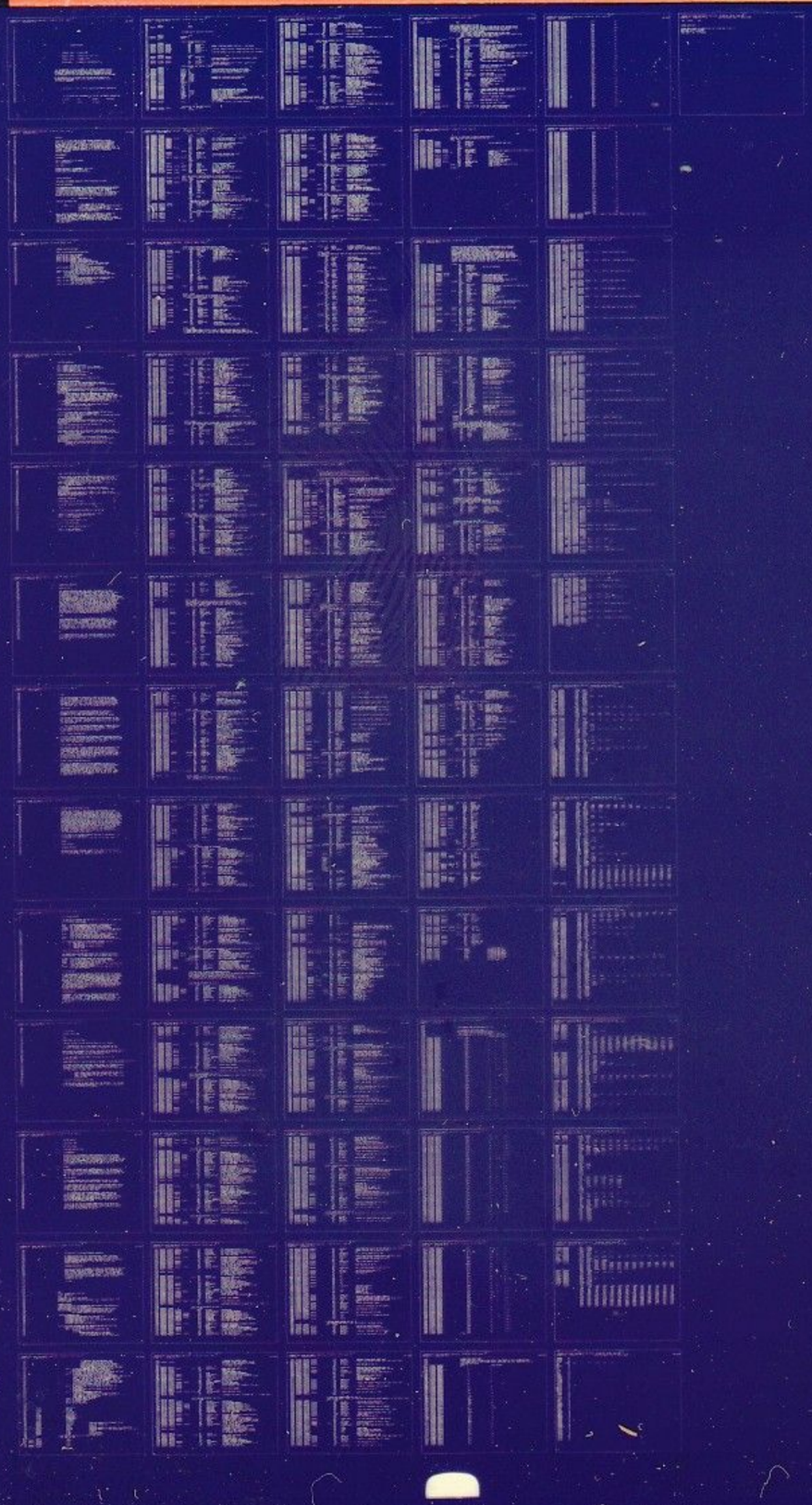
CR11

CR11 DIAG TSTS
CZCRACO

AH-8413C-MC
FICHE 1 OF 1



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IDENTIFICATION

PRODUCT CODE: AC-8412C-MC
PRODUCT NAME: CZCRACO CR11 DIAG TSTS
PRODUCT DATE: OCTOBER, 1979
MAINTAINER: DIAGNOSTIC ENGINEERING

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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108
109                          4.1     CONTROL SWITCH SETTINGS
110
111                                  BASIC SWITCH REGISTER SETTINGS ARE:
112
113                                  SW15=1 OR UP---HALT ON ERROR
114                                  SW14=1 OR UP---SCOPE LOOP
115                                  SW13=1 OR UP---INHIBIT PRINT OUT
116                                  SW12=1 OR UP---INHIBIT TRACE TRAPPING
117                                  SW11=1 OR UP---INHIBIT SUB-PROGRAM ITERATION
118                                                 (NOTE THAT IF SW11 IS SET, THE CARD COUNT
119                                                 WILL BE ALTERED, CAUSING FAILURES IN THE
120                                                 DATA TEST SECTION.)
121                                  SW10=1 OR UP---CR11 CONTROLLER USES THE M829 MODULE
122                                                 (IF DOWN, ASSUMES THE M8290 MODULE)
123                                  SW07=1 OR UP---LOOP THRU THE INSTRUCTION TEST PORTION
124                                  NOTE:   DATA ERRORS MAY OCCUR IF SW7 IS SET, THEN CLEARED.
125                                          ALSO THE TEST MAY HANG WHEN THE INPUT HOPPER GOES EMPTY
126                                          IF SW7 WAS SET.
127                                  SW06=1 OR UP---RETURN TO THE BEGINNING OF THE INSTRUCTION TEST
128                                                 WHEN CONTINUING FROM ONE DECK TO ANOTHER
129                                  SW05=1 OR UP---HALT BETWEEN TEST DECKS
130                                                 (SEE 5.2.1 FOR EXPLANATION OF SW5=0)
131                                  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).
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188
189
190                          4.3.4   SINGLE DATA PATTERN TEST (SA 250)
191
192                                  A SPECIAL DECK (1 OR MORE CARDS) MUST BE PUNCHED TO RUN THIS TEST.
193                                  ANY DATA PATTERN MAY BE USED, BUT IT MUST BE IDENTICAL IN ALL
194                                          80 COLUMNS OF ALL THE CARDS (I.E. ONLY ONE PIECE OF DATA).
195                                  LOAD THIS PREPARED DECK INTO THE INPUT HOPPER.
196                                  PRESS CARD READER 'MOTOR START'' AND 'READ START'' ('RESET'' ON
197                                          DOCUMATION READER).
198                                  LOAD SA 250.
199                                  IF HARDWARE SWITCH REGISTER IS AVAILABLE SET SWITCHE
200                                  SETTINGS BEFORE PRESSING START. IF SWITCH-LESS MACHINE SIMPLY
201                                  PRESS START.
202                                  WHEN THE CARD READER RUNS OUT OF CARDS IT WILL RING THE BELL.
203                                  RELOADING THE DECK AND PRESSING 'READ START'' ('RESET'') ON THE CARD
204                                  READER WILL CONTINUE THE TEST.
205
206                          5.      OPERATING PROCEDURE
207
208                          5.1     OPERATIONAL SWITCH SETTINGS
209
210                          5.1.1   AT SA 200 (INSTRUCTION AND DATA RELIABILITY TEST)
211
212                                  SEE 4.1
213
214                          5.1.2   AT SA 210 OR 220 (ERROR FUNCTION TEST FOR CR11)
215
216                                  SW00=1 TO INHIBIT TESTING THE DARK-LIGHT ERROR.
217                                  SW14=1 TO LOOP THRU THE CURRENT SUBTEST
218                                  SW15=1 TO HALT ON ERROR
219
220                          5.1.3   AT SA 240 (SINGLE SUBTEST LOOP)
221
222                                  SEE 4.1 FOR SR OPTIONS
223
224                          5.1.4   AT SA 250 (SINGLE DATA PATTERN TEST)
225
226                                  SW15=1 TO HALT ON ERROR
227                                  SW13=1 TO INHIBIT PRINTOUTS
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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.

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                                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.
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447
448                          8.      MISCELLANEOUS
449
450                          8.1     EXECUTION TIME
451
452                                  NOT APPLICABLE
453
454                          8.2     CARD DECK DESCRIPTION
455
456                          8.2.1   ALPHANUMERIC
457
458                                  REFERENCE THE ALPHANUMERIC TABLE BEGINNING AT THE TAG ALPCD
459                                  IN THE LISTING FOR THE CODES PUNCHED FOR EACH OF 80 COLUMNS
460                                  OF THE FIRST CARD.  THE FIRST VALUE GIVEN FOR A COLUMN IS THE CARD
461                                  IMAGE OF THAT COLUMN, WHILE THE SECOND VALUE IS THE ENCODED FORM
462                                  OF THE SAME PATTERN.  EACH SUCCESSIVE CARD IN THE DECK USES THE
463                                  SAME SEQUENCE OF CODES ROTATED ONE COLUMN TO THE LEFT.
464
465                          8.2.2   BINARY
466
467                                  REFERENCE THE BINARY DATA TABLE BEGINNING AT THE TAG BINCD IN
468                                  THE LISTING FOR THE CODES PUNCHED FOR EACH OF THE 80 COLUMNS OF
469                                  THE 1ST CARD.  AS WITH THE ALPHANUMERIC DECK EACH SUCCESSIVE CARD
470                                  HAS THE SAME SEQUENCE OF CODES ROTATED ONE COLUMN TO THE LEFT.
471
472                          8.3     SPECIAL NOTES
473
474                                  IF THE CARD READER GOES OFF-LINE BEFORE THE END OF A CARD,
475                                  BUSY REMAINS SET UNTIL THE CARD ACTUALLY CLEARS THE READER.
476
477                                  THE CARD READER GOES OFF-LINE DUE TO ''INPUT HOPPER EMPTY'' AFTER
478                                  THE 80TH COLUMN OF THE LAST CARD IS READ, BUT BEFORE CARD DONE
479                                  OCCURS.  THUS, THE SPECIAL CONDITION BIT IN THE CSR WILL BE
480                                  SET BEFORE CARD DONE ON THE LAST CARD.
481
482                                  IF THE CARD READER USES AN M829 MODULE, SW10 MUST BE SET
483                                  IN THE SWITCH REGISTER.  WITH THE M829 MODULE, CARD DONE
484                                  NEVER OCCURS AFTER THE LAST CARD IN THE INPUT HOPPER IS READ.
485                                  IF THE CARD READER USES AN M8290 MODULE, SW10 MUST NOT BE SET.
486                                  WITH THE M8290 MODULE, CARD DONE IS ISSUED AFTER THE LAST
487                                  CARD IN THE INPUT HOPPER IS READ.
488
489                                  IF BIT 0 OF THE CRS IS CLEARED IMMEDIATELY AFTER BEING SET,
490                                  THE READING OF A CARD MAY NOT OCCUR.  SINCE THIS BIT IS WRITE
491                                  ONLY, A BIS OR BIC DONE AFTER SETTING BIT 0 MAY CLEAR THE BIT
492                                  AND PREVENT THE READ FROM OCCURRING.
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493
494
495                         8.4     TESTING CR11'S WITH NON-STANDARD ADDRESSES
496
497                                 BY SUBSTITUTING INTO THE LOCATIONS KCRS, KCRB1, AND CRB2
498                                 THE ADDRESSES OF THE CRS, CRB1, AND CRB2 OF A CARD READER
499                                 ASSIGNED A NON-STANDARD ADDRESS, AND SUBSTITUTING ITS INTERRUPT
500                                 VECTOR ADDRESS INTO ADINT, A CR11 MAY BE TESTED AT ANY
501                                 ADDRESS ASSIGNED TO IT.
502
503                         9.      PROGRAM DESCRIPTION
504
505                                 THIS SET OF TESTS IS DESIGNED TO CHECK ALL OPERATIONS OF THE CR11
506                                 CARD READER, WITH THE NECESSARY EXCEPTION THAT TIMING IN MOST
507                                 CASES IS ONLY PARTIALLY TESTED.  A SPECIAL TEST IS INCLUDED TO
508                                 CHECK OUT THE ERROR FUNCTIONS OF THE G.D.I. 100 READER, WHICH
509                                 PRINTS OUT DIRECTIONS AS IT GOES ALONG.  A TEST IS ALSO INCLUDED
510                                 TO ISOLATE DIFFICULT DATA ERRORS USING A SPECIAL TEST DECK
511                                 PUNCHED BY THE USER.
512
513                         10.     LISTING%
514
515
516
517
518
519
520                         .ABS
521                         .TITLE  CZCRACO CR11 DIAG TSTS
522                         .NLIST  MD,MC,CND
523                         .LIST   ME
524                         ;DIAGNOSTIC FOR CR11 CARD READER
525                         ;COPYRIGHT 1970,1979, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
526                         ;BY RICK FADDEN
527
528                         ;CHANGE HISTORY
529                         ;(MODIFIED AUGUST-71 FOR DOCUMATION CARD READER (JOHN RODENHISER))
530                         ;(MODIFIED APRIL-72 FOR HARDWARE ECO)
531                         ;MODIFIED MARCH 1976 FOR SWITCH-LESS PROCESSORS BY RON PLATUKIS
532                         ;REV.CO, OCTOBER 1979 TO BE ASSEMBLED USING CZCRAC.SML, WHICH
533                         ;                    WILL ENABLE ABSOLUTE MODE ADDRESSING (AMA).
534
535                         ;STARTING ADDRESSES ARE:
536                         ;       200=INSTRUCTION AND DATA TEST FOR THE CR11
537                         ;       210=ERROR FUNCTION TEST OF CR11 (GDI)
538                         ;       220=ERROR FUNCTION TEST OF CR11 USING DOCUMATION READER.
539                         ;       240=SINGLE TEST LOOP
540                         ;       250=READ SINGLE DATA PATTERN TEST
541
542                         ;SWITCH REGISTER SETTINGS FOR THE INSTRUCTION AND DATA TEST ARE:
543                         ;       SW04=1 FOR THE BINARY TEST DECK
544                         ;       SW05=1 TO HALT AT THE END OF A STANDARD 80 CARD
545                         ;              TEST DECK.
546                         ;              =0 TO CONTINUE FROM ONE DECK TO THE NEXT.
547                         ;                     AFTER THE LAST DECK IN THE HOPPER IS
548                         ;                     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
                                ;
                                ;
                                ;               PSR=177776
                                ;               NOP=240
                                ;               HLT=EMT
                                ;               SCOPE=EMT+1
                                ;               CNTLU=EMT+2
                                ;               KBINTT=EMT+3
                                ;               READC=EMT+4
                                ;               SUSWRR=EMT+5
                                ;               CKU=EMT+6
                                ;               TIT=EMT+7
                                ;               ADINT=%0                ;CONTAINS ADDRESS OF INTERRUPT VECTOR
                                ;               COUNT=%1                ;USED FOR TIMING, ETC.
                                ;               R2=%2                   ;SCRATCH
                                ;               CRS=%3                  ;CONTAINS ADDRESS OF CARD READ STATUS REGISTER
                                ;               CRB1=%4                 ;CONTAINS ADDRESS OF CARD READER BUFFER (12 BIT DATA)
                                ;               R5=%5                   ;SCRATCH
                                ;               SP=%6                   ;STACK POINTER
                                ;               PC=%7                   ;PROGRAM COUNTER
                                ;LOAD TRAP CATCHER INTO LOCATIONS 0 THRU 377
                                ;LOAD TRAP VECTORS
                                ;               .=14
000014  000642                  ;               TRTRAP
000016  000340                  ;               340
000030                          ;               .=30
000030  012752                  ;               EMTSRV
000032  000340                  ;               340
```

```
                                .=46
000046  006466                  LOGIC


                        ;SOFTWARE SWITCH REGISTER LOCATIONS

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

                        ;LOAD STARTING ADDRESS AREA
                                .=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

                                .=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
                                .=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
```

```
                                                CNTLU
                                                CKU
000001  012144                                  MOV     #1,ITMAX        ;SET ITERATION MAXIMUM TO 1 ITERATION
000634                                          MOV     KCRS,CRS        ;SET UP REGISTER POINTERS
000636                                          MOV     KCRB1,CRB1
000604                                          MOV     INTVC,ADINT     ;LOAD ADDRESS OF INTERRUPT VECTOR
000602                                          CLR     INTFLG          ;INITIALIZE INTERRUPT FLAG
000644                                          CLR     TRFLG           ;INITIALIZE TRACE FLAG
000340  177776                                  MOV     #340,PSR        ;SETUP PROCESSOR STATUS
                                                RTS     %7              ;RETURN
                                        BEGIN:  TIT
016205                                          MOV     #SUBT1,R2
000652                                          JSR     %7,SETUP        ;INITIALIZE POINTERS AND FLAGS
                                                BR      TEST            ;GO TO INSTRUCTION TESTS
000176  000616                          RESTRT: CMP     #SWREG,SWR
                                                BNE     1$
                                                CNTLU
                                                CKU
000644                                  1$:     TST     TRFLG           ;CHECK FOR TRACE TRAPPING
                                                BNE     TRAPX           ;IF SET, TRACE TRAP
000340  177776                          NOTRP:  MOV     #340,PSR        ;IF ZERO, CLEAR TRACE BIT
                                                BR      TEST            ;GO TO INSTRUCTION TESTS
010000  177614                          TRAPX:  BIT     #10000,@SWR     ;CHECK SW12
                                                BNE     NOTRP           ;BRANCH IF SET TO CLEAR TRACE BIT
000360  177776                                  MOV     #360,PSR        ;SET TRACE BIT

                                        ;TEST FOR CORRECT INITIALIZATION OF STATUS REGISTER
001022  012150                          TEST:   MOV     #TEST1A,RETURN  ;SETUP SCOPE LOOP RETURN ADDRESS
                                        TEST1:  SCOPE
011506                                  TEST1A: JSR     %7,CKBIT8       ;CHECK FOR OFF-LINE SET
177776  000646                                  MOV     PSR,PROC        ;STORE PROCESSOR STATUS
177776                                          CLR     PSR             ;CLEAR TRACE BIT
                                                CLR     COUNT           ;INITIALIZE COUNTER
                                                INC     COUNT           ;WAIT TO BE CERTAIN
                                                BNE     .-2             ;THAT ALL CARDS ARE
                                                INC     COUNT           ;THRU BEFORE ISSUING
                                                BNE     .-2             ;INIT
000646  177776                                  MOV     PROC,PSR        ;RESTORE PROCESSOR STATUS
                                                RESET                   ;SEND OUT INIT
                                                TST     @CRS            ;CHECK FOR STATUS REGISTER ALL ZERO
                                                BEQ     .+4             ;BRANCH IF OK
                                                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
177776                                          BIS     #177776,@CRS    ;SET ALL BITS BUT 0
000102                                          CMP     #102,@CRS       ;ONLY BITS 1 AND 6 SHOULD BE SET
                                                BEQ     .+6             ;BRANCH IF OK
                                                HLT                     ;STATUS REGISTER DIDN'T CONTAIN 102
                                                BR      TEST2           ;BRANCH AFTER FAILURE
                                        ;CLEARING STATUS REGISTER SHOULD CLEAR BITS 1 AND 6
                                                CLR     @CRS            ;CLEAR BITS 1 AND 6
                                                TST     @CRS            ;CHECK FOR ALL BITS CLEAR
                                                BEQ     .+4             ;BRANCH IF OK
                                                HLT                     ;BIT 1 AND/OR BIT 6 DIDN'T CLEAR

                                        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
```

```
                                        ;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             ;BRANCH 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
```

```
829  001520  005201                          INC     COUNT           ;INCREMENT COUNTER
830  001522  005714                          TST     @CRB1           ;CLEAR READY
831  001524  105713                          TSTB    @CRS            ;MAKE SURE IT CLEARED
832  001526  100001                          BPL     .+4             ;BRANCH IF IT DID
833  001530  104000                          HLT                     ;READING DATA BUFFER DIDN'T CLEAR READY
834  001532  000755                          BR      LOOP5           ;LOOP
835  001534  032713  004000          CK5:    BIT     #4000, @CRS     ;CHECK TIMING ERROR BIT
836  001540  001401                          BEQ     .+4             ;BRANCH IF NOT SET
837  001542  104000                          HLT                     ;TIMING ERROR WAS SET
838                                          ;NOTE THAT IF COLUMN READY SET MORE THAN 80 TIMES
839                                          ;A TIMING ERROR WILL OCCUR AND THE COUNT WILL BE 79 (=117 OCTAL)
840  001544  000421                          BR      TEST6           ;BRANCH AFTER ERROR
841  001546  020127  000117                  CMP     COUNT, #79.     ;CHECK COUNT
842  001552  001401                          BEQ     .+4             ;BRANCH IF 80 COLUMN READYS OCCURRED
843  001554  104000                          HLT                     ;COLUMN READY DIDN'T OCCUR 80 TIMES
844                                                                  ;BEFORE CARD DONE
845  001556  021327  040200                  CMP     @CRS,#40200     ;ONLY CARD DONE AND COLUMN READY SHOULD BE SET
846  001562  001401                          BEQ     .+4
847  001564  104000                          HLT                     ;STATUS REGISTER IN WRONG STATE
848  001566  005013                          CLR     @CRS            ;SHOULD CLEAR DONE BUT NOT READY
849  001570  021327  000200                  CMP     @CRS,#200       ;CHECK FOR ONLY READY SET
850  001574  001401                          BEQ     .+4             ;BRANCH IF OK
851  001576  104000                          HLT                     ;STATUS REGISTER IN WRONG STATE
852  001600  005714                          TST     @CRB1           ;READING DATA BUFFER SHOULD CLEAR COLUMN READY
853  001602  005713                          TST     @CRS            ;CHECK STATUS REGISTER
854  001604  001401                          BEQ     .+4             ;BRANCH IF ALL BITS ZERO
855  001606  104000                          HLT                     ;STATUS REGISTER NOT EQUAL TO ZERO
856
857  001610  104001              TEST6:  SCOPE
858                              ;A TIMING ERROR SHOULD SET BIT 11 BEFORE CARD DONE OCCURS, EVEN IF IT OCCURS AT COLUMN 8
859                              ;A DATOB TO THE LOW BYTE OF THE CRS SHOULD CLEAR BITS 15,14, AND 11
860  001612  004737  011434              JSR     %7,INIT         ;INITIALIZE
861  001616  012701  000115              MOV     #77.,COUNT      ;SETUP COUNTER
862  001622  005213                      INC     @CRS            ;START READING A CARD
863  001624  105713              LOOP6:  TSTB    @CRS            ;WAIT FOR COLUMN READY
864  001626  100376                      BPL     .-2
865  001630  005714                      TST     @CRB1           ;CLEAR COLUMN READY
866  001632  005301                      DEC     COUNT           ;GO THRU LOOP FOR 1ST 78 COLUMN READY'S
867  001634  100373                      BPL     LOOP6
868  001636  032713  144000              BIT     #144000,@CRS    ;WAIT FOR CARD DONE OR TIMING ERROR
869  001642  001775                      BEQ     .-4             ;OR SPECIAL CONDITION
870  001644  032713  040000              BIT     #40000,@CRS     ;CARD DONE SET?
871  001650  001026                      BNE     ERR6            ;YES, 2 POSSIBLE TEST FAILURES
872  001652  032713  004000              BIT     #4000,@CRS      ;CHECK TIMING ERROR
873  001656  001416                      BEQ     OFF6            ;IF NOT SET, READER IS PROBABLY OFF-LINE
874  001660  105713                      TSTB    @CRS            ;CHECK COLUMN READY
875  001662  100001                      BPL     .+4             ;BRANCH IF CLEAR
876  001664  104000                      HLT                     ;TIMING ERROR DIDN'T CLEAR READY
877  001666  005713                      TST     @CRS            ;WAIT FOR SPECIAL CONDITION
878  001670  100376                      BPL     .-2
879  001672  032713  040000              BIT     #40000,@CRS     ;CHECK CARD DONE
880  001676  001406                      BEQ     OFF6            ;IF NOT SET, READER IS PROBABLY OFF-LINE
881  001700  105013                      CLRB    @CRS            ;DATOB TO LOW BYTE OF CRS
882  001702  032713  144000              BIT     #144000,@CRS    ;CHECK BITS 15,14,11
883  001706  001415                      BEQ     TEST7           ;BRANCH IF CLEAR TO NEXT TEST
884  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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 941  002100  104000                          HLT                     ;TIMING ERROR NOT CLEARED BY DATOB
 942  002102  000411                          BR      TEST8           ;GO TO NEXT TEST AFTER ERROR
 943  002104  032713  140000                  BIT     #140000,@CRS    ;WAIT FOR DONE OR SPECIAL CONDITION
 944  002110  001775                          BEQ     .-4
 945  002112  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
 946  002116  001003                          BNE     TEST8           ;BRANCH IF READER OFF-LINE
 947  002120  005713                          TST     @CRS            ;SPECIAL CONDITION SHOULDN'T SET
 948  002122  100001                          BPL     .+4             ;SINCE DATOB CLEARED TIMING ERROR
 949  002124  104000                          HLT                     ;BIT 15 WAS SET, 8 WASN'T
 950
 951
 952  002126  104001              TEST8:  SCOPE
 953                              ;DATA SHOULD BE AVAILABLE IN THE DATA BUFFER FOR AT LEAST 1.0 MILLISECOND
 954  002130  004737  011434              JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
 955  002134  013737  177776  000646      MOV     PSR,PROC        ;STORE CURRENT PROCESSOR STATUS
 956  002142  005037  177776              CLR     PSR             ;CLEAR TRACE BIT
 957  002146  005213                      INC     @CRS            ;START READ
 958  002150  032713  140200      LOOP8:  BIT     #140200,@CRS    ;WAIT FOR COLUMN READY OR CARD DONE
 959  002154  001775                      BEQ     .-4             ;OR SPECIAL CONDITION
 960  002156  032713  040000              BIT     #40000,@CRS     ;CARD DONE?
 961  002162  001023                      BNE     DBRCK8          ;YES, GO TO CHECK STROBING OF DBR
 962  002164  005713                      TST     @CRS            ;NO, CHECK BIT 15
 963  002166  100002                      BPL     .+6             ;BRANCH IF NOT SET
 964  002170  104000                      HLT                     ;BIT 15 WAS SET
 965  002172  000441                      BR      TEST9           ;GO TO NEXT TEST AFTER ERROR
 966  002174  005013                      CLR     @CRS            ;DATO TO CRS - SHOULDN'T CLEAR BUSY OR READY
 967  002176  022713  001200              CMP     #1200,@CRS      ;CHECK FOR BUSY AND READY
 968  002202  001402                      BEQ     .+6             ;BRANCH IF STILL SET
 969  002204  104000                      HLT                     ;CRS IN WRONG STATE
 970  002206  000433                      BR      TEST9           ;GO TO NEXT TEST AFTER ERROR
 971  002210  011405                      MOV     @CRB1,R5        ;STORE DATA
 972  002212  012701  000300              MOV     #300,COUNT      ;INITIALIZE COUNTER
 973  002216  005301                      DEC     COUNT           ;WAIT FOR 1 MILLISECOND (APPROX.)
 974  002220  001376                      BNE     .-2
 975  002222  021405                      CMP     @CRB1,R5        ;DATA UNCHANGED?
 976  002224  001751                      BEQ     LOOP8           ;OK, CONTINUE
 977  002226  104000                      HLT                     ;DATA NOT AVAILABLE FOR 1.0 MILLISECONDS
 978  002230  000422                      BR      TEST9           ;GO TO NEXT TEST AFTER FAILURE
 979  002232  017702  176402      DBRCK8: MOV     @CRB2,R2        ;STORE ENCODED DATA IN REGISTER 2
 980  002236  012701  000100              MOV     #100,COUNT      ;SET UP COUNTER
 981  002242  021405              CONT8:  CMP     @CRB1,R5        ;READ CARD-IMAGE DATA BUFFER
 982  002244  001402                      BEQ     .+6             ;BRANCH IF UNCHANGED
 983  002246  104000                      HLT                     ;CRB1 READ INCORRECTLY
 984  002250  000407                      BR      REST8           ;BRANCH TO RESTORE PROCESSOR STATUS AND EXIT
 985  002252  027702  176362              CMP     @CRB2,R2        ;READ ENCODED DATA BUFFER
 986  002256  001402                      BEQ     .+6             ;BRANCH IF UNCHANGED
 987  002260  104000                      HLT                     ;CRB2 READ INCORRECTLY
 988  002262  000402                      BR      REST8           ;BRANCH AFTER FAILURE
 989  002264  005301                      DEC     COUNT           ;COUNT DOWN
 990  002266  001365                      BNE     CONT8           ;LOOP IF NOT DONE
 991  002270  013737  000646  177776 REST8:  MOV  PROC,PSR        ;RESTORE PROCESSOR STATUS
 992
 993
 994  002276  104001              TEST9:  SCOPE
 995                              ;EJECT SHOULD PREVENT FURTHER COLUMN READY'S
 996                              ;CARD DONE SHOULD STILL OCCUR, AND TIMING ERRORS SHOULD BE
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 997                                    ;PREVENTED IF THE CURRENT COLUMN READY IS CLEARED
 998  002300  004737  011434                    JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
 999  002304  013737  177776  000646            MOV     PSR,PROC        ;SAVE PROCESSOR STATUS
1000  002312  005037  177776                    CLR     PSR             ;CLEAR TRACE BIT
1001  002316  005213                            INC     @CRS            ;START READ
1002  002320  105713                            TSTB    @CRS            ;WAIT FOR COLUMN READY
1003  002322  001776                            BEQ     .-2
1004  002324  052713  000002                    BIS     #2,@CRS         ;SET EJECT
1005  002330  005714                            TST     @CRB1           ;CLEAR COLUMN READY
1006  002332  005001                            CLR     COUNT           ;LOOP TAKES 11.4 MICROSECONDS ONCE THRU
1007  002334  032713  044200          WAIT9:    BIT     #44200,@CRS     ;WAIT FOR CARD DONE, TIMING ERROR, OR
1008  002340  001004                            BNE     CK9             ;COLUMN READY
1009  002342  005201                            INC     COUNT           ;TIME FOR ABOUT 3/4 SECOND
1010  002344  001373                            BNE     WAIT9           ;CONTINUE WAITING
1011  002346  104000                            HLT                     ;NO CARD DONE OCCURRED WITHIN 3/4 SECOND
1012  002350  000411                            BR      REST9           ;CONTINUE AFTER FAILURE
1013  002352  032713  040000          CK9:      BIT     #40000,@CRS     ;CHECK FOR CARD DONE
1014  002356  001006                            BNE     REST9
1015  002360  032713  000200                    BIT     #200,@CRS       ;CHECK COLUMN READY
1016  002364  001402                            BEQ     .+6             ;BRANCH IF NOT SET
1017  002366  104000                            HLT                     ;COLUMN READY WAS SET
1018  002370  000401                            BR      REST9
1019  002372  104000                            HLT                     ;EJECT DID NOT PREVENT A TIMING ERROR
1020  002374  013737  000646  177776  REST9:    MOV     PROC,PSR        ;RESTORE PROCESSOR STATUS
1021
1022
1023  002402  104001                    TEST10: SCOPE
1024                                    ;CARD DONE SHOULD CAUSE AN INTERRUPT
1025  002404  004737  011434                    JSR     %7,INIT         ;INITIALIZE
1026  002410  012710  002464                    MOV     #TINT10,@ADINT  ;LOAD RETURN POINTER
1027  002414  052737  000340  177776            BIS     #340,PSR        ;SET PROCESSOR TO LEVEL 7
1028  002422  013760  177776  000002            MOV     PSR,2(ADINT)    ;LOAD RETURN PROCESSOR STATUS
1029  002430  042737  000340  177776            BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
1030  002436  012713  000103                    MOV     #103,@CRS       ;SET EJECT, INTERRUPT ENABLE, AND READ
1031  002442  032713  040000                    BIT     #40000,@CRS     ;WAIT FOR CARD DONE
1032  002446  001775                            BEQ     .-4
1033  002450  016037  000002  177776            MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1034  002456  105013                            CLRB    @CRS            ;CLEAR INTERRUPT ENABLE
1035  002460  104000                            HLT                     ;NO INTERRUPT OCCURRED
1036  002462  000414                            BR      CONT10
1037  002464  032713  040000          TINT10:   BIT     #40000,@CRS     ;CHECK CARD DONE
1038  002470  001001                            BNE     .+4             ;BRANCH IF SET
1039  002472  104000                            HLT                     ;CARD DONE NOT SET
1040  002474  022626                            CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1041  002476  005713                            TST     @CRS            ;MAKE SURE NO ERROR OCCURRED
1042  002500  100001                            BPL     .+4
1043  002502  104000                            HLT                     ;BIT 15 WAS SET
1044  002504  105713                            TSTB    @CRS            ;CHECK COLUMN READY
1045  002506  100001                            BPL     .+4             ;BRANCH IF NOT SET
1046  002510  104000                            HLT                     ;COLUMN READY WAS SET
1047  002512  005013                            CLR     @CRS            ;DISABLE INTERRUPTS
1048  002514  012710  000232          CONT10:   MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1049  002520  005037  000232                    CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1050
1051  002524  104001                    TEST11: SCOPE
1052                                    ;COLUMN READY SHOULD CAUSE AN INTERRUPT
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1053  002526  004737  011434                JSR     %7,INIT          ;INITIALIZE
1054  002532  012710  002604                MOV     #TINT11,@ADINT   ;LOAD RETURN POINTER
1055  002536  052737  000340  177776        BIS     #340,PSR         ;SET PROCESSOR STATUS TO LEVEL 7
1056  002544  013760  177776  000002        MOV     PSR,2(ADINT)     ;LOAD RETURN PROCESSOR STATUS
1057  002552  042737  000340  177776        BIC     #340,PSR         ;SET PROCESSOR PRIORITY TO 0
1058  002560  012713  000101                MOV     #101,@CRS        ;SET READ AND INTERRUPT ENABLE
1059  002564  105713                        TSTB    @CRS             ;WAIT FOR COLUMN READY
1060  002566  100376                        BPL     .-2
1061  002570  016037  000002  177776        MOV     2(ADINT),PSR     ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1062  002576  005013                        CLR     @CRS             ;CLEAR INTERRUPT ENABLE
1063  002600  104000                        HLT                      ;COLUMN READY DID NOT INTERRUPT
1064  002602  000405                        BR      CONT11
1065  002604  005013              TINT11:   CLR     @CRS             ;CLEAR INTERRUPT ENABLE
1066  002606  105713                        TSTB    @CRS             ;MAKE SURE COLUMN READY IS SET
1067  002610  100401                        BMI     .+4              ;BRANCH IF SET
1068  002612  104000                        HLT                      ;COLUMN READY WASN'T SET
1069  002614  022626                        CMP     (SP)+,(SP)+      ;RESTORE STACK POINTER
1070  002616  012710  000232        CONT11: MOV     #232,@ADINT      ;CHANGE INTERRUPT RETURN ADDRESS
1071  002622  005037  000232                CLR     @#232            ;TO CAUSE A HALT IF ANOTHER INTERRUPT OCCURS
1072
1073  002626  104001              TEST12: SCOPE
1074                              ;CARD DONE SHOULDN'T CAUSE AN INTERRUPT IF THE PROCESSOR IS AT LEVEL 7 PRIORITY
1075  002630  004737  011434                JSR     %7,INIT          ;INITIALIZE
1076  002634  012710  002670                MOV     #TINT12,@ADINT   ;SETUP RETURN
1077  002640  052737  000340  177776        BIS     #340,PSR         ;SET PROCESSOR TO LEVEL 7 PRIORITY
1078  002646  013760  177776  000002        MOV     PSR,2(ADINT)     ;LOAD RETURN PROCESSOR STATUS
1079  002654  012713  000103                MOV     #103,@CRS        ;SET EJECT, INTERRUPT ENABLE, AND READ
1080  002660  032713  040000                BIT     #40000,@CRS      ;WAIT FOR CARD DONE
1081  002664  001775                        BEQ     .-4
1082  002666  000402                        BR      .+6              ;CONTINUE IF NO INTERRUPT OCCURRED
1083  002670  104000              TINT12:   HLT                      ;AN INTERRUPT OCCURRED
1084  002672  022626                        CMP     (SP)+,(SP)+      ;RESTORE STACK POINTER
1085  002674  005013                        CLR     @CRS             ;CLEAR INTERRUPT ENABLE AND EJECT
1086  002676  012710  000232                MOV     #232,@ADINT      ;CHANGE INTERRUPT RETURN ADDRESS
1087  002702  005037  000232                CLR     @#232            ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1088
1089                              ;FIND THE LEVEL AT WHICH AN INTERRUPT OCCURS
1090                              ;PRINT OUT A MESSAGE STATING THIS LEVEL IF IT IS OTHER THAN THE STANDARD (LEVEL 6)
1091                              ;MAKE CERTAIN THAT IT ALWAYS OCCURS AT THIS LEVEL
1092                              ;THE MESSAGE STATING THE LEVEL IS PRINTED ONLY ONCE, AND THE PROGRAM MUST
1093                              ;BE STARTED OVER AT LOCATION 200 FOR IT TO BE PRINTED AGAIN
1094
1095
1096                              ;TEST FOR AN INTERRUPT ON LEVEL 7
1097  002706  104001              TEST13: SCOPE
1098  002710  004737  011434                JSR     %7,INIT          ;INITIALIZE
1099  002714  012710  003024                MOV     #TINT13,@ADINT   ;SETUP RETURN ADDRESS
1100  002720  052737  000340  177776        BIS     #340,PSR         ;SET PROCESSOR PRIORITY TO 7
1101  002726  013760  177776  000002        MOV     PSR,2(ADINT)     ;SETUP RETURN PROCESSOR STATUS
1102  002734  042737  000340  177776        BIC     #340,PSR         ;SET PROCESSOR PRIORITY TO 0
1103  002742  052737  000300  177776        BIS     #300,PSR         ;SET PROCESSOR TO LEVEL 6 PRIORITY
1104  002750  012713  000103                MOV     #103,@CRS        ;SET EJECT INTERRUPT ENABLE, AND READ
1105  002754  032713  040000                BIT     #40000,@CRS      ;WAIT FOR CARD DONE
1106  002760  001775                        BEQ     .-4
1107  002762  016037  000002  177776        MOV     2(ADINT),PSR     ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1108  002770  005013                        CLR     @CRS             ;DISABLE INTERRUPTS
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1109  002772  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1110  002776  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1111  003002  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
1112  003006  100044                          BPL     TEST14          ;IF NO, GO TO NEXT TEST
1113  003010  023727  000602  100007          CMP     INTFLG,#100007  ;IF SO, CHECK TO SEE
1114  003016  100440                          BMI     TEST14          ;THAT THE INTERRUPT LEVEL RECORDED
1115                                                                  ;IS BELOW THE CURRENT LEVEL
1116  003020  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
1117                                                                  ;AT LEVEL 7, BUT PREVIOUSLY OCCURRED
1118                                                                  ;AT OR ABOVE THIS LEVEL
1119  003022  000436                          BR      TEST14
1120  003024  032713  040000          TINT13: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
1121  003030  001001                          BNE     .+4             ;BRANCH IF SET
1122  003032  104000                          HLT                     ;CARD DONE WASN'T SET
1123  003034  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
1124  003036  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1125  003042  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1126  003046  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1127  003050  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
1128  003054  100414                          BMI     SET7    ;BRANCH IF FLAG SET
1129  003056  012737  100007  000602          MOV     #100007,INTFLG ;SET FLAG AND LEVEL
1130  003064  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
1131  003070  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
1132  003074  012702  000007                  MOV     #7,R2
1133  003100  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
1134  003104  000405                          BR      TEST14
1135  003106  023727  000602  100007  SET7: CMP     INTFLG,#100007  ;CHECK PREVIOUS LEVEL
1136  003114  100001                          BPL     TEST14
1137  003116  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1138
1139                                  ;TEST FOR AN INTERRUPT ON LEVEL 6
1140                                  ;SINCE THIS IS WHERE THE CARD READER NORMALLY IS, DON'T PRINT OUT A MESSAGE
1141                                  ;IF IT IS FOUND HERE
1142  003120  104001                  TEST14: SCOPE
1143  003122  004737  011434                  JSR     %7,INIT         ;INITIALIZE
1144  003126  012710  003216                  MOV     #TINT14,@ADINT  ;SETUP RETURN ADDRESS
1145  003132  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
1146  003140  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
1147  003146  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
1148  003154  052737  000240  177776          BIS     #240,PSR        ;SET PROCESSOR TO LEVEL 5 PRIORITY
1149  003162  012713  000103                  MOV     #103,@CRS       ;SET EJECT, INTERRUPT ENABLE, AND READ
1150  003166  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
1151  003172  001775                          BEQ     .-4
1152  003174  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1153  003202  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
1154  003204  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1155  003210  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1156  003214  000426                          BR      TEST15
1157  003216  032713  040000          TINT14: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
1158  003222  001001                          BNE     .+4             ;BRANCH IF SET
1159  003224  104000                          HLT                     ;CARD DONE WASN'T SET
1160  003226  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
1161  003230  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1162  003234  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1163  003240  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1164  003242  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
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1165  003246  100404                          BMI     SET14           ;BRANCH IF FLAG SET
1166  003250  012737  100006  000602          MOV     #100006,INTFLG  ;SET FLAG AND LEVEL
1167  003256  000405                          BR      TEST15
1168  003260  023727  000602  100006  SET14:  CMP     INTFLG,#100006  ;CHECK PREVIOUS LEVEL
1169  003266  100001                          BPL     TEST15
1170  003270  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1171
1172                                  ;TEST FOR AN INTERRUPT ON LEVEL 5
1173  003272  104001                  TEST15: SCOPE
1174  003274  004737  011434                  JSR     %7,INIT         ;INITIALIZE
1175  003300  012710  003410                  MOV     #TINT15,@ADINT  ;SETUP RETURN ADDRESS
1176  003304  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
1177  003312  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
1178  003320  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
1179  003326  052737  000200  177776          BIS     #200,PSR        ;SET PROCESSOR TO LEVEL 4 PRIORITY
1180  003334  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
1181  003340  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
1182  003344  001775                          BEQ     .-4
1183  003346  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1184  003354  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
1185  003356  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1186  003362  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1187  003366  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
1188  003372  100044                          BPL     TEST16          ;IF NO, GO TO NEXT TEST
1189  003374  023727  000602  100005          CMP     INTFLG,#100005  ;IF SO, CHECK TO SEE
1190  003402  100440                          BMI     TEST16          ;THAT THE INTERRUPT LEVEL RECORDED
1191                                                                  ;IS BELOW THE CURRENT LEVEL
1192  003404  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
1193                                                                  ;AT LEVEL 5, BUT PREVIOUSLY OCCURRED
1194                                                                  ;AT OR ABOVE THIS LEVEL
1195  003406  000436                          BR      TEST16
1196  003410  032713  040000          TINT15: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
1197  003414  001001                          BNE     .+4             ;BRANCH IF SET
1198  003416  104000                          HLT                     ;CARD DONE WASN'T SET
1199  003420  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
1200  003422  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1201  003426  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1202  003432  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1203  003434  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
1204  003440  100414                          BMI     SET5    ;BRANCH IF FLAG SET
1205  003442  012737  100005  000602          MOV     #100005,INTFLG ;SET FLAG AND LEVEL
1206  003450  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
1207  003454  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
1208  003460  012702  000005                  MOV     #5,R2
1209  003464  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
1210  003470  000405                          BR      TEST16
1211  003472  023727  000602  100005  SET5:  CMP     INTFLG,#100005  ;CHECK PREVIOUS LEVEL
1212  003500  100001                          BPL     TEST16
1213  003502  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1214
1215                                  ;TEST FOR AN INTERRUPT ON LEVEL 4
1216  003504  104001                  TEST16: SCOPE
1217  003506  004737  011434                  JSR     %7,INIT         ;INITIALIZE
1218  003512  012710  003622                  MOV     #TINT16,@ADINT  ;SETUP RETURN ADDRESS
1219  003516  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
1220  003524  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
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1221  003532  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
1222  003540  052737  000140  177776          BIS     #140,PSR        ;SET PROCESSOR TO LEVEL 3 PRIORITY
1223  003546  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
1224  003552  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
1225  003556  001775                          BEQ     .-4
1226  003560  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1227  003566  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
1228  003570  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1229  003574  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1230  003600  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
1231  003604  100044                          BPL     TEST17          ;IF NO, GO TO NEXT TEST
1232  003606  023727  000602  100004          CMP     INTFLG,#100004  ;IF SO, CHECK TO SEE
1233  003614  100440                          BMI     TEST17          ;THAT THE INTERRUPT LEVEL RECORDED
1234                                                                  ;IS BELOW THE CURRENT LEVEL
1235  003616  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
1236                                                                  ;AT LEVEL 4, BUT PREVIOUSLY OCCURRED
1237                                                                  ;AT OR ABOVE THIS LEVEL
1238  003620  000436                          BR      TEST17
1239  003622  032713  040000          TINT16: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
1240  003626  001001                          BNE     .+4             ;BRANCH IF SET
1241  003630  104000                          HLT                     ;CARD DONE WASN'T SET
1242  003632  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
1243  003634  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1244  003640  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1245  003644  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1246  003646  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
1247  003652  100414                          BMI     SET4    ;BRANCH IF FLAG SET
1248  003654  012737  100004  000602          MOV     #100004,INTFLG ;SET FLAG AND LEVEL
1249  003662  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
1250  003666  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
1251  003672  012702  000004                  MOV     #4,R2
1252  003676  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
1253  003702  000405                          BR      TEST17
1254  003704  023727  000602  100004  SET4: CMP     INTFLG,#100004  ;CHECK PREVIOUS LEVEL
1255  003712  100001                          BPL     TEST17
1256  003714  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1257
1258                                  ;TEST FOR AN INTERRUPT ON LEVEL 3
1259  003716  104001                  TEST17: SCOPE
1260  003720  004737  011434                  JSR     %7,INIT         ;INITIALIZE
1261  003724  012710  004034                  MOV     #TINT17,@ADINT  ;SETUP RETURN ADDRESS
1262  003730  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
1263  003736  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
1264  003744  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
1265  003752  052737  000100  177776          BIS     #100,PSR        ;SET PROCESSOR TO LEVEL 2 PRIORITY
1266  003760  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
1267  003764  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
1268  003770  001775                          BEQ     .-4
1269  003772  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1270  004000  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
1271  004002  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1272  004006  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1273  004012  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
1274  004016  100044                          BPL     TEST18          ;IF NO, GO TO NEXT TEST
1275  004020  023727  000602  100003          CMP     INTFLG,#100003  ;IF SO, CHECK TO SEE
1276  004026  100440                          BMI     TEST18          ;THAT THE INTERRUPT LEVEL RECORDED
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1277
1278  004030  104000                          HLT                     ;IS BELOW THE CURRENT LEVEL
1279                                                                  ;INTERRUPT DIDN'T OCCUR WITH STATUS
1280                                                                  ;AT LEVEL 3, BUT PREVIOUSLY OCCURRED
1281  004032  000436                          BR      TEST18          ;AT OR ABOVE THIS LEVEL
1282  004034  032713  040000        TINT17:   BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
1283  004040  001001                          BNE     .+4             ;BRANCH IF SET
1284  004042  104000                          HLT                     ;CARD DONE WASN'T SET
1285  004044  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
1286  004046  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1287  004052  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1288  004056  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1289  004060  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
1290  004064  100414                          BMI     SET3    ;BRANCH IF FLAG SET
1291  004066  012737  100003  000602          MOV     #100003,INTFLG ;SET FLAG AND LEVEL
1292  004074  012702  014503                  MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
1293  004100  004737  012152                  JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
1294  004104  012702  000003                  MOV     #3,R2
1295  004110  004737  011734                  JSR     %7,PROCT        ;PRINT LEVEL NUMBER
1296  004114  000405                          BR      TEST18
1297  004116  023727  000602  100003  SET3:  CMP     INTFLG,#100003  ;CHECK PREVIOUS LEVEL
1298  004124  100001                          BPL     TEST18
1299  004126  104000                          HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1300
1301                                  ;TEST FOR AN INTERRUPT ON LEVEL 2
1302  004130  104001                  TEST18: SCOPE
1303  004132  004737  011434                  JSR     %7,INIT         ;INITIALIZE
1304  004136  012710  004246                  MOV     #TINT18,@ADINT  ;SETUP RETURN ADDRESS
1305  004142  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
1306  004150  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
1307  004156  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
1308  004164  052737  000040  177776          BIS     #040,PSR        ;SET PROCESSOR TO LEVEL 1 PRIORITY
1309  004172  012713  000103                  MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
1310  004176  032713  040000                  BIT     #40000,@CRS     ;WAIT FOR CARD DONE
1311  004202  001775                          BEQ     .-4
1312  004204  016037  000002  177776          MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1313  004212  005013                          CLR     @CRS            ;DISABLE INTERRUPTS
1314  004214  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1315  004220  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1316  004224  005737  000602                  TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
1317  004230  100044                          BPL     TEST19          ;IF NO, GO TO NEXT TEST
1318  004232  023727  000602  100002          CMP     INTFLG,#100002  ;IF SO, CHECK TO SEE
1319  004240  100440                          BMI     TEST19          ;THAT THE INTERRUPT LEVEL RECORDED
1320                                                                  ;IS BELOW THE CURRENT LEVEL
1321  004242  104000                          HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
1322                                                                  ;AT LEVEL 2, BUT PREVIOUSLY OCCURRED
1323                                                                  ;AT OR ABOVE THIS LEVEL
1324  004244  000436                          BR      TEST19
1325  004246  032713  040000        TINT18:   BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
1326  004252  001001                          BNE     .+4             ;BRANCH IF SET
1327  004254  104000                          HLT                     ;CARD DONE WASN'T SET
1328  004256  005013                          CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
1329  004260  012710  000232                  MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1330  004264  005037  000232                  CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1331  004270  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1332  004272  005737  000602                  TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
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1333  004276  100414                        BMI     SET2    ;BRANCH IF FLAG SET
1334  004300  012737  100002  000602        MOV     #100002,INTFLG ;SET FLAG AND LEVEL
1335  004306  012702  014503                MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
1336  004312  004737  012152                JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
1337  004316  012702  000002                MOV     #2,R2
1338  004322  004737  011734                JSR     %7,PROCT        ;PRINT LEVEL NUMBER
1339  004326  000405                        BR      TEST19
1340  004330  023727  000602  100002  SET2: CMP     INTFLG,#100002  ;CHECK PREVIOUS LEVEL
1341  004336  100001                        BPL     TEST19
1342  004340  104000                        HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1343
1344                                ;TEST FOR AN INTERRUPT ON LEVEL 1
1345  004342  104001                TEST19: SCOPE
1346  004344  004737  011434                JSR     %7,INIT         ;INITIALIZE
1347  004350  012710  004460                MOV     #TINT19,@ADINT  ;SETUP RETURN ADDRESS
1348  004354  052737  000340  177776        BIS     #340,PSR        ;SET PROCESSOR PRIORITY TO 7
1349  004362  013760  177776  000002        MOV     PSR,2(ADINT)    ;SETUP RETURN PROCESSOR STATUS
1350  004370  042737  000340  177776        BIC     #340,PSR        ;SET PROCESSOR PRIORITY TO 0
1351  004376  052737  000000  177776        BIS     #000,PSR        ;SET PROCESSOR TO LEVEL 0 PRIORITY
1352  004404  012713  000103                MOV     #103,@CRS       ;SET EJECT INTERRUPT ENABLE, AND READ
1353  004410  032713  040000                BIT     #40000,@CRS     ;WAIT FOR CARD DONE
1354  004414  001775                        BEQ     .-4
1355  004416  016037  000002  177776        MOV     2(ADINT),PSR    ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1356  004424  005013                        CLR     @CRS            ;DISABLE INTERRUPTS
1357  004426  012710  000232                MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1358  004432  005037  000232                CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1359  004436  005737  000602                TST     INTFLG          ;CHECK TO SEE IF LEVEL ALREADY RECORDED
1360  004442  100044                        BPL     TEST20          ;IF NO, GO TO NEXT TEST
1361  004444  023727  000602  100001        CMP     INTFLG,#100001  ;IF SO, CHECK TO SEE
1362  004452  100440                        BMI     TEST20          ;THAT THE INTERRUPT LEVEL RECORDED
1363                                                                ;IS BELOW THE CURRENT LEVEL
1364  004454  104000                        HLT                     ;INTERRUPT DIDN'T OCCUR WITH STATUS
1365                                                                ;AT LEVEL 1, BUT PREVIOUSLY OCCURRED
1366                                                                ;AT OR ABOVE THIS LEVEL
1367  004456  000436                        BR      TEST20
1368  004460  032713  040000        TINT19: BIT     #40000,@CRS     ;MAKE SURE CARD DONE IS SET
1369  004464  001001                        BNE     .+4             ;BRANCH IF SET
1370  004466  104000                        HLT                     ;CARD DONE WASN'T SET
1371  004470  005013                        CLR     @CRS            ;DISABLE FURTHER INTERRUPTS
1372  004472  012710  000232                MOV     #232,@ADINT     ;CHANGE INTERRUPT RETURN ADDRESS
1373  004476  005037  000232                CLR     @#232           ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1374  004502  022626                        CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1375  004504  005737  000602                TST     INTFLG          ;CHECK FOR PREVIOUS FLAG
1376  004510  100414                        BMI     SET1    ;BRANCH IF FLAG SET
1377  004512  012737  100001  000602        MOV     #100001,INTFLG ;SET FLAG AND LEVEL
1378  004520  012702  014503                MOV     #MSG4,R2        ;SETUP FOR PRINTOUT
1379  004524  004737  012152                JSR     %7,TOUT         ;PRINT MESSAGE 'THE INTERRUPT LEVEL WAS''
1380  004530  012702  000001                MOV     #1,R2
1381  004534  004737  011734                JSR     %7,PROCT        ;PRINT LEVEL NUMBER
1382  004540  000405                        BR      TEST20
1383  004542  023727  000602  100001  SET1: CMP     INTFLG,#100001  ;CHECK PREVIOUS LEVEL
1384  004550  100001                        BPL     TEST20
1385  004552  104000                        HLT                     ;INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1386
1387                                ;A TIMING ERROR SHOULDN'T CAUSE AN INTERRUPT
1388  004554  104001                TEST20: SCOPE
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1389  004556  004737  011434                JSR     %7,INIT          ;INITIALIZE
1390  004562  012710  004634                MOV     #TINT20,@ADINT   ;LOAD RETURN POINTER
1391  004566  052737  000340  177776        BIS     #340,PSR         ;SET PROCESSOR TO HIGHEST PRIORITY
1392  004574  013760  177776  000002        MOV     PSR,2(ADINT)     ;LOAD RETURN PROCESSOR STATUS
1393  004602  012713  000101                MOV     #101,@CRS        ;SET INTERRUPT ENABLE AND READ
1394  004606  032713  004000                BIT     #4000,@CRS       ;WAIT FOR TIMING ERROR TO SET
1395  004612  001775                        BEQ     .-4
1396  004614  042737  000340  177776        BIC     #340,PSR         ;MOVE PROCESSOR TO LOWEST PRIORITY
1397  004622  000240                        NOP                      ;CLOCK INTERRUPT IF IT OCCURRED
1398  004624  016037  000002  177776        MOV     2(ADINT),PSR     ;MOVE PROCESSOR BACK TO HIGHEST PRIORITY
1399  004632  000402                        BR      .+6
1400  004634  104000              TINT20:   HLT                      ;TIMING ERROR CAUSED AN INTERRUPT
1401  004636  022626                        CMP     (SP)+,(SP)+      ;RESTORE STACK POINTER
1402  004640  012710  000232                MOV     #232,@ADINT      ;CHANGE INTERRUPT ADDRESS TO CAUSE A
1403  004644  005037  000232                CLR     @#232            ;HALT IF AN INTERRUPT OCCURS
1404  004650  032713  040000                BIT     #40000,@CRS      ;WAIT FOR CARD DONE
1405  004654  001775                        BEQ     .-4
1406  004656  005013                        CLR     @CRS             ;CLEAR INTERRUPT ENABLE
1407
1408  004660  104001              TEST21:   SCOPE
1409                              ;TEST FOR NO INTERRUPT OCCURING WITH INTERRUPT ENABLE SET AND REST CLEARED
1410  004662  004737  011434                JSR     %7,INIT          ;INITIALIZE CSR TO ZERO
1411  004666  012710  004736                MOV     #TNINT,@ADINT    ;SETUP RETURN ADDRESS
1412  004672  052737  000340  177776        BIS     #340,PSR         ;SET PROCESSOR TO LEVEL 7
1413  004700  013760  177776  000002        MOV     PSR,2(ADINT)     ;STORE PROCESSOR STATUS
1414  004706  005037  177776                CLR     PSR              ;SET PROCESSOR TO LEVEL 0
1415  004712  012713  000100                MOV     #100,@CRS        ;ENABLE INTERRUPTS
1416  004716  005227  000000                INC     #0               ;WAIT AWHILE
1417  004722  001375                        BNE     .-4
1418  004724  016037  000002  177776        MOV     2(ADINT),PSR     ;RESTORE PROCESSOR TO LEVEL 7
1419  004732  005013                        CLR     @CRS             ;DISABLE FURTHER INTERRUPTS
1420  004734  000403                        BR      CONT21
1421  004736  104000              TNINT:    HLT                      ;AN INTERRUPT OCCURRED
1422  004740  022626                        CMP     (SP)+,(SP)+      ;RESTORE STACK
1423  004742  005013                        CLR     @CRS             ;DISABLE FURTHER INTERRUPTS
1424  004744  005037  000232      CONT21:   CLR     @#232            ;CHANGE INTERRUPT RETURN ADDRESS TO
1425  004750  012710  000232                MOV     #232,@ADINT      ;CAUSE A HALT IF AN INTERRUPT OCCURS
1426
1427  004754  104001              TEST22:   SCOPE
1428                              ;CHECK FOR SIMULTANEOUS INTERRUPTS ON MORE THAN ONE LEVEL
1429  004756  004737  011434                JSR     %7,INIT          ;INITIALIZE CSR TO ZERO
1430  004762  012710  005020                MOV     #T2INT,@ADINT    ;SETUP RETURN ADDRESS
1431  004766  052737  000340  177776        BIS     #340,PSR         ;SET PROCESSOR TO LEVEL 7
1432  004774  013760  177776  000002        MOV     PSR,2(ADINT)     ;STORE PROCESSOR STATUS
1433  005002  042737  000340  177776        BIC     #340,PSR         ;SET PROCESSOR TO LEVEL 0
1434  005010  012713  000103                MOV     #103,@CRS        ;SET INTERRUPT ENABLE AND EJECT A CARD
1435  005014  000001                        WAIT                     ;WAIT FOR INTERRUPT
1436  005016  000776                        BR      .-2              ;SIT IF TRACE BIT IS SET
1437  005020  022626              T2INT:    CMP     (6)+,(6)+        ;RESTORE STACK POINTER
1438  005022  012710  005044                MOV     #T2INTA,@ADINT   ;CHANGE RETRUN ADDRESS
1439  005026  005037  177776                CLR     PSR              ;SET PROCESSOR TO LEVEL 0
1440  005032  000240                        NOP                      ;WAIT
1441  005034  016037  000002  177776        MOV     2(ADINT),PSR     ;RESTORE PROCESSOR TO LEVEL 7
1442  005042  000402                        BR      CONT22
1443  005044  022626              T2INTA:   CMP     (6)+,(6)+        ;RESTORE STACK
1444  005046  104000                        HLT                      ;THE INTERRUPT OCCURRED AT 2 LEVELS
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1445  005050  005013                  CONT22: CLR     @CRS            ;DISABLE INTERRUPTS
1446  005052  005037  000232                  CLR     @#232           ;CHANGE INTERRUPT RETURN ADDRESS TO
1447  005056  012710  000232                  MOV     #232,@ADINT     ;CAUSE A HALT IF AN INTERRUPT OCCURS
1448
1449  005062  104001                  TEST23: SCOPE
1450                                  ;ALL MODES OF ADDRESSING CRB1 OR CRB2 (DATO,DATOB,DATI) SHOULD CLEAR
1451                                  ;COLUMN READY
1452  005064  004737  011434                  JSR     %7,INIT         ;INITIALIZE
1453  005070  005213                          INC     @CRS            ;START READING A CARD
1454  005072  105713                          TSTB    @CRS            ;WAIT FOR COLUMN READY
1455  005074  100376                          BPL     .-2
1456  005076  005014                          CLR     @CRB1           ;DATO TO CRB1
1457  005100  105713                          TSTB    @CRS            ;CHECK COLUMN READY
1458  005102  100002                          BPL     CNT23A          ;BRANCH IF CLEARED
1459  005104  104000                          HLT                     ;DATO TO CRB1 DIDN'T CLEAR READY
1460  005106  000467                          BR      TEST24          ;GO TO NEXT TEST
1461  005110  105713                  CNT23A: TSTB    @CRS            ;WAIT FOR COLUMN READY
1462  005112  100376                          BPL     .-2
1463  005114  105014                          CLRB    @CRB1           ;DATOB TO LOW BYTE OF CRB1
1464  005116  105713                          TSTB    @CRS            ;CHECK COLUMN READY
1465  005120  100002                          BPL     CNT23B          ;BRANCH IF CLEARED
1466  005122  104000                          HLT                     ;DATOB TO CRB1 LOW BYTE DIDN'T CLEAR READY
1467  005124  000460                          BR      TEST24          ;GO TO NEXT TEST
1468  005126  105713                  CNT23B: TSTB    @CRS            ;WAIT FOR COLUMN READY
1469  005130  100376                          BPL     .-2
1470  005132  105064  000001                CLRB    1(CRB1)         ;DATOB TO HIGH BYTE OF CRB1
1471  005136  105713                          TSTB    @CRS            ;CHECK COLUMN READY
1472  005140  100002                          BPL     CNT23C          ;BRANCH IF CLEARED
1473  005142  104000                          HLT                     ;DATOB TO CRB1 HIGH BYTE DIDN'T CLEAR READY
1474  005144  000450                          BR      TEST24          ;GO TO NEXT TEST
1475  005146  105713                  CNT23C: TSTB    @CRS            ;WAIT FOR COLUMN READY
1476  005150  100376                          BPL     .-2
1477  005152  005714                          TST     @CRB1           ;DATI TO CRB1
1478  005154  105713                          TSTB    @CRS            ;CHECK COLUMN READY
1479  005156  100002                          BPL     CNT23D          ;BRANCH IF CLEARED
1480  005160  104000                          HLT                     ;DATI TO CRB1 DIDN'T CLEAR READY
1481  005162  000441                          BR      TEST24          ;GO TO NEXT TEST
1482  005164  105713                  CNT23D: TSTB    @CRS            ;WAIT FOR COLUMN READY
1483  005166  100376                          BPL     .-2
1484  005170  005077  173444                CLR     @CRB2           ;DATO TO CRB2
1485  005174  105713                          TSTB    @CRS            ;CHECK COLUMN READY
1486  005176  100002                          BPL     CNT23E          ;BRANCH IF CLEARED
1487  005200  104000                          HLT                     ;DATO TO CRB2 DIDN'T CLEAR READY
1488  005202  000431                          BR      TEST24          ;GO TO NEXT TEST
1489  005204  105713                  CNT23E: TSTB    @CRS            ;WAIT FOR COLUMN READY
1490  005206  100376                          BPL     .-2
1491  005210  105077  173424                CLRB    @CRB2           ;DATOB TO LOW BYTE OF CRB2
1492  005214  105713                          TSTB    @CRS            ;CHECK COLUMN READY
1493  005216  100002                          BPL     CNT23F          ;BRANCH IF CLEARED
1494  005220  104000                          HLT                     ;DATOB TO CRB2 LOW BYTE DIDN'T CLEAR READY
1495  005222  000421                          BR      TEST24          ;GO TO NEXT TEST
1496  005224  105713                  CNT23F: TSTB    @CRS            ;WAIT FOR COLUMN READY
1497  005226  100376                          BPL     .-2
1498  005230  013702  000640                MOV     CRB2,R2         ;LOAD POINTER
1499  005234  105062  000001                CLRB    1(R2)           ;DATOB TO HIGH BYTE OF CRB2
1500  005240  105713                          TSTB    @CRS            ;CHECK COLUMN READY
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1501  005242  100002                          BPL     CNT23G          ;BRANCH IF CLEARED
1502  005244  104000                          HLT                     ;DATOB TO CRB2 HIGH BYTE DIDN'T CLEAR READY
1503  005246  000407                          BR      TEST24          ;GO TO NEXT TEST
1504
1505  005250  105713              CNT23G:     TSTB    @CRS            ;WAIT FOR COLUMN READY
1506  005252  100376                          BPL     .-2
1507  005254  005777  173360                  TST     @CRB2           ;DATI TO CRB2
1508  005260  105713                          TSTB    @CRS            ;CHECK COLUMN READY
1509  005262  100001                          BPL     TEST24          ;BRANCH IF CLEARED
1510  005264  104000                          HLT                     ;DATI TO CRB2 DIDN'T CLEAR READY
1511
1512  005266  104001              TEST24:     SCOPE
1513                              ;SETTING EJECT AFTER A COLUMN READY WITHOUT CLEARING THE COLUMN READY
1514                              ;SHOULD SET TIMING ERROR (WHICH IN TURN SHOULD CLEAR COLUMM READY)
1515  005270  004737  011434                  JSR     %7,INIT         ;INITIALIZE
1516  005274  005213                          INC     @CRS            ;START READING A CARD
1517  005276  105713                          TSTB    @CRS            ;CHECK COLUMN READY - WAIT
1518  005300  100376                          BPL     .-2
1519  005302  052713  000002                  BIS     #2,@CRS         ;SET EJECT
1520  005306  105713                          TSTB    @CRS            ;CHECK COLUMN READY
1521  005310  100402                          BMI     CNT24A          ;BRANCH IF STILL SET
1522  005312  104000                          HLT                     ;SETTING EJECT CLEARED COLUMN READY
1523  005314  000421                          BR      END24           ;BRANCH TO WAIT FOR DONE AFTER ERROR
1524  005316  032713  004000      CNT24A:     BIT     #4000,@CRS      ;CHECK TIMING ERROR
1525  005322  001013                          BNE     TIM24           ;BRANCH IF SET
1526  005324  032713  040400                  BIT     #40400,@CRS     ;CHECK CARD DONE AND OFF-LINE
1527  005330  001772                          BEQ     CNT24A          ;LOOP IF NONE SET
1528  005332  032713  040000                  BIT     #40000,@CRS     ;CARD DONE SET?
1529  005336  001003                          BNE     CNT24B          ;YES - BRANCH TO ERROR PRINTOUT
1530  005340  004737  011506                  JSR     %7,CKBIT8       ;NO - BIT 8 WAS SET SO OUTPUT MESSAGE
1531  005344  000415                          BR      ENDCK           ;BRANCH AFTER COMING BACK ON-LINE
1532  005346  104000              CNT24B:     HLT                     ;CARD DONE SET BUT TIMING ERROR DIDN'T
1533  005350  000413                          BR      ENDCK           ;BRANCH TO NEXT SECTION
1534  005352  105713              TIM24:      TSTB    @CRS            ;CHECK COLUMN READY
1535  005354  100001                          BPL     .+4             ;BRANCH IF NOT SET
1536  005356  104000                          HLT                     ;TIMING ERROR DIDN'T CLEAR READY
1537  005360  032713  040400      END24:      BIT     #40400,@CRS     ;WAIT FOR CARD DONE OR OFF-LINE
1538  005364  001775                          BEQ     END24
1539  005366  032713  000400                  BIT     #400,@CRS       ;CHECK OFF LINE
1540  005372  001402                          BEQ     ENDCK           ;BRANCH IF NOT SET
1541  005374  004737  011506                  JSR     %7,CKBIT8       ;OUTPUT ERROR MESSAGE
1542
1543                              ;CHECK SW7 AND RETURN TO TEST1 IF SET, AFTER RINGING BELL
1544                              ;OTHERWISE GO INTO THE DATA TEST
1545  005400  104001              ENDCK:      SCOPE
1546  005402  032777  000200  173206          BIT     #200,@SWR
1547  005410  001406                          BEQ     DATST
1548  005412  004737  011462                  JSR     %7,BELL
1549  005416  005137  000644                  COM     TRFLG           ;TOGGLE TRACE FLAG
1550  005422  000137  000742                  JMP     RESTRT
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1551
1552
1553                            ;*********************************************************
1554                            ;DATA RELIABILITY TEST FOR CR11
1555                            ;*********************************************************
1556
1557                            ;CHECK SR FOR TYPE OF DECK BEING TESTED, AND INITIALIZE POINTERS
1558  005426  012737  000056  006646  DATST:  MOV     #56,CDCNT       ;SETUP CARD COUNT TO ENTER TABLE CORRESPONDING TO NEXT C
1559  005434  000410                  BR      DATST2          ;SKIP NEXT INSTRUCTION
1560  005436  022737  000176  000616  DATST1: CMP     #SWREG,SWR
1561  005444  001002                  BNE     1$
1562  005446  104002                  CNTLU
1563  005450  104006                  CKU
1564  005452  005037  006646          1$:     CLR     CDCNT           ;SETUP CARD COUNT TO ENTER DATA TABLE AT BEGINNING
1565  005456  005037  000650          DATST2: CLR     ERFLG           ;FLAG SET PREVENTS PRINTING OUT ERROR HEADING
1566  005462  032777  000020  173126          BIT     #20,@SWR                ;CHECK BIT 4 OF SR FOR TYPE OF DECK
1567  005470  001412                  BEQ     ALP1            ;BRANCH IF NOT SET TO LOAD ALPHANUMERIC POINTERS
1568  005472  012737  013524  006642          MOV     #BINCD,TSTART   ;BIT 2 SET, LOAD BINARY TABLE POINTERS
1569  005500  012737  014222  006644          MOV     #BINEND,TEND
1570  005506  012737  015627  006640          MOV     #MSG15,DECK
1571  005514  000411                  BR      CONTD           ;BRANCH AROUND ALPHANUMERIC POINTERS
1572  005516  012737  013024  006642  ALP1:   MOV     #ALPCD,TSTART   ;LOAD ALPHANUMERIC TABLE POINTERS
1573  005524  012737  013522  006644          MOV     #ALPEND,TEND
1574  005532  012737  015616  006640          MOV     #MSG14,DECK
1575  005540  005737  000644          CONTD:  TST     TRFLG           ;CHECK TRACE TRAP FLAG
1576  005544  001004                  BNE     TRP1            ;BRANCH IF FLAG WAS SET
1577  005546  012737  000340  177776  NOTRP1: MOV     #340,PSR        ;CLEAR TRACE BIT
1578  005554  000407                  BR      DCNT1
1579  005556  032777  010000  173032  TRP1:   BIT     #10000,@SWR     ;CHECK SW12 TO INHIBIT TRACE TRAPPING
1580  005564  001370                  BNE     NOTRP1          ;BRANCH IF SET
1581  005566  012737  000360  177776          MOV     #360,PSR        ;SET TRACE BIT
1582  005574  004737  011434          DCNT1:  JSR     %7,INIT         ;INITIALIZE CARD READER STATUS REGISTER
1583                            ;SET UP INTERRUPT SERVICING, AND START READING
1584  005600  012710  005634          MOV     #SRVC,@ADINT    ;SETUP RETURN POINTER
1585  005604  042737  000340  177776  BIC     #340,PSR        ;SET PROCESSOR TO LEVEL 0
1586  005612  013760  177776  000002  MOV     PSR,2(ADINT)    ;STORE CURRENT STATUS
1587  005620  004737  006540          JSR     %7,NXCRD        ;ADJUST POINTER AND START READING
1588  005624  052713  000101          BIS     #101,@CRS       ;ENABLE INTERRUPTS
1589  005630  000001                  WAIT                    ;WAIT FOR INTERRUPTS
1590  005632  000776                  BR      .-2
1591
1592                            ;INTERRUPT SERVICE ROUTINE WHICH RUNS DATA RELIABILITY TEST
1593  005634  005713          SRVC:   TST     @CRS            ;CHECK SPECIAL CONDITION (BIT 15)
1594  005636  100460                  BMI     ERSET           ;BRANCH IF SET
1595  005640  105713                  TSTB    @CRS            ;CHECK COLUMN READY
1596  005642  100402                  BMI     .+6             ;BRANCH IF SET
1597  005644  000137  006412          JMP     NOTCOL          ;JUMP IF NOT SET
1598  005650  005237  006650          INC     CLCNT           ;KEEP TRACK OF COLUMN NUMBER
1599  005654  011437  006652          MOV     @CRB1,DAT1      ;STORE DATA OF FIRST READ
1600  005660  105713                  TSTB    @CRS            ;MAKE SURE COLUMN READY CLEARED
1601  005662  100006                  BPL     SCONT1          ;BRANCH IF IT DID
1602  005664  052737  000340  177776          BIS     #340,PSR        ;SET PROCESSOR TO LEVEL 7
1603  005672  104000                  HLT                     ;READING DATA DIDN'T CLEAR COLUMN READY
1604  005674  000137  006432          JMP     LASTCK          ;GO TO NEXT CARD AFTER ERROR PRINTOUT
1605  005700  017737  172734  006656  SCONT1: MOV     @CRB2,DATENC    ;STORE ENCODED DATA
1606  005706  012701  000010          MOV     #10,COUNT       ;WAIT AWHILE
```

```
1607  005712  005301                          DEC     COUNT
1608  005714  001376                          BNE     .-2
1609  005716  011437  006654                  MOV     @CRB1,DAT2      ;STORE DATA OF SECOND READ
1610  005722  005037  006660                  CLR     PTOFF           ;CLEAR POINTER OFFSET
1611  005726  023715  006652                  CMP     DAT1,@R5        ;CHECK FIRST DATA READ
1612  005732  001053                          BNE     FAIL            ;PRINTOUT IF WRONG
1613  005734  012737  000002  006660          MOV     #2,PTOFF        ;SET POINTER OFFSET
1614  005742  023725  006654                  CMP     DAT2,(R5)+      ;CHECK SECOND READING OF SAME DATA
1615  005746  001045                          BNE     FAIL            ;BRANCH IF WRONG
1616  005750  012737  000004  006660          MOV     #4,PTOFF        ;SET POINTER OFFSET
1617  005756  023725  006656                  CMP     DATENC,(R5)+    ;CHECK ENCODED DATA
1618  005762  001037                          BNE     FAIL            ;BRANCH IF WRONG
1619  005764  020537  006644                  CMP     R5,TEND         ;CHECK FOR END OF TABLE
1620  005770  100402                          BMI     .+6             ;IF NOT THERE, RTI
1621  005772  013705  006642                  MOV     TSTART,R5       ;MOVE POINTER TO LOOP THRU TABLE
1622  005776  000002                          RTI
1623                                  ;SPECIAL CONDITION BIT 15 WAS SET WHEN THE INTERRUPT SERVICE ROUTINE
1624                                  ;WAS ENTERED
1625                                  ;OUTPUT A MESSAGE AND HALT
1626  006000  052737  000340  177776  ERSET:  BIS     #340,PSR        ;LOCK OUT INTERRUPTS
1627  006006  104003                          KBINTT
1628  006010  022737  000120  006646          CMP     #80.,CDCNT      ;CHECK FOR LAST CARD
1629  006016  001006                          BNE     ER1             ;IF NOT, PRINT OUT MESSAGE
1630  006020  022737  000120  006650          CMP     #80.,CLCNT      ;IF LAST CARD, CHECK FOR LAST COLUMN
1631  006026  001002                          BNE     ER1             ;IF NOT, PRINT MESSAGE
1632  006030  000137  006662                  JMP     ALLDON          ;IF END OF DECK, JUMP
1633  006034  012702  015640          ER1:    MOV     #MSG16,R2       ;'BIT 15 WAS SET.''
1634  006040  004737  012152                  JSR     %7,TOUT
1635  006044  012702  015661                  MOV     #MSG17,R2       ;'REMEDY THE ERROR CONDITION
1636  006050  004737  012152                  JSR     %7,TOUT         ;AND PRESS CONTINUE''
1637  006054  000000                          HALT
1638  006056  000137  006432                  JMP     LASTCK          ;SET UP FOR NEXT CARD AND GO ON
1639  006062  052737  000340  177776  FAIL:   BIS     #340,PSR        ;LOCK OUT INTERRUPTS
1640  006070  052713  000002                  BIS     #2,@CRS         ;SET EJECT TO PREVENT TIMING ERROR
1641  006074  005714                          TST     @CRB1           ;MAKE SURE COLUMN READY IS CLEARED
1642  006076  032777  020000  172512          BIT     #20000,@SWR     ;CK SW13
1643  006104  001431                          BEQ     FAILCN          ;CONTINUE IF NOT SET
1644  006106  005777  172504                  TST     @SWR            ;IF SET, CHECK FOR HALT ON ERROR
1645  006112  100003                          BPL     FAILC           ;BRANCH IF HALT ON ERROR NOT SET
1646  006114  000000                          HALT                    ;HALT ON ERROR SET
1647  006116  000137  006432                  JMP     LASTCK          ;CONTINUE  AFTER HALT
1648  006122  032713  040000          FAILC:  BIT     #40000, @CRS    ;CHECK FOR CARD DONE
1649  006126  001402                          BEQ     .+6
1650  006130  000137  006432                  JMP     LASTCK          ;INHIBIT PRINTOUT AFTER CARD DONE SET
1651  006134  032713  000400                  BIT     #400,@CRS       ;CHECK FOR OFF-LINE
1652  006140  001770                          BEQ     FAILC           ;BRANCH IF NOT
1653  006142  022737  000120  006646          CMP     #80.,CDCNT      ;CHECK FOR LAST CARD
1654  006150  001002                          BNE     .+6
1655  006152  000137  006662                  JMP     ALLDON          ;IF LAST CARD, WAIT FOR NEXT DECK
1656  006156  004737  011506                  JSR     %7,CKBIT8       ;IF NOT LAST CARD, PRINT MESSAGE
1657  006162  004737  006540                  JSR     %7,NXCRD        ;START NEXT CARD THRU READER
1658  006166  000002                          RTI
1659  006170  005737  000650          FAILCN: TST     ERFLG           ;TEST FLAG FOR PREVIOUS PRINTOUT
1660  006174  001006                          BNE     NOHD            ;IF SET,  DON'T OUTPUT HEADING
1661  006176  005237  000650                  INC     ERFLG           ;SET FLAG
1662  006202  012702  015526                  MOV     #MSG13,R2       ;OUTPUT HEADING FOR DATA ERROR PRINTOUT
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1663  006206  004737  012152              NOHD:   JSR     %7,TOUT
1664  006212  013702  006640                      MOV     DECK,R2         ;OUTPUT TYPE OF DECK
1665  006216  004737  012152                      JSR     %7,TOUT
1666  006222  004737  011542                      JSR     %7,SPACE
1667  006226  013702  006646                      MOV     CDCNT,R2        ;OUTPUT CARD NUMBER WHERE ERROR OCCURRED
1668  006232  004737  011734                      JSR     %7,PROCT
1669  006236  004737  011542                      JSR     %7,SPACE
1670  006242  013702  006650                      MOV     CLCNT,R2        ;OUTPUT COLUMN NUMBER WHERE ERROR OCCURRED
1671  006246  004737  011734                      JSR     %7,PROCT
1672  006252  004737  011542                      JSR     %7,SPACE
1673  006256  163705  006660                      SUB     PTOFF,R5        ;SUBTRACT OFFSET FROM POINTER TO POINT TO
1674                                                                        ;ADDRESS OF DESIRED PATTERN
1675  006262  012502                             MOV     (R5)+,R2        ;OUTPUT CORRECT DATA PATTERN (NOT ENCODED)
1676  006264  004737  011734                      JSR     %7,PROCT
1677  006270  004737  011542                      JSR     %7,SPACE
1678  006274  013702  006652                      MOV     DAT1,R2         ;OUTPUT DATA READ ON FIRST READING OF BUFFER
1679  006300  004737  011734                      JSR     %7,PROCT
1680  006304  004737  011542                      JSR     %7,SPACE
1681  006310  013702  006654                      MOV     DAT2,R2         ;OUTPUT DATA READ ONE MILLISECOND LATER
1682  006314  004737  011734                      JSR     %7,PROCT
1683  006320  004737  011542                      JSR     %7,SPACE
1684  006324  011502                             MOV     @R5,R2          ;OUTPUT CORRECT DATA PATTERN (ENCODED FORM)
1685  006326  004737  011734                      JSR     %7,PROCT
1686  006332  004737  011542                      JSR     %7,SPACE
1687  006336  013702  006656                      MOV     DATENC,R2       ;OUTPUT DATA READ (ENCODED)
1688  006342  004737  011734                      JSR     %7,PROCT
1689  006346  104003                             KBINTT
1690  006350  005777  172242                      TST     @SWR            ;CHECK "HALT ON ERROR" SWITCH
1691  006354  100001                             BPL     .+4             ;BRANCH IF NOT SET
1692  006356  000000                             HALT                    ;HALT AFTER AN ERROR
1693  006360  005713                             TST     @CRS            ;CHECK ERROR
1694  006362  100023                             BPL     LASTCK          ;BRANCH IF NOT SET
1695  006364  022737  000120  006646              CMP     #80.,CDCNT      ;CHECK FOR LAST CARD
1696  006372  001005                             BNE     FAILC1
1697  006374  032713  000400                      BIT     #400,@CRS
1698  006400  001423                             BEQ     LASTCD
1699  006402  000137  006662                      JMP     ALLDON
1700  006406  000137  006000          FAILC1:     JMP     ERSET           ;OUTPUT ERROR MESSAGE
1701
1702                                            ;INTERRUPT NOT DUE TO ERROR OR COLUMN READY
1703  006412  032713  040000          NOTCOL:     BIT     #40000,@CRS     ;CHECK FOR CARD DONE
1704  006416  001474                             BEQ     NOTCD           ;BRANCH IF NOT SET
1705  006420  022737  000120  006650              CMP     #80.,CLCNT      ;CHECK COLUMN COUNT
1706  006426  001401                             BEQ     .+4             ;SKIP ERROR HALT IF 80 COLUMNS WERE READ
1707  006430  104000                             HLT                     ;LESS THAN EIGHTY COLUMNS WERE READ
1708  006432  022737  000120  006646  LASTCK:     CMP     #80.,CDCNT      ;CHECK FOR LAST CARD
1709  006440  001403                             BEQ     LASTCD          ;BRANCH IF LAST CARD
1710  006442  004737  006540                      JSR     %7,NXCRD        ;IF NOT LAST CARD
1711  006446  000002                             RTI                     ;GO ON
1712  006450  022626                  LASTCD:     CMP     (SP)+,(SP)+     ;IF LAST CARD, RESTORE STACK POINTER
1713  006452  004737  011462                      JSR     %7,BELL         ;RING BELL TO SIGNIFY "PASS COMPLETE"
1714  006456  013702  000042                      MOV     @#42,R2         ;MONITOR HOOK
1715  006462  001405                             BEQ     END
1716  006464  000005                             RESET
1717  006466  004712                  LOGIC:      JSR     %7,(R2)
1718  006470  000240                             NOP
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 1719  006472  000240                          NOP
 1720  006474  000240                          NOP
 1721  006476  032777  000040  172112  END:    BIT     #40,@SWR                ;CHECK SR FOR CONTINUATION TO ANOTHER DECK
 1722  006504  001002                          BNE     .+6                     ;BRANCH TO HALT IF SW5 SET
 1723  006506  000137  006514                  JMP     DECKCK                  ;CONTINUE TO ANOTHER DECK
 1724  006512  000000                          HALT                            ;DATA TEST DONE
 1725
 1726                                  ;WHEN CONTINUING FROM ONE DECK TO ANOTHER, CHECK SW6 FOR TYPE
 1727                                  ;OF TESTING TO BE PERFORMED
 1728  006514  005137  000644          DECKCK: COM     TRFLG                   ;TOGGLE TRACE FLAG
 1729  006520  032777  000100  172070          BIT     #100,@SWR               ;CHECK SW6
 1730  006526  001402                          BEQ     .+6                     ;BRANCH IF NOT SET
 1731  006530  000137  000742                  JMP     RESTRT                  ;RERUN COMBINED INSTRUCTION AND DATA TEST
 1732  006534  000137  005436                  JMP     DATST1
 1733
 1734  006540  013705  006642          NXCRD:  MOV     TSTART,R5               ;LOAD R5 WITH TABLE STARTING ADDRESS
 1735  006544  006337  006646                  ASL     CDCNT                   ;MULTIPLY CARD COUNT BY FOUR
 1736  006550  006337  006646                  ASL     CDCNT
 1737  006554  063705  006646                  ADD     CDCNT,R5                ;ADD OFFSET TO R5 TO POINT TO NEXT DATUM
 1738  006560  006237  006646                  ASR     CDCNT                   ;RESTORE CARD COUNT
 1739  006564  006237  006646                  ASR     CDCNT
 1740  006570  042713  000002                  BIC     #2,@CRS                 ;CLEAR EJECT IF SET
 1741  006574  005213                          INC     @CRS                    ;READ ANOTHER CARD
 1742  006576  005237  006646                  INC     CDCNT                   ;KEEP TRACK OF CARD NUMBER
 1743  006602  005037  006650                  CLR     CLCNT                   ;INITIALIZE COLUMN COUNT
 1744  006606  000207                          RTS     %7                      ;RETURN
 1745                                  ;INTERRUPT NOT CAUSED BY ERROR, COLUMN READY, OR CARD DONE
 1746  006610  052737  000340  177776  NOTCD:  BIS     #340,PSR                ;LOCK OUT FURTHER INTERRUPTS
 1747  006616  032713  002000                  BIT     #2000,@CRS              ;TEST ON-LINE TRANSITION BIT
 1748  006622  001003                          BNE     NOTCD1                  ;BRANCH IF SET
 1749  006624  104000                          HLT                             ;NO BITS SET TO CAUSE AN INTERRUPT
 1750  006626  000137  006432                  JMP     LASTCK                  ;START NEXT CARD
 1751  006632  104000          NOTCD1: HLT                                     ;ON-LINE TRANSITION CAUSED AN INTERRUPT
 1752  006634  000137  006432                  JMP     LASTCK                  ;START NEXT CARD
 1753  006640  000000          DECK:   0                                       ;POINTER TO LITERAL ''ALPHA'' OR 'BINARY''
 1754  006642  000000          TSTART: 0                                       ;STARTING ADDRESS OF DATA TABLE
 1755  006644  000000          TEND:   0                                       ;END ADDRESS OF DATA TABLE
 1756  006646  000000          CDCNT:  0                                       ;NUMBER OF CARD BEING READ
 1757  006650  000000          CLCNT:  0                                       ;NUMBER OF COLUMN BEING CHECKED
 1758  006652  000000          DAT1:   0                                       ;DATA ON FIRST READ FROM CRB1
 1759  006654  000000          DAT2:   0                                       ;DATA ON SECOND READ OF CRB1
 1760  006656  000000          DATENC: 0                                       ;DATA READ FROM CRB2
 1761  006660  000000          PTOFF:  0                                       ;OFFSET TO POINTER FOR DATA PRINTOUT
 1762  006662  004737  011462  ALLDON: JSR     %7,BELL                         ;RING BELL
 1763  006666  032713  000400                  BIT     #400,@CRS               ;CHECK OFF-LINE BIT
 1764  006672  001001                          BNE     .+4                     ;BRANCH IF SET
 1765  006674  104000                          HLT                             ;OFF-LINE NOT SET, BUT SPECIAL CONDITION
 1766                                          ;WAS SET AFTER 80 COLUMNS OF THE 80TH CARD WERE READ
 1767  006676  032777  000040  171712          BIT     #40,@SWR                        ;CHECK SR FOR HALT AT END OF DECK
 1768  006704  001403                          BEQ     ALCNT                   ;CONTINUE IF NOT SET
 1769  006706  000000                          HALT                            ;END OF DECK,SW5 SET
 1770  006710  000137  006514                  JMP     DECKCK                  ;CHECK FOR TYPE OF TESTING
 1771  006714  032777  002000  171674  ALCNT:  BIT     #2000,@SWR              ;DOES THIS CR11 USE THE M829 MODULE?
 1772  006722  001025                          BNE     ALCNT1                  ;YES- BRANCH
 1773  006724  005027  000000                  CLR     #0                      ;NO-STALL TO ALLOW CARD DONE TO SET
 1774  006730  005337  006726                  DEC     .-2
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1775  006734  001375                          BNE     .-4
1776  006736  005327  000000                  DEC     #0
1777  006742  001375                          BNE     .-4
1778  006744  005327  000000                  DEC     #0
1779  006750  001375                          BNE     .-4
1780  006752  032713  040000                  BIT     #40000, @CRS    ;CHECK CARD DONE
1781  006756  001001                          BNE     .+4
1782  006760  104000                          HLT                     ;CARD DONE DIDN'T SET- THIS ERROR COULD BE
1783  006762  005013                          CLR     @CRS            ;CAUSED BY RUNNING A CR11 WHICH HAS THE
1784                                                                  ;M829 MODULE AND NOT SETTING SWITCH REGISTER
1785                                                                  ;SWITCH 10
1786
1787  006764  032713  157377                  BIT     #157377,@CRS    ;ONLY BIT 8 MAY STILL BE SET
1788  006770  001401                          BEQ     .+4             ;BRANCH IF OK
1789  006772  104000                          HLT                     ;STATUS REGISTER INCORRECT
1790  006774  000405                          BR ALCNT2
1791  006776  005013          ALCNT1:         CLR     @CRS            ;CLEAR ERROR
1792  007000  032713  156377                  BIT     #156377,@CRS    ;ONLY BITS 8 AND 9 MAY STILL BE SET
1793                                                                  ;BIT 9 MAY BE SET SINCE CARD MAY NOT
1794                                                                  ;YET HAVE CLEARED THE READER TO CAUSE
1795                                                                  ;CARD DONE
1796  007004  001401                          BEQ     .+4
1797  007006  104000                          HLT                     ;STATUS REGISTER INCORRECT
1798  007010  052737  000340  177776  ALCNT2: BIS     #340,PSR        ;SET PROCESSOR TO LEVEL 7
1799  007016  013760  177776  000002          MOV     PSR,2(ADINT)    ;SETUP RETURN STATUS
1800  007024  105213                          INCB    @CRS            ;ATTEMPT TO READ- SHOULD RESET ERROR
1801  007026  005713                          TST     @CRS            ;CHECK BIT 15
1802  007030  100402                          BMI     ALLOK           ;BRANCH IF OK
1803  007032  104000                          HLT                     ;SETTING READ DIDN'T RESET ERROR
1804  007034  000416                          BR      ALWAIT          ;BRANCH TO WAIT FOR ON-LINE
1805  007036  012710  007070          ALLOK:  MOV     #SRVC1,@ADINT   ;LOAD INTERRUPT RETURN ADDRESS
1806  007042  005037  177776                  CLR     PSR             ;SET PROCESSOR TO LEVEL 0
1807  007046  012713  000101                  MOV     #101,@CRS       ;ENABLE INTERRUPTS, KEEP ERROR SET BY SETTING READ
1808  007052  000240                          NOP                     ;CLOCK IN INTERRUPT
1809  007054  016037  000002  177776          MOV     2(ADINT),PSR    ;SET PROCESSOR TO LEVEL 7
1810  007062  005013                          CLR     @CRS            ;CLEAR INTERRUPT ENABLE AND ERROR
1811  007064  104000                          HLT                     ;BIT 15 DIDN'T CAUSE AN INTERRUPT
1812  007066  000402                          BR      .+6
1813  007070  022626          SRVC1:  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1814  007072  005013          ALWAIT: CLR     @CRS            ;CLEAR INTERRUPT ENABLE AND ERROR
1815  007074  012710  007132                  MOV     #SRVC2,@ADINT   ;CHANGE INTERRUPT RETURN ADDRESS
1816  007100  112713  000100                  MOVB    #100,@CRS       ;ENABLE INTERRUPTS
1817  007104  042737  000340  177776          BIC     #340,PSR        ;SET PROCESSOR TO LEVEL 0
1818  007112  032713  000400                  BIT     #400,@CRS       ;CHECK OFF-LINE BIT
1819  007116  001375                          BNE     .-4             ;LOOP UNTIL CLEAR
1820  007120  016037  000002  177776          MOV     2(ADINT),PSR    ;SET PROCESSOR TO LEVEL 7
1821  007126  104000                          HLT                     ;NO INTERRUPT OCCURRED
1822  007130  000403                          BR      SRVC2A          ;BRANCH AROUND
1823  007132  004737  011462          SRVC2:  JSR     %7,BELL         ;RING BELL
1824  007136  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
1825  007140  032713  002000          SRVC2A: BIT     #2000,@CRS      ;CHECK BIT 10
1826  007144  001001                          BNE     .+4             ;BRANCH IF SET
1827  007146  104000                          HLT                     ;BIT 10 NOT SET
1828  007150  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
1829  007154  001401                          BEQ     .+4             ;BRANCH IF NOT SET
1830  007156  104000                          HLT                     ;BIT 8 WAS SET
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1831  007160  005013                          CLR     @CRS            ;DATO TO CRS
1832  007162  032713  002000                  BIT     #2000,@CRS      ;CHECK BIT 10
1833  007166  001401                          BEQ     .+4             ;BRANCH IF NOT SET
1834  007170  104000                          HLT                     ;DATO DIDN'T CLEAR ON-LINE BIT
1835  007172  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK FROM INITIAL INTERRUPT
1836  007174  000137  006514                  JMP     DECKCK          ;RESTART
1837
1838  007200  005037  000632          ERCR11: CLR     FLAG
1839  007204  000403                          BR      TSTA
1840  007206  012737  000001  000632  ERCM11: MOV     #1,FLAG
1841  007214  104007                  TSTA:   TIT
1842  007216  012702  016231                  MOV     #SUBT2,R2
1843  007222  004737  000652                  JSR     %7,SETUP        ;INITIALIZE REGISTERS
1844  007226  012737  007236  012150        MOV     #TESTA+2,RETURN ;SETUP SCOPE LOOP RETURN ADDRESS
1845                          ;THE CARD READER GOING OFF-LINE SHOULD SET SPECIAL CONDITION (BIT 15) AND OFF-LINE (BIT
1846  007234  104001                  TESTA:  SCOPE
1847  007236  005037  012144                  CLR     ITMAX           ;RUN EACH ERROR TEST ONCE ONLY
1848  007242  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
1849  007246  012702  014410                  MOV     #MSG3,R2        ;'PRESS CARD READER 'READ STOP'''
1850  007252  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
1851  007256  001402                          BEQ     .+6             ;NO
1852  007260  012702  014450                  MOV     #MSG3A,R2       ;'PRESS CARD READER 'STOP'''
1853  007264  004737  012152                  JSR     %7,TOUT
1854  007270  012702  014343                  MOV     #MSG2,R2
1855  007274  004737  012152                  JSR     %7,TOUT         ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
1856  007300  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
1857  007304  000000                          HALT
1858  007306  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
1859  007312  001001                          BNE     .+4             ;BRANCH IF SET
1860  007314  104000                          HLT                     ;OFF-LINE (BIT 8) WASN'T SET
1861  007316  005713                          TST     @CRS            ;CHECK BIT 15
1862  007320  100401                          BMI     .+4             ;BRANCH IF SET
1863  007322  104000                          HLT                     ;BIT 15 WASN'T SET
1864  007324  012702  014224                  MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START''';
1865  007330  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
1866  007334  001402                          BEQ     .+6             ;NO
1867  007336  012702  014307                  MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
1868  007342  004737  012152                  JSR     %7,TOUT
1869  007346  012702  014343                  MOV     #MSG2,R2
1870  007352  004737  012152                  JSR     %7,TOUT         ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
1871  007356  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
1872  007362  000000                          HALT
1873  007364  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
1874  007370  001375                          BNE     .-4
1875
1876                          ;INPUT HOPPER EMPTY SHOULD SET SPECIAL CONDITION
1877  007372  104001                  TESTB:  SCOPE
1878  007374  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
1879  007400  012702  014536                  MOV     #MSG5,R2        ;'REMOVE ALL CARDS FROM THE INPUT HOPPER''
1880  007404  004737  012152                  JSR     %7,TOUT
1881  007410  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
1882  007414  004737  012152                  JSR     %7,TOUT
1883  007420  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
1884  007424  000000                          HALT
1885  007426  032713  000400                  BIT     #400,@CRS       ;CHECK BIT8
1886  007432  001001                          BNE     .+4             ;BRANCH IF SET
```

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 1887  007434  104000                          HLT                     ;OFF-LINE (BIT 8) WASN'T SET
 1888  007436  005713                          TST     @CRS            ;CHECK SPECIAL CONDITION BIT
 1889  007440  100401                          BMI     .+4             ;BRANCH IF SET
 1890  007442  104000                          HLT                     ;SPECIAL CONDITION NOT SET
 1891  007444  012702  014607                  MOV     #MSG6,R2        ;'RESTORE CARDS IN INPUT HOPPER''
 1892  007450  004737  012152                  JSR     %7,TOUT
 1893  007454  012702  014224                  MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
 1894  007460  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
 1895  007464  001402                          BEQ     .+6             ;NO
 1896  007466  012702  014307                  MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
 1897  007472  004737  012152                  JSR     %7,TOUT
 1898  007476  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
 1899  007502  004737  012152                  JSR     %7,TOUT
 1900  007506  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
 1901  007512  000000                          HALT
 1902  007514  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
 1903  007520  001375                          BNE     .-4
 1904
 1905                          ;OUTPUT STACKER FULL SHOULD SET BIT 15
 1906  007522  104001          TESTC:  SCOPE
 1907  007524  004737  011434                  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
 1908  007530  012702  014653                  MOV     #MSG7,R2        ;'RAISE OUTPUT STACKER PRESSURE ARM ABOVE HORIZONTAL THE
 1909  007534  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
 1910  007540  001402                          BEQ     .+6             ;NO
 1911  007542  012702  014771                  MOV     #MSG7A,R2       ;'LOWER OUTPUT STACKER PLATE TO BOTTOM''
 1912  007546  004737  012152                  JSR     %7,TOUT
 1913  007552  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
 1914  007556  004737  012152                  JSR     %7,TOUT
 1915  007562  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
 1916  007566  000000                          HALT
 1917  007570  032713  000400                  BIT     #400,@CRS       ;CHECK BIT 8
 1918  007574  001001                          BNE     .+4             ;BRANCH IF SET
 1919  007576  104000                          HLT                     ;OFF-LINE (BIT 8) WASN'T SET
 1920  007600  005713                          TST     @CRS            ;CHECK SPECIAL CONDITION BIT
 1921  007602  100401                          BMI     .+4             ;BRANCH IF SET
 1922  007604  104000                          HLT                     ;SPECIAL CONDITION NOT SET
 1923  007606  012702  014224                  MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
 1924  007612  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
 1925  007616  001402                          BEQ     .+6             ;NO
 1926  007620  012702  014307                  MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
 1927  007624  004737  012152                  JSR     %7,TOUT
 1928  007630  012702  014343                  MOV     #MSG2,R2
 1929  007634  004737  012152                  JSR     %7,TOUT         ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
 1930  007640  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
 1931  007644  000000                          HALT
 1932  007646  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
 1933  007652  001375                          BNE     .-4
 1934
 1935                          ;A FEED ERROR SHOULD SET BIT 15
 1936                          ;THIS ERROR OCCURS WHEN THE FEED MECHANISM FAILS TO DELIVER A CARD TO THE READ STATION
 1937  007654  104001          TESTD:  SCOPE
 1938  007656  004737  011434                  JSR     %7,INIT
 1939  007662  012702  014536                  MOV     #MSG5,R2        ;'REMOVE ALL CARDS FROM THE INPUT HOPPER''
 1940  007666  004737  012152                  JSR     %7,TOUT
 1941  007672  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
 1942  007676  004737  012152                  JSR     %7,TOUT
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1943  007702  012702  015040                MOV     #MSG8,R2        ;'HOLD DOWN THE SWITCH AT THE BOTTOM OF INPUT HOPPER
1944  007706  005737  000632                TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
1945  007712  001402                       BEQ     .+6             ;NO
1946  007714  012702  015131                MOV     #MSG8A,R2       ;'LIFT SWITCH UNDER RIFFLE CAP
1947  007720  004737  012152                JSR     %7,TOUT
1948  007724  012702  014224                MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'
1949  007730  005737  000632                TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
1950  007734  001402                       BEQ     .+6             ;NO
1951  007736  012702  014307                MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
1952  007742  004737  012152                JSR     %7,TOUT
1953  007746  004737  012274                JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
1954  007752  000000                       HALT
1955  007754  032713  002000                BIT     #2000,@CRS      ;WAIT FOR CARD READER TO COME ON-LINE
1956  007760  001775                       BEQ     .-4
1957  007762  004737  011434                JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
1958  007766  012713  000003                MOV     #3,@CRS         ;SET EJECT AND READ
1959  007772  005227  000000                INC     #0              ;WAIT AWHILE
1960  007776  001375                       BNE     .-4
1961  010000  005227  000000                INC     #0
1962  010004  001375                       BNE     .-4
1963  010006  005227  000000                INC     #0
1964  010012  001375                       BNE     .-4
1965  010014  005227  000000                INC     #0
1966  010020  001375                       BNE     .-4
1967  010022  032713  000400                BIT     #400,@CRS       ;TEST OFF-LINE BIT
1968  010026  001001                       BNE     .+4             ;BRANCH IF SET
1969  010030  104000                       HLT                     ;BIT 8 WAS NOT SET
1970  010032  005713                       TST     @CRS            ;CHECK BIT 15
1971  010034  100401                       BMI     .+4             ;BRANCH IF SET
1972  010036  104000                       HLT                     ;BIT 15 WAS NOT SET
1973  010040  012702  014607                MOV     #MSG6,R2
1974  010044  004737  012152                JSR     %7,TOUT         ;'RESTORE CARDS IN THE INPUT HOPPER''
1975  010050  012702  014224                MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
1976  010054  005737  000632                TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
1977  010060  001402                       BEQ     .+6             ;NO
1978  010062  012702  014307                MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
1979  010066  004737  012152                JSR     %7,TOUT
1980  010072  012702  014343                MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
1981  010076  004737  012152                JSR     %7,TOUT
1982  010102  004737  012274                JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
1983  010106  000000                       HALT
1984  010110  032713  000400                BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
1985  010114  001375                       BNE     .-4
1986  010116  005737  000632                TST     FLAG            ;SKIP NEXT TEST IF DOCUMATION READER
1987  010122  001402                       BEQ     .+6
1988  010124  000137  010444                JMP     TESTG
1989
1990                                  ;A MOTION ERROR SHOULD SET BIT 15
1991                                  ;THIS ERROR OCCURS WHEN A CARD JAM OCCURS AT THE READ STATION
1992  010130  104001                TESTE:  SCOPE
1993  010132  004737  011434                JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
1994  010136  012702  014410                MOV     #MSG3,R2        ;'PRESS CARD READER 'READ STOP'''
1995  010142  004737  012152                JSR     %7,TOUT
1996  010146  012702  014343                MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
1997  010152  004737  012152                JSR     %7,TOUT
1998  010156  012702  015170                MOV     #MSG9,R2        ;'BLOCK THE CARD READER STATION TO
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 1999  010162  004737  012152                 JSR     %7,TOUT         ;PREVENT A CARD GOING THRU, AND''
 2000  010166  012702  014224                 MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
 2001  010172  004737  012152                 JSR     %7,TOUT
 2002  010176  004737  012274                 JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
 2003  010202  000000                         HALT
 2004  010204  032713  002000                 BIT     #2000,@CRS      ;MONITOR ON-LINE TRANSITION (BIT 10)
 2005  010210  001775                         BEQ     .-4             ;CONTINUE WHEN CARD READER COMES ON-LINE
 2006  010212  012713  000003                 MOV     #3,@CRS         ;READ A CARD AND SET EJECT
 2007  010216  032713  140000                 BIT     #140000,@CRS    ;CHECK DONE AND SPECIAL CONDITION BITS
 2008  010222  001775                         BEQ     .-4             ;WAIT
 2009  010224  005713                         TST     @CRS            ;CHECK SPECIAL CONDITION BIT
 2010  010226  100401                         BMI     .+4             ;CONTINUE IF SET
 2011  010230  104000                         HLT                     ;SPECIAL CONDITION NOT SET
 2012  010232  012702  015272                 MOV     #MSG10,R2       ;'REMOVE JAMMED CARD''
 2013  010236  004737  012152                 JSR     %7,TOUT
 2014  010242  012702  014224                 MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
 2015  010246  004737  012152                 JSR     %7,TOUT
 2016  010252  012702  014343                 MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
 2017  010256  004737  012152                 JSR     %7,TOUT
 2018  010262  004737  012274                 JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
 2019  010266  000000                         HALT
 2020  010270  032713  000400                 BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
 2021  010274  001375                         BNE     .-4
 2022
 2023                          ;A STACK FAIL ERROR SHOULD SET BIT 15
 2024                          ;ERROR OCCURS WHEN 3 CARDS IN A ROW HAVE NOT BEEN DELIVERED PROPERLY TO THE OUTPUT STACK
 2025  010276  104001         TESTF:  SCOPE
 2026  010300  004737  011434                 JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
 2027  010304  012702  014410                 MOV     #MSG3,R2        ;'PRESS CARD READER 'READ STOP'''
 2028  010310  004737  012152                 JSR     %7,TOUT
 2029  010314  012702  014343                 MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
 2030  010320  004737  012152                 JSR     %7,TOUT
 2031  010324  012702  015317                 MOV     #MSG11,R2       ;'HOLD THE OUTPUT STACKER GATE OPEN.  THEN''
 2032  010330  004737  012152                 JSR     %7,TOUT
 2033  010334  012702  014224                 MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND
 2034  010340  004737  012152                 JSR     %7,TOUT         ;'READ START.'''
 2035  010344  004737  012274                 JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
 2036  010350  000000                         HALT
 2037  010352  032713  002000                 BIT     #2000,@CRS      ;WAIT FOR CARD READER TO COME ON-LINE
 2038  010356  001775                         BEQ     .-4
 2039  010360  012701  000003                 MOV     #3,COUNT        ;INITIALIZE COUNTER TO READ 3 CARDS
 2040  010364  012713  000003         LOOPF:  MOV     #3,@CRS         ;EJECT A CARD
 2041  010370  032713  140000                 BIT     #140000,@CRS    ;WAIT FOR CARD DONE OR SPECIAL CONDITION
 2042  010374  001775                         BEQ     .-4
 2043  010376  005301                         DEC     COUNT           ;COUNT DOWN
 2044  010400  001371                         BNE     LOOPF           ;READ 3 CARDS ALL TOGETHER
 2045  010402  005713                         TST     @CRS            ;CHECK SPECIAL CONDITION BIT 15
 2046  010404  100401                         BMI     .+4             ;BRANCH IF SET
 2047  010406  104000                         HLT                     ;SPECIAL CONDITION NOT SET
 2048  010410  012702  014224                 MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
 2049  010414  004737  012152                 JSR     %7,TOUT
 2050  010420  012702  014343                 MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
 2051  010424  004737  012152                 JSR     %7,TOUT
 2052  010430  004737  012274                 JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
 2053  010434  000000                         HALT
 2054  010436  032713  000400                 BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
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2055  010442  001375                        BNE     .-4
2056
2057                                  ;DARK-LIGHT ERROR SHOULD SET BIT 15
2058                                  ;THIS OCCURS WHEN DATA IS SENSED BEFORE COLUMN ONE OR AFTER COLUMN EIGHTY
2059                                  ;OR WHEN THE SENSORS ARE NOT ALL SENSING A HOLE AFTER THE CARD HAS PASSED
2060                                  ;THIS TEST IS SKIPPED IF BIT 0 OF THE SWITCH REGISTER EQUALS ONE
2061                                  ;TO MAKE THE 2 DARK-LIGHT CHECK CARDS:
2062                                  ;       1.  TEAR A SMALL PIECE FROM THE LEADING EDGE OF ONE CARD
2063                                  ;       2.  TAPE 2 CARDS TOGETHER TO MAKE ONE 'LONG' CARD-IT ONLY NEEDS TO BE
2064                                  ;           ABOUT 1/2 INCH LONGER THAN A REGULAR CARD
2065  010444  104001                  TESTG:  SCOPE
2066  010446  032777  000001  170142          BIT     #1,@SWR         ;CHECK SW0
2067  010454  001410                          BEQ     CONTG           ;RUN TEST IF NOT SET
2068  010456  004737  011462                  JSR     %7,BELL         ;IF SET, RING BELL AND
2069  010462  000000                          HALT                    ;HALT
2070  010464  012737  007236  012150          MOV     #TESTA+2,RETURN ;SETUP SCOPE LOOP RETURN ADDRESS TO LOOP THRU TESTS
2071  010472  000137  007234                  JMP     TESTA           ;START ERROR TESTS OVER ON CONTINUING
2072  010476  004737  011434          CONTG:  JSR     %7,INIT         ;INITIALIZE STATUS REGISTER
2073  010502  005001                          CLR     COUNT           ;INITIALIZE COUNTER
2074  010504  005201                          INC     COUNT           ;SET TO INDICATE FIRST PASS
2075  010506  012702  015371                  MOV     #MSG12,R2       ;'PLACE SPECIAL DARK-LIGHT CHECK CARDS (SEE LISTING, TES
2076  010512  004737  012152                  JSR     %7,TOUT         ;AT THE BOTTOM OF THE INPUT STACK''
2077  010516  012702  014224          LOOPG:  MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
2078  010522  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
2079  010526  001402                          BEQ     .+6             ;NO
2080  010530  012702  014307                  MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET'''
2081  010534  004737  012152                  JSR     %7,TOUT
2082  010540  012702  014343                  MOV     #MSG2,R2
2083  010544  004737  012152                  JSR     %7,TOUT         ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
2084  010550  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
2085  010554  000000                          HALT
2086  010556  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
2087  010562  001375                          BNE     .-4
2088  010564  012713  000003                  MOV     #3,@CRS         ;EJECT THE CARD
2089  010570  032713  140000                  BIT     #140000,@CRS    ;WAIT FOR ERROR OR CARD DONE
2090  010574  001775                          BEQ     .-4
2091  010576  005713                          TST     @CRS            ;CHECK SPECIAL CONDITION
2092  010600  100401                          BMI     .+4             ;CONTINUE IF SET
2093  010602  104000                          HLT                     ;SPECIAL CONDITION NOT SET
2094  010604  005301                          DEC     COUNT           ;COUNT DOWN
2095  010606  001743                          BEQ     LOOPG           ;IF FIRST PASS, LOOP
2096  010610  004737  011462                  JSR     %7,BELL         ;RING BELL
2097  010614  000000                          HALT
2098  010616  012702  014224                  MOV     #MSG1,R2        ;'PRESS CARD READER 'MOTOR START' AND 'READ START'''
2099  010622  005737  000632                  TST     FLAG            ;CHANGE MESSAGE FOR DOCUMATION READER?
2100  010626  001402                          BEQ     .+6             ;NO
2101  010630  012702  014307                  MOV     #MSG1A,R2       ;'PRESS CARD READER 'RESET' ''
2102  010634  004737  012152                  JSR     %7,TOUT
2103  010640  012702  014343                  MOV     #MSG2,R2        ;'THEN HIT 'CONTINUE' ON THE CONSOLE''
2104  010644  004737  012152                  JSR     %7,TOUT
2105  010650  004737  012274                  JSR     %7,CRLF4        ;MOVE MESSAGE UP ON TTY
2106  010654  000000                          HALT
2107  010656  032713  000400                  BIT     #400,@CRS       ;WAIT FOR OFF-LINE TO CLEAR
2108  010662  001375                          BNE     .-4
2109  010664  012737  007236  012150          MOV     #TESTA+2,RETURN ;SETUP SCOPE LOOP RETURN ADDRESS
2110  010672  000137  007234                  JMP     TESTA           ;LOOP THRU TEST ON CONTINUING
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2111
2112
2113                                    ;ROUTINE TO LOOP THRU A SINGLE INSTRUCTION TEST
2114                                    ;NOTE THAT SW11 MUST BE DOWN AFTER 2ND HALT
2115  010676  104007                   TESTX:  TIT
2116  010700  012702  016264                   MOV     #SUBT4,R2
2117  010704  004737  000652                   JSR     %7,SETUP                ;SETUP POINTERS AND FLAGS
2118  010710  012702  016115                   MOV     #STADD,R2
2119  010714  004737  012152                   JSR     PC,TOUT
2120  010720  104004                           READC
2121  010722  013737  000622  011012           MOV     TMP1,RETRNX
2122  010730  062737  000002  011012           ADD     #2,RETRNX               ;CHANGE TO FIRST ADDRESS AFTER SCOPE INSTRUCTION
2123  010736  032777  010000  167652  2$:      BIT     #10000,@SWR             ;CHECK SW12
2124  010744  001404                           BEQ     .+12                    ;BRANCH IF NOT SET
2125  010746  042737  000020  177776           BIC     #20,PSR                 ;CLEAR TRACE BIT
2126  010754  000403                           BR      .+10                    ;SKIP NEXT INSTRUCTION
2127  010756  052737  000020  177776           BIS     #20,PSR                 ;SET TRACE BIT
2128  010764  005037  012146                   CLR     ITCNT                   ;CLEAR ITERATION COUNTER
2129  010770  012737  011002  012150           MOV     #XLOOP,RETURN           ;LOAD RETURN ADDRESS
2130  010776  000177  000010                   JMP     @RETRNX                 ;JUMP TO TEST
2131  011002  005037  012146           XLOOP:  CLR     ITCNT                   ;KEEP ITERATION COUNTER AT ZERO
2132  011006  000177  000000                   JMP     @RETRNX                 ;JUMP TO TEST
2133  011012  000000                   RETRNX: 0
2134
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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
```

```
2191  011220  001376                        BNE     CKLP2
2192  011222  011437  006654                MOV     @CRB1,DAT2      ;READ CRB1 AGAIN
2193  011226  023737  006652  011432        CMP     DAT1,CARDIM     ;COMPARE FIRST DATA TO PATTERN
2194  011234  001005                        BNE     CKFAIL          ;BRANCH IF FAILURE
2195  011236  023737  006654  011432        CMP     DAT2,CARDIM     ;COMPARE SECOND READING TO PATTERN
2196  011244  001001                        BNE     CKFAIL          ;BRANCH IF FAILURE
2197  011246  000721                        BR      CKLP1           ;WAIT FOR NEXT COLUMN OR END OF CARD
2198  011250  005237  011426        CKFAIL: INC     TOTERR          ;COUNT ERRORS
2199  011254  104003                        KBINTT
2200  011256  032777  020000  167332        BIT     #20000,@SWR     ;CHECK FOR INHIBITING PRINTOUT
2201  011264  001047                        BNE     CKHLT           ;BRANCH AROUND PRINTOUT IF SET
2202  011266  005737  000650                TST     ERFLG           ;TEST FLAG TO PRINT HEADING
2203  011272  001006                        BNE     CKNOHD          ;BRANCH IF ALREADY DONE
2204  011274  005237  000650                INC     ERFLG           ;PRINT HEADING ONCE ONLY
2205  011300  012702  015764                MOV     #MSG19,R2       ;OUTPUT HEADING
2206  011304  004737  012152                JSR     %7,TOUT
2207  011310  004737  012242        CKNOHD: JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN, LINEFEED
2208  011314  013702  006650                MOV     CLCNT,R2        ;PRINT COLUMN NUMBER
2209  011320  004737  011734                JSR     %7,PROCT
2210  011324  004737  011542                JSR     %7,SPACE
2211  011330  013702  006652                MOV     DAT1,R2         ;PRINT FIRST READING
2212  011334  004737  011734                JSR     %7,PROCT
2213  011340  004737  011542                JSR     %7,SPACE
2214  011344  013702  006654                MOV     DAT2,R2         ;PRINT SECOND READING
2215  011350  004737  011734                JSR     %7,PROCT
2216  011354  004737  011542                JSR     %7,SPACE
2217  011360  013702  011430                MOV     TOTCRD,R2       ;PRINT TOTAL NUMBER OF CARDS READ
2218  011364  004737  011734                JSR     %7,PROCT
2219  011370  004737  011542                JSR     %7,SPACE
2220  011374  013702  011426                MOV     TOTERR,R2       ;PRINT TOTAL NUMBER OF DATA ERRORS
2221  011400  004737  011734                JSR     %7,PROCT
2222  011404  005777  167206        CKHLT:  TST     @SWR            ;CHECK SW15 TO HALT ON ERROR
2223  011410  100002                        BPL     CKDONE          ;BRANCH IF NOT SET
2224  011412  000000                        HALT                    ;HALT ON ERROR
2225  011414  000625                        BR      CKLOOP          ;CONTINUE
2226  011416  032713  140000        CKDONE: BIT     #140000,@CRS    ;WAIT FOR SPECIAL CONDITION OR DONE
2227  011422  001775                        BEQ     CKDONE
2228  011424  000621                        BR      CKLOOP          ;START NEXT CARD AFTER CHECKING BIT 8
2229  011426  000000        TOTERR: 0
2230  011430  000000        TOTCRD: 0
2231  011432  000000        CARDIM: 0
2232
2233                        ;ISSUE MESSAGE IF CARD READER IS OFF-LINE
2234                        ;WAIT FOR BUSY TO CLEAR IN CASE CARD READER IS STILL READING A CARD
2235                        ;INITIALIZE STATUS REGISTER AND USE ERROR HALT IF IT DOESN'T CLEAR PROPERLY
2236                        ;NOTE THAT PROGRAM WILL HANG HERE IF BUSY REMAINS SET
2237  011434  004737  011506        INIT:   JSR     %7,CKBIT8       ;SEE IF OFF-LINE BIT IS SET
2238  011440  032713  001000                BIT     #1000,@CRS      ;WAIT FOR BUSY TO CLEAR, IN CASE
2239  011444  001375                        BNE     .-4             ;A CARD IS STILL BEING READ
2240  011446  005013                        CLR     @CRS            ;INITIALIZE STATUS REGISTER
2241  011450  005714                        TST     @CRB1           ;READ DATA BUFFER TO CLEAR COLUMN READY
2242  011452  005713                        TST     @CRS            ;MAKE SURE INITIALIZATION OK
2243  011454  001401                        BEQ     .+4             ;BRANCH IF ALL BITS ZERO
2244  011456  104000                        HLT                     ;NOT ALL BITS OF STATUS REGISTER ARE ZERO
2245  011460  000207                        RTS     %7              ;RETURN
2246
```

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2247
2248  011462  105777  167124          ;BELL ON PASS COMPLETE
2249  011466  100375          BELL:   TSTB    @TCSR           ;WAIT FOR TTY READY
2250  011470  012777  000207  167116        BPL     .-4
2251  011476  012737  000001  012144        MOV     #207,@TDBR      ;RING BELL
2252  011504  000207                        MOV     #1,ITMAX        ;MAKE CERTAIN ITERATION MAXIMUM IS CORRECT
2253                                        RTS     %7              ;RETURN
2254
2255                                  ;SUBROUTINE TO CHECK FOR BIT 8 (OFF-LINE) BEING SET IN CARD
2256  011506  032713  000400         ;READER CSR, AND PRINT OUT A MESSAGE IF IT IS
2257  011512  001001         CKBIT8: BIT     #400,@CRS       ;CHECK BIT 8
2258  011514  000207                 BNE     .+4             ;BRANCH IF SET
2259  011516  012702  015744         RTS     %7              ;RETURN IF NOT SET
2260  011522  004737  012152         MOV     #MSG18,R2       ;OUTPUT MESSAGE
2261  011526  012702  015661         JSR     %7,TOUT         ;'BIT 8 WAS SET''
2262  011532  004737  012152         MOV     #MSG17,R2       ;'REMEDY THE ERROR CONDITION
2263  011536  000000                 JSR     %7,TOUT         ;AND PRESS 'CONTINUE'''
2264  011540  000762                 HALT                    ;WAIT FOR CONTINUE
2265                                  BR      CKBIT8          ;CHECK AGAIN
2266
2267                                  ;SUBROUTINE TO ISSUE N SPACES
2268                                  ;N IS ONE PLUS VALUE CONTAINED IN SPACEX
2269                                  ;SPACEX IS CLEARED WITHIN THE SUBROUTINE, SO THAT A CALL ON
2270  011542  105777  167044         ;SPACE WITHOUT LOADING SPACEX ISSUES ONLY ONE SPACE
2271  011546  100375         SPACE:  TSTB    @TCSR           ;WAIT FOR TTY READY
2272  011550  012777  000240  167036        BPL     .-4
2273  011556  005337  011572                MOV     #240,@TDBR      ;OUTPUT A SPACE
2274  011562  100367                 DEC     SPACEX          ;DECREMENT COUNT
2275  011564  005037  011572                BPL     SPACE           ;LOOP IF NOT DONE
2276  011570  000207                 CLR     SPACEX          ;RESET COUNT TO ZERO
2277  011572  000000                 RTS     %7              ;RETURN
2278                                SPACEX: 0
2279
2280
2281                                  ;ENTERED WITH SYSTEM TRAP CALL (HLT)
2282                                  ;PRINT OUT THE ERROR PC AND STATUS REGISTER
2283  011574  104003         PRINT:  KBINTT
2284  011576  037727  167014  020000          BIT     @SWR,#20000     ;TEST FOR INHIBIT PRINT OUT
2285  011604  001401                 BEQ     .+4             ;BRANCH TO PRINT
2286  011606  000437                 BR      B.CK            ;INHIBIT, CHECK FOR HALT
2287  011610  012637  011730                MOV     (6)+,   SAVPC   ;PC OF FAILING ROUTINE
2288  011614  012637  011732                MOV     (6)+,   SAVPSR  ;PSR OR ERROR CONDITION
2289  011620  024646                 CMP     -(6),   -(6)    ;RESTORE STACK
2290  011622  004737  012242                JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN, LINEFEED
2291  011626  010237  011722                MOV     %2,     SAVR2   ;SAVE R2
2292  011632  013702  011730                MOV     SAVPC,  %2
2293  011636  004737  011734                JSR     %7,     PROCT   ;PRINT PC+2 IN OCTAL
2294  011642  105777  166744                TSTB    @TCSR           ;WAIT FOR TTY READY
2295  011646  100375                 BPL     .-4
2296  011650  012777  000240  166736        MOV     #240,   @TDBR   ;OUTPUT A SPACE
2297  011656  013702  011732                MOV     SAVPSR, %2
2298  011662  004737  011734                JSR     %7,     PROCT   ;PRINT PROCESSOR STATUS AT TIME OF FAILURE
2299  011666  013702  011722                MOV     SAVR2,  %2      ;RESTORE REGISTER 2
2300  011672  105777  166714                TSTB    @TCSR           ;WAIT FOR TTY READY
2301  011676  100375                 BPL     .-4
2302  011700  012777  000240  166706        MOV     #240,@TDBR
```

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2303  011706  104003                  B.CK:   KBINTT
2304  011710  005777  166702                  TST     @SWR            ;CHECK SR FOR HALT SWITCH
2305  011714  100001                          BPL     .+4             ;BRANCH IF NOT SET
2306  011716  000000                          HALT                    ;HALT ON ERROR UP
2307  011720  000002                          RTI                     ;RETURN TO MAIN LINE
2308  011722  000000                  SAVR2:  0
2309  011724  000000                  SAVR3:  0
2310  011726  000000                  SAVR4:  0
2311  011730  000000                  SAVPC:  0
2312  011732  000000                  SAVPSR: 0
2313
2314  011734  010337  011724          PROCT:  MOV     %3,SAVR3        ;SAVE R3
2315  011740  010437  011726                  MOV     %4,SAVR4        ;SAVE R4
2316  011744  005004                          CLR     %4              ;CLEAR R4 TO USE AS COUNTER
2317  011746  005001                          CLR     COUNT           ;CLEAR COUNT TO USE AS CARRY FLAG
2318  011750  012703  000260                  MOV     #260,   %3      ;SETUP ASCII ZERO IN R3
2319  011754  005702                          TST     %2              ;CHECK BIT 15 OF DESIRED NUMBER
2320  011756  100001                          BPL     .+4             ;BRANCH IF NOT SET
2321  011760  005203                          INC     %3              ;CHANGE TO ASCII ONE
2322  011762  006102                          ROL     %2              ;ROTATE INTO RIGHTMOST BIT
2323  011764  006102                          ROL     %2              ;TO PREPARE FOR LOOP
2324  011766  005501                          ADC     COUNT           ;STORE CARRY
2325  011770  105777  166616          C.WAIT: TSTB    @TCSR           ;WAIT FOR TTY READY
2326  011774  100375                          BPL     C.WAIT
2327  011776  010377  166612                  MOV     %3,     @TDBR   ;OUTPUT ASCII
2328  012002  005204                          INC     %4              ;COUNT CHARACTERS OUTPUT
2329  012004  020427  000006                  CMP     %4,     #6      ;CHECK FOR DONE
2330  012010  001005                          BNE     C.CONT          ;BRANCH IF NOT DONE
2331  012012  013703  011724                  MOV     SAVR3,%3        ;RESTORE REGISTER 3
2332  012016  013704  011726                  MOV     SAVR4,%4        ;RESTORE REGISTER 4
2333  012022  000207                          RTS     %7              ;RETURN
2334  012024  000241          C.CONT: CLC                             ;CLEAR CARRY
2335  012026  005701                          TST     COUNT           ;TEST CARRY FLAG
2336  012030  001402                          BEQ     .+6             ;BRANCH IF NOT SET
2337  012032  005001                          CLR     COUNT           ;CLEAR FLAG
2338  012034  000261                          SEC                     ;SET CARRY
2339  012036  006102                          ROL     %2              ;ROTATE NEXT 3 BITS INTO RIGHTMOST 3
2340  012040  006102                          ROL     %2
2341  012042  006102                          ROL     %2
2342  012044  005501                          ADC     COUNT           ;STORE CARRY
2343  012046  010203                          MOV     %2,     %3      ;MOVE DATA FOR OUTPUT
2344  012050  042703  177770                  BIC     #177770,%3      ;CLEAR ALL BUT RIGHTMOST 3 BITS
2345  012054  052703  000260                  BIS     #260,   %3      ;SET TO ASCII EQUIVALENT
2346  012060  000743                          BR      C.WAIT          ;LOOP
2347                          ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST 2 TIMES
2348  012062  104003          SCOPEC: KBINTT
2349  012064  032777  040000  166524          BIT     #40000, @SWR    ;TEST SR FOR SCOPE
2350  012072  001012                          BNE     D.1             ;YES,SCOPE
2351  012074  032777  004000  166514          BIT     #4000,@SWR      ;NO- TEST FOR ITERATION
2352  012102  001013                          BNE     D.2             ;INHIBIT ITERATION
2353  012104  023737  012146  012144          CMP     ITCNT,ITMAX     ;CHECK FOR ITERATIONS COMPLETE
2354  012112  100007                          BPL     D.2             ;EXIT-DONE
2355  012114  005237  012146                  INC     ITCNT           ;INCREMENT COUNT
2356  012120  022606                  D.1:    CMP     (6)+,   %6      ;REPOSITION STACK POINTER
2357  012122  012637  177776                  MOV     (6)+,   PSR     ;RESTORE PROCESSOR STATUS
2358  012126  000177  000016                  JMP     @RETURN         ;RETURN TO RERUN TEST
```

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2359  012132  005037  012146          D.2:    CLR     ITCNT           ;CLEAR COUNTER
2360  012136  011637  012150                  MOV     @%6,    RETURN  ;SAVE SCOPE RETURN POINTER
2361  012142  000002                          RTI                     ;RETURN INLINE-NEXT TEST
2362  012144  000001                  ITMAX:  1                       ;MAX NUMBER OF ITERATIONS
2363  012146  000000                  ITCNT:  0                       ;COUNT LOCATION FOR ITERATION LOOP
2364  012150  001022                  RETURN: TEST1+2                 ;ADDRESS OF LAST TEST
2365
2366                                  ;MOV ADDRESS OF MESSAGE TO REGISTER 2
2367                                  ;THEN JSR %7, TOUT
2368  012152  142777  000177  166432  TOUT:   BICB    #177,   @TCSR   ;CLEAR INT FLAG
2369  012160  111237  012240                  MOVB    @%2,    L.EOMK  ;MOVE IN EOM MARKER
2370  012164  005202                  L.INC:  INC     %2              ;MOVE DATA POINTER TO NEXT BYTE
2371  012166  121237  012240          L.TOUT: CMPB    @%2,    L.EOMK  ;COMPARE FOR EOM
2372  012172  001006                          BNE     L.CNT           ;BRANCH IF NOT END OF MESSAGE
2373  012174  105777  166412                  TSTB    @TCSR           ;WAIT FOR TTY READY
2374  012200  100375                          BPL     .-4
2375  012202  005077  166406                  CLR     @TDBR           ;OUTPUT NULL
2376  012206  000207                          RTS     %7              ;RETURN IF EOM
2377  012210  121227  000100          L.CNT:  CMPB    @%2,    #'@     ;CHECK FOR CR,LF REQUEST
2378  012214  001003                          BNE     .+10            ;BRANCH IF NOT
2379  012216  004737  012242                  JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN, LINEFEED
2380  012222  000760                          BR      L.INC           ;LOOP
2381  012224  105777  166362                  TSTB    @TCSR           ;WAIT FOR TTY
2382  012230  100375                          BPL     .-4
2383  012232  112277  166356                  MOVB    (2)+,   @TDBR   ;OUTPUT NEXT CHARACTER
2384  012236  000753                          BR      L.TOUT          ;CONTINUE
2385  012240  000000                  L.EOMK: 0
2386
2387                                  ;SUBROUTINE TO ISSUE CARRIAGE RETURN AND LINEFEED
2388  012242  105777  166344          CRLF:   TSTB    @TCSR           ;WAIT FOR TTY READY
2389  012246  100375                          BPL     .-4
2390  012250  112777  000215  166336          MOVB    #215,   @TDBR   ;SEND CARRIAGE RETURN
2391  012256  105777  166330                  TSTB    @TCSR           ;WAIT FOR TTY
2392  012262  100375                          BPL     .-4
2393  012264  112777  000212  166322          MOVB    #212,   @TDBR   ;SEND LINE FEED
2394  012272  000207                          RTS     %7              ;RETURN
2395
2396                                  ;DO 4 CRLF'S TO MOVE MESSAGES ON TELETYPE
2397  012274  004737  012242          CRLF4:  JSR     %7,CRLF
2398  012300  004737  012242                  JSR     %7,CRLF
2399  012304  004737  012242                  JSR     %7,CRLF
2400  012310  004737  012242                  JSR     %7,CRLF
2401  012314  000207                          RTS     %7
2402
2403  012316  022737  000176  000616  CNTLUU: CMP     #SWREG,SWR
2404  012324  001403                          BEQ     1$
2405  012326  062716  000002                  ADD     #2,(SP)
2406  012332  000504                          BR      OUT
2407  012334  012702  016055          1$:     MOV     #SWREQ,R2
2408  012340  004737  012152                  JSR     PC,TOUT
2409  012344  013702  000176                  MOV     SWREG,R2
2410  012350  004737  011734                  JSR     PC,PROCT
2411  012354  012702  016040                  MOV     #NEWIS,R2
2412  012360  004737  012152                  JSR     PC,TOUT
2413  012364  005037  000622          AGN:    CLR     TMP1
2414  012370  012737  000007  000630          MOV     #7,CSNT
```

```
2415  012376  105777  166204          READ:   TSTB    @KBCSR
2416  012402  100375                          BPL     READ
2417  012404  117737  166200  000626          MOVB    @KBDBR,TIB
2418  012412  113777  000626  166174          MOVB    TIB,@TDBR
2419  012420  142737  000200  000626          BICB    #200,TIB
2420  012426  122737  000025  000626          CMPB    #25,TIB
2421  012434  001005                          BNE     2$
2422  012436  012702  016176                  MOV     #CTLU,R2
2423  012442  004737  012152                  JSR     PC,TOUT
2424  012446  000746                          BR      AGN
2425  012450  122737  000015  000626  2$:     CMPB    #15,TIB
2426  012456  001430                          BEQ     1$
2427  012460  122737  000060  000626          CMPB    #60,TIB
2428  012466  003027                          BGT     INERRR
2429  012470  122737  000067  000626          CMPB    #67,TIB
2430  012476  002423                          BLT     INERRR
2431  012500  142737  000060  000626          BICB    #60,TIB
2432  012506  006337  000622                  ASL     TMP1
2433  012512  006337  000622                  ASL     TMP1
2434  012516  006337  000622                  ASL     TMP1
2435  012522  153737  000626  000622          BISB    TIB,TMP1
2436  012530  005337  000630                  DEC     CSNT
2437  012534  001404                          BEQ     INERRR
2438  012536  000717                          BR      READ
2439  012540  004737  012242          1$:     JSR     %7,CRLF
2440  012544  000002          OUT:    RTI
2441  012546  012702  016027          INERRR: MOV     #QEST,R2
2442  012552  004737  012152                  JSR     PC,TOUT
2443  012556  000702                          BR      AGN
2444
2445                                ;ROUTINE TO CHECK EXISTANCE OF SWREG
2446
2447  012560  013746  000006          SUSWR:  MOV     6,-(SP)
2448  012564  013746  000004                  MOV     4,-(SP)
2449  012570  012737  012610  000004          MOV     #1$,4
2450  012576  022777  177777  166012          CMP     #-1,@SWR
2451  012604  001402                          BEQ     2$
2452  012606  000407                          BR      3$
2453  012610  022626                  1$:     CMP     (SP)+,(SP)+
2454  012612  012737  000176  000616  2$:     MOV     #SWREG,SWR
2455  012620  012737  000174  000620          MOV     #DISPREG,DISPLAY
2456  012626  012637  000004          3$:     MOV     (SP)+,4
2457  012632  012637  000006                  MOV     (SP)+,6
2458  012636  000002                          RTI
2459
2460  012640  022737  000176  000616  KBINT:  CMP     #SWREG,SWR
2461  012646  001016                          BNE     1$
2462  012650  005037  000622                  CLR     TMP1
2463  012654  117737  165730  000622          MOVB    @KBDBR,TMP1
2464  012662  142737  000200  000622          BICB    #200,TMP1
2465  012670  122737  000007  000622          CMPB    #7,TMP1
2466  012676  001002                          BNE     1$
2467  012700  104002                          CNTLU
2468  012702  104006                          CKU
2469  012704  000002                  1$:     RTI
2470
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2471
2472  012706  005737  000624          ;TYPE THE MAIN TITLE
2473  012712  001406          TITTYP: TST     TIFLG
2474  012714  012702  016143          BEQ     1$
2475  012720  004737  012152          MOV     #TITL,R2
2476  012724  005037  000624          JSR     %7,TOUT
2477  012730  000002          1$:     CLR     TIFLG
2478                                  RTI
2479  012732  122737  000007  000630  CKUU:   CMPB    #7,CSNT
2480  012740  001403                  BEQ     1$
2481  012742  013777  000622  165646          MOV     TMP1,@SWR
2482  012750  000002          1$:     RTI
2483
2484  012752  011646          EMTSRV: MOV     (SP),-(SP)
2485  012754  162716  000002          SUB     #2,(SP)
2486  012760  017616  000000          MOV     @(SP),(SP)
2487  012764  006316                  ASL     (SP)
2488  012766  042716  177001          BIC     #177001,(SP)
2489  012772  062716  013004          ADD     #EMTTAB,(SP)
2490  012776  017616  000000          MOV     @(SP),(SP)
2491  013002  000136                  JMP     @(SP)+
2492
2493  013004  011574          EMTTAB: PRINT                   ;CALLED BY EMT HLT
2494  013006  012062                  SCOPEC                  ;CALLED BY EMT SCOPE
2495  013010  012316                  CNTLUU                  ;CALLED BY EMT CNTLU
2496  013012  012640                  KBINT                   ;CALLED BY EMT KBINTT
2497  013014  012376                  READ                    ;CALLED BY EMT READC
2498  013016  012560                  SUSWR                   ;CALLED BY EMT SUSWRR
2499  013020  012732                  CKUU                    ;CALLED BY EMT CKU
2500  013022  012706                  TITTYP                  ;CALLED BY EMT TIT
2501
2502
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2503
2504                                    ;DATA TABLES FOR DATA RELIABILITY TESTS
2505
2506                                    ;ALPHANUMERIC DECK DATA TABLE
2507                                    ;FIRST VALUE FOR A COLUMN IS THE DIRECT
2508                                    ;CARD IMAGE FOR THAT COLUMN ON CARD 1
2509                                    ;THE SECOND VALUE IS THE ENCODED FORM OF THAT DATA
2510                                                                ;COLUMN CHAR HOLLERITH
2511  013024  004000                    ALPCD:  4000                ;1      &       12
2512  013026  000200                            200
2513  013030  004400                            4400                ;2      A       12 1
2514  013032  000201                            201
2515  013034  004200                            4200                ;3      B       12 2
2516  013036  000202                            202
2517  013040  004100                            4100                ;4      C       12 3
2518  013042  000203                            203
2519  013044  004040                            4040                ;5      D       12 4
2520  013046  000204                            204
2521  013050  004020                            4020                ;6      E       12 5
2522  013052  000205                            205
2523  013054  004010                            4010                ;7      F       12 6
2524  013056  000206                            206
2525  013060  004004                            4004                ;8      G       12 7
2526  013062  000207                            207
2527  013064  004002                            4002                ;9      H       12 8
2528  013066  000210                            210
2529  013070  004001                            4001                ;10     I       12 9
2530  013072  000220                            220
2531  013074  004202                            4202                ;11     CENT    12 8 2
2532  013076  000212                            212
2533  013100  004102                            4102                ;12     .       12 8 3
2534  013102  000213                            213
2535  013104  004042                            4042                ;13     <       12 8 4
2536  013106  000214                            214
2537  013110  004022                            4022                ;14     (       12 8 5
2538  013112  000215                            215
2539  013114  004012                            4012                ;15     +       12 8 6
2540  013116  000216                            216
2541  013120  004006                            4006                ;16     1       12 8 7
2542  013122  000217                            217
2543  013124  002000                            2000                ;17     -       11
2544  013126  000100                            100
2545  013130  002400                            2400                ;18     J       11 1
2546  013132  000101                            101
2547  013134  002200                            2200                ;19     K       11 2
2548  013136  000102                            102
2549  013140  002100                            2100                ;20     L       11 3
2550  013142  000103                            103
2551  013144  002040                            2040                ;21     M       11 4
2552  013146  000104                            104
2553  013150  002020                            2020                ;22     N       11 5
2554  013152  000105                            105
2555  013154  002010                            2010                ;23     O       11 6
2556  013156  000106                            106
2557  013160  002004                            2004                ;24     P       11 7
2558  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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 2671                                   ;BINARY DECK DATA TABLE
 2672                                   ;FIRST VALUE FOR A COLUMN IS THE DIRECT CARD IMAGE OF THAT COLUMN ON CARD1
 2673                                   ;THE SECOND VALUE IS THE ENCODED VALUE, WHICH ORS THE OCTAL REPRESENTATION OF
 2674                                   ;ROWS ONE THRU SEVEN
 2675  013524  000000                   BINCD:  0                       ;CARD COLUMN 1
 2676  013526  000000                           0
 2677  013530  000001                           1                       ;2
 2678  013532  000020                           20
 2679  013534  000002                           2                       ;3
 2680  013536  000010                           10
 2681  013540  000004                           4                       ;4
 2682  013542  000007                           7
 2683  013544  000010                           10                      ;5
 2684  013546  000006                           6
 2685  013550  000020                           20                      ;6
 2686  013552  000005                           5
 2687  013554  000040                           40                      ;7
 2688  013556  000004                           4
 2689  013560  000100                           100                     ;8
 2690  013562  000003                           3
 2691  013564  000200                           200                     ;9
 2692  013566  000002                           2
 2693  013570  000400                           400                     ;10
 2694  013572  000001                           1
 2695  013574  001000                           1000                    ;11
 2696  013576  000040                           40
 2697  013600  002000                           2000                    ;12
 2698  013602  000100                           100
 2699  013604  004000                           4000                    ;13
 2700  013606  000200                           200
 2701  013610  001111                           1111                    ;14
 2702  013612  000067                           67
 2703  013614  002222                           2222                    ;15
 2704  013616  000117                           117
 2705  013620  003333                           3333                    ;16
 2706  013622  000177                           177
 2707  013624  004444                           4444                    ;17
 2708  013626  000207                           207
 2709  013630  005555                           5555                    ;18
 2710  013632  000267                           267
 2711  013634  006666                           6666                    ;19
 2712  013636  000317                           317
 2713  013640  007777                           7777                    ;20
 2714  013642  000377                           377
 2715  013644  001010                           1010                    ;21
 2716  013646  000046                           46
 2717  013650  001212                           1212                    ;22
 2718  013652  000056                           56
 2719  013654  001313                           1313                    ;23
 2720  013656  000077                           77
 2721  013660  001414                           1414                    ;24
 2722  013662  000047                           47
 2723  013664  001515                           1515                    ;25
 2724  013666  000067                           67
 2725  013670  001616                           1616                    ;26
 2726  013672  000057                           57
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 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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 2783  014054  005757                          5757                    ;55
 2784  014056  000277                          277
 2785  014060  006060                          6060                    ;56
 2786  014062  000305                          305
 2787  014064  006161                          6161                    ;57
 2788  014066  000327                          327
 2789  014070  006262                          6262                    ;58
 2790  014072  000317                          317
 2791  014074  006363                          6363                    ;59
 2792  014076  000337                          337
 2793  014100  006464                          6464                    ;60
 2794  014102  000307                          307
 2795  014104  006565                          6565                    ;61
 2796  014106  000327                          327
 2797  014110  006767                          6767                    ;62
 2798  014112  000337                          337
 2799  014114  007070                          7070                    ;63
 2800  014116  000347                          347
 2801  014120  007171                          7171                    ;64
 2802  014122  000367                          367
 2803  014124  007272                          7272                    ;65
 2804  014126  000357                          357
 2805  014130  007373                          7373                    ;66
 2806  014132  000377                          377
 2807  014134  007474                          7474                    ;67
 2808  014136  000347                          347
 2809  014140  007575                          7575                    ;68
 2810  014142  000367                          367
 2811  014144  007676                          7676                    ;69
 2812  014146  000357                          357
 2813  014150  000101                          0101                    ;70
 2814  014152  000023                          23
 2815  014154  000202                          0202                    ;71
 2816  014156  000012                          12
 2817  014160  000303                          0303                    ;72
 2818  014162  000033                          33
 2819  014164  000404                          0404                    ;73
 2820  014166  000007                          7
 2821  014170  000505                          0505                    ;74
 2822  014172  000027                          27
 2823  014174  000606                          0606                    ;75
 2824  014176  000017                          17
 2825  014200  000707                          0707                    ;76
 2826  014202  000037                          37
 2827  014204  003210                          3210                    ;77
 2828  014206  000146                          146
 2829  014210  000123                          0123                    ;78
 2830  014212  000037                          37
 2831  014214  007654                          7654                    ;79
 2832  014216  000347                          347
 2833  014220  004567                          4567                    ;80
 2834  014222  000237                BINEND:   237
 2835  014224  040057  051120  051505  MSG1:   .ASCII ;/@PRESS CARD READER 'MOTOR START' AND 'READ START'/;
 2836  014232  020123  040503  042122
 2837  014240  051040  040505  042504
 2838  014246  020122  046447  052117
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2839  014254  051117  051440  040524
2840  014262  052122  020047  047101
2841  014270  020104  051047  040505
2842  014276  020104  052123  051101
2843  014304  023524      057
2844  014307      057  030100  042522  MSG1A:  .ASCII  ;/@PRESS CARD READER 'RESET'/;
2845  014314  051523  041440  051101
2846  014322  020104  042522  042101
2847  014330  051105  023440  042522
2848  014336  042523  023524      057
2849  014343      057  052100  042510  MSG2:   .ASCII  ;/@THEN HIT 'CONTINUE' ON THE CONSOLE/;
2850  014350  020116  044510  020124
2851  014356  041447  047117  044524
2852  014364  052516  023505  047440
2853  014372  020116  044124  020105
2854  014400  047503  051516  046117
2855  014406  027505
2856  014410  040057  051120  051505  MSG3:   .ASCII  ;/@PRESS CARD READER 'READ STOP'/;
2857  014416  020123  040503  042122
2858  014424  051040  040505  042504
2859  014432  020122  051047  040505
2860  014440  020104  052123  050117
2861  014446  027447
2862  014450  040057  051120  051505  MSG3A:  .ASCII  ;/@PRESS CARD READER 'STOP'/;
2863  014456  020123  040503  042122
2864  014464  051040  040505  042504
2865  014472  020122  051447  047524
2866  014500  023520      057
2867  014503      057  052100  042510  MSG4:   .ASCII  ;/@THE INTERRUPT LEVEL WAS /;
2868  014510  044440  052116  051105
2869  014516  052522  052120  046040
2870  014524  053105  046105  053440
2871  014532  051501  027440
2872  014536  040057  042522  047515  MSG5:   .ASCII  ;/@REMOVE ALL CARDS FROM THE INPUT HOPPER/;
2873  014544  042526  040440  046114
2874  014552  041440  051101  051504
2875  014560  043040  047522  020115
2876  014566  044124  020105  047111
2877  014574  052520  020124  047510
2878  014602  050120  051105      057
2879  014607      057  051100  051505  MSG6:   .ASCII  ;/@RESTORE CARDS IN THE INPUT HOPPER/;
2880  014614  047524  042522  041440
2881  014622  051101  051504  044440
2882  014630  020116  044124  020105
2883  014636  047111  052520  020124
2884  014644  047510  050120  051105
2885  014652      057
2886  014653      057  051100  044501  MSG7:   .ASCII  ;/@RAISE OUTPUT STACKER PRESSURE ARM SLIGHTLY ABOVE HORIZONTAL @ THEN LO
2887  014660  042523  047440  052125
2888  014666  052520  020124  052123
2889  014674  041501  042513  020122
2890  014702  051120  051505  052523
2891  014710  042522  040440  046522
2892  014716  051440  044514  044107
2893  014724  046124  020131  041101
2894  014732  053117  020105  047510
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 2895  014740  044522  047532  052116
 2896  014746  046101  040040  052040
 2897  014754  042510  020116  047514
 2898  014762  042527  020122  052111
 2899  014770     057
 2900  014771     057  046100  053517  MSG7A:  .ASCII  ;/@LOWER OUTPUT STACKER PLATE TO BOTTOM/;
 2901  014776  051105  047440  052125
 2902  015004  052520  020124  052123
 2903  015012  041501  042513  020122
 2904  015020  046120  052101  020105
 2905  015026  047524  041040  052117
 2906  015034  047524  027515
 2907  015040  040057  047510  042114  MSG8:   .ASCII  ;/@HOLD DOWN THE SWITCH AT THE BOTTOM OF THE INPUT HOPPER/;
 2908  015046  042040  053517  020116
 2909  015054  044124  020105  053523
 2910  015062  052111  044103  040440
 2911  015070  020124  044124  020105
 2912  015076  047502  052124  046517
 2913  015104  047440  020106  044124
 2914  015112  020105  047111  052520
 2915  015120  020124  047510  050120
 2916  015126  051105     057
 2917  015131     057  046100  043111  MSG8A:  .ASCII  ;/@LIFT SWITCH UNDER RIFFLE CAP/;
 2918  015136  020124  053523  052111
 2919  015144  044103  052440  042116
 2920  015152  051105  051040  043111
 2921  015160  046106  020105  040503
 2922  015166  027520
 2923  015170  040057  046102  041517  MSG9:   .ASCII  ;/@BLOCK THE CARD READER STATION TO PREVENT A CARD GOING THRU, AND/;
 2924  015176  020113  044124  020105
 2925  015204  040503  042122  051040
 2926  015212  040505  042504  020122
 2927  015220  052123  052101  047511
 2928  015226  020116  047524  050040
 2929  015234  042522  042526  052116
 2930  015242  040440  041440  051101
 2931  015250  020104  047507  047111
 2932  015256  020107  044124  052522
 2933  015264  020054  047101  027504
 2934  015272  040057  042522  047515  MSG10:  .ASCII  ;/@REMOVE JAMMED CARD/;
 2935  015300  042526  045040  046501
 2936  015306  042515  020104  040503
 2937  015314  042122     057
 2938  015317     057  044100  046117  MSG11:  .ASCII  ;/@HOLD THE OUTPUT STACKER GATE OPEN. THEN/;
 2939  015324  020104  044124  020105
 2940  015332  052517  050124  052125
 2941  015340  051440  040524  045503
 2942  015346  051105  043440  052101
 2943  015354  020105  050117  047105
 2944  015362  020056  044124  047105
 2945  015370     057
 2946  015371     057  050100  040514  MSG12:  .ASC'   ;/@PLACE SPECIAL DARK-LIGHT CHECK CARDS (SEE LISTING, TESTG);
 2947  015376  042503  051440  042520
 2948  015404  044503  046101  042040
 2949  015412  051101  026513  044514
 2950  015420  044107  020124  044103
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 2951  015426  041505  020113  040503
 2952  015434  042122  020123  051450
 2953  015442  042505  046040  051511
 2954  015450  044524  043516  020054
 2955  015456  042524  052123  024507
 2956  015464  040500  020124  044124          .ASCII  ;@AT THE BOTTOM OF THE INPUT STACK/;
 2957  015472  020105  047502  052124
 2958  015500  046517  047440  020106
 2959  015506  044124  020105  047111
 2960  015514  052520  020124  052123
 2961  015522  041501  027513
 2962  015526  040057  042504  045503  MSG13:  .ASCII  ;/@DECK    CARD  COLUMN PATTERN READ1 READ2  CODED  READ/;
 2963  015534  020040  020040  040503
 2964  015542  042122  020040  047503
 2965  015550  052514  047115  050040
 2966  015556  052101  042524  047122
 2967  015564  051040  040505  030504
 2968  015572  051040  040505  031104
 2969  015600  020040  047503  042504
 2970  015606  020104  051040  040505
 2971  015614  027504
 2972  015616  040057  046101  044120  MSG14:  .ASCII  ;/@ALPHA /;
 2973  015624  020101     057
 2974  015627     057  041100  047111  MSG15:  .ASCII  ;/@BINARY/;
 2975  015634  051101  027531
 2976  015640  040057  044502  020124  MSG16:  .ASCII  ;/@BIT 15 WAS SET/;
 2977  015646  032461  053440  051501
 2978  015654  051440  052105     057
 2979  015661     057  051100  046505  MSG17:  .ASCII  ;/@REMEDY THE ERROR CONDITION AND PRESS 'CONTINUE'@/;
 2980  015666  042105  020131  044124
 2981  015674  020105  051105  047522
 2982  015702  020122  047503  042116
 2983  015710  052111  047511  020116
 2984  015716  047101  020104  051120
 2985  015724  051505  020123  041447
 2986  015732  047117  044524  052516
 2987  015740  023505  027500
 2988  015744  040057  044502  020124  MSG18:  .ASCII  ;/@BIT 8 WAS SET/;
 2989  015752  020070  040527  020123
 2990  015760  042523  027524
 2991  015764  040057  047503  052514  MSG19:  .ASCII  ;/@COLUMN READ1 READ2  CARDS ERRORS/;
 2992  015772  047115  051040  040505
 2993  016000  030504  051040  040505
 2994  016006  031104  020040  040503
 2995  016014  042122  020123  051105
 2996  016022  047522  051522     057
 2997  016027     057  037500  020100  QEST:   .ASCII  ;/@?@  = /;
 2998  016034  036440  027440
 2999  016040  020057  020040  020040  NEWIS:  .ASCII  ;/     NEW = /;
 3000  016046  042516  020127  020075
 3001  016054     057
 3002  016055     057  051500  051127  SWREQ:  .ASCII  ;/@SWR = /;
 3003  016062  036440  027440
 3004  016066  040057  040503  042122  CIMPAT: .ASCII  ;/@CARD IMAGE PATTERN= /;
 3005  016074  044440  040515  042507
 3006  016102  050040  052101  042524
```

```
 3007  016110  047122  020075     057
 3008  016115     057  051500  040524  STADD:  .ASCII  ;/@STARTING ADDRESS = /;
 3009  016122  052122  047111  020107
 3010  016130  042101  051104  051505
 3011  016136  020123  020075     057
 3012  016143     057  040100  055103  TITL:   .ASCII ;/@@CZCRACO CR11 DIAG TSTS /;
 3013  016150  051103  041501  020060
 3014  016156  051103  030461  042040
 3015  016164  040511  020107  051524
 3016  016172  051524  027440
 3017  016176  057057  040125  020075  CTLU:   .ASCII  ;/^U@= /;
 3018  016204     057
 3019  016205     057  044500  051516  SUBT1:  .ASCII  ;/@INSTR + DATA TEST/;
 3020  016212  051124  025440  042040
 3021  016220  052101  020101  042524
 3022  016226  052123     057
 3023  016231     057  041500  030522  SUBT2:  .ASCII  ;/@CR11 ERROR FUNCTION TEST/;
 3024  016236  020061  051105  047522
 3025  016244  020122  052506  041516
 3026  016252  044524  047117  052040
 3027  016260  051505  027524
 3028  016264  040057  044523  043516  SUBT4:  .ASCII  ;/@SINGLE TEST LOOP/;
 3029  016272  042514  052040  051505
 3030  016300  020124  047514  050117
 3031  016306     057
 3032  016307     057  051500  047111  SUBT5:  .ASCII  ;/@SINGLE DATA PATTERN TEST/;
 3033  016314  046107  020105  040504
 3034  016322  040524  050040  052101
 3035  016330  042524  047122  052040
 3036  016336  051505  027524
 3037          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
DBRCK8  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
                       1205*   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         1664     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#
```

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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#
```

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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)