCCURRED
                                                                ;AT OR ABOVE THIS LEVEL
003022  000436                          BR      TEST14
003024  032713  040000          TINT13: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
003030  001001                          BNE     .+4             ;BRANCH IF SET
003032  104000                          HLT                     ;CARD DONE WASN'T SET
003034  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
003036  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
003042  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
003046  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
003050  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
003054  100414                          BMI     SET7    ;BRANCH IF FLAG SET
003056  012737  100007  000602          MOV     #100007,INTFLG ;SET FLAG AND LEVEL
003064  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
003070  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
003074  012702  000007                  MOV     #7,R2
003100  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
003104  000405                          BR      TEST14
003106  023727  000602  100007  SET7: CMP       INTFLG,#100007  ;CHECK PREVIOUS LEVEL
003114  100001                          BPL     TEST14
003116  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL

                                ;TEST FOR AN INTERRUPT ON LEVEL 6
                                ;SINCE THIS IS WHERE THE CARD READER NORMALLY IS, DON'T PRINT OUT A MESSAGE
                                ;IF IT IS FOUND HERE
003120  104001                  TEST14: SCOPE
003122  004737  011434                  JSR     %7,INIT         ;INITIALIZE
003126  012710  003216                  MOV     #TINT14,@ADINT  ;SETUP RETURN ADDRESS
003132  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
003140  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
003146  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
003154  052737  000240  177776          BIS     #240,PSR        ;SET PROCESSOR TO LEVEL 5 PRIORITY
003162  012713  000103                  MOV     #103,@CRS       ;SET EJECT, INTERRUPT ENABLE, AND READ
003166  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
003172  001775                          BEQ     .-4
003174  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
003202  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
003204  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
003210  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
003214  000426                          BR      TEST15
003216  032713  040000          TINT14: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
003222  001001                          BNE     .+4             ;BRANCH IF SET
003224  104000                          HLT                     ;CARD DONE WASN'T SET
003226  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
003230  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
003234  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
003240  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
003242  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
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003246  100404                          BMI     SET14           ;BRANCH IF FLAG SET
003250  012737  100006  000602          MOV     #100006,INTFLG  ;SET FLAG AND LEVEL
003256  000405                          BR      TEST15
003260  023727  000602  100006  SET14:  CMP     INTFLG,#100006  ;CHECK PREVIOUS LEVEL
003266  100001                          BPL     TEST15
003270  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL

                                ;TEST FOR AN INTERRUPT ON LEVEL 5
003272  104001                  TEST15: SCOPE
003274  004737  011434                  JSR     %7,INIT         ;INITIALIZE
003300  012710  003410                  MOV     #TINT15,@ADINT  ;SETUP RETURN ADDRESS
003304  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
003312  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
003320  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
003326  052737  000200  177776          BIS     #200,PSR        ;SET PROCESSOR TO LEVEL 4 PRIORITY
003334  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
003340  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
003344  001775                          BEQ     .-4
003346  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
003354  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
003356  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
003362  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
003366  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
003372  100044                          BPL     TEST16          ;IF NO, GO TO NEXT TEST
003374  023727  000602  100005          CMP     INTFLG,#100005  ;IF SO, CHECK TO SEE
003402  100440                          BMI     TEST16          ;THAT THE INTERRUPT LEVEL RECORDED
                                                                ;IS BELOW THE CURRENT LEVEL
003404  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
                                                                ;AT LEVEL 5, BUT PREVIOUSLY OCCURRED
                                                                ;AT OR ABOVE THIS LEVEL
003406  000436                          BR      TEST16
003410  032713  040000          TINT15: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
003414  001001                          BNE     .+4             ;BRANCH IF SET
003416  104000                          HLT                     ;CARD DONE WASN'T SET
003420  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
003422  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
003426  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
003432  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
003434  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
003440  100414                          BMI     SET5    ;BRANCH IF FLAG SET
003442  012737  100005  000602          MOV     #100005,INTFLG ;SET FLAG AND LEVEL
003450  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
003454  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
003460  012702  000005                  MOV     #5,R2
003464  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
003470  000405                          BR      TEST16
003472  023727  000602  100005  SET5: CMP       INTFLG,#100005  ;CHECK PREVIOUS LEVEL
003500  100001                          BPL     TEST16
003502  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL

                                ;TEST FOR AN INTERRUPT ON LEVEL 4
003504  104001                  TEST16: SCOPE
003506  004737  011434                  JSR     %7,INIT         ;INITIALIZE
003512  012710  003622                  MOV     #TINT16,@ADINT  ;SETUP RETURN ADDRESS
003516  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
003524  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
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003532  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
003540  052737  000140  177776          BIS     #140,PSR        ;SET PROCESSOR TO LEVEL 3 PRIORITY
003546  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
003552  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
003556  001775                          BEQ     .-4
003560  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
003566  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
003570  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
003574  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
003600  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
003604  100044                          BPL     TEST17          ;IF NO  GO TO NEXT TEST
003606  023727  000602  100004          CMP     INTFLG,#100004  ;IF SO, CHECK TO SEE
003614  100440                          BMI     TEST17          ;THAT THE INTERRUPT LEVEL RECORDED
                                                                ;IS BELOW THE CURRENT LEVEL
003616  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
                                                                ;AT LEVEL 4, BUT PREVIOUSLY OCCURRED
                                                                ;AT OR ABOVE THIS LEVEL
003620  000436                          BR      TEST17
003622  032713  040000          TINT16: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
003626  001001                          BNE     .+4             ;BRANCH IF SET
003630  104000                          HLT                     ;CARD DONE WASN'T SET
003632  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
003634  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
003640  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
003644  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
003646  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
003652  100414                          BMI     SET4    ;BRANCH IF FLAG SET
003654  012737  100004  000602          MOV     #100004,INTFLG ;SET FLAG AND LEVEL
003662  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
003666  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
003672  012702  000004                  MOV     #4,R2
003676  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
003702  000405                          BR      TEST17
003704  023727  000602  100004  SET4:   CMP     INTFLG,#100004  ;CHECK PREVIOUS LEVEL
003712  100001                          BPL     TEST17
003714  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL

                                ;TEST FOR AN INTERRUPT ON LEVEL 3
003716  104001                  TEST17: SCOPE
003720  004737  011434                  JSR     %7,INIT         ;INITIALIZE
003724  012710  004034                  MOV     #TINT17,@ADINT  ;SETUP RETURN ADDRESS
003730  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
003736  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
003744  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
003752  052737  000100  177776          BIS     #100,PSR        ;SET PROCESSOR TO LEVEL 2 PRIORITY
003760  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
003764  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
003770  001775                          BEQ     .-4
003772  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
004000  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
004002  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
004006  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
004012  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
004016  100044                          BPL     TEST18          ;IF NO, GO TO NEXT TEST
004020  023727  000602  100003          CMP     INTFLG,#100003  ;IF SO, CHECK TO SEE
004026  100440                          BMI     TEST18          ;THAT THE INTERRUPT LEVEL RECORDED
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                                                                ;IS BELOW THE CURRENT LEVEL
004030  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
                                                                ;AT LEVEL 3, BUT PREVIOUSLY OCCURRED
                                                                ;AT OR ABOVE THIS LEVEL
004032  000436                          BR      TEST18
004034  032713  040000          TINT17: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
004040  001001                          BNE     .+4             ;BRANCH IF SET
004042  104000                          HLT                     ;CARD DONE WASN'T SET
004044  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
004046  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
004052  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
004056  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
004060  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
004064  100414                          BMI     SET3    ;BRANCH IF FLAG SET
004066  012737  100003  000602          MOV     #100003,INTFLG ;SET FLAG AND LEVEL
004074  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
004100  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
004104  012702  000003                  MOV     #3,R2
004110  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
004114  000405                          BR      TEST18
004116  023727  000602  100003  SET3: CMP       INTFLG,#100003  ;CHECK PREVIOUS LEVEL
004124  100001                          BPL     TEST18
004126  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL

                                ;TEST FOR AN INTERRUPT ON LEVEL 2
004130  104001                  TEST18: SCOPE
004132  004737  011434                  JSR     %7,INIT         ;INITIALIZE
004136  012710  004246                  MOV     #TINT18,@ADINT  ;SETUP RETURN ADDRESS
004142  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
004150  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
004156  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
004164  052737  000040  177776          BIS     #040,PSR        ;SET PROCESSOR TO LEVEL 1 PRIORITY
004172  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
004176  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
004202  001775                          BEQ     .-4
004204  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
004212  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
004214  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
004220  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
004224  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
004230  100044                          BPL     TEST19          ;IF NO, GO TO NEXT TEST
004232  023727  000602  100002          CMP     INTFLG,#100002  ;IF SO, CHECK TO SEE
004240  100440                          BMI     TEST19          ;THAT THE INTERRUPT LEVEL RECORDED
                                                                ;IS BELOW THE CURRENT LEVEL
004242  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
                                                                ;AT LEVEL 2, BUT PREVIOUSLY OCCURRED
                                                                ;AT OR ABOVE THIS LEVEL
004244  000436                          BR      TEST19
004246  032713  040000          TINT18: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
004252  001001                          BNE     .+4             ;BRANCH IF SET
004254  104000                          HLT                     ;CARD DONE WASN'T SET
004256  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
004260  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
004264  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
004270  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
004272  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
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004276  100414                          BMI     SET2    ;BRANCH IF FLAG SET
004300  012737  100002  000602          MOV     #100002,INTFLG ;SET FLAG AND LEVEL
004306  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
004312  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
004316  012702  000002                  MOV     #2,R2
004322  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
004326  000405                          BR      TEST19
004330  023727  000602  100002  SET2: CMP       INTFLG,#100002  ;CHECK PREVIOUS LEVEL
004336  100001                          BPL     TEST19
004340  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL

                                ;TEST FOR AN INTERRUPT ON LEVEL 1
004342  104001                  TEST19: SCOPE
004344  004737  011434                  JSR     %7,INIT         ;INITIALIZE
004350  012710  004460                  MOV     #TINT19,@ADINT  ;SETUP RETURN ADDRESS
004354  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
004362  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
004370  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
004376  052737  000000  177776          BIS     #000,PSR        ;SET PROCESSOR TO LEVEL 0 PRIORITY
004404  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
004410  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
004414  001775                          BEQ     .-4
004416  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
004424  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
004426  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
004432  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
004436  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
004442  100044                          BPL     TEST20          ;IF NO, GO TO NEXT TEST
004444  023727  000602  100001          CMP     INTFLG,#100001  ;IF SO, CHECK TO SEE
004452  100440                          BMI     TEST20          ;THAT THE INTERRUPT LEVEL RECORDED
                                                                ;IS BELOW THE CURRENT LEVEL
004454  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
                                                                ;AT LEVEL 1, BUT PREVIOUSLY OCCURRED
                                                                ;AT OR ABOVE THIS LEVEL
004456  000436                          BR      TEST20
004460  032713  040000          TINT19: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
004464  001001                          BNE     .+4             ;BRANCH IF SET
004466  104000                          HLT                     ;CARD DONE WASN'T SET
004470  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
004472  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
004476  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
004502  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
004504  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
004510  100414                          BMI     SET1    ;BRANCH IF FLAG SET
004512  012737  100001  000602          MOV     #100001,INTFLG ;SET FLAG AND LEVEL
004520  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
004524  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
004530  012702  000001                  MOV     #1,R2
004534  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
004540  000405                          BR      TEST20
004542  023727  000602  100001  SET1: CMP       INTFLG,#100001  ;CHECK PREVIOUS LEVEL
004550  100001                          BPL     TEST20
004552  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL

                                ;A TIMING ERROR SHOULDN'T CAUSE AN INTERRUPT
004554  104001                  TEST20: SCOPE
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004556  004737  011434                  JSR     %7,INIT          ;INITIALIZE
004562  012710  004634                  MOV     #TINT20,@ADINT   ;LOAD RETURN POINTER
004566  052737  000340  177776          BIS     #340,PSR         ;SET PROCESSOR TO HIGHEST PRIORITY
004574  013760  177776  000002          MOV     PSR,2(ADINT)     ;LOAD RETURN PROCESSOR STATUS
004602  012713  000101                  MOV     #101,@CRS        ;SET INTERRUPT ENABLE AND READ
004606  032713  004000                  BIT     #4000,@CRS       ;WAIT FOR TIMING ERROR TO SET
004612  001775                          BEQ     .-4
004614  042737  000340  177776          BIC     #340,PSR         ;MOVE PROCESSOR TO LOWEST PRIORITY
004622  000240                          NOP                      ;CLOCK INTERRUPT IF IT OCCURRED
004624  016037  000002  177776          MOV     2(ADINT),PSR     ;MOVE PROCESSOR BACK TO HIGHEST PRIORITY
004632  000402                          BR      .+6
004634  104000                  TINT20: HLT                      ;TIMING ERROR CAUSED AN INTERRUPT
004636  022626                          CMP     (SP)+,(SP)+      ;RESTORE STACK POINTER
004640  012710  000232                  MOV     #232,@ADINT      ;CHANGE INTERRUPT ADDRESS TO CAUSE A
004644  005037  000232                  CLR     @#232            ;HALT IF AN INTERRUPT OCCURS
004650  032713  040000                  BIT     #40000,@CRS      ;WAIT FOR CARD DONE
004654  001775                          BEQ     .-4
004656  005013                          CLR     @CRS             ;CLEAR INTERRUPT ENABLE

004660  104001                  TEST21: SCOPE
                                ;TEST FOR NO INTERRUPT OCCURING WITH INTERRUPT ENABLE SET AND REST CLEARED
004662  004737  011434                  JSR     %7,INIT          ;INITIALIZE CSR TO ZERO
004666  012710  004736                  MOV     #TNINT,@ADINT    ;SETUP RETURN ADDRESS
004672  052737  000340  177776          BIS     #340,PSR         ;SET PROCESSOR TO LEVEL 7
004700  013760  177776  000002          MOV     PSR,2(ADINT)     ;STORE PROCESSOR STATUS
004706  005037  177776                  CLR     PSR              ;SET PROCESSOR TO LEVEL 0
004712  012713  000100                  MOV     #100,@CRS        ;ENABLE INTERRUPTS
004716  005227  000000                  INC     #0               ;WAIT AWHILE
004722  001375                          BNE     .-4
004724  016037  000002  177776          MOV     2(ADINT),PSR     ;RESTORE PROCESSOR TO LEVEL 7
004732  005013                          CLR     @CRS             ;DISABLE FURTHER INTERRUPTS
004734  000403                          BR      CONT21
004736  104000                  TNINT:  HLT                      ;AN INTERRUPT OCCURRED
004740  022626                          CMP     (SP)+,(SP)+      ;RESTORE STACK
004742  005013                          CLR     @CRS             ;DISABLE FURTHER INTERRUPTS
004744  005037  000232          CONT21: CLR     @#232            ;CHANGE INTERRUPT RETURN ADDRESS TO
004750  012710  000232                  MOV     #232,@ADINT      ;CAUSE A HALT IF AN INTERRUPT OCCURS

004754  104001                  TEST22: SCOPE
                                ;CHECK FOR SIMULTANEOUS INTERRUPTS ON MORE THAN ONE LEVEL
004756  004737  011434                  JSR     %7,INIT          ;INITIALIZE CSR TO ZERO
004762  012710  005020                  MOV     #T2INT,@ADINT    ;SETUP RETURN ADDRESS
004766  052737  000340  177776          BIS     #340,PSR         ;SET PROCESSOR TO LEVEL 7
004774  013760  177776  000002          MOV     PSR,2(ADINT)     ;STORE PROCESSOR STATUS
005002  042737  000340  177776          BIC     #340,PSR         ;SET PROCESSOR TO LEVEL 0
005010  012713  000103                  MOV     #103,@CRS        ;SET INTERRUPT ENABLE AND EJECT A CARD
005014  000001                          WAIT                     ;WAIT FOR INTERRUPT
005016  000776                          BR      .-2              ;SIT IF TRACE BIT IS SET
005020  022626                  T2INT:  CMP     (6)+,(6)+        ;RESTORE STACK POINTER
005022  012710  005044                  MOV     #T2INTA,@ADINT   ;CHANGE RETRUN ADDRESS
005026  005037  177776                  CLR     PSR              ;SET PROCESSOR TO LEVEL 0
005032  000240                          NOP                      ;WAIT
005034  016037  000002  177776          MOV     2(ADINT),PSR     ;RESTORE PROCESSOR TO LEVEL 7
005042  000402                          BR      CONT22
005044  022626                  T2INTA: CMP     (6)+,(6)+        ;RESTORE STACK
005046  104000                          HLT                      ;THE INTERRUPT OCCURRED AT 2 LEVELS
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005050  005013                  CONT22: CLR     @CRS            ;DISABLE INTERRUPTS
005052  005037  000232                  CLR     @#232           ;CHANGE INTERRUPT RETURN ADDRESS TO
005056  012710  000232                  MOV     #232,@ADINT     ;CAUSE A HALT IF AN INTERRUPT OCCURS

005062  104001                  TEST23: SCOPE
                                ;ALL MODES OF ADDRESSING CRB1 OR CRB2 (DATO,DATOB,DATI) SHOULD CLEAR
                                ;COLUMN READY
005064  004737  011434                  JSR     %7,INIT         ;INITIALIZE
005070  005213                          INC     @CRS            ;START READING A CARD
005072  105713                          TSTB    @CRS            ;WAIT FOR COLUMN READY
005074  100376                          BPL     .-2
005076  005014                          CLR     @CRB1           ;DATO TO CRB1
005100  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005102  100002                          BPL     CNT23A          ;BRANCH IF CLEARED
005104  104000                          HLT                     ;DATO TO CRB1 DIDN'T CLEAR READY
005106  000467                          BR      TEST24          ;GO TO NEXT TEST
005110  105713                  CNT23A: TSTB    @CRS            ;WAIT FOR COLUMN READY
005112  100376                          BPL     .-2
005114  105014                          CLRB    @CRB1           ;DATOB TO LOW BYTE OF CRB1
005116  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005120  100002                          BPL     CNT23B          ;BRANCH IF CLEARED
005122  104000                          HLT                     ;DATOB TO CRB1 LOW BYTE DIDN'T CLEAR READY
005124  000460                          BR      TEST24          ;GO TO NEXT TEST
005126  105713                  CNT23B: TSTB    @CRS            ;WAIT FOR COLUMN READY
005130  100376                          BPL     .-2
005132  105064  000001                  CLRB    1(CRB1)         ;DATOB TO HIGH BYTE OF CRB1
005136  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005140  100002                          BPL     CNT23C          ;BRANCH IF CLEARED
005142  104000                          HLT                     ;DATOB TO CRB1 HIGH BYTE DIDN'T CLEAR READY
005144  000450                          BR      TEST24          ;GO TO NEXT TEST
005146  105713                  CNT23C: TSTB    @CRS            ;WAIT FOR COLUMN READY
005150  100376                          BPL     .-2
005152  005714                          TST     @CRB1           ;DATI TO CRB1
005154  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005156  100002                          BPL     CNT23D          ;BRANCH IF CLEARED
005160  104000                          HLT                     ;DATI TO CRB1 DIDN'T CLEAR READY
005162  000441                          BR      TEST24          ;GO TO NEXT TEST
005164  105713                  CNT23D: TSTB    @CRS            ;WAIT FOR COLUMN READY
005166  100376                          BPL     .-2
005170  005077  173444                  CLR     @CRB2           ;DATO TO CRB2
005174  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005176  100002                          BPL     CNT23E          ;BRANCH IF CLEARED
005200  104000                          HLT                     ;DATO TO CRB2 DIDN'T CLEAR READY
005202  000431                          BR      TEST24          ;GO TO NEXT TEST
005204  105713                  CNT23E: TSTB    @CRS            ;WAIT FOR COLUMN READY
005206  100376                          BPL     .-2
005210  105077  173424                  CLRB    @CRB2           ;DATOB TO LOW BYTE OF CRB2
005214  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005216  100002                          BPL     CNT23F          ;BRANCH IF CLEARED
005220  104000                          HLT                     ;DATOB TO CRB2 LOW BYTE DIDN'T CLEAR READY
005222  000421                          BR      TEST24          ;GO TO NEXT TEST
005224  105713                  CNT23F: TSTB    @CRS            ;WAIT FOR COLUMN READY
005226  100376                          BPL     .-2
005230  013702  000640                  MOV     CRB2,R2         ;LOAD POINTER
005234  105062  000001                  CLRB    1(R2)           ;DATOB TO HIGH BYTE OF CRB2
005240  105713                          TSTB    @CRS            ;CHECK COLUMN READY
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005242  100002                          BPL     CNT23G          ;BRANCH IF CLEARED
005244  104000                          HLT                     ;DATOB TO CRB2 HIGH BYTE DIDN'T CLEAR READY
005246  000407                          BR      TEST24          ;GO TO NEXT TEST

005250  105713                  CNT23G: TSTB    @CRS            ;WAIT FOR COLUMN READY
005252  100376                          BPL     .-2
005254  005777  173360                  TST     @CRB2           ;DATI TO CRB2
005260  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005262  100001                          BPL     TEST24          ;BRANCH IF CLEARED
005264  104000                          HLT                     ;DATI TO CRB2 DIDN'T CLEAR READY

005266  104001                  TEST24: SCOPE
                                ;SETTING EJECT AFTER A COLUMN READY WITHOUT CLEARING THE COLUMN READY
                                ;SHOULD SET TIMING ERROR (WHICH IN TURN SHOULD CLEAR COLUMM READY)
005270  004737  011434                  JSR     %7,INIT         ;INITIALIZE
005274  005213                          INC     @CRS            ;START READING A CARD
005276  105713                          TSTB    @CRS            ;CHECK COLUMN READY - WAIT
005300  100376                          BPL     .-2
005302  052713  000002                  BIS     #2,@CRS         ;SET EJECT
005306  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005310  100402                          BMI     CNT24A          ;BRANCH IF STILL SET
005312  104000                          HLT                     ;SETTING EJECT CLEARED COLUMN READY
005314  000421                          BR      END24           ;BRANCH TO WAIT FOR DONE AFTER ERROR
005316  032713  004000          CNT24A: BIT     #4000,@CRS      ;CHECK TIMING ERROR
005322  001013                          BNE     TIM24           ;BRANCH IF SET
005324  032713  040400                  BIT     #40400,@CRS     ;CHECK CARD DONE AND OFF-LINE
005330  001772                          BEQ     CNT24A          ;LOOP IF NONE SET
005332  032713  040000                  BIT     #40000,@CRS     ;CARD DONE SET?
005336  001003                          BNE     CNT24B          ;YES - BRANCH TO ERROR PRINTOUT
005340  004737  011506                  JSR     %7,CKBIT8       ;NO - BIT 8 WAS SET SO OUTPUT MESSAGE
005344  000415                          BR      ENDCK           ;BRANCH AFTER COMING BACK ON-LINE
005346  104000                  CNT24B: HLT                     ;CARD DONE SET BUT TIMING ERROR DIDN'T
005350  000413                          BR      ENDCK           ;BRANCH TO NEXT SECTION
005352  105713                  TIM24:  TSTB    @CRS            ;CHECK COLUMN READY
005354  100001                          BPL     .+4             ;BRANCH IF NOT SET
005356  104000                          HLT                     ;TIMING ERROR DIDN'T CLEAR READY
005360  032713  040400          END24:  BIT     #40400,@CRS     ;WAIT FOR CARD DONE OR OFF-LINE
005364  001775                          BEQ     END24
005366  032713  000400                  BIT     #400,@CRS       ;CHECK OFF LINE
005372  001402                          BEQ     ENDCK           ;BRANCH IF NOT SET
005374  004737  011506                  JSR     %7,CKBIT8       ;OUTPUT ERROR MESSAGE

                                ;CHECK SW7 AND RETURN TO TEST1 IF SET, AFTER RINGING BELL
                                ;OTHERWISE GO INTO THE DATA TEST
005400  104001                  ENDCK:  SCOPE
005402  032777  000200  173206          BIT     #200,@SWR
005410  001406                          BEQ     DATST
005412  004737  011462                  JSR     %7,BELL
005416  005137  000644                  COM     TRFLG           ;TOGGLE TRACE FLAG
005422  000137  000742                  JMP     RESTRT
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                                        ;*****************************************************
                                        ;DATA RELIABILITY TEST FOR CR11
                                        ;*****************************************************

                                        ;CHECK SR FOR TYPE OF DECK BEING TESTED, AND INITIALIZE POINTERS
005426  012737  000056  006646  DATST:  MOV     #56,CDCNT       ;SETUP CARD COUNT TO ENTER TABLE CORRESPONDING TO NEXT C
005434  000410                          BR      DATST2          ;SKIP NEXT INSTRUCTION
005436  022737  000176  000616  DATST1: CMP     #SWREG,SWR
005444  001002                          BNE     1$
005446  104002                          CNTLU
005450  104006                          CKU
005452  005037  006646          1$:     CLR     CDCNT           ;SETUP CARD COUNT TO ENTER DATA TABLE AT BEGINNING
005456  005037  000650          DATST2: CLR     ERFLG           ;FLAG SET PREVENTS PRINTING OUT ERROR HEADING
005462  032777  000020  173126          BIT     #20,@SWR                ;CHECK BIT 4 OF SR FOR TYPE OF DECK
005470  001412                          BEQ     ALP1            ;BRANCH IF NOT SET TO LOAD ALPHANUMERIC POINTERS
005472  012737  013524  006642          MOV     #BINCD,TSTART   ;BIT 2 SET, LOAD BINARY TABLE POINTERS
005500  012737  014222  006644          MOV     #BINEND,TEND
005506  012737  015627  006640          MOV     #MSG15,DECK
005514  000411                          BR      CONTD           ;BRANCH AROUND ALPHANUMERIC POINTERS
005516  012737  013024  006642  ALP1:   MOV     #ALPCD,TSTART   ;LOAD ALPHANUMERIC TABLE POINTERS
005524  012737  013522  006644          MOV     #ALPEND,TEND
005532  012737  015616  006640          MOV     #MSG14,DECK
005540  005737  000644          CONTD:  TST     TRFLG           ;CHECK TRACE TRAP FLAG
005544  001004                          BNE     TRP1            ;BRANCH IF FLAG WAS SET
005546  012737  000340  177776  NOTRP1: MOV     #340,PSR        ;CLEAR TRACE BIT
005554  000407                          BR      DCNT1
005556  032777  010000  173032  TRP1:   BIT     #10000,@SWR     ;CHECK SW12 TO INHIBIT TRACE TRAPPING
005564  001370                          BNE     NOTRP1          ;BRANCH IF SET
005566  012737  000360  177776          MOV     #360,PSR        ;SET TRACE BIT
005574  004737  011434          DCNT1:  JSR     %7,INIT         ;INITIALIZE CARD READER STATUS REGISTER
                                        ;SET UP INTERRUPT SERVICING, AND START READING
005600  012710  005634                  MOV     #SRVC,@ADINT    ;SETUP RETURN POINTER
005604  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR TO LEVEL 0
005612  013760  177776  000002          MOV     PSR,2(ADINT)    ;STORE CURRENT STATUS
005620  004737  006540                  JSR     %7,NXCRD        ;ADJUST POINTER AND START READING
005624  052713  000101                  BIS     #101,@CRS       ;ENABLE INTERRUPTS
005630  000001                          WAIT                    ;WAIT FOR INTERRUPTS
005632  000776                          BR      .-2

                                        ;INTERRUPT SERVICE ROUTINE WHICH RUNS DATA RELIABILITY TEST
005634  005713                  SRVC:   TST     @CRS            ;CHECK SPECIAL CONDITION (BIT 15)
005636  100460                          BMI     ERSET           ;BRANCH IF SET
005640  105713                          TSTB    @CRS            ;CHECK COLUMN READY
005642  100402                          BMI     .+6             ;BRANCH IF SET
005644  000137  006412                  JMP     NOTCOL          ;JUMP IF NOT SET
005650  005237  006650                  INC     CLCNT           ;KEEP TRACK OF COLUMN NUMBER
005654  011437  006652                  MOV     @CRB1,DAT1      ;STORE DATA OF FIRST READ
005660  105713                          TSTB    @CRS            ;MAKE SURE COLUMN READY CLEARED
005662  100006                          BPL     SCONT1          ;BRANCH IF IT DID
005664  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR TO LEVEL 7
005672  104000                          HLT                     ;READING DATA DIDN'T CLEAR COLUMN READY
005674  000137  006432                  JMP     LASTCK          ;GO TO NEXT CARD AFTER ERROR PRINTOUT
005700  017737  172734  006656  SCONT1: MOV     @CRB2,DATENC    ;STORE ENCODED DATA
005706  012701  000010                  MOV     #10,COUNT       ;WAIT AWHILE
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005712  005301                          DEC     COUNT
005714  001376                          BNE     .-2
005716  011437  006654                  MOV     @CRB1,DAT2      ;STORE DATA OF SECOND READ
005722  005037  006660                  CLR     PTOFF           ;CLEAR POINTER OFFSET
005726  023715  006652                  CMP     DAT1,@R5        ;CHECK FIRST DATA READ
005732  001053                          BNE     FAIL            ;PRINTOUT IF WRONG
005734  012737  000002  006660          MOV     #2,PTOFF        ;SET POINTER OFFSET
005742  023725  006654                  CMP     DAT2,(R5)+      ;CHECK SECOND READING OF SAME DATA
005746  001045                          BNE     FAIL            ;BRANCH IF WRONG
005750  012737  000004  006660          MOV     #4,PTOFF        ;SET POINTER OFFSET
005756  023725  006656                  CMP     DATENC,(R5)+    ;CHECK ENCODED DATA
005762  001037                          BNE     FAIL            ;BRANCH IF WRONG
005764  020537  006644                  CMP     R5,TEND         ;CHECK FOR END OF TABLE
005770  100402                          BMI     .+6             ;IF NOT THERE, RTI
005772  013705  006642                  MOV     TSTART,R5       ;MOVE POINTER TO LOOP THRU TABLE
005776  000002                          RTI
                                ;SPECIAL CONDITION BIT 15 WAS SET WHEN THE INTERRUPT SERVICE ROUTINE
                                ;WAS ENTERED
                                ;OUTPUT A MESSAGE AND HALT
006000  052737  000340  177776  ERSET:  BIS     #340,PSR        ;LOCK OUT INTERRUPTS
006006  104003                          KBINTT
006010  022737  000120  006646          CMP     #80.,CDCNT      ;CHECK FOR LAST CARD
006016  001006                          BNE     ER1             ;IF NOT, PRINT OUT MESSAGE
006020  022737  000120  006650          CMP     #80.,CLCNT      ;IF LAST CARD, CHECK FOR LAST COLUMN
006026  001002                          BNE     ER1             ;IF NOT, PRINT MESSAGE
006030  000137  006662                  JMP     ALLDON          ;IF END OF DECK, JUMP
006034  012702  015640          ER1:    MOV     #MSG16,R2       ;"BIT 15 WAS SET."
006040  004737  012152                  JSR     %7,TOUT
006044  012702  015661                  MOV     #MSG17,R2       ;"REMEDY THE ERROR CONDITION
006050  004737  012152                  JSR     %7,TOUT         ;AND PRESS CONTINUE"
006054  000000                          HALT
006056  000137  006432                  JMP     LASTCK          ;SET UP FOR NEXT CARD AND GO ON
006062  052737  000340  177776  FAIL:   BIS     #340,PSR        ;LOCK OUT INTERRUPTS
006070  052713  000002                  BIS     #2,@CRS         ;SET EJECT TO PREVENT TIMING ERROR
006074  005714                          TST     @CRB1           ;MAKE SURE COLUMN READY IS CLEARED
006076  032777  020000  172512          BIT     #20000,@SWR     ;CK SW13
006104  001431                          BEQ     FAILCN          ;CONTINUE IF NOT SET
006106  005777  172504                  TST     @SWR            ;IF SET, CHECK FOR HALT ON ERROR
006112  100003                          BPL     FAILC           ;BRANCH IF HALT ON ERROR NOT SET
006114  000000                          HALT                    ;HALT ON ERROR SET
006116  000137  006432                  JMP     LASTCK          ;CONTINUE  AFTER HALT
006122  032713  040000          FAILC:  BIT     #40000, @CRS    ;CHECK FOR CARD DONE
006126  001402                          BEQ     .+6
006130  000137  006432                  JMP     LASTCK          ;INHIBIT PRINTOUT AFTER CARD DONE SET
006134  032713  000400                  BIT     #400,@CRS       ;CHECK FOR OFF-LINE
006140  001770                          BEQ     FAILC           ;BRANCH IF NOT
006142  022737  000120  006646          CMP     #80.,CDCNT      ;CHECK FOR LAST CARD
006150  001002                          BNE     .+6
006152  000137  006662                  JMP     ALLDON          ;IF LAST CARD, WAIT FOR NEXT DECK
006156  004737  011506                  JSR     %7,CKBIT8       ;IF NOT LAST CARD, PRINT MESSAGE
006162  004737  006540                  JSR     %7,NXCRD        ;START NEXT CARD THRU READER
006166  000002                          RTI
006170  005737  000650          FAILCN: TST     ERFLG           ;TEST FLAG FOR PREVIOUS PRINTOUT
006174  001006                          BNE     NOHD            ;IF SET,  DON'T OUTPUT HEADING
006176  005237  000650                  INC     ERFLG           ;SET FLAG
006202  012702  015526                  MOV     #MSG13,R2       ;OUTPUT HEADING FOR DATA ERROR PRINTOUT
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006206  004737  012152                  JSR     %7,TOUT
006212  013702  006640          NOHD:   MOV     DECK,R2         ;OUTPUT TYPE OF DECK
006216  004737  012152                  JSR     %7,TOUT
006222  004737  011542                  JSR     %7,SPACE
006226  013702  006646                  MOV     CDCNT,R2        ;OUTPUT CARD NUMBER WHERE ERROR OCCURRED
006232  004737  011734                  JSR     %7,PROCT
006236  004737  011542                  JSR     %7,SPACE
006242  013702  006650                  MOV     CLCNT,R2        ;OUTPUT COLUMN NUMBER WHERE ERROR OCCURRED
006246  004737  011734                  JSR     %7,PROCT
006252  004737  011542                  JSR     %7,SPACE
006256  163705  006660                  SUB     PTOFF,R5        ;SUBTRACT OFFSET FROM POINTER TO POINT TO
                                                                ;ADDRESS OF DESIRED PATTERN
006262  012502                          MOV     (R5)+,R2        ;OUTPUT CORRECT DATA PATTERN (NOT ENCODED)
006264  004737  011734                  JSR     %7,PROCT
006270  004737  011542                  JSR     %7,SPACE
006274  013702  006652                  MOV     DAT1,R2         ;OUTPUT DATA READ ON FIRST READING OF BUFFER
006300  004737  011734                  JSR     %7,PROCT
006304  004737  011542                  JSR     %7,SPACE
006310  013702  006654                  MOV     DAT2,R2         ;OUTPUT DATA READ ONE MILLISECOND LATER
006314  004737  011734                  JSR     %7,PROCT
006320  004737  011542                  JSR     %7,SPACE
006324  011502                          MOV     @R5,R2          ;OUTPUT CORRECT DATA PATTERN (ENCODED FORM)
006326  004737  011734                  JSR     %7,PROCT
006332  004737  011542                  JSR     %7,SPACE
006336  013702  006656                  MOV     DATENC,R2       ;OUTPUT DATA READ (ENCODED)
006342  004737  011734                  JSR     %7,PROCT
006346  104003                          KBINTT
006350  005777  172242                  TST     @SWR            ;CHECK 'HALT ON ERROR'' SWITCH
006354  100001                          BPL     .+4             ;BRANCH IF NOT SET
006356  000000                          HALT                    ;HALT AFTER AN ERROR
006360  005713                          TST     @CRS            ;CHECK ERROR
006362  100023                          BPL     LASTCK          ;BRANCH IF NOT SET
006364  022737  000120  006646          CMP     #80.,CDCNT      ;CHECK FOR LAST CARD
006372  001005                          BNE     FAILC1
006374  032713  000400                  BIT     #400,@CRS
006400  001423                          BEQ     LASTCD
006402  000137  006662                  JMP     ALLDON
006406  000137  006000          FAILC1: JMP     ERSET           ;OUTPUT ERROR MESSAGE

                                ;INTERRUPT NOT DUE TO ERROR OR COLUMN READY
006412  032713  040000          NOTCOL: BIT     #40000,@CRS     ;CHECK FOR CARD DONE
006416  001474                          BEQ     NOTCD           ;BRANCH IF NOT SET
006420  022737  000120  006650          CMP     #80.,CLCNT      ;CHECK COLUMN COUNT
006426  001401                          BEQ     .+4             ;SKIP ERROR HALT IF 80 COLUMNS WERE READ
006430  104000                          HLT                     ;LESS THAN EIGHTY COLUMNS WERE READ
006432  022737  000120  006646  LASTCK: CMP     #80.,CDCNT      ;CHECK FOR LAST CARD
006440  001403                          BEQ     LASTCD          ;BRANCH IF LAST CARD
006442  004737  006540                  JSR     %7,NXCRD        ;IF NOT LAST CARD
006446  000002                          RTI                     ;GO ON
006450  022626                  LASTCD: CMP     (SP)+,(SP)+     ;IF LAST CARD, RESTORE STACK POINTER
006452  004737  011462                  JSR     %7,BELL         ;RING BELL TO SIGNIFY 'PASS COMPLETE''
006456  013702  000042                  MOV     @#42,R2         ;MONITOR HOOK
006462  001405                          BEQ     END
006464  000005                          RESET
006466  004712                  LOGIC:  JSR     %7,(R2)
006470  000240                          NOP
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006472  000240                          NOP
006474  000240                          NOP
006476  032777  000040  172112  END:    BIT     #40,@SWR                ;CHECK SR FOR CONTINUATION TO ANOTHER DECK
006504  001002                          BNE     .+6             ;BRANCH TO HALT IF SW5 SET
006506  000137  006514                  JMP     DECKCK          ;CONTINUE TO ANOTHER DECK
006512  000000                          HALT                    ;DATA TEST DONE

                                ;WHEN CONTINUING FROM ONE DECK TO ANOTHER, CHECK SW6 FOR TYPE
                                ;OF TESTING TO BE PERFORMED
006514  005137  000644          DECKCK: COM     TRFLG           ;TOGGLE TRACE FLAG
006520  032777  000100  172070          BIT     #100,@SWR               ;CHECK SW6
006526  001402                          BEQ     .+6             ;BRANCH IF NOT SET
006530  000137  000742                  JMP     RESTRT          ;RERUN COMBINED INSTRUCTION AND DATA TEST
006534  000137  005436                  JMP     DATST1

006540  013705  006642          NXCRD:  MOV     TSTART,R5       ;LOAD R5 WITH TABLE STARTING ADDRESS
006544  006337  006646                  ASL     CDCNT           ;MULTIPLY CARD COUNT BY FOUR
006550  006337  006646                  ASL     CDCNT
006554  063705  006646                  ADD     CDCNT,R5        ;ADD OFFSET TO R5 TO POINT TO NEXT DATUM
006560  006237  006646                  ASR     CDCNT           ;RESTORE CARD COUNT
006564  006237  006646                  ASR     CDCNT
006570  042713  000002                  BIC     #2,@CRS         ;CLEAR EJECT IF SET
006574  005213                          INC     @CRS            ;READ ANOTHER CARD
006576  005237  006646                  INC     CDCNT           ;KEEP TRACK OF CARD NUMBER
006602  005037  006650                  CLR     CLCNT           ;INITIALIZE COLUMN COUNT
006606  000207                          RTS     %7              ;RETURN
                                ;INTERRUPT NOT CAUSED BY ERROR, COLUMN READY, OR CARD DONE
006610  052737  000340  177776  NOTCD:  BIS     #340,PSR        ;LOCK OUT FURTHER INTERRUPTS
006616  032713  002000                  BIT     #2000,@CRS      ;TEST ON-LINE TRANSITION BIT
006622  001003                          BNE     NOTCD1          ;BRANCH IF SET
006624  104000                          HLT                     ;NO BITS SET TO CAUSE AN INTERRUPT
006626  000137  006432                  JMP     LASTCK          ;START NEXT CARD
006632  104000                  NOTCD1: HLT                     ;ON-LINE TRANSITION CAUSED AN INTERRUPT
006634  000137  006432                  JMP     LASTCK          ;START NEXT CARD
006640  000000                  DECK:   0                       ;POINTER TO LITERAL ''ALPHA'' OR 'BINARY''
006642  000000                  TSTART: 0                       ;STARTING ADDRESS OF DATA TABLE
006644  000000                  TEND:   0                       ;END ADDRESS OF DATA TABLE
006646  000000                  CDCNT:  0                       ;NUMBER OF CARD BEING READ
006650  000000                  CLCNT:  0                       ;NUMBER OF COLUMN BEING CHECKED
006652  000000                  DAT1:   0                       ;DATA ON FIRST READ FROM CRB1
006654  000000                  DAT2:   0                       ;DATA ON SECOND READ OF CRB1
006656  000000                  DATENC: 0                       ;DATA READ FROM CRB2
006660  000000                  PTOFF:  0                       ;OFFSET TO POINTER FOR DATA PRINTOUT
006662  004737  011462          ALLDON: JSR     %7,BELL         ;RING BELL
006666  032713  000400                  BIT     #400,@CRS       ;CHECK OFF-LINE BIT
006672  001001                          BNE     .+4             ;BRANCH IF SET
006674  104000                          HLT                     ;OFF-LINE NOT SET, BUT SPECIAL CONDITION
                                                                ;WAS SET AFTER 80 COLUMNS OF THE 80TH CARD WERE READ
006676  032777  000040  171712          BIT     #40,@SWR                ;CHECK SR FOR HALT AT END OF DECK
006704  001403                          BEQ     ALCNT           ;CONTINUE IF NOT SET
006706  000000                          HALT                    ;END OF DECK,SW5 SET
006710  000137  006514                  JMP     DECKCK          ;CHECK FOR TYPE OF TESTING
006714  032777  002000  171674  ALCNT:  BIT     #2000,@SWR      ;DOES THIS CR11 USE THE M829 MODULE?
006722  001025                          BNE     ALCNT1          ;YES- BRANCH
006724  005027  000000                  CLR     #0              ;NO-STALL TO ALLOW CARD DONE TO SET
006730  005337  006726                  DEC     .-2
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006734  001375                          BNE     .-4
006736  005327  000000                  DEC     #0
006742  001375                          BNE     .-4
006744  005327  000000                  DEC     #0
006750  001375                          BNE     .-4
006752  032713  040000                  BIT     #40000, @CRS    ;CHECK CARD DONE
006756  001001                          BNE     .+4
006760  104000                          HLT                     ;CARD DONE DIDN'T SET- THIS ERROR COULD BE
006762  005013                          CLR     @CRS            ;CAUSED BY RUNNING A CR11 WHICH HAS THE
                                                                ;M829 MODULE AND NOT SETTING SWITCH REGISTER
                                                                ;SWITCH 10

006764  032713  157377                  BIT     #157377,@CRS    ;ONLY BIT 8 MAY STILL BE SET
006770  001401                          BEQ     .+4             ;BRANCH IF OK
006772  104000                          HLT                     ;STATUS REGISTER INCORRECT
006774  000405                          BR ALCNT2
006776  005013                  ALCNT1: CLR     @CRS            ;CLEAR ERROR
007000  032713  156377                  BIT     #156377,@CRS    ;ONLY BITS 8 AND 9 MAY STILL BE SET
                                                                ;BIT 9 MAY BE SET SINCE CARD MAY NOT
                                                                ;YET HAVE CLEARED THE READER TO CAUSE
                                                                ;CARD DONE
007004  001401                          BEQ     .+4
007006  104000                          HLT                     ;STATUS REGISTER INCORRECT
007010  052737  000340  177776  ALCNT2: BIS     #340,PSR        ;SET PROCESSOR TO LEVEL 7
007016  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN STATUS
007024  105213                          INCB    @CRS            ;ATTEMPT TO READ- SHOULD RESET ERROR
007026  005713                          TST     @CRS            ;CHECK BIT 15
007030  100402                          BMI     ALLOK           ;BRANCH IF OK
007032  104000                          HLT                     ;SETTING READ DIDN'T RESET ERROR
007034  000416                          BR      ALWAIT          ;BRANCH TO WAIT FOR ON-LINE
007036  012710  007070          ALLOK:  MOV     #SRVC1,@ADINT   ;LOAD INTERRUPT RETURN ADDRESS
007042  005037  177776                  CLR     PSR             ;SET PROCESSOR TO LEVEL 0
007046  012713  000101                  MOV     #101,@CRS       ;ENABLE INTERRUPTS, KEEP ERROR SET BY SETTING READ
007052  000240                          NOP                     ;CLOCK IN INTERRUPT
007054  016037  000002  177776          MOV     2(ADINT),PSR    ;SET PROCESSOR TO LEVEL 7
007062  005013                          CLR     @CRS            ;CLEAR INTERRUPT ENABLE AND ERROR
007064  104000                          HLT                     ;BIT 15 DIDN'T CAUSE AN INTERRUPT
007066  000402                          BR      .+6
007070  022626                  SRVC1:  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
007072  005013                  ALWAIT: CLR     @CRS            ;CLEAR INTERRUPT ENABLE AND ERROR
007074  012710  007132                  MOV     #SRVC2,@ADINT   ;CHANGE INTERRUPT RETURN ADDRESS
007100  112713  000100                  MOVB    #100,@CRS       ;ENABLE INTERRUPTS
007104  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR TO LEVEL 0
007112  032713  000400                  BIT     #400,@CRS       ;CHECK OFF-LINE BIT
007116  001375                          BNE     .-4             ;LOOP UNTIL CLEAR
007120  016037  000002  177776          MOV     2(ADINT),PSR    ;SET PROCESSOR TO LEVEL 7
007126  104000                          HLT                     ;NO INTERRUPT OCCURRED
007130  000403                          BR      SRVC2A          ;BRANCH AROUND
007132  004737  011462          SRVC2:  JSR     %7,BELL         ;RING BELL
007136  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
007140  032713  002000          SRVC2A: BIT     #2000,@CRS      ;CHECK BIT 10
007144  001001                          BNE     .+4             ;BRANCH IF SET
007146  104000                          HLT                     ;BIT 10 NOT SET
007150  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
007154  001401                          BEQ     .+4             ;BRANCH IF NOT SET
007156  104000                          HLT                     ;BIT 8 WAS SET
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007160  005013                          CLR     @CRS            ;DATO TO CRS
007162  032713  002000                  BIT     #2000,@CRS      ;CHECK BIT 10
007166  001401                          BEQ     .+4             ;BRANCH IF NOT SET
007170  104000                          HLT                     ;DATO DIDN'T CLEAR ON-LINE BIT
007172  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK FROM INITIAL INTERRUPT
007174  000137  006514                  JMP     DECKCK          ;RESTART

007200  005037  000632          ERCR11: CLR     FLAG
007204  000403                          BR      TSTA
007206  012737  000001  000632  ERCM11: MOV     #1,FLAG
007214  104007                  TSTA:   TIT
007216  012702  016231                  MOV     #SUBT2,R2
007222  004737  000652                  JSR     %7,SETUP        ;INITIALIZE REGISTERS
007226  012737  007236  012150          MOV     #TESTA+2,RETURN ;SETUP SCOPE LOOP RETURN ADDRESS

                                ;THE CARD READER GOING OFF-LINE SHOULD SET SPECIAL CONDITION (BIT 15) AND OFF-LINE (BIT
007234  104001                  TESTA:  SCOPE
007236  005037  012144                  CLR     ITMAX           ;RUN EACH ERROR TEST ONCE ONLY
007242  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
007246  012702  014410                  MOV     #MSG3,R2        ;'PRESS CARD READER 'READ STOP'''
007252  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
007256  001402                          BEQ     .+6             ;NO
007260  012702  014450                  MOV     #MSG3A,R2       ;'PRESS CARD READER 'STOP'''
007264  004737  012152                  JSR     %7,TOUT
007270  012702  014343                  MOV     #MSG2,R2
007274  004737  012152                  JSR     %7,TOUT         ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
007300  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
007304  000000                          HALT
007306  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
007312  001001                          BNE     .+4             ;BRANCH IF SET
007314  104000                          HLT                     ;OFF-LINE (BIT 8) WASN'T SET
007316  005713                          TST     @CRS            ;CHECK BIT 15
007320  100401                          BMI     .+4             ;BRANCH IF SET
007322  104000                          HLT                     ;BIT 15 WASN'T SET
007324  012702  014224                  MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START''';
007330  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
007334  001402                          BEQ     .+6             ;NO
007336  012702  014307                  MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
007342  004737  012152                  JSR     %7,TOUT
007346  012702  014343                  MOV     #MSG2,R2
007352  004737  012152                  JSR     %7,TOUT         ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
007356  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
007362  000000                          HALT
007364  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
007370  001375                          BNE     .-4

                                ;INPUT HOPPER EMPTY SHOULD SET SPECIAL CONDITION
007372  104001                  TESTB:  SCOPE
007374  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
007400  012702  014536                  MOV     #MSG5,R2        ;'REMOVE ALL CARDS FROM THE INPUT HOPPER''
007404  004737  012152                  JSR     %7,TOUT
007410  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
007414  004737  012152                  JSR     %7,TOUT
007420  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
007424  000000                          HALT
007426  032713  000400                  BIT     #400,@CRS       ;CHECK BIT8
007432  001001                          BNE     .+4             ;BRANCH IF SET
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007434  104000                          HLT                     ;OFF-LINE (BIT 8) WASN'T SET
007436  005713                          TST     @CRS            ;CHECK SPECIAL CONDITION BIT
007440  100401                          BMI     .+4             ;BRANCH IF SET
007442  104000                          HLT                     ;SPECIAL CONDITION NOT SET
007444  012702  014607                  MOV     #MSG6,R2        ;'RESTORE CARDS IN INPUT HOPPER''
007450  004737  012152                  JSR     %7,TOUT
007454  012702  014224                  MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
007460  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
007464  001402                          BEQ     .+6             ;NO
007466  012702  014307                  MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
007472  004737  012152                  JSR     %7,TOUT
007476  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
007502  004737  012152                  JSR     %7,TOUT
007506  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
007512  000000                          HALT
007514  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
007520  001375                          BNE     .-4

                                ;OUTPUT STACKER FULL SHOULD SET BIT 15
007522  104001                  TESTC:  SCOPE
007524  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
007530  012702  014653                  MOV     #MSG7,R2        ;'RAISE OUTPUT STACKER PRESSURE ARM ABOVE HORIZONTAL THE
007534  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
007540  001402                          BEQ     .+6             ;NO
007542  012702  014771                  MOV     #MSG7A,R2       ;'LOWER OUTPUT STACKER PLATE TO BOTTOM''
007546  004737  012152                  JSR     %7,TOUT
007552  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
007556  004737  012152                  JSR     %7,TOUT
007562  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
007566  000000                          HALT
007570  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
007574  001001                          BNE     .+4             ;BRANCH IF SET
007576  104000                          HLT                     ;OFF-LINE (BIT 8) WASN'T SET
007600  005713                          TST     @CRS            ;CHECK SPECIAL CONDITION BIT
007602  100401                          BMI     .+4             ;BRANCH IF SET
007604  104000                          HLT                     ;SPECIAL CONDITION NOT SET
007606  012702  014224                  MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
007612  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
007616  001402                          BEQ     .+6             ;NO
007620  012702  014307                  MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
007624  004737  012152                  JSR     %7,TOUT
007630  012702  014343                  MOV     #MSG2,R2
007634  004737  012152                  JSR     %7,TOUT         ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
007640  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
007644  000000                          HALT
007646  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
007652  001375                          BNE     .-4

                                ;A FEED ERROR SHOULD SET BIT 15
                                ;THIS ERROR OCCURS WHEN THE FEED MECHANISM FAILS TO DELIVER A CARD TO THE READ STATION
007654  104001                  TESTD:  SCOPE
007656  004737  011434                  JSR     %7,INIT
007662  012702  014536                  MOV     #MSG5,R2        ;'REMOVE ALL CARDS FROM THE INPUT HOPPER''
007666  004737  012152                  JSR     %7,TOUT
007672  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
007676  004737  012152                  JSR     %7,TOUT
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007702  012702  015040          MOV     #MSG8,R2        ;'HOLD DOWN THE SWITCH AT THE BOTTOM OF INPUT HOPPER
007706  005737  000632          TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
007712  001402                  BEQ     .+6             ;NO
007714  012702  015131          MOV     #MSG8A,R2       ;'LIFT SWITCH UNDER RIFFLE CAP
007720  004737  012152          JSR     %7,TOUT
007724  012702  014224          MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'
007730  005737  000632          TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
007734  001402                  BEQ     .+6             ;NO
007736  012702  014307          MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
007742  004737  012152          JSR     %7,TOUT
007746  004737  012274          JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
007752  000000                  HALT
007754  032713  002000          BIT     #2000,@CRS      ;WAIT FOR CARD READER TO COME ON-LINE
007760  001775                  BEQ     .-4
007762  004737  011434          JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
007766  012713  000003          MOV     #3,@CRS         ;SET EJECT AND READ
007772  005227  000000          INC     #0              ;WAIT AWHILE
007776  001375                  BNE     .-4
010000  005227  000000          INC     #0
010004  001375                  BNE     .-4
010006  005227  000000          INC     #0
010012  001375                  BNE     .-4
010014  005227  000000          INC     #0
010020  001375                  BNE     .-4
010022  032713  000400          BIT     #400,@CRS       ;TEST OFF-LINE BIT
010026  001001                  BNE     .+4             ;BRANCH IF SET
010030  104000                  HLT                     ;BIT 8 WAS NOT SET
010032  005713                  TST     @CRS            ;CHECK BIT 15
010034  100401                  BMI     .+4             ;BRANCH IF SET
010036  104000                  HLT                     ;BIT 15 WAS NOT SET
010040  012702  014607          MOV     #MSG6,R2
010044  004737  012152          JSR     %7,TOUT         ;'RESTORE CARDS IN THE INPUT HOPPER''
010050  012702  014224          MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
010054  005737  000632          TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
010060  001402                  BEQ     .+6             ;NO
010062  012702  014307          MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
010066  004737  012152          JSR     %7,TOUT
010072  012702  014343          MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
010076  004737  012152          JSR     %7,TOUT
010102  004737  012274          JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
010106  000000                  HALT
010110  032713  000400          BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
010114  001375                  BNE     .-4
010116  005737  000632          TST     FLAG            ;SKIP NEXT TEST IF DOCUMATION READER
010122  001402                  BEQ     .+6
010124  000137  010444          JMP     TESTG

                        ;A MOTION ERROR SHOULD SET BIT 15
                        ;THIS ERROR OCCURS WHEN A CARD JAM OCCURS AT THE READ STATION
010130  104001          TESTE:  SCOPE
010132  004737  011434          JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
010136  012702  014410          MOV     #MSG3,R2        ;'PRESS CARD READER 'READ STOP'''
010142  004737  012152          JSR     %7,TOUT
010146  012702  014343          MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
010152  004737  012152          JSR     %7,TOUT
010156  012702  015170          MOV     #MSG9,R2        ;'BLOCK THE CARD READER STATION TO
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010162  004737  012152                JSR     %7,TOUT         ;PREVENT A CARD GOING THRU, AND''
010166  012702  014224                MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
010172  004737  012152                JSR     %7,TOUT
010176  004737  012274                JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
010202  000000                        HALT
010204  032713  002000                BIT     #2000,@CRS      ;MONITOR ON-LINE TRANSITION (BIT 10)
010210  001775                        BEQ     .-4             ;CONTINUE WHEN CARD READER COMES ON-LINE
010212  012713  000003                MOV     #3,@CRS         ;READ A CARD AND SET EJECT
010216  032713  140000                BIT     #140000,@CRS    ;CHECK DONE AND SPECIAL CONDITION BITS
010222  001775                        BEQ     .-4             ;WAIT
010224  005713                        TST     @CRS            ;CHECK SPECIAL CONDITION BIT
010226  100401                        BMI     .+4             ;CONTINUE IF SET
010230  104000                        HLT                     ;SPECIAL CONDITION NOT SET
010232  012702  015272                MOV     #MSG10,R2       ;'REMOVE JAMMED CARD''
010236  004737  012152                JSR     %7,TOUT
010242  012702  014224                MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
010246  004737  012152                JSR     %7,TOUT
010252  012702  014343                MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
010256  004737  012152                JSR     %7,TOUT
010262  004737  012274                JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
010266  000000                        HALT
010270  032713  000400                BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
010274  001375                        BNE     .-4

                        ;A STACK FAIL ERROR SHOULD SET BIT 15
                        ;ERROR OCCURS WHEN 3 CARDS IN A ROW HAVE NOT BEEN DELIVERED PROPERLY TO THE OUTPUT STACK
010276  104001          TESTF:  SCOPE
010300  004737  011434                JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
010304  012702  014410                MOV     #MSG3,R2        ;'PRESS CARD READER 'READ STOP'''
010310  004737  012152                JSR     %7,TOUT
010314  012702  014343                MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
010320  004737  012152                JSR     %7,TOUT
010324  012702  015317                MOV     #MSG11,R2       ;'HOLD THE OUTPUT STACKER GATE OPEN.  THEN''
010330  004737  012152                JSR     %7,TOUT
010334  012702  014224                MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND
010340  004737  012152                JSR     %7,TOUT         ;'READ START.'''
010344  004737  012274                JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
010350  000000                        HALT
010352  032713  002000                BIT     #2000,@CRS      ;WAIT FOR CARD READER TO COME ON-LINE
010356  001775                        BEQ     .-4
010360  012701  000003                MOV     #3,COUNT        ;INITIALIZE COUNTER TO READ 3 CARDS
010364  012713  000003          LOOPF:  MOV     #3,@CRS         ;EJECT A CARD
010370  032713  140000                BIT     #140000,@CRS    ;WAIT FOR CARD DONE OR SPECIAL CONDITION
010374  001775                        BEQ     .-4
010376  005301                        DEC     COUNT           ;COUNT DOWN
010400  001371                        BNE     LOOPF           ;READ 3 CARDS ALL TOGETHER
010402  005713                        TST     @CRS            ;CHECK SPECIAL CONDITION BIT 15
010404  100401                        BMI     .+4             ;BRANCH IF SET
010406  104000                        HLT                     ;SPECIAL CONDITION NOT SET
010410  012702  014224                MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
010414  004737  012152                JSR     %7,TOUT
010420  012702  014343                MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
010424  004737  012152                JSR     %7,TOUT
010430  004737  012274                JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
010434  000000                        HALT
010436  032713  000400                BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
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010442  001375                          BNE     .-4

                                ;DARK-LIGHT ERROR SHOULD SET BIT 15
                                ;THIS OCCURS WHEN DATA IS SENSED BEFORE COLUMN ONE OR AFTER COLUMN EIGHTY
                                ;OR WHEN THE SENSORS ARE NOT ALL SENSING A HOLE AFTER THE CARD HAS PASSED
                                ;THIS TEST IS SKIPPED IF BIT 0 OF THE SWITCH REGISTER EQUALS ONE
                                ;TO MAKE THE 2 DARK-LIGHT CHECK CARDS:
                                ;       1.  TEAR A SMALL PIECE FROM THE LEADING EDGE OF ONE CARD
                                ;       2.  TAPE 2 CARDS TOGETHER TO MAKE ONE 'LONG'' CARD-IT ONLY NEEDS TO BE
                                ;           ABOUT 1/2 INCH LONGER THAN A REGULAR CARD
010444  104001                  TESTG:  SCOPE
010446  032777  000001  170142          BIT     #1,@SWR         ;CHECK SW0
010454  001410                          BEQ     CONTG           ;RUN TEST IF NOT SET
010456  004737  011462                  JSR     %7,BELL         ;IF SET, RING BELL AND
010462  000000                          HALT                    ;HALT
010464  012737  007236  012150          MOV     #TESTA+2,RETURN ;SETUP SCOPE LOOP RETURN ADDRESS TO LOOP THRU TESTS
010472  000137  007234                  JMP     TESTA           ;START ERROR TESTS OVER ON CONTINUING
010476  004737  011434          CONTG:  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
010502  005001                          CLR     COUNT           ;INITIALIZE COUNTER
010504  005201                          INC     COUNT           ;SET TO INDICATE FIRST PASS
010506  012702  015371                  MOV     #MSG12,R2       ;'PLACE SPECIAL DARK-LIGHT CHECK CARDS (SEE LISTING, TES
010512  004737  012152                  JSR     %7,TOUT         ;AT THE BOTTOM OF THE INPUT STACK''
010516  012702  014224          LOOPG:  MOV     #MSG1,R2        ;''PRESS CARD READER 'MOTOR START' AND 'READ START'''
010522  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
010526  001402                          BEQ     .+6             ;NO
010530  012702  014307                  MOV     #MSG1A,R2       ;''PRESS CARD READER 'RESET'''
010534  004737  012152                  JSR     %7,TOUT
010540  012702  014343                  MOV     #MSG2,R2
010544  004737  012152                  JSR     %7,TOUT         ;''THEN HIT 'CONTINUE' ON THE CONSOLE''
010550  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
010554  000000                          HALT
010556  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
010562  001375                          BNE     .-4
010564  012713  000003                  MOV     #3,@CRS         ;EJECT THE CARD
010570  032713  140000                  BIT     #140000,@CRS    ;WAIT FOR ERROR OR CARD DONE
010574  001775                          BEQ     .-4
010576  005713                          TST     @CRS            ;CHECK SPECIAL CONDITION
010600  100401                          BMI     .+4             ;CONTINUE IF SET
010602  104000                          HLT                     ;SPECIAL CONDITION NOT SET
010604  005301                          DEC     COUNT           ;COUNT DOWN
010606  001743                          BEQ     LOOPG           ;IF FIRST PASS, LOOP
010610  004737  011462                  JSR     %7,BELL         ;RING BELL
010614  000000                          HALT
010616  012702  014224                  MOV     #MSG1,R2        ;''PRESS CARD READER 'MOTOR START' AND 'READ START'''
010622  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
010626  001402                          BEQ     .+6             ;NO
010630  012702  014307                  MOV     #MSG1A,R2       ;''PRESS CARD READER 'RESET' ''
010634  004737  012152                  JSR     %7,TOUT
010640  012702  014343                  MOV     #MSG2,R2        ;''THEN HIT 'CONTINUE' ON THE CONSOLE''
010644  004737  012152                  JSR     %7,TOUT
010650  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
010654  000000                          HALT
010656  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
010662  001375                          BNE     .-4
010664  012737  007236  012150          MOV     #TESTA+2,RETURN ;SETUP SCOPE LOOP RETURN ADDRESS
010672  000137  007234                  JMP     TESTA           ;LOOP THRU TEST ON CONTINUING
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                                        ;ROUTINE TO LOOP THRU A SINGLE INSTRUCTION TEST
                                        ;NOTE THAT SW11 MUST BE DOWN AFTER 2ND HALT
010676  104007                          TESTX:  TIT
010700  012702  016264                          MOV     #SUBT4,R2
010704  004737  000652                          JSR     %7,SETUP                ;SETUP POIN'ERS AND FLAGS
010710  012702  016115                          MOV     #STADD,R2
010714  004737  012152                          JSR     PC,TOUT
010720  104004                                  READC
010722  013737  000622  011012                  MOV     TMP1,RETRNX
010730  062737  000002  011012                  ADD     #2,RETRNX               ;CHANGE TO FIRST ADDRESS AFTER SCOPE INSTRUCTION
010736  032777  010000  167652  2$:             BIT     #10000,@SWR             ;CHECK SW12
010744  001404                                  BEQ     .+12                    ;BRANCH IF NOT SET
010746  042737  000020  177776                  BIC     #20,PSR                 ;CLEAR TRACE BIT
010754  000403                                  BR      .+10                    ;SKIP NEXT INSTRUCTION
010756  052737  000020  177776                  BIS     #20,PSR                 ;SET TRACE BIT
010764  005037  012146                          CLR     ITCNT                   ;CLEAR ITERATION COUNTER
010770  012737  011002  012150                  MOV     #XLOOP,RETURN           ;LOAD RETURN ADDRESS
010776  000177  000010                          JMP     @RETRNX                 ;JUMP TO TEST
011002  005037  012146          XLOOP:          CLR     ITCNT                   ;KEEP ITERATION COUNTER AT ZERO
011006  000177  000000                          JMP     @RETRNX                 ;JUMP TO TEST
011012  000000                  RETRNX:         0
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                                        ;ROUTINE TO CHECK CARDS WHICH HAVE ALL COLUMNS IDENTICALLY PUNCHED.
                                        ;THIS ROUTINE ALLOWS SPECIFIC TYPES OF DATA FAILURES TO BE STUDIED
                                        ;EASILY  THE PATTERN IS STORED, AND THEN
                                        ;EACH COLUMN OF EACH CARD IS READ TWICE AND COMPARED WITH IT.  IF A
                                        ;DISCREPANCY OCCURS, THE ERROR IS PRINTED OUT ALONG WITH THE TOTAL
                                        ;NUMBER OF CARDS READ AND THE TOTAL NUMBER OF DATA ERRORS DISCOVERED
                                        ;UP TO THAT POINT (ALL PRINTOUTS ARE IN OCTAL).  WHEN THE INPUT HOPPER
                                        ;IS EMPTY, THE ROUTINE RINGS THE BELL AND WAITS FOR MORE CARDS TO BE
                                        ;LOADED AND THE CARD READER TO BE PUT BACK ON-LINE.
                                        ;SW15=1 CAUSES A HALT AFTER AN ERROR, AND SW13=1 INHIBITS ERROR PRINTOUTS.

011014  104007                  CKSAME: TIT
011016  012702  016307                  MOV     #SUBT5,R2
011022  004737  000652                  JSR     %7,SETUP        ;INITIALIZE POINTERS
011026  012702  016066                  MOV     #CIMPAT,R2
011032  004737  012152                  JSR     PC,TOUT
011036  104004                          READC
011040  013737  000622  011432          MOV     TMP1,CARDIM
011046  042737  170000  011432          BIC     #170000,CARDIM  ;CLEAR UPPER BITS OF PATTERN
011054  005037  011430                  CLR     TOTCRD          ;INITIALIZE CARD COUNT
011060  005037  011426                  CLR     TOTERR          ;INITIALIZE ERROR COUNT
011064  005037  000650                  CLR     ERFLG           ;CLEAR FLAG FOR PRINTING ERROR HEADING
011070  005037  006650          CKLOOP: CLR     CLCNT           ;INITIALIZE COLUMN COUNT
011074  104003                          KBINTT
011076  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
011102  001017                          BNE     CKSIT           ;BRANCH IF SET TO WAIT FOR READER TO COME ON-LINE.
011104  005213                          INC     @CRS            ;START READING CARD
011106  005237  011430                  INC     TOTCRD          ;INCREMENT CARD COUNT
011112  105713                  CKLP1:  TSTB    @CRS            ;CHECK COLUMM READY
011114  100426                          BMI     CKCOL           ;BRANCH IF SET
011116  032713  040000                  BIT     #40000,@CRS     ;CHECK CARD DONE
011122  001015                          BNE     CKCRD           ;BRANCH IF SET
011124  005713                          TST     @CRS            ;CHECK SPECIAL CONDITION
011126  100371                          BPL     CKLP1           ;LOOP IF NOT SET
011130  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
011134  001002                          BNE     CKSIT           ;BRANCH IF SET TO WAIT FOR READER ON-LINE.
011136  104000                          HLT                     ;SPECIAL CONDITION SET, BIT 8 CLEAR
011140  000753                          BR      CKLOOP

011142  004737  011462          CKSIT:  JSR     %7,BELL         ;RING BELL TO SIGNIFY READER OFF-LINE
011146  032713  000400          CKSIT1: BIT     #400,@CRS       ;CHECK BIT 8
011152  001375                          BNE     CKSIT1          ;LOOP IF STILL SET
011154  000745                          BR      CKLOOP          ;START NEXT CARD
011156  022737  000120  006650  CKCRD:  CMP     #80.,CLCNT      ;CHECK FOR 80 COLUMNS READ
011164  001741                          BEQ     CKLOOP          ;START NEXT CARD IF OK
011166  104000                          HLT                     ;FINAL COLUMN COUNT WASN'T 80
011170  000737                          BR      CKLOOP          ;START NEXT CARD
011172  011437  006652          CKCOL:  MOV     @CRB1,DAT1      ;READ DATA BUFFER
011176  005237  006650                  INC     CLCNT           ;COUNT COLUMNS
011202  105713                          TSTB    @CRS            ;CHECK COLUMN READY
011204  100002                          BPL     .+6             ;BRANCH IF OK
011206  104000                          HLT                     ;READING DBR DIDN'T CLEAR READY
011210  000727                          BR      CKLOOP          ;START NEXT CARD AFTER ERROR
011212  012701  000200                  MOV     #200,COUNT      ;WAIT AWHILE
011216  005301                  CKLP2:  DEC     COUNT
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011220  001376                          BNE     CKLP2
011222  011437  006654                  MOV     @CRB1,DAT2      ;READ CRB1 AGAIN
011226  023737  006652  011432          CMP     DAT1,CARDIM     ;COMPARE FIRST DATA TO PATTERN
011234  001005                          BNE     CKFAIL          ;BRANCH IF FAILURE
011236  023737  006654  011432          CMP     DAT2,CARDIM     ;COMPARE SECOND READING TO PATTERN
011244  001001                          BNE     CKFAIL          ;BRANCH IF FAILURE
011246  000721                          BR      CKLP1           ;WAIT FOR NEXT COLUMN OR END OF CARD
011250  005237  011426          CKFAIL: INC     TOTERR          ;COUNT ERRORS
011254  104003                          KBINTT
011256  032777  020000  167332          BIT     #20000,@SWR     ;CHECK FOR INHIBITING PRINTOUT
011264  001047                          BNE     CKHLT           ;BRANCH AROUND PRINTOUT IF SET
011266  005737  000650                  TST     ERFLG           ;TEST FLAG TO PRINT HEADING
011272  001006                          BNE     CKNOHD          ;BRANCH IF ALREADY DONE
011274  005237  000650                  INC     ERFLG           ;PRINT HEADING ONCE ONLY
011300  012702  015764                  MOV     #MSG19,R2       ;OUTPUT HEADING
011304  004737  012152                  JSR     %7,TOUT
011310  004737  012242          CKNOHD: JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN, LINEFEED
011314  013702  006650                  MOV     CLCNT,R2        ;PRINT COLUMN NUMBER
011320  004737  011734                  JSR     %7,PROCT
011324  004737  011542                  JSR     %7,SPACE
011330  013702  006652                  MOV     DAT1,R2         ;PRINT FIRST READING
011334  004737  011734                  JSR     %7,PROCT
011340  004737  011542                  JSR     %7,SPACE
011344  013702  006654                  MOV     DAT2,R2         ;PRINT SECOND READING
011350  004737  011734                  JSR     %7,PROCT
011354  004737  011542                  JSR     %7,SPACE
011360  013702  011430                  MOV     TOTCRD,R2       ;PRINT TOTAL NUMBER OF CARDS READ
011364  004737  011734                  JSR     %7,PROCT
011370  004737  011542                  JSR     %7,SPACE
011374  013702  011426                  MOV     TOTERR,R2       ;PRINT TOTAL NUMBER OF DATA ERRORS
011400  004737  011734                  JSR     %7,PROCT
011404  005777  167206          CKHLT:  TST     @SWR            ;CHECK SW15 TO HALT ON ERROR
011410  100002                          BPL     CKDONE          ;BRANCH IF NOT SET
011412  000000                          HALT                    ;HALT ON ERROR
011414  000625                          BR      CKLOOP          ;CONTINUE
011416  032713  140000          CKDONE: BIT     #140000,@CRS    ;WAIT FOR SPECIAL CONDITION OR DONE
011422  001775                          BEQ     CKDONE
011424  000621                          BR      CKLOOP          ;START NEXT CARD AFTER CHECKING BIT 8
011426  000000                  TOTERR: 0
011430  000000                  TOTCRD: 0
011432  000000                  CARDIM: 0

                                ;ISSUE MESSAGE IF CARD READER IS OFF-LINE
                                ;WAIT FOR BUSY TO CLEAR IN CASE CARD READER IS STILL READING A CARD
                                ;INITIALIZE STATUS REGISTER AND USE ERROR HALT IF IT DOESN'T CLEAR PROPERLY
                                ;NOTE THAT PROGRAM WILL HANG HERE IF BUSY REMAINS SET
011434  004737  011506          INIT:   JSR     %7,CKBIT8       ;SEE IF OFF-LINE BIT IS SET
011440  032713  001000                  BIT     #1000,@CRS      ;WAIT FOR BUSY TO CLEAR, IN CASE
011444  001375                          BNE     .-4             ;A CARD IS STILL BEING READ
011446  005013                          CLR     @CRS            ;INITIALIZE STATUS REGISTER
011450  005714                          TST     @CRB1           ;READ DATA BUFFER TO CLEAR COLUMN READY
011452  005713                          TST     @CRS            ;MAKE SURE INITIALIZATION OK
011454  001401                          BEQ     .+4             ;BRANCH IF ALL BITS ZERO
011456  104000                          HLT                     ;NOT ALL BITS OF STATUS REGISTER ARE ZERO
011460  000207                          RTS     %7              ;RETURN
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                                        ;BELL ON PASS COMPLETE
011462  105777  167124                  BELL:   TSTB    @TCSR           ;WAIT FOR TTY READY
011466  100375                                  BPL     .-4
011470  012777  000207  167116                  MOV     #207,@TDBR      ;RING BELL
011476  012737  000001  012144                  MOV     #1,ITMAX        ;MAKE CERTAIN ITERATION MAXIMUM IS CORRECT
011504  000207                                  RTS     %7              ;RETURN

                                        ;SUBROUTINE TO CHECK FOR BIT 8 (OFF-LINE) BEING SET IN CARD
                                        ;READER CSR, AND PRINT OUT A MESSAGE IF IT IS
011506  032713  000400                  CKBIT8: BIT     #400,@CRS       ;CHECK BIT 8
011512  001001                                  BNE     .+4             ;BRANCH IF SET
011514  000207                                  RTS     %7              ;RETURN IF NOT SET
011516  012702  015744                          MOV     #MSG18,R2       ;OUTPUT MESSAGE
011522  004737  012152                          JSR     %7,TOUT         ;'BIT 8 WAS SET''
011526  012702  015661                          MOV     #MSG17,R2       ;'REMEDY THE ERROR CONDITION
011532  004737  012152                          JSR     %7,TOUT         ;AND PRESS 'CONTINUE'''
011536  000000                                  HALT                    ;WAIT FOR CONTINUE
011540  000762                                  BR      CKBIT8          ;CHECK AGAIN

                                        ;SUBROUTINE TO ISSUE N SPACES
                                        ;N IS ONE PLUS VALUE CONTAINED IN SPACEX
                                        ;SPACEX IS CLEARED WITHIN THE SUBROUTINE, SO THAT A CALL ON
                                        ;SPACE WITHOUT LOADING SPACEX ISSUES ONLY ONE SPACE
011542  105777  167044                  SPACE:  TSTB    @TCSR           ;WAIT FOR TTY READY
011546  100375                                  BPL     .-4
011550  012777  000240  167036                  MOV     #240,@TDBR      ;OUTPUT A SPACE
011556  005337  011572                          DEC     SPACEX          ;DECREMENT COUNT
011562  100367                                  BPL     SPACE           ;LOOP IF NOT DONE
011564  005037  011572                          CLR     SPACEX          ;RESET COUNT TO ZERO
011570  000207                                  RTS     %7              ;RETURN
011572  000000                          SPACEX: 0


                                        ;ENTERED WITH SYSTEM TRAP CALL (HLT)
                                        ;PRINT OUT THE ERROR PC AND STATUS REGISTER
011574  104003                          PRINT:  KBINTT
011576  037727  167014  020000                  BIT     @SWR,#20000     ;TEST FOR INHIBIT PRINT OUT
011604  001401                                  BEQ     .+4             ;BRANCH TO PRINT
011606  000437                                  BR      B.CK            ;INHIBIT, CHECK FOR HALT
011610  012637  011730                          MOV     (6)+,   SAVPC   ;PC OF FAILING ROUTINE
011614  012637  011732                          MOV     (6)+,   SAVPSR  ;PSR OR ERROR CONDITION
011620  024646                                  CMP     -(6),   -(6)    ;RESTORE STACK
011622  004737  012242                          JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN, LINEFEED
011626  010237  011722                          MOV     %2,     SAVR2   ;SAVE R2
011632  013702  011730                          MOV     SAVPC,  %2
011636  004737  011734                          JSR     %7,     PROCT   ;PRINT PC+2 IN OCTAL
011642  105777  166744                          TSTB    @TCSR           ;WAIT FOR TTY READY
011646  100375                                  BPL     .-4
011650  012777  000240  166736                  MOV     #240,   @TDBR   ;OUTPUT A SPACE
011656  013702  011732                          MOV     SAVPSR, %2
011662  004737  011734                          JSR     %7,     PROCT   ;PRINT PROCESSOR STATUS AT TIME OF FAILURE
011666  013702  011722                          MOV     SAVR2,  %2      ;RESTORE REGISTER 2
011672  105777  166714                          TSTB    @TCSR           ;WAIT FOR TTY READY
011676  100375                                  BPL     .-4
011700  012777  000240  166706                  MOV     #240,@TDBR
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011706  104003                  B.CK:   KBINTT
011710  005777  166702                  TST     @SWR            ;CHECK SR FOR HALT SWITCH
011714  100001                          BPL     .+4             ;BRANCH IF NOT SET
011716  000000                          HALT                    ;HALT ON ERROR UP
011720  000002                          RTI                     ;RETURN TO MAIN LINE
011722  000000                  SAVR2:  0
011724  000000                  SAVR3:  0
011726  000000                  SAVR4:  0
011730  000000                  SAVPC:  0
011732  000000                  SAVPSR: 0

011734  010337  011724          PROCT:  MOV     %3,SAVR3        ;SAVE R3
011740  010437  011726                  MOV     %4,SAVR4        ;SAVE R4
011744  005004                          CLR     %4              ;CLEAR R4 TO USE AS COUNTER
011746  005001                          CLR     COUNT           ;CLEAR COUNT TO USE AS CARRY FLAG
011750  012703  000260                  MOV     #260,   %3      ;SETUP ASCII ZERO IN R3
011754  005702                          TST     %2              ;CHECK BIT 15 OF DESIRED NUMBER
011756  100001                          BPL     .+4             ;BRANCH IF NOT SET
011760  005203                          INC     %3              ;CHANGE TO ASCII ONE
011762  006102                          ROL     %2              ;ROTATE INTO RIGHTMOST BIT
011764  006102                          ROL     %2              ;TO PREPARE FOR LOOP
011766  005501                          ADC     COUNT           ;STORE CARRY
011770  105777  166616          C.WAIT: TSTB    @TCSR           ;WAIT FOR TTY READY
011774  100375                          BPL     C.WAIT
011776  010377  166612                  MOV     %3,     @TDBR   ;OUTPUT ASCII
012002  005204                          INC     %4              ;COUNT CHARACTERS OUTPUT
012004  020427  000006                  CMP     %4,     #6      ;CHECK FOR DONE
012010  001005                          BNE     C.CONT          ;BRANCH IF NOT DONE
012012  013703  011724                  MOV     SAVR3,%3        ;RESTORE REGISTER 3
012016  013704  011726                  MOV     SAVR4,%4        ;RESTORE REGISTER 4
012022  000207                          RTS     %7              ;RETURN
012024  000241                  C.CONT: CLC                     ;CLEAR CARRY
012026  005701                          TST     COUNT           ;TEST CARRY FLAG
012030  001402                          BEQ     .+6             ;BRANCH IF NOT SET
012032  005001                          CLR     COUNT           ;CLEAR FLAG
012034  000261                          SEC                     ;SET CARRY
012036  006102                          ROL     %2              ;ROTATE NEXT 3 BITS INTO RIGHTMOST 3
012040  006102                          ROL     %2
012042  006102                          ROL     %2
012044  005501                          ADC     COUNT           ;STORE CARRY
012046  010203                          MOV     %2,     %3      ;MOVE DATA FOR OUTPUT
012050  042703  177770                  BIC     #177770,%3      ;CLEAR ALL BUT RIGHTMOST 3 BITS
012054  052703  000260                  BIS     #260,   %3      ;SET TO ASCII EQUIVALENT
012060  000743                          BR      C.WAIT          ;LOOP
                                ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST 2 TIMES
012062  104003                  SCOPEC: KBINTT
012064  032777  040000  166524          BIT     #40000, @SWR    ;TEST SR FOR SCOPE
012072  001012                          BNE     D.1             ;YES,SCOPE
012074  032777  004000  166514          BIT     #4000,@SWR      ;NO- TEST FOR ITERATION
012102  001013                          BNE     D.2             ;INHIBIT ITERATION
012104  023737  012146  012144          CMP     ITCNT,ITMAX     ;CHECK FOR ITERATIONS COMPLETE
012112  100007                          BPL     D.2             ;EXIT-DONE
012114  005237  012146                  INC     ITCNT           ;INCREMENT COUNT
012120  022606                  D.1:    CMP     (6)+,   %6      ;REPOSITION STACK POINTER
012122  012637  177776                  MOV     (6)+,   PSR     ;RESTORE PROCESSOR STATUS
012126  000177  000016                  JMP     @RETURN         ;RETURN TO RERUN TEST
```

```
012132  005037  012146          D.2:    CLR     ITCNT           ;CLEAR COUNTER
012136  011637  012150                  MOV     @%6,    RETURN  ;SAVE SCOPE RETURN POINTER
012142  000002                          RTI                     ;RETURN INLINE-NEXT TEST
012144  000001                  ITMAX:  1                       ;MAX NUMBER OF ITERATIONS
012146  000000                  ITCNT:  0                       ;COUNT LOCATION FOR ITERATION LOOP
012150  001022                  RETURN: TEST1+2                 ;ADDRESS OF LAST TEST

                                ;MOV ADDRESS OF MESSAGE TO REGISTER 2
                                ;THEN JSR %7, TOUT
012152  142777  000177  166432  TOUT:   BICB    #177,   @TCSR   ;CLEAR INT FLAG
012160  111237  012240                  MOVB    @%2,    L.EOMK  ;MOVE IN EOM MARKER
012164  005202                  L.INC:  INC     %2              ;MOVE DATA POINTER TO NEXT BYTE
012166  121237  012240          L.TOUT: CMPB    @%2,    L.EOMK  ;COMPARE FOR EOM
012172  001006                          BNE     L.CNT           ;BRANCH IF NOT END OF MESSAGE
012174  105777  166412                  TSTB    @TCSR           ;WAIT FOR TTY READY
012200  100375                          BPL     .-4
012202  005077  166406                  CLR     @TDBR           ;OUTPUT NULL
012206  000207                          RTS     %7              ;RETURN IF EOM
012210  121227  000100          L.CNT:  CMPB    @%2,    #'@     ;CHECK FOR CR,LF REQUEST
012214  001003                          BNE     .+10            ;BRANCH IF NOT
012216  004737  012242                  JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN, LINEFEED
012222  000760                          BR      L.INC           ;LOOP
012224  105777  166362                  TSTB    @TCSR           ;WAIT FOR TTY
012230  100375                          BPL     .-4
012232  112277  166356                  MOVB    (2)+,   @TDBR   ;OUTPUT NEXT CHARACTER
012236  000753                          BR      L.TOUT          ;CONTINUE
012240  000000                  L.EOMK: 0

                                ;SUBROUTINE TO ISSUE CARRIAGE RETURN AND LINEFEED
012242  105777  166344          CRLF:   TSTB    @TCSR           ;WAIT FOR TTY READY
012246  100375                          BPL     .-4
012250  112777  000215  166336          MOVB    #215,   @TDBR   ;SEND CARRIAGE RETURN
012256  105777  166330                  TSTB    @TCSR           ;WAIT FOR TTY
012262  100375                          BPL     .-4
012264  112777  000212  166322          MOVB    #212,   @TDBR   ;SEND LINE FEED
012272  000207                          RTS     %7              ;RETURN

                                ;DO 4 CRLF'S TO MOVE MESSAGES ON TELETYPE
012274  004737  012242          CRLF4:  JSR     %7,CRLF
012300  004737  012242                  JSR     %7,CRLF
012304  004737  012242                  JSR     %7,CRLF
012310  004737  012242                  JSR     %7,CRLF
012314  000207                          RTS     %7

012316  022737  000176  000616  CNTLUU: CMP     #SWREG,SWR
012324  001403                          BEQ     1$
012326  062716  000002                  ADD     #2,(SP)
012332  000504                          BR      OUT
012334  012702  016055          1$:     MOV     #SWREQ,R2
012340  004737  012152                  JSR     PC,TOUT
012344  013702  000176                  MOV     SWREG,R2
012350  004737  011734                  JSR     PC,PROCT
012354  012702  016040                  MOV     #NEWIS,R2
012360  004737  012152                  JSR     PC,TOUT
012364  005037  000622          AGN:    CLR     TMP1
012370  012737  000007  000630          MOV     #7,CSNT
```

```
012376  105777  166204          READ:   TSTB    @KBCSR
012402  100375                          BPL     READ
012404  117737  166200  000626          MOVB    @KBDBR,TIB
012412  113777  000626  166174          MOVB    TIB,@TDBR
012420  142737  000200  000626          BICB    #200,TIB
012426  122737  000025  000626          CMPB    #25,TIB
012434  001005                          BNE     2$
012436  012702  016176                  MOV     #CTLU,R2
012442  004737  012152                  JSR     PC,TOUT
012446  000746                          BR      AGN
012450  122737  000015  000626  2$:     CMPB    #15,TIB
012456  001430                          BEQ     1$
012460  122737  000060  000626          CMPB    #60,TIB
012466  003027                          BGT     INERRR
012470  122737  000067  000626          CMPB    #67,TIB
012476  002423                          BLT     INERRR
012500  142737  000060  000626          BICB    #60,TIB
012506  006337  000622                  ASL     TMP1
012512  006337  000622                  ASL     TMP1
012516  006337  000622                  ASL     TMP1
012522  153737  000626  000622          BISB    TIB,TMP1
012530  005337  000630                  DEC     CSNT
012534  001404                          BEQ     INERRR
012536  000717                          BR      READ
012540  004737  012242          1$:     JSR     %7,CRLF
012544  000002                  OUT:    RTI
012546  012702  016027          INERRR: MOV     #QEST,R2
012552  004737  012152                  JSR     PC,TOUT
012556  000702                          BR      AGN

                                ;ROUTINE TO CHECK EXISTANCE OF SWREG

012560  013746  000006          SUSWR:  MOV     6,-(SP)
012564  013746  000004                  MOV     4,-(SP)
012570  012737  012610  000004          MOV     #1$,4
012576  022777  177777  166012          CMP     #-1,@SWR
012604  001402                          BEQ     2$
012606  000407                          BR      3$
012610  022626                  1$:     CMP     (SP)+,(SP)+
012612  012737  000176  000616  2$:     MOV     #SWREG,SWR
012620  012737  000174  000620          MOV     #DISPREG,DISPLAY
012626  012637  000004          3$:     MOV     (SP)+,4
012632  012637  000006                  MOV     (SP)+,6
012636  000002                          RTI

012640  022737  000176  000616  KBINT:  CMP     #SWREG,SWR
012646  001016                          BNE     1$
012650  005037  000622                  CLR     TMP1
012654  117737  165730  000622          MOVB    @KBDBR,TMP1
012662  142737  000200  000622          BICB    #200,TMP1
012670  122737  000007  000622          CMPB    #7,TMP1
012676  001002                          BNE     1$
012700  104002                          CNTLU
012702  104006                          CKU
012704  000002                  1$:     RTI
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                                        ;TYPE THE MAIN TITLE
012706  005737  000624          TITTYP: TST     TIFLG
012712  001406                          BEQ     1$
012714  012702  016143                  MOV     #TITL,R2
012720  004737  012152                  JSR     %7,TOUT
012724  005037  000624                  CLR     TIFLG
012730  000002                  1$:     RTI

012732  122737  000007  000630  CKUU:   CMPB    #7,CSNT
012740  001403                          BEQ     1$
012742  013777  000622  165646          MOV     TMP1,@SWR
012750  000002                  1$:     RTI

012752  011646                  EMTSRV: MOV     (SP),-(SP)
012754  162716  000002                  SUB     #2,(SP)
012760  017616  000000                  MOV     @(SP),(SP)
012764  006316                          ASL     (SP)
012766  042716  177001                  BIC     #177001,(SP)
012772  062716  013004                  ADD     #EMTTAB,(SP)
012776  017616  000000                  MOV     @(SP),(SP)
013002  000136                          JMP     @(SP)+

013004  011574                  EMTTAB: PRINT                   ;CALLED BY EMT HLT
013006  012062                          SCOPEC                  ;CALLED BY EMT SCOPE
013010  012316                          CNTLUU                  ;CALLED BY EMT CNTLU
013012  012640                          KBINT                   ;CALLED BY EMT KBINTT
013014  012376                          READ                    ;CALLED BY EMT READC
013016  012560                          SUSWR                   ;CALLED BY EMT SUSWRR
013020  012732                          CKUU                    ;CALLED BY EMT CKU
013022  012706                          TITTYP                  ;CALLED BY EMT TIT
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                                        ;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
013024  004000                          ALPCD:  4000                    ;1      &       12
013026  000200                                  200
013030  004400                                  4400                    ;2      A       12 1
013032  000201                                  201
013034  004200                                  4200                    ;3      B       12 2
013036  000202                                  202
013040  004100                                  4100                    ;4      C       12 3
013042  000203                                  203
013044  004040                                  4040                    ;5      D       12 4
013046  000204                                  204
013050  004020                                  4020                    ;6      E       12 5
013052  000205                                  205
013054  004010                                  4010                    ;7      F       12 6
013056  000206                                  206
013060  004004                                  4004                    ;8      G       12 7
013062  000207                                  207
013064  004002                                  4002                    ;9      H       12 8
013066  000210                                  210
013070  004001                                  4001                    ;10     I       12 9
013072  000220                                  220
013074  004202                                  4202                    ;11     CENT    12 8 2
013076  000212                                  212
013100  004102                                  4102                    ;12     .       12 8 3
013102  000213                                  213
013104  004042                                  4042                    ;13     <       12 8 4
013106  000214                                  214
013110  004022                                  4022                    ;14     (       12 8 5
013112  000215                                  215
013114  004012                                  4012                    ;15     +       12 8 6
013116  000216                                  216
013120  004006                                  4006                    ;16     |       12 8 7
013122  000217                                  217
013124  002000                                  2000                    ;17     -       11
013126  000100                                  100
013130  002400                                  2400                    ;18     J       11 1
013132  000101                                  101
013134  002200                                  2200                    ;19     K       11 2
013136  000102                                  102
013140  002100                                  2100                    ;20     L       11 3
013142  000103                                  103
013144  002040                                  2040                    ;21     M       11 4
013146  000104                                  104
013150  002020                                  2020                    ;22     N       11 5
013152  000105                                  105
013154  002010                                  2010                    ;23     O       11 6
013156  000106                                  106
013160  002004                                  2004                    ;24     P       11 7
013162  000107                                  107
```

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 2559  013164  002002                    2002                ;25    Q       11 8
 2560  013166  000110                    110
 2561  013170  002001                    2001                ;26    R       11 9
 2562  013172  000120                    120
 2563  013174  002202                    2202                ;27    :       11 8 2
 2564  013176  000112                    112
 2565  013200  002102                    2102                ;28    $       11 8 3
 2566  013202  000113                    113
 2567  013204  002042                    2042                ;29    *       11 8 4
 2568  013206  000114                    114
 2569  013210  002022                    2022                ;30    )       11 8 5
 2570  013212  000115                    115
 2571  013214  002012                    2012                ;31    ;       11 8 6
 2572  013216  000116                    116
 2573  013220  002006                    2006                ;32    BLANK   11 8 7
 2574  013222  000117                    117
 2575  013224  001000                    1000                ;33    0       0
 2576  013226  000040                    40
 2577  013230  001400                    1400                ;34    /       0 1
 2578  013232  000041                    41
 2579  013234  001200                    1200                ;35    S       0 2
 2580  013236  000042                    42
 2581  013240  001100                    1100                ;36    T       0 3
 2582  013242  000043                    43
 2583  013244  001040                    1040                ;37    U       0 4
 2584  013246  000044                    44
 2585  013250  001020                    1020                ;38    V       0 5
 2586  013252  000045                    45
 2587  013254  001010                    1010                ;39    W       0 6
 2588  013256  000046                    46
 2589  013260  001004                    1004                ;40    X       0 7
 2590  013262  000047                    47
 2591  013264  001002                    1002                ;41    Y       0 8
 2592  013266  000050                    50
 2593  013270  001001                    1001                ;42    Z       0 9
 2594  013272  000060                    60
 2595  013274  001202                    1202                ;43            0 8 2
 2596  013276  000052                    52
 2597  013300  001102                    1102                ;44    ,       0 8 3
 2598  013302  000053                    53
 2599  013304  001042                    1042                ;45    %       0 8 4
 2600  013306  000054                    54
 2601  013310  001022                    1022                ;46    -       0 8 5
 2602  013312  000055                    55
 2603  013314  001012                    1012                ;47    >       0 8 6
 2604  013316  000056                    56
 2605  013320  001006                    1006                ;48    ?       0 8 7
 2606  013322  000057                    57
 2607  013324  000000                    0000                ;49            BLANK
 2608  013326  000000                    0
 2609  013330  000400                    0400                ;50    1       1
 2610  013332  000001                    1
 2611  013334  000200                    0200                ;51    2       2
 2612  013336  000002                    2
 2613  013340  000100                    0100                ;52    3       3
 2614  013342  000003                    3
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2615  013344  000040                    0040                ;53   4     4
2616  013346  000004                    4
2617  013350  000020                    0020                ;54   5     5
2618  013352  000005                    5
2619  013354  000010                    0010                ;55   6     6
2620  013356  000006                    6
2621  013360  000004                    0004                ;56   7     7
2622  013362  000007                    7
2623  013364  000002                    0002                ;57   8     8
2624  013366  000010                    10
2625  013370  000001                    0001                ;58   9     9
2626  013372  000020                    20
2627  013374  000202                    0202                ;59   :     8 2
2628  013376  000012                    12
2629  013400  000102                    0102                ;60   #     8 3
2630  013402  000013                    13
2631  013404  000042                    0042                ;61   A     8 4
2632  013406  000014                    14
2633  013410  000022                    0022                ;62   '     8 5
2634  013412  000015                    15
2635  013414  000012                    0012                ;63   =     8 6
2636  013416  000016                    16
2637  013420  000006                    0006                ;64   ''    8 7
2638  013422  000017                    17
2639  013424  004000                    4000                ;65   &     12
2640  013426  000200                    200
2641  013430  004400                    4400                ;66   A     12 1
2642  013432  000201                    201
2643  013434  004200                    4200                ;67   B     12 2
2644  013436  000202                    202
2645  013440  004100                    4100                ;68   C     12 3
2646  013442  000203                    203
2647  013444  004040                    4040                ;69   D     12 4
2648  013446  000204                    204
2649  013450  004020                    4020                ;70   E     12 5
2650  013452  000205                    205
2651  013454  004010                    4010                ;71   F     12 6
2652  013456  000206                    206
2653  013460  004004                    4004                ;72   G     12 7
2654  013462  000207                    207
2655  013464  004002                    4002                ;73   H     12 8
2656  013466  000210                    210
2657  013470  004001                    4001                ;74   I     12 9
2658  013472  000220                    220
2659  013474  004202                    4202                ;75   CENT  12 8 2
2660  013476  000212                    212
2661  013500  004102                    4102                ;76   .     12 8 3
2662  013502  000213                    213
2663  013504  004042                    4042                ;77   <     12 8 4
2664  013506  000214                    214
2665  013510  004022                    4022                ;78   (     12 8 5
2666  013512  000215                    215
2667  013514  004012                    4012                ;79   +     12 8 6
2668  013516  000216                    216
2669  013520  004006                    4006                ;80   1     12 8 7
2670  013522  000217          ALPEND:   217
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                                        ;BINARY DECK DATA TABLE
                                        ;FIRST VALUE FOR A COLUMN IS THE DIRECT CARD IMAGE OF THAT COLUMN ON CARD1
                                        ;THE SECOND VALUE IS THE ENCODED VALUE, WHICH ORS THE OCTAL REPRESENTATION OF
                                        ;ROWS ONE THRU SEVEN
013524  000000                          BINCD:  0                       ;CARD COLUMN 1
013526  000000                                  0
013530  000001                                  1                       ;2
013532  000020                                  20
013534  000002                                  2                       ;3
013536  000010                                  10
013540  000004                                  4                       ;4
013542  000007                                  7
013544  000010                                  10                      ;5
013546  000006                                  6
013550  000020                                  20                      ;6
013552  000005                                  5
013554  000040                                  40                      ;7
013556  000004                                  4
013560  000100                                  100                     ;8
013562  000003                                  3
013564  000200                                  200                     ;9
013566  000002                                  2
013570  000400                                  400                     ;10
013572  000001                                  1
013574  001000                                  1000                    ;11
013576  000040                                  40
013600  002000                                  2000                    ;12
013602  000100                                  100
013604  004000                                  4000                    ;13
013606  000200                                  200
013610  001111                                  1111                    ;14
013612  000067                                  67
013614  002222                                  2222                    ;15
013616  000117                                  117
013620  003333                                  3333                    ;16
013622  000177                                  177
013624  004444                                  4444                    ;17
013626  000207                                  207
013630  005555                                  5555                    ;18
013632  000267                                  267
013634  006666                                  6666                    ;19
013636  000317                                  317
013640  007777                                  7777                    ;20
013642  000377                                  377
013644  001010                                  1010                    ;21
013646  000046                                  46
013650  001212                                  1212                    ;22
013652  000056                                  56
013654  001313                                  1313                    ;23
013656  000077                                  77
013660  001414                                  1414                    ;24
013662  000047                                  47
013664  001515                                  1515                    ;25
013666  000067                                  67
013670  001616                                  1616                    ;26
013672  000057                                  57
```

```
2727  013674  001717                    1717            ;27
2728  013676  000077                    77
2729  013700  002020                    2020            ;28
2730  013702  000105                    105
2731  013704  002121                    2121            ;29
2732  013706  000127                    127
2733  013710  002323                    2323            ;30
2734  013712  000137                    137
2735  013714  002424                    2424            ;31
2736  013716  000107                    107
2737  013720  002525                    2525            ;32
2738  013722  000127                    127
2739  013724  002626                    2626            ;33
2740  013726  000117                    117
2741  013730  002727                    2727            ;34
2742  013732  000137                    137
2743  013734  003030                    3030            ;35
2744  013736  000147                    147
2745  013740  003131                    3131            ;36
2746  013742  000167                    167
2747  013744  003232                    3232            ;37
2748  013746  000157                    157
2749  013750  003434                    3434            ;38
2750  013752  000147                    147
2751  013754  003535                    3535            ;39
2752  013756  000167                    167
2753  013760  003636                    3636            ;40
2754  013762  000157                    157
2755  013764  003737                    3737            ;41
2756  013766  000177                    177
2757  013770  004040                    4040            ;42
2758  013772  000204                    204
2759  013774  004141                    4141            ;43
2760  013776  000227                    227
2761  014000  004242                    4242            ;44
2762  014002  000216                    216
2763  014004  004343                    4343            ;45
2764  014006  000237                    237
2765  014010  004545                    4545            ;46
2766  014012  000227                    227
2767  014014  004646                    4646            ;47
2768  014016  000217                    217
2769  014020  004747                    4747            ;48
2770  014022  000237                    237
2771  014024  005050                    5050            ;49
2772  014026  000246                    246
2773  014030  005151                    5151            ;50
2774  014032  000267                    267
2775  014034  005252                    5252            ;51
2776  014036  000256                    256
2777  014040  005353                    5353            ;52
2778  014042  000277                    277
2779  014044  005454                    5454            ;53
2780  014046  000247                    247
2781  014050  005656                    5656            ;54
2782  014052  000257                    257
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```
014054  005757                          5757                    ;55
014056  000277                          277
014060  006060                          6060                    ;56
014062  000305                          305
014064  006161                          6161                    ;57
014066  000327                          327
014070  006262                          6262                    ;58
014072  000317                          317
014074  006363                          6363                    ;59
014076  000337                          337
014100  006464                          6464                    ;60
014102  000307                          307
014104  006565                          6565                    ;61
014106  000327                          327
014110  006767                          6767                    ;62
014112  000337                          337
014114  007070                          7070                    ;63
014116  000347                          347
014120  007171                          7171                    ;64
014122  000367                          367
014124  007272                          7272                    ;65
014126  000357                          357
014130  007373                          7373                    ;66
014132  000377                          377
014134  007474                          7474                    ;67
014136  000347                          347
014140  007575                          7575                    ;68
014142  000367                          367
014144  007676                          7676                    ;69
014146  000357                          357
014150  000101                          0101                    ;70
014152  000023                          23
014154  000202                          0202                    ;71
014156  000012                          12
014160  000303                          0303                    ;72
014162  000033                          33
014164  000404                          0404                    ;73
014166  000007                          7
014170  000505                          0505                    ;74
014172  000027                          27
014174  000606                          0606                    ;75
014176  000017                          17
014200  000707                          0707                    ;76
014202  000037                          37
014204  003210                          3210                    ;77
014206  000146                          146
014210  000123                          0123                    ;78
014212  000037                          37
014214  007654                          7654                    ;79
014216  000347                          347
014220  004567                          4567                    ;80
014222  000237                  BINEND: 237
014224  040057  051120  051505  MSG1:   .ASCII ;/@PRESS CARD READER 'MOTOR START' AND 'READ START'/;
014232  020123  040503  042122
014240  051040  040505  042504
014246  020122  046447  052117
```

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014254  051117  051440  040524
014262  052122  020047  047101
014270  020104  051047  040505
014276  020104  052123  051101
014304  023524     057
014307     057  050100  042522  MSG1A:  .ASCII  ;/@PRESS CARD READER 'RESET'/;
014314  051523  041440  051101
014322  020104  042522  042101
014330  051105  023440  042522
014336  042523  023524     057
014343     057  052100  042510  MSG2:   .ASCII  ;/@THEN HIT 'CONTINUE' ON THE CONSOLE/;
014350  020116  044510  020124
014356  041447  047117  044524
014364  052516  023505  047440
014372  020116  044124  020105
014400  047503  051516  046117
014406  027505
014410  040057  051120  051505  MSG3:   .ASCII  ;/@PRESS CARD READER 'READ STOP'/;
014416  020123  040503  042122
014424  051040  040505  042504
014432  020122  051047  040505
014440  020104  052123  050117
014446  027447
014450  040057  051120  051505  MSG3A:  .ASCII  ;/@PRESS CARD READER 'STOP'/;
014456  020123  040503  042122
014464  051040  040505  042504
014472  020122  051447  047524
014500  023520     057
014503     057  052100  042510  MSG4:   .ASCII  ;/@THE INTERRUPT LEVEL WAS /;
014510  044440  052116  051105
014516  052522  052120  046040
014524  053105  046105  053440
014532  051501  027440
014536  040057  042522  047515  MSG5:   .ASCII  ;/@REMOVE ALL CARDS FROM THE INPUT HOPPER/;
014544  042526  040440  046114
014552  041440  051101  051504
014560  043040  047522  020115
014566  044124  020105  047111
014574  052520  020124  047510
014602  050120  051105     057
014607     057  051100  051505  MSG6:   .ASCII  ;/@RESTORE CARDS IN THE INPUT HOPPER/;
014614  047524  042522  041440
014622  051101  051504  044440
014630  020116  044124  020105
014636  047111  052520  020124
014644  047510  050120  051105
014652     057
014653     057  051100  044501  MSG7:   .ASCII  ;/@RAISE OUTPUT STACKER PRESSURE ARM SLIGHTLY ABOVE HORIZONTAL @ THEN LO
014660  042523  047440  052125
014666  052520  020124  052123
014674  041501  042513  020122
014702  051120  051505  052523
014710  042522  040440  046522
014716  051440  044514  044107
014724  046124  020131  041101
014732  053117  020105  047510
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014740  044522  047532  052116
014746  046101  040040  052040
014754  042510  020116  047514
014762  042527  020122  052111
014770     057
014771     057  046100  053517  MSG7A:  .ASCII  ;/@LOWER OUTPUT STACKER PLATE TO BOTTOM/;
014776  051105  047440  052125
015004  052520  020124  052123
015012  041501  042513  020122
015020  046120  052101  020105
015026  047524  041040  052117
015034  047524  027515
015040  040057  047510  042114  MSG8:   .ASCII  ;/@HOLD DOWN THE SWITCH AT THE BOTTOM OF THE INPUT HOPPER/;
015046  042040  053517  020116
015054  044124  020105  053523
015062  052111  044103  040440
015070  020124  044124  020105
015076  047502  052124  046517
015104  047440  020106  044124
015112  020105  047111  052520
015120  020124  047510  050120
015126  051105     057
015131     057  046100  043111  MSG8A:  .ASCII  ;/@LIFT SWITCH UNDER RIFFLE CAP/;
015136  020124  053523  052111
015144  044103  052440  042116
015152  051105  051040  043111
015160  046106  020105  040503
015166  027520
015170  040057  046102  041517  MSG9:   .ASCII  ;/@BLOCK THE CARD READER STATION TO PREVENT A CARD GOING THRU, AND/;
015176  020113  044124  020105
015204  040503  042122  051040
015212  040505  042504  020122
015220  052123  052101  047511
015226  020116  047524  050040
015234  042522  042526  052116
015242  040440  041440  051101
015250  020104  047507  047111
015256  020107  044124  052522
015264  020054  047101  027504
015272  040057  042522  047515  MSG10:  .ASCII  ;/@REMOVE JAMMED CARD/;
015300  042526  045040  046501
015306  042515  020104  040503
015314  042122     057
015317     057  044100  046117  MSG11:  .ASCII  ;/@HOLD THE OUTPUT STACKER GATE OPEN. THEN/;
015324  020104  044124  020105
015332  052517  050124  052125
015340  051440  040524  045503
015346  051105  043440  052101
015354  020105  050117  047105
015362  020056  044124  047105
015370     057
015371     057  050100  040514  MSG12:  .ASC'   ;/@PLACE SPECIAL DARK-LIGHT CHECK CARDS (SEE LISTING, TESTG);
015376  042503  051440  042520
015404  044503  046101  042040
015412  051101  026513  044514
015420  044107  020124  044103
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015426  041505  020113  040503
015434  042122  020123  051450
015442  042505  046040  051511
015450  044524  043516  020054
015456  042524  052123  024507
015464  040500  020124  044124          .ASCII  ;@AT THE BOTTOM OF THE INPUT STACK/;
015472  020105  047502  052124
015500  046517  047440  020106
015506  044124  020105  047111
015514  052520  020124  052123
015522  041501  027513
015526  040057  042504  045503  MSG13:  .ASCII  ;/@DECK    CARD  COLUMN PATTERN READ1 READ2  CODED  READ/;
015534  020040  020040  040503
015542  042122  020040  047503
015550  052514  047115  050040
015556  052101  042524  047122
015564  051040  040505  030504
015572  051040  040505  031104
015600  020040  047503  042504
015606  020104  051040  040505
015614  027504
015616  040057  046101  044120  MSG14:  .ASCII  ;/@ALPHA /;
015624  020101     057
015627     057  041100  047111  MSG15:  .ASCII  ;/@BINARY/;
015634  051101  027531
015640  040057  044502  020124  MSG16:  .ASCII  ;/@BIT 15 WAS SET/;
015646  032461  053440  051501
015654  051440  052105     057
015661     057  051100  046505  MSG17:  .ASCII  ;/@REMEDY THE ERROR CONDITION AND PRESS 'CONTINUE'@/;
015666  042105  020131  044124
015674  020105  051105  047522
015702  020122  047503  042116
015710  052111  047511  020116
015716  047101  020104  051120
015724  051505  020123  041447
015732  047117  044524  052516
015740  023505  027500
015744  040057  044502  020124  MSG18:  .ASCII  ;/@BIT 8 WAS SET/;
015752  020070  040527  020123
015760  042523  027524
015764  040057  047503  052514  MSG19:  .ASCII  ;/@COLUMN READ1 READ2  CARDS ERRORS/;
015772  047115  051040  040505
016000  030504  051040  040505
016006  031104  020040  040503
016014  042122  020123  051105
016022  047522  051522     057
016027     057  037500  020100  QEST:   .ASCII  ;/@?@  = /;
016034  036440  027440
016040  020057  020040  020040  NEWIS:  .ASCII  ;/     NEW = /;
016046  042516  020127  020075
016054     057
016055     057  051500  051127  SWREQ:  .ASCII  ;/@SWR = /;
016062  036440  027440
016066  040057  040503  042122  CIMPAT: .ASCII  ;/@CARD IMAGE PATTERN= /;
016074  044440  040515  042507
016102  050040  052101  042524
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016110  047122  020075     057
016115     057  051500  040524  STADD:  .ASCII  ;/@STARTING ADDRESS = /;
016122  052122  047111  020107
016130  042101  051104  051505
016136  020123  020075     057
016143     057  040100  055103  TITL:   .ASCII ;/@@CZCRACO CR11 DIAG TSTS /;
016150  051103  041501  020060
016156  051103  030461  042040
016164  040511  020107  051524
016172  051524  027440
016176  057057  040125  020075  CTLU:   .ASCII  ;/^U@= /;
016204     057
016205     057  044500  051516  SUBT1:  .ASCII  ;/@INSTR + DATA TEST/;
016212  051124  025440  042040
016220  052101  020101  042524
016226  052123     057
016231     057  041500  030522  SUBT2:  .ASCII  ;/@CR11 ERROR FUNCTION TEST/;
016236  020061  051105  047522
016244  020122  052506  041516
016252  044524  047117  052040
016260  051505  027524
016264  040057  044523  043516  SUBT4:  .ASCII  ;/@SINGLE TEST LOOP/;
016272  042514  052040  051505
016300  020124  047514  050117
016306     057
016307     057  051500  047111  SUBT5:  .ASCII  ;/@SINGLE DATA PATTERN TEST/;
016314  046107  020105  040504
016322  040524  050040  052101
016330  042524  047122  052040
016336  051505  027524
        000001                          .END
```

```
AGN      012364    2413#  2424   2443
ALCNT    006714    1768   1771#
ALCNT1   006776    1772   1791#
ALCNT2   007010    1790   1798#
ALLDON   006662    1632   1655   1699   1762#
ALLOK    007036    1802   1805#
ALPCD    013024    1572   2511#
ALPEND   013522    1573   2670#
ALP1     005516    1567   1572#
ALWAIT   007072    1804   1814#
BEGIN    000726     619    671#
BELL     011462    1548   1713   1762   1823   2068   2096   2175   2248#
BINCD    013524    1568   2675#
BINEND   014222    1569   2834#
B.CK     011706    2286   2303#
CARDIM   011432    2153*  2154*  2193   2195   2231#
CDCNT    006646    1558*  1564*  1628   1653   1667   1695   1708   1735*  1736*  1737   1738*  1739*  1742*
                   1756#
CIMPAT   016066    2150   3004#
CKBIT8   011506     690    719    750   1530   1541   1656   2237   2256#  2264
CKCOL    011172    2165   2183#
CKCRD    011156    2167   2179#
CKDONE   011416    2223   2226#  2227
CKFAIL   011250    2194   2196   2198#
CKHLT    011404    2201   2222#
CKLOOP   011070    2158#  2173   2178   2180   2182   2188   2225   2228
CKLP1    011112    2164#  2169   2197
CKLP2    011216    2190#  2191
CKNOHD   011310    2203   2207#
CKSAME   011014     630   2147#
CKSIT    011142    2161   2171   2175#
CKSIT1   011146    2176#  2177
CKU    = 104006     587#   662    678   1563   2468
CKUU     012732    2479#  2499
CK4      001370     781    786   788#
CK5      001534     822    835#
CK9      002352    1008   1013#
CLCNT    006650    1598*  1630   1670   1705   1743*  1757#  2158*  2179   2184*  2208
CNTLU  = 104002     583#   661    677   1562   2467
CNTLUU   012316    2403#  2495
CNT23A   005110    1458   1461#
CNT23B   005126    1465   1468#
CNT23C   005146    1472   1475#
CNT23D   005164    1479   1482#
CNT23E   005204    1486   1489#
CNT23F   005224    1493   1496#
CNT23G   005250    1501   1505#
CNT24A   005316    1521   1524#  1527
CNT24B   005346    1529   1532#
CONTD    005540    1571   1575#
CONTG    010476    2067   2072#
CONT10   002514    1036   1048#
CONT11   002616    1064   1070#
CONT2    001226     738    742#
CONT21   004744    1420   1424#
CONT22   005050    1442   1445#
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CONT4	001410	791	795#											
CONT8	002242	981#	990											
CRB2	000640	650#	979	985	1484*	1491*	1498	1507	1605					
CRLF	012242	2207	2290	2379	2388#	2397	2398	2399	2400	2439				
CRLF4	012274	1856	1871	1883	1900	1915	1930	1953	1982	2002	2018	2035	2052	2084
		2105	2397#											
CSNT	000630	646#	2414*	2436*	2479									
CTLU	016176	2422	3017#											
C.CONT	012024	2330	2334#											
C.WAIT	011770	2325#	2326	2346										
DATENC	006656	1605*	1617	1687	1760#									
DATST	005426	1547	1558#											
DATST1	005436	1560#	1732											
DATST2	005456	1559	1565#											
DAT1	006652	1599*	1611	1678	1758#	2183*	2193	2211						
DAT2	006654	1609*	1614	1681	1759#	2192*	2195	2214						
DBRCKR	002232	961	979#											
DCNT1	005574	1578	1582#											
DECK	006640	1570*	1574*	1664	1753#									
DECKCK	006514	1723	1728#	1770	1836									
DISPLA	000620	642#	2455*											
DISPRE	000174	613#	2455											
DONE3	001314	758	765#											
DONE7	002030	913	921	924#										
D.1	012120	2350	2356#											
D.2	012132	2352	2354	2359#										
EMTSRV	012752	603	2484#											
EMTTAB	013004	2489	2493#											
END	006476	1715	1721#											
ENDCK	005400	1531	1533	1540	1545#									
END24	005360	1523	1537#	1538										
ERCM11	007206	623	1840#											
ERCR11	007200	621	1838#											
ERFLG	000650	655#	1565*	1659	1661*	2157*	2202	2204*						
ERR6	001726	871	891#											
ERSET	006000	1594	1626#	1700										
ER1	006034	1629	1631	1633#										
FAIL	006062	1612	1615	1618	1639#									
FAILC	006122	1645	1648#	1652										
FAILCN	006170	1643	1659#											
FAILC1	006406	1696	1700#											
FLAG	000632	647#	1838*	1840*	1850	1865	1894	1909	1924	1944	1949	1976	1986	2078
		2099												
HLT	104000	581#	702	708	714	725	739	745	755	763	767	790	794	797
		800	803	806	810	825	833	837	843	847	851	855	876	884
		889	893	895	910	922	926	931	936	941	949	964	969	977
		983	987	1011	1017	1019	1035	1039	1043	1046	1063	1068	1083	1116
		1122	1137	1159	1170	1192	1198	1213	1235	1241	1256	1278	1284	1299
		1321	1327	1342	1364	1370	1385	1400	1421	1444	1459	1466	1473	1480
		1487	1494	1502	1510	1522	1532	1536	1603	1707	1749	1751	1765	1782
		1789	1797	1803	1811	1821	1827	1830	1834	1860	1863	1887	1890	1919
		1922	1969	1972	2011	2047	2093	2172	2181	2187	2244			
INERRR	012546	2428	2430	2437	2441#									
INIT	011434	774	816	860	903	954	998	1025	1053	1075	1098	1143	1174	1217
		1260	1303	1346	1389	1410	1429	1452	1515	1582	1848	1878	1907	1938
		1957	1993	2026	2072	2237#								

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INTFLG  000602    635#   667*   1111   1113   1127   1129*  1135   1164   1166*  1168   1187   1189   1203
                  1105*  1211   1230   1232   1246   1248*  1254   1273   1275   1289   1291*  1297   1316
                  1318   1332   1334*  1340   1359   1361   1375   1377*  1383
INTVC   000604    636#   666
ITCNT   012146    2128*  2131*  2353   2355*  2359*  2363#
ITMAX   012144    663*   1847*  2251*  2353   2362#
KBCSR   000606    637#   2415
KBDBR   000610    638#   2417   2463
KBINT   012640    2460#  2496
KBINTT= 104003    584#   1627   1689   2159   2199   2283   2303   2348
KCRB1   000636    649#   665
KCRS    000634    648#   664
LASTCD  006450    1698   1709   1712#
LASTCK  006432    1604   1638   1647   1650   1694   1708#  1750   1752
LOGIC   006466    607    1717#
LOOPF   010364    2040#  2044
LOOPG   010516    2077#  2095
LOOP3   001266    754    757#   760
LOOP4   001336    777#   779    784
LOOP4B  001354    783#   787
LOOP5   001466    819#   828    834
LOOP6   001624    863#   867
LOOP7   001756    906#   907    917
LOOP8   002150    958#   976
L.CNT   012210    2372   2377#
L.EOMK  012240    2369*  2371   2385#
L.INC   012164    2370#  2380
L.TOUT  012166    2371#  2384
MSG1    014224    1864   1893   1923   1948   1975   2000   2014   2033   2048   2077   2098   2835#
MSG1A   014307    1867   1896   1926   1951   1978   2080   2101   2844#
MSG10   015272    2012   2934#
MSG11   015317    2031   2938#
MSG12   015371    2075   2946#
MSG13   015526    1662   2962#
MSG14   015616    1574   2972#
MSG15   015627    1570   2974#
MSG16   015640    1633   2976#
MSG17   015661    1635   2261   2979#
MSG18   015744    2259   2988#
MSG19   015764    2205   2991#
MSG2    014343    1854   1869   1881   1898   1913   1928   1941   1980   1996   2016   2029   2050   2082
                  2103   2849#
MSG3    014410    1849   1994   2027   2856#
MSG3A   014450    1852   2862#
MSG4    014503    1130   1206   1249   1292   1335   1378   2867#
MSG5    014536    1879   1939   2872#
MSG6    014607    1891   1973   2879#
MSG7    014653    1908   2886#
MSG7A   014771    1911   2900#
MSG8    015040    1943   2907#
MSG8A   015131    1946   2917#
MSG9    015170    1998   2923#
NEWIS   016040    2411   2999#
NOHD    006212    1660   1664#
NOP   = 000240    580#
NOTCD   006610    1704   1746#
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NOTCD1  006632          1748    1751#
NOTCOL  006412          1597    1703#
NOTRP   000764           681#    684
NOTRP1  005546          1577#   1580
NXCRD   006540          1587    1657    1710    1734#
OFF6    001714           873     880     887#
OUT     012544          2406    2440#
PRINT   011574          2283#   2493
PROC    000646           653#    691*    698     720*    736     955*    991     999*    1020
PROCT   011734          1133    1209    1252    1295    1338    1381    1668    1671    1676    1679    1682    1685    1688
                        2209    2212    2215    2218    2221    2293    2298    2314#   2410
PSR   = 177776           579#    669*    681*    685*    691     692*    698*    720     721*    736*    955     956*    991*
                         999    1000*   1020*   1027*   1028    1029*   1033*   1055*   1056    1057*   1061*   1077*   1078
                        1100*   1101    1102*   1103*   1107*   1145*   1146    1147*   1148*   1152*   1176*   1177    1178*
                        1179*   1183*   1219*   1220    1221*   1222*   1226*   1262*   1263    1264*   1265*   1269*   1305*
                        1306    1307*   1308*   1312*   1348*   1349    1350*   1351*   1355*   1391*   1392    1396*   1398*
                        1412*   1413    1414*   1418*   1431*   1432    1433*   1439*   1441*   1577*   1581*   1585*   1586
                        1602*   1626*   1639*   1746*   1798*   1799    1806*   1809*   1817*   1820*   2125*   2127*   2357*
PTOFF   006660          1610*   1613*   1616*   1673    1761#
QEST    016027          2441    2997#
READ    012376          2415#   2416    2438    2497
READC = 104004           585#   2120    2152
RESTRT  000742           675#   1550    1731
REST8   002270           984     988     991#
REST9   002374          1012    1014    1018    1020#
RETRNX  011012          2121*   2122*   2130    2132    2133#
RETURN  012150           688*   1844*   2070*   2109*   2129*   2358    2360*   2364#
SAVPC   011730          2287*   2292    2311#
SAVPSR  011732          2288*   2297    2312#
SAVR2   011722          2291*   2299    2308#
SAVR3   011724          2309#   2314*   2331
SAVR4   011726          2310#   2315*   2332
SCONT1  005700          1601    1605#
SCOPE = 104001           582#    689     716     747     769     813     857     897     952     994     1023    1051    1073
                        1097    1142    1173    1216    1259    1302    1345    1388    1408    1427    1449    1512    1545
                        1846    1877    1906    1937    1992    2025    2065
SCOPEC  012062          2348#   2494
SETUP   000652           659#    673    1843    2117    2149
SET1    004542          1376    1383#
SET14   003260          1165    1168#
SET2    004330          1333    1340#
SET3    004116          1290    1297#
SET4    003704          1247    1254#
SET5    003472          1204    1211#
SET7    003106          1128    1135#
SPACE   011542          1666    1669    1672    1677    1680    1683    1686    2210    2213    2216    2219    2270#   2274
SPACEX  011572          2273*   2275*   2277#
SRVC    005634          1584    1593#
SRVC1   007070          1805    1813#
SRVC2   007132          1815    1823#
SRVC2A  007140          1822    1825#
STACK   000600           618     620     622     626     629     634#
STADD   016115          2118    3008#
SUBT1   016205           672    3019#
SUBT2   016231          1842    3023#
SUBT4   016264          2116    3028#
```

```
SUBT5   016307          2148    3032#
SUSWR   012560          2447#   2498
SUSWRR= 104005           586#    660
SWR     000616           641#    675     683    1546    1560    1566    1579    1642    1644    1690    1721    1729    1767
                        1771    2066    2123    2200    2222    2284    2304    2349    2351    2403    2450    2454*   2460
                        2481*
SWREG   000176           614#    675    1560    2403    2409    2454    2460
SWREQ   016055          2407    3002#
TCSR    000612           639#   2248    2270    2294    2300    2325    2368*   2373    2381    2388    2391
TDBR    000614           640#   2250*   2272*   2296*   2302*   2327*   2375*   2383*   2390*   2393*   2418*
TEND    006644          1569*   1573*   1619    1755#
TEST    001012           674     682    688#
TESTA   007234          1844    1846#   2070    2071    2109    2110
TESTB   007372          1877#
TESTC   007522          1906#
TESTD   007654          1937#
TESTE   010130          1992#
TESTF   010276          2025#
TESTG   010444          1988    2065#
TESTX   010676           627    2115#
TEST1   001020           689#   2364
TEST1A  001022           688     690#
TEST10  002402          1023#
TEST11  002524          1051#
TEST12  002626          1073#
TEST13  002706          1097#
TEST14  003120          1112    1114    1119    1134    1136    1142#
TEST15  003272          1156    1167    1169    1173#
TEST16  003504          1188    1190    1195    1210    1212    1216#
TEST17  003716          1231    1233    1238    1253    1255    1259#
TEST18  004130          1274    1276    1281    1296    1298    1302#
TEST19  004342          1317    1319    1324    1339    1341    1345#
TEST2   001116           709     716#
TEST20  004554          1360    1362    1367    1382    1384    1388#
TEST21  004660          1408#
TEST22  004754          1427#
TEST23  005062          1449#
TEST24  005266          1460    1467    1474    1481    1488    1495    1503    1509    1512#
TEST3   001242           740     747#
TEST4   001324           756     762     764     766     769#
TEST5   001454           813#
TEST6   001610           826     840    857#
TEST7   001742           883     886     888     890     894    897#
TEST8   002126           911     923     927     937     942     946    952#
TEST9   002276           965     970     978    994#
TIB     000626           645#   2417*   2418    2419*   2420    2425    2427    2429    2431*   2435
TIFLG   000624           644#   2472    2476*
TIM24   005352          1525    1534#
TINT10  002464          1026    1037#
TINT11  002604          1054    1065#
TINT12  002670          1076    1083#
TINT13  003024          1099    1120#
TINT14  003216          1144    1157#
TINT15  003410          1175    1196#
TINT16  003622          1218    1239#
TINT17  004034          1261    1282#
```

TINT18	004246	1304	1325#											
TINT19	004460	1347	1368#											
TINT20	004634	1390	1400#											
TIT =	104007	588#	671	1841	2115	2147								
TITL	016143	2474	3012#											
TITTYP	012706	2472#	2500											
TMP1	000622	643#	2121	2153	2413*	2432*	2433*	2434*	2435*	2462*	2463*	2464*	2465	2481
TNINT	004736	1411	1421#											
TOTCRD	011430	2155*	2163*	2217	2230#									
TOTERR	011426	2156*	2198*	2220	2229#									
TOUT	012152	659	1131	1207	1250	1293	1336	1379	1634	1636	1663	1665	1853	1855
		1868	1870	1880	1882	1892	1897	1899	1912	1914	1927	1929	1940	1942
		1947	1952	1974	1979	1981	1995	1997	1999	2001	2013	2015	2017	2028
		2030	2032	2034	2049	2051	2076	2081	2083	2102	2104	2119	2151	2206
		2260	2262	2368#	2408	2412	2423	2442	2475					
TRAPX	000774	680	683#											
TRFLG	000644	652#	668*	679	1549*	1575	1728*							
TRP1	005556	1576	1579#											
TRTRAP	000642	600	651#											
TSTA	007214	1839	1841#											
TSTART	006642	1568*	1572*	1621	1734	1754#								
T2INT	005020	1430	1437#											
T2INTA	005044	1438	1443#											
WAIT9	002334	1007#	1010											
XLOOP	011002	2129	2131#											
. =	016342	598	599#	602#	606#	612#	617#	625#	633#	695	697	701	707	713
		724	727	729	731	733	735	744	789	793	796	799	801	802
		805	809	820	824	832	836	842	846	850	854	864	869	875
		878	892	909	915	919	925	930	933	935	940	944	948	959
		963	968	974	982	986	1003	1016	1032	1038	1042	1045	1060	1067
		1081	1082	1106	1121	1151	1158	1182	1197	1225	1240	1268	1283	1311
		1326	1354	1369	1395	1399	1405	1417	1436	1455	1462	1469	1476	1483
		1490	1497	1506	1518	1535	1590	1596	1608	1620	1649	1654	1691	1706
		1722	1730	1764	1774*	1775	1777	1779	1781	1788	1796	1812	1819	1826
		1829	1833	1851	1859	1862	1866	1874	1886	1889	1895	1903	1910	1918
		1921	1925	1933	1945	1950	1956	1960	1962	1964	1966	1968	1971	1977
		1985	1987	2005	2008	2010	2021	2038	2042	2046	2055	2079	2087	2090
		2092	2100	2108	2124	2126	2186	2239	2243	2249	2257	2271	2285	2295
		2301	2305	2320	2336	2374	2378	2382	2389	2392				

```
COMMEN      1#
ENDCOM      1#
ESCAPE      1#
INT      1095#   1096    1172    1215    1258    1301    1344
MULT        1#
NEWTST      1#
POP         1#
PUSH        1#
SETUP       1#
SKIP        1#
SLASH       1#
STARS       1#
TYPBIN      1#
TYPDEC      1#
TYPNAM      1#
TYPNUM      1#
TYPOCS      1#
TYPOCT      1#
TYPTXT      1#
$$ESCA      1#
$$NEWT      1#
$$SKIP      1#
.EQUAT      1#
.HEADE      1#
.KT11       1#
.SETUP      1#
.SWRHI      1#
.$ACT1      1#
.$CATC      1#
.$CMTA      1#
.$DB2D      1#
.$DB2O      1#
.$DIV       1#
.$EOP       1#
.$ERRO      1#
.$ERRT      1#
.$MULT      1#
.$POWE      1#
.$RAND      1#
.$RDDE      1#
.$RDOC      1#
.$READ      1#
.$SAVE      1#
.$SB2D      1#
.$SB2O      1#
.$SCOP      1#
.$SIZE      1#
.$SUPR      1#
.$TRAP      1#
.$TYPB      1#
.$TYPD      1#
.$TYPE      1#
.$TYPO      1#
.1170       1#
```

```
. ABS.  016342     000


 ERRORS DETECTED:  0

 CZCRAC.BIN,CZCRAC.LST/CRF/SOL/NL:TOC=CZCRAC.SML,CZCRAC.P11
 RUN-TIME: 25 36 2 SECONDS
 RUN-TIME RATIO: 302/64=4.6
 CORE USED:  25K  (49 PAGES)
```