

CM11-F

DIAGNOSTIC
MD-11-DZCMB-B

EP-DZCMB-B-DL-A

OCT 1976

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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZCMB-B-D
PRODUCT NAME: CM11F DIAGNOSTIC TEST WITH THE
DOCUMENTATION OM-200 CARD READER <80 COLUMN>
DATE CREATED: NOVEMBER 1, 1974
MAINTAINER: DIAGNOSTIC ENGINEERING
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1. ABSTRACT

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

2. REQUIREMENTS

2.1 EQUIPMENT

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

2.2 TEST DECKS

MAINDEC-00-DZCMA-A-CA PUNCHED ALPHANUMERIC TEST DECK
MAINDEC-00-DZCMA-A-CB PUNCHED BINARY TEST DECK
MAINDEC-00-DZCMB-A-CO MARKSENSE BINARY TEST DECK
SPARE CARDS FOR THE ERROR FUNCTION TEST

2.3 STORAGE

THE ROUTINE USES MEMORY 0 TO 16000.

3. LOADING PROCEDURE

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

BASIC SWITCH REGISTER SETTINGS ARE:

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

4.2 STARTING ADDRESSES

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

4.3 PROGRAM AND/OR OPERATOR ACTION

4.3.1 INSTRUCTION AND DATA RELIABILITY TEST (SA 200)

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

4.3.2 PICK SUBTEST LOOP (SA 210)

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

4.3.3 ERROR FUNCTION TEST (SA 220)

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

4.3.4 SINGLE SUBTEST LOOP (SA 240)

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

4.3.5 SINGLE DATA PATTERN TEST (SA 250)

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

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

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

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

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

5.1.1 AT SA 200 (INSTRUCTION AND DATA RELIABILITY TEST)

SEE 4.1

5.1.2 AT SA 210 (PICK SUBTEST LOOP)

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

5.1.3 AT SA 220 (ERROR FUNCTION TEST FOR CM11F)

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

5.1.4 AT SA 240 (SINGLE SUBTEST LOOP)

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

5.1.5 AT SA 250 (SINGLE DATA PATTERN TEST)

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

5.2 SUBROUTINE ABSTRACTS

5.2.1 BEGIN SA 200

THE INSTRUCTION TESTS ARE RUN FIRST, FOLLOWED BY THE DATA RELIABILITY TESTS ON THE REMAINING CARDS IN THE FIRST TEST DECK. AT THE END OF THE DECK THE BELL WILL RING, AND IF SWS=1 THE PROGRAM HALTS. IF SWS=0, PROGRAM ACTION DEPENDS ON THE NUMBER OF TEST DECKS LOADED. IF THERE ARE STILL CARDS IN THE INPUT HOPPER, THE PROGRAM WILL RUN THE DATA RELIABILITY TEST ON THE ENTIRE DECK. IF THE INPUT HOPPER IS EMPTY AT THE END OF A DECK, THE PROGRAM WILL RUN A SET OF TESTS OF OFF-LINE OPERATIONS. AT THE END OF THESE TESTS, IT WAITS FOR THE CARD READER TO BE PUT BACK ON-LINE. FURTHER CHECKS ARE MADE OF THE OFF-LINE TO ON-LINE OPERATIONS, AND THEN THE DATA RELIABILITY TEST IS RUN ON THE ENTIRE DECK. IF SWS=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 AND DATA TEST UNLESS SW12 IS SET. THE FIRST INSTRUCTION EXECUTED UPON TRAPPING IS AN "RTI" (OR "RTT") WHICH RETURNS TO THE INTERRUPTED SEQUENCE. THIS CONTINUES UNTIL THE END OF THE PROGRAM LOOP IS REACHED.

5.2.5 TRAPCATCHER

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

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

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

5.2.6 ERCM11 (ERROR FUNCTION TEST)

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

5.2.7 TESTX (SINGLE TEST LOOP)

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

5.2.8 CKSAME (SINGLE DATA PATTERN TEST)

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

5.2.9 DELAY (PICK SUBTEST LOOP)

THIS TEST IS DESIGNED TO AID IN THE DIAGNOSIS OF DIFFICULT DICK PROBLEMS AND FACILITATE REPAIR. IT CONTINUOUSLY MOVES CARDS THRU THE CARD READER AT A RATE DETERMINED BY THE SWITCH REGISTER VALUE. NIETHER DATA OR STATUS REGISTER ARE CHECKED FOR ERRORS. THE PROGRAM WILL CONTINUALLY LOOP UNTIL STOPPED BY THE OPERATOR

5.3 PROGRAM AND/OR OPERATOR ACTION

- 5.3.1 LOADING AND STARTING AT 200 WITH ALL SWITCHES DOWN IS WORST CASE TESTING. A SINGLE ALPHANUMERIC DECK SHOULD BE RUN. THIS EXECUTES AN INSTRUCTION TEST FOLLOWED BY A DATA RELIABILITY TEST. AT THE END OF THE DECK CHECKS ARE MADE OF THE FLAG SETTINGS WHICH SHOULD BE AFFECTED, AND THE PROGRAM WAITS FOR AN INTERRUPT FROM THE READER COMING BACK ON-LINE. AT THE END OF THE FIRST DECK THE OPERATOR SHOULD LOAD ONE OR MORE DECKS IN THE INPUT HOPPER AND PRESS "RESET" ON THE CARD READER. IF THE CARD READER IS WORKING PROPERLY, THE BELL WILL RING ONCE WHEN "RESET" IS PRESSED AND THE ENTIRE DECK WILL BE RUN THRU THE DATA RELIABILITY PORTION OF THE TEST. IF, AFTER READING 80 CARDS, THE INPUT HOPPER IS NOT EMPTY, THE PROGRAM WILL CONTINUE TO THE NEXT DECK. SWITCH OPTIONS MAY BE USED TO ALTER THIS FLOW AS NOTED IN SECTION 4.1.
- 5.3.2 TO GO DIRECTLY TO A SINGLE SUBTEST AND RUN IT CONTINUOUSLY, USE SA 240. AT THE FIRST HALT, SET THE SWITCH REGISTER TO THE STARTING ADDRESS OF THE DESIRED SUBTEST (I.E. THE ADDRESS OF THE SCOPE INSTRUCTION AT THE START OF THE TEST), AND CONTINUE. AT THE SECOND HALT, SET THE DESIRED SWITCH REGISTER OPTIONS AND CONTINUE (SW11 MUST BE = 0). THE PROGRAM WILL CONTINUOUSLY LOOP THRU THE DESIRED SUBTEST UNTIL SW11 IS SET OR THE PROCESSOR IS HALTED.

6. ERRORS

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

DATA ERRORS NOT TRACED TO CARD READER HARDWARE INCLUDE:

- A. SW03 AND SW04 NOT SET TO TYPE OF DECK USED
- B. CARD MISSING
- C. DAMAGED CARD

6.1.3 SINGLE DATA PATTERN PRINTOUT

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

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

6.2 ERROR RECOVERY

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

6.3 ERRORS INVOLVING BIT 8 OF THE CSR

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

7. RESTRICTIONS

7.1 STARTING PROCEDURE

NONE

7.2 OPERATIONAL RESTRICTIONS

7.2.1 COMBINED INSTRUCTION AND DATA RELIABILITY TEST (SA 200)

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

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

7.2.2 PICK SUBTEST LOOP (SA 210)

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

7.2.3 ERROR FUNCTION TEST (SA 220)

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

7.2.4 SINGLE DATA PATTERN TEST (SA 250)

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

8. MISCELLANEOUS

8.1 EXECUTION TIME

NOT APPLICABLE

8.2 CARD DECK DESCRIPTION

8.2.1 PUNCHED ALPHANUMERIC

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

8.2.2 PUNCHED BINARY

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

8.2.3 MARKSENSE BINARY DECK

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

8.3 SPECIAL NOTES

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

"CARD DONE" FROM THE LAST CARD IN THE INPUT HOPPER WILL OCCUR BEFORE THE CARD READER GOES OFF-LINE DUE TO "INPUT HOPPER EMPTY."

CLEARING BIT 0 OF THE CRS AFTER SETTING IT CAN CAUSE THE READER TO NOT READ A CARD IF IT IS DONE RAPIDLY ENOUGH.

8.4 TESTING CM11F'S WITH NON-STANDARD ADDRESSES

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

9. PROGRAM DESCRIPTION

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

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

10. LISTING

SEE FOLLOWING PAGES.

11. FLOWCHART

NOT APPLICABLE.

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522
523
524
525
526
527      177570      SR=177570
528      177776      PSR=177776
529      000240      NOP=240
530      104000      HLT=EMT
531      104400      SCOPE=TRAP
532      000006      RTT=6
533      000000      ADINT=%0      ;CONTAINS ADDRESS OF INTERRUPT VECTOR
534      000001      COUNT=%1      ;USED FOR TIMING, ETC.
535      000002      R2=%2      ;SCRATCH
536      000003      CRS=%3      ;CONTAINS ADDRESS OF CARD READ STATUS REGISTER
537      000004      CRB1=%4      ;CONTAINS ADDRESS OF CARD READER BUFFER (12 BIT DATA)
538      000005      R5=%5      ;SCRATCH
539      000006      SP=%6      ;STACK POINTER
540      000007      PC=%7      ;PROGRAM COUNTER
541
542      ;LOAD TRAP CATCHER INTO LOCATIONS 0 THRU 377
543      ;LOAD TRAP VECTORS FOR HLT AND SCOPE ROUTINES
544      .=14
545      000014      001030      TRTRAP
546      000016      000340      340
547      .=30
548      000030      011574      PRINT
549      000032      000340      340
550      000034      012042      SCOPEC
551      000036      000340      340
552      .=46
553      000046      005650      LOGICAL
554
555      ;LOAD STARTING ADDRESS AREA
556      .=200
557      000200      012706      001000      MOV      #STACK, SP
558      000204      000167      000740      JMP      BEGIN      ;NORMAL STARTING ADDRESS FOR DOCUMENTATION OM-200 READER
559      000210      012706      001000      MOV      #STACK, SP
560      000214      000167      011054      JMP      DELAY      ;PICK DELAY TEST
561      000220      012706      001000      MOV      #STACK, SP
562      000224      000167      007244      JMP      ERCM11      ;STARTING ADDRESS FOR CM11F ERROR FUNCTION TEST
563      .=240
564      000240      012706      001000      MOV      #STACK, SP
565      000244      000167      010344      JMP      TESTX      ;STARTING ADDRESS FOR LOOP WHICH CONTINUALLY RUNS
566      ;ANY SINGLE SUBTEST
567      000250      012706      001000      MOV      #STACK, SP
568      000254      000167      010416      JMP      CKSAME      ;STARTING ADDRESS OF TEST TO READ A SINGLE DATA
569      ;PATTERN CONTINUOUSLY
570
571      ;LOAD POINTERS AND GENERAL STORAGE
572      .=1000
573      001000      000000      STACK: 0      ;STACK POINTER INITIALIZED TO POINT HERE
574      001012      001012      ;IN CASE OF STACK OVERFLOW
575      001012      000000      INTFLG: 0      ;CONTAINS LEVEL THAT INTERRUPT IS FOUND AT
576      001014      000230      INTVC: 230      ;ADDRESS OF CARD READER INTERRUPT VECTOR

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577	001016	177564			TCSR:	177564		; ADDRESS OF TELETYPE STATUS REGISTER
578	001020	177566			TDBR:	177566		; ADDRESS OF TELETYPE DATA BUFFER
579	001022	177160			KCRS:	177160		; ADDRESS OF CARD READER STATUS REGISTER
580	001024	177162			KCRB1:	177162		; ADDRESS OF CARD READER DATA BUFFER
581	001026	177164			CRB2:	177164		; ADDRESS TO READ ENCODED DATA
582	001030	000002			TRTRAP:	RTI		; RETURN FROM TRACE LOOP (CHANGED TO RTT FOR AN 11/45)
583	001032	000000			TRFLG:	0		; TOGGLED TO SWITCH BETWEEN TRACE TRAPPING AND NORMAL FLO
584	001034	000000			PROC:	0		; STORES PROCESSOR STATUS WHEN TRACE TRAP MUST BE CLEARED
585								; IN A SUBTEST
586	001036	000000			ERFLG:	0		; SET TO ZERO TO OUTPUT DATA ERROR HEADING
587	001040	177772			PIRQ:	177772		; ADDRESS OF PDP 11/45 PIRQ REGISTER
588								
589								
590								
591	001042	012767	000001	011052				
592	001050	016703	177746		INITIALIZE CSR AND DBR POINTERS			
593	001054	016704	177744		SETUP:	MOV #1,ITMAX		; SET ITERATION MAXIMUM TO 1 ITERATION
594	001060	016700	177730			MOV KCRS,CRS		; SET UP REGISTER POINTERS
595	001064	005067	177722			MOV KCRB1,CRB1		
596	001070	005067	177736			MOV INTVC,ADINT		; LOAD ADDRESS OF INTERRUPT VECTOR
597	001074	012737	001122	000010		CLR INTFLG		; INITIALIZE INTERRUPT FLAG
598	001102	005037	000012			CLR TRFLG		; INITIALIZE TRACE FLAG
599	001106	006700				MOV #TRET,#10		; SETUP RESVD INST TRAP RETURN
600	001110	000240				CLR #12		
601	001112	012737	000006	001030		SXT R0		; SIGN EXTEND INST.
602	001120	000404				NOP		
603	001122	012737	000002	001030		MOV #RTT,#TRTRAP		; IF NO TRAP THIS IS AN 11/45 OR 11/40
604	001130	022626				BR .+12		
605	001132	012737	000012	000010	TRET:	MOV #RTI,#TRTRAP		; IF TRAP, NOT AN 11/45 OR 11/40
606	001140	012767	000340	176630		CMP (SP)+,(SP)+		; RESTORE STACK POINTER
607	001146	000207				MOV #12,#10		
608	001150	004767	177666			MOV #340,PSR		; SETUP PROCESSOR STATUS TO LEVEL 7
609	001154	000417				RTS %7		; RETURN
610	001156	012746	000340		BEGIN:	JSR %7,SETUP		; INITIALIZE POINTERS AND FLAGS
611	001162	012746	001214			BR TEST		; GO TO INSTRUCTION TESTS
612	001166	005767	177640		RESTRT:	MOV #340,-(SP)		; PUSH STATUS ON STACK
613	001172	100007				MOV #TEST,-(SP)		; PUSH PC ON STACK
614	001174	032767	010000	176366		TST TRFLG		; CHECK FLAG
615	001202	001003				BPL PSSET		; IF IT IS POSITIVE, CLEAR T BIT
616	001204	012766	000360	000002		BIT #10000,SR		; TRACE TRAPPING INHIBITED?
617	001212	000002				BNE PSSET		; BRANCH IF YES
618					PSSET:	MOV #360,2(SP)		; SET T BIT ON STACK
619						RTI		
620	001214	012767	001224	010704				
621	001222	104400						
622	001224	004767	010256					
623	001230	004767	010136					
624	001234	005001						
625	001236	005201						
626	001240	001376						
627	001242	005201						
628	001244	001376						
629	001246	005201						
630	001250	001376						
631	001252	016746	177556					
632	001256	012746	001264					

633	001262	000002			RTI			
634	001264	000005			TST1B: RESET			; SEND OUT INIT
635	001266	005713			TST	2CRS		; CHECK FOR STATUS REGISTER ALL ZERO
636	001270	001401			BEQ	.+4		; BRANCH IF OK
637	001272	104000			HLT			; STATUS REGISTER NOT CORRECTLY INITIALIZED
638								; ONLY BITS 1 AND 6 OF THE STATUS REGISTER SHOULD BE ABLE TO BE SET TO ONE
639								; AND READ BACK AS ONE
640	001274	052713	177776		BIS	#177776,2CRS		; SET ALL BITS BUT 0
641	001300	022713	000102		CMP	#102,2CRS		; ONLY BITS 1 AND 6 SHOULD BE SET
642	001304	001402			BEQ	.+6		; BRANCH IF OK
643	001306	104000			HLT			; STATUS REGISTER DIDN'T CONTAIN 102
644	001310	000404			BR	TEST2		; BRANCH AFTER FAILURE
645								; CLEARING STATUS REGISTER SHOULD CLEAR BITS 1 AND 6
646	001312	005013			CLR	2CRS		; CLEAR BITS 1 AND 6
647	001314	005713			TST	2CRS		; CHECK FOR ALL BITS CLEAR
648	001316	001401			BEQ	.+4		; BRANCH IF OK
649	001320	104000			HLT			; BIT 1 AND/OR BIT 6 DIDN'T CLEAR
650								
651	001322	104400			TEST2: SCOPE			
652					; START	SHOULD CAUSE CARD DONE WITHIN 1 SECOND		
653					; BIT 0	SHOULD ALWAYS READ AS BEING EQUAL TO ZERO		
654	001324	004767	010156		JSR	%7,CKBITB		; CHECK FOR OFF-LINE SET
655	001330	004767	010036		JSR	%7,CLRTR		; STORE CURRENT PROCESSOR STATUS AND CLEAR TRACE BIT
656	001334	005213			INC	2CRS		; START READING A CARD
657	001336	032713	000001		BIT	#1,2CRS		; CHECK BIT 0
658	001342	001401			BEQ	.+4		; BRANCH IF NOT SET
659	001344	104000			HLT			; BIT 0 READ AS A ONE
660	001346	005001			CLR	COUNT		; INITIALIZE COUNTER
661	001350	005201			INC	COUNT		; WAIT
662	001352	001376			BNE	.-2		
663	001354	005201			INC	COUNT		
664	001356	001376			BNE	.-2		
665	001360	005201			INC	COUNT		
666	001362	001376			BNE	.-2		
667	001364	005201			INC	COUNT		
668	001366	001376			BNE	.-2		
669	001370	016746	177440		MOV	PROC,-(SP)		; RESTORE PROCESSOR STATUS
670	001374	012746	001402		MOV	#TST2A,-(SP)		
671	001400	000002			RTI			
672	001402	032713	040000		TST2A: BIT	#40000,2CRS		; CHECK CARD DONE
673	001406	001002			BNE	CONT2		; CONTINUE IF SET
674	001410	104000			HLT			; CARD DONE DIDN'T SET WITHIN 400 MS
675	001412	000406			BR	TEST3		; NOTE THAT FAILURE COULD BE DUE TO READ NOT BEING RESET
676								; DATO TO STATUS REGISTER SHOULD CLEAR
677	001414	052713	040000		CONT2: BIS	#40000,2CRS		
678	001420	032713	040000		BIT	#40000,2CRS		; CARD DONE
679	001424	001401			BEQ	.+4		; BRANCH IF IT DID
680	001426	104000			HLT			; DATO DIDN'T CLEAR CARD DONE
681								
682	001430	104400			TEST3: SCOPE			
683					; BUSY (BIT 9)	SHOULD BE SET BY READING A CARD		
684					; IT SHOULD REMAIN SET UNTIL	CARD DONE SETS, WHICH SHOULD CLEAR IT		
685	001432	004767	010050		JSR	%7,CKBITB		; CHECK FOR OFF-LINE SET
686	001436	005013			CLR	2CRS		; INITIALIZE STATUS REGISTER
687	001440	005213			INC	2CRS		; READ A CARD
688	001442	032713	001000		BIT	#1000,2CRS		; CHECK BUSY


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689 001446 001002          BNE      LOOP3          ;BRANCH IF SET
690 001450 104000          HLT
691 001452 000417          BR
692 001454 032713 040000  LOOP3:  BIT      #40000, @CRS  ;CHECK CARD DONE
693 001460 001010          BNE      DONE3          ;BRANCH IF SET
694 001462 032713 001000          BIT      #1000, @CRS   ;CHECK BUSY
695 001466 001372          BNE      LOOP3          ;BRANCH IF STILL SET
696 001470 032713 040000          BIT      #40000, @CRS  ;CHECK CARD DONE
697 001474 001006          BNE      TEST4          ;GO TO NEXT TEST IF SET
698 001476 104000          HLT
699 001500 000404          BR
700 001502 032713 001000  DONE3:  BIT      #1000, @CRS  ;CHECK BUSY
701 001506 001401          BEQ      TEST4          ;GO ON TO NEXT TEST IF CLEAR
702 001510 104000          HLT
703
704 001512 104400          TEST4:  SCOPE
705          ;A TIMING ERROR SHOULD OCCUR IF DATA IS NOT READ AND NEW DATA COMES IN
706          ;A TIMING ERROR SHOULD SET THE SPECIAL CONDITION BIT WHEN CARD DONE OCCURS
707          ;COLUMN READY SHOULD BE CLEARED BY THE TIMING ERROR AND PREVENTED FROM RESETTING
708          ;BITS 11,14, AND 15 SHOULD BE CLEARED BY A DATO TO THE STATUS REGISTER
709
710 001514 004767 007624          JSR      %7, INIT      ;INIT STATUS REGISTER
711 001520 005001          CLR      COUNT        ;INITIALIZE COUNTER
712 001522 005213          INC      @CRS         ;INITIATE READ
713 001524 032713 140200  LOOP4:  BIT      #140200, @CRS  ;WAIT FOR SPECIAL CONDITION, CARD DONE,
714          ;OR COLUMN READY
715 001530 001775          BEQ      LOOP4        ;LOOP IF NONE OCCURRED
716 001532 032713 140000          BIT      #140000, @CRS ;SPECIAL CONDITION OR CARD DONE?
717 001536 001007          BNE      CK4         ;YES, BRANCH
718 001540 005201          INC      COUNT        ;NO, COUNT COLUMN READYS
719 001542 105713          TSTB   @CRS         ;WAIT FOR COLUMN READY TO CLEAR
720 001544 100367          BPL     LOOP4        ;IF CLEAR, RETURN TO LOOP4
721 001546 032713 140000          BIT      #140000, @CRS ;CHECK FOR SPECIAL CONDITION OR CARD DONE
722 001552 001001          BNE      CK4         ;BRANCH IF EITHER SET
723 001554 000772          BR      LOOP4B       ;OTHERWISE, CHECK AGAIN
724 001556 032713 040000  CK4:   BIT      #40000, @CRS ;CHECK CARD DONE
725 001562 001002          BNE      .+6         ;BRANCH IF SET
726 001564 104000          HLT
727 001566 000403          BR      CONT4        ;SPECIAL CONDITION SET BEFORE CARD DONE
728 001570 005713          TST     @CRS         ;CHECK SPECIAL CONDITION
729 001572 100401          BMI     .+4         ;BRANCH IF SET
730 001574 104000          HLT
731 001576 032713 004000  CONT4:  BIT      #4000, @CRS ;SPECIAL CONDITION WASN'T SET
732 001602 001001          BNE      .+4         ;CHECK TIMING ERROR
733 001604 104000          HLT
734 001606 005301          DEC     COUNT        ;BRANCH IF SET
735 001610 100002          BPL     .+6         ;TIMING ERROR WASN'T SET
736 001612 104000          HLT
737 001614 000402          BR      .+6         ;CHECK NUMBER OF COLUMN READYS
738 001616 001401          BEQ     .+4         ;BRANCH IF ANY OCCURRED
739 001620 104000          HLT
740 001622 105713          TSTB   @CRS         ;COLUMN READY NEVER OCCURRED
741 001624 100001          BPL     .+4         ;BRANCH IF ONLY ONE OCCURRED
742 001626 104000          HLT
743 001630 005013          CLR     @CRS         ;COLUMN READY OCCURRED MORE THAN ONCE
744 001632 032713 144000          BIT      #144000, @CRS ;CHECK TIMING ERROR
          ;COLUMN READY WASN'T CLEARED
          ;CLEAR BITS 11,14, AND 15 VIA DATO
          ;CHECK

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745 001636 001401      BEQ      .+4
746 001640 104000      HLT
                                ;BITS 11,14, AND 15 WEREN'T ALL CLEARED
747
748
749 001642 104400
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
751
752 001644 004767 007474      JSR      %7,INIT      ;INITIALIZE STATUS REGISTER
753 001650 005001      CLR      COUNT      ;INITIALIZE COUNTER
754 001652 005213      INC      %CRS      ;INITIATE READ
755 001654 032713 140200      LOOP5:  BIT      #140200,%CRS ;WAIT FOR COLUMN READY, CARD DONE
756 001660 001775      BEQ      .-4        ;OR SPECIAL CONDITION
757 001662 032713 040000      BIT      #40000,%CRS ;CARD DONE?
758 001666 001015      BNE      CK5        ;YES, BRANCH
759 001670 005713      TST      %CRS      ;CHECK BIT 15
760 001672 100002      BPL      .+6        ;SKIP ERROR HALT IF NOT SET
761 001674 104000      HLT
                                ;BIT 15 WAS SET
762 001676 000437      BR       TEST6      ;GO TO NEXT TEST
763 001700 020127 000117      CMP      COUNT,%79. ;CHECK FOR 80
764 001704 100363      BPL      LOOP5     ;BRANCH IF 80 OR MORE WITHOUT CLEARING READY
765 001706 005201      INC      COUNT     ;INCREMENT COUNTER
766 001710 005714      TST      %CRB1    ;CLEAR READY
767 001712 105713      TSTB    %CRS      ;MAKE SURE IT CLEARED
768 001714 100001      BPL      .+4        ;BRANCH IF IT DID
769 001716 104000      HLT
                                ;READING DATA BUFFER DIDN'T CLEAR READY
770 001720 000755      BR       LOOP5     ;LOOP
771 001722 032713 004000      CK5:    BIT      #4000,%CRS ;CHECK TIMING ERROR BIT
772 001726 001401      BEQ      .+4        ;BRANCH IF NOT SET
773 001730 104000      HLT
                                ;TIMING ERROR WAS SET
774
                                ;NOTE THAT IF COLUMN READY SET MORE THAN 80 TIMES
                                ;A TIMING ERROR WILL OCCUR AND THE COUNT WILL BE 79
775
776 001732 000421      BR       TEST6     ;BRANCH AFTER ERROR
777 001734 020127 000117      CMP      COUNT,%79. ;CHECK COUNT
778 001740 001401      BEQ      .+4        ;BRANCH IF 80 COLUMN READYS OCCURRED
779 001742 104000      HLT
                                ;COLUMN READY DIDN'T OCCUR 80 TIMES
                                ;BEFORE CARD DONE
780
                                ;ONLY CARD DONE AND COLUMN READY SHOULD BE SET
781 001744 021327 040200      CMP      %CRS,#40200
782 001750 001401      BEQ      .+4
783 001752 104000      HLT
                                ;STATUS REGISTER IN WRONG STATE
784 001754 005013      CLR      %CRS     ;SHOULD CLEAR DONE BUT NOT READY
785 001756 021327 000200      CMP      %CRS,%200 ;CHECK FOR ONLY READY SET
786 001762 001401      BEQ      .+4        ;BRANCH IF OK
787 001764 104000      HLT
                                ;STATUS REGISTER IN WRONG STATE
788 001766 005714      TST      %CRB1    ;READING DATA BUFFER SHOULD CLEAR COLUMN READY
789 001770 005713      TST      %CRS     ;CHECK STATUS REGISTER
790 001772 001401      BEQ      .+4        ;BRANCH IF ALL BITS ZERO
791 001774 104000      HLT
                                ;STATUS REGISTER NOT EQUAL TO ZERO
792
793 001776 104400
TEST6: SCOPE
;TIMING ERROR SHOULD SET BIT 11 BEFORE CARD DONE OCCURS, EVEN IF IT OCCURS AT COLUMN 80
;A DATOB TO THE LOW BYTE OF THE CRS SHOULD CLEAR BITS 15,14, AND 11
794
795
796 002000 004767 007340      JSR      %7,INIT      ;INITIALIZE
797 002004 012701 000115      MOV      #77,COUNT   ;SETUP COUNTER
798 002010 005213      INC      %CRS      ;START READING A CARD
799 002012 105713      LOOP6:  TSTB    %CRS ;WAIT FOR COLUMN READY
800 002014 100376      BPL      .-2

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801	002016	005714		TST	QCRB1		; CLEAR COLUMN READY
802	002020	005301		DEC	COUNT		; GO THRU LOOP FOR 1ST 78 COLUMN READY'S
803	002022	100373		BPL	LOOP6		
804	002024	032713	144000	BIT	#144000, QCRS		; WAIT FOR CARD DONE OR TIMING ERROR
805	002030	001775		BEQ	.-4		; OR SPECIAL CONDITION
806	002032	032713	040000	BIT	#40000, QCRS		; CARD DONE SET?
807	002036	001026		BNE	ERR6		; YES, 2 POSSIBLE TEST FAILURES
808	002040	032713	004000	BIT	#4000, QCRS		; CHECK TIMING ERROR
809	002044	001416		BEQ	OFF6		; IF NOT SET, READER IS PROBABLY OFF-LINE
810	002046	105713		TSTB	QCRS		; CHECK COLUMN READY
811	002050	100001		BPL	.-4		; BRANCH IF CLEAR
812	002052	104000		HLT			; TIMING ERROR DIDN'T CLEAR READY
813	002054	005713		TST	QCRS		; WAIT FOR SPECIAL CONDITION
814	002056	100376		BPL	.-2		
815	002060	032713	040000	BIT	#40000, QCRS		; CHECK CARD DONE
816	002064	001406		BEQ	OFF6		; IF NOT SET, READER IS PROBABLY OFF-LINE
817	002066	105013		CLRB	QCRS		; DATOB TO LOW BYTE OF CRS
818	002070	032713	144000	BIT	#144000, QCRS		; CHECK BITS 15, 14, 11
819	002074	001415		BEQ	TEST7		; BRANCH IF CLEAR TO NEXT TEST
820	002076	104000		HLT			; DATOB TO LOW BYTE OF CRS DIDN'T CLEAR
821							; BITS 15, 14 AND/OR 11
822	002100	000413		BR	TEST7		; GO TO NEXT TEST
823	002102	032713	000400	OFF6:	BIT #400, QCRS		; CHECK BIT 8
824	002106	001010		BNE	TEST7		; BRANCH IF SET
825	002110	104000		HLT			; BIT 15 WAS SET, 8 WASN'T
826	002112	000406		BR	TEST7		; GO TO NEXT TEST
827	002114	032713	004000	ERR6:	BIT #4000, QCRS		; TIMING ERROR SET?
828	002120	001402		BEQ	.+6		; NO, BRANCH
829	002122	104000		HLT			; TIMING ERROR DIDN'T SET BEFORE CARD DONE
830	002124	000401		BR	TEST7		; GO TO NEXT TEST AFTER ERROR
831	002126	104000		HLT			; TIMING ERROR WASN'T SET
832							
833	002130	104400		TEST7:	SCOPE		
834							; NOT READING THE BOTH COLUMN OF DATA FROM THE BUFFER
835							; SHOULD CAUSE A TIMING ERROR ON THE FIRST COLUMN OF THE NEXT CARD
836							; SETTING EJECT SHOULD CLEAR TIMING ERROR, AND BIT 15 SHOULDN'T SET
837							; INCB SHOULD START A READ
838							
839	002132	004767	007206	JSR	%7 INIT		; INITIALIZE
840	002136	005213		INC	QCRS		; START READ
841	002140	012701	000120	MOV	#80, COUNT		; INITIALIZE COUNTER
842	002144	032713	140200	LOOP7:	BIT #140200, QCRS		; TEST FOR ERROR, DONE OR READY
843	002150	001775		BEQ	LOOP7		; LOOP IF NONE SET
844	002152	032713		TST	QCRS		; CHECK ERROR
845	002154	100002		BPL	.+6		; BRANCH IF NOT SET
846	002156	104000		HLT			; BIT 15 WAS SET
847	002160	000455		BR	TEST8		; GO TO NEXT TEST AFTER ERROR
848	002162	032713	040000	BIT	#40000, QCRS		; CHECK FOR CARD DONE
849	002166	001013		BNE	DONE7		; BRANCH IF SET
850	002170	005301		DEC	COUNT		; COUNT
851	002172	001402		BEQ	.+6		; IF BOTH COLUMN READY, BRANCH
852	002174	005714		TST	QCRB1		; CLEAR DONE
853	002176	000762		BR	LOOP7		; LOOP
854	002200	032713	140000	BIT	#140000, QCRS		; WAIT FOR DONE OR SPECIAL CONDITION
855	002204	001775		BEQ	.-4		
856	002206	005713		TST	QCRS		; CHECK SPECIAL CONDITION

857	002210	100002		BPL	DONE7		: BRANCH IF NOT SET
858	002212	104000		HLT			: SPECIAL CONDITION WAS SET
859	002214	000437		BR	TEST8		: GO TO NEXT TEST AFTER ERROR
860	002216	005701		DONE7: TST	COUNT		: TEST FOR 80 COLUMN READY'S
861	002220	001402		BEQ	+.6		: BRANCH IF OK
862	002222	104000		HLT			: COLUMN READY DID NOT OCCUR 80 TIMES
863	002224	000433		BR	TEST8		: GO TO NEXT TEST AFTER ERROR
864	002226	105213		INCB	2CRS		: START READ
865	002230	105713		TSTB	2CRS		: CHECK COLUMN READY
866	002232	100401		BMI	+.4		: BRANCH IF STILL SET
867	002234	104000		HLT			: READY DID NOT REMAIN SET
868	002236	032713	004000	BIT	#4000, 2CRS		: TEST FOR TIMING ERROR
869	002242	001775		BEQ	-.4		: LOOP IF NOT SET
870	002244	105713		TSTB	2CRS		: CHECK COLUMN READY
871	002246	1000		BPL	+.6		: BRANCH IF NOT SET
872	002250	10400		HLT			: TIMING ERROR DIDN'T CLEAR READY
873	002252	000420		BR	TEST8		
874	002254	112713	000002	MOVB	#2, 2CRS		: SET EJECT
875	002260	032713	004000	BIT	#4000, 2CRS		: CHECK TIMING ERROR
876	002264	001402		BEQ	+.6		: BRANCH IF CLEARED
877	002266	104000		HLT			: TIMING ERROR NOT CLEARED BY DATOB
878	002270	000411		BR	TEST8		: GO TO NEXT TEST AFTER ERROR
879	002272	032713	140000	BIT	#140000, 2CRS		: WAIT FOR DONE OR SPECIAL CONDITION
880	002276	001775		BEQ	-.4		
881	002300	032713	000400	BIT	#400, 2CRS		: CHECK BIT 8
882	002304	001003		BNE	TEST8		: BRANCH IF READER OFF-LINE
883	002306	005713		TST	2CRS		: SPECIAL CONDITION SHOULDN'T SET
884	002310	100001		BPL	+.4		: SINCE DATOB CLEARED TIMING ERROR
885	002312	104000		HLT			: BIT 15 WAS SET, 8 WASN'T
886							
887							
888	002314	104400		TEST8: SCOPE			
889				: DATA SHOULD BE	AVAILABLE IN THE	DATA BUFFER FOR AT LEAST 1.0 MILLISECOND	
890	002316	004767	007022	JSR	%7, INIT		: INITIALIZE STATUS REGISTER
891	002322	004767	007044	JSR	%7, CLRTR		: STORE CURRENT PROCESSOR STATUS AND CLEAR TRACE BIT
892	002326	005213		INC	2CRS		: START READ
893	002330	032713	140200	LOOP8: BIT	#140200, 2CRS		: WAIT FOR COLUMN READY OR CARD DONE
894	002334	001775		BEQ	-.4		: OR SPECIAL CONDITION
895	002336	032713	040000	BIT	#40000, 2CRS		: CARD DONE?
896	002342	001023		BNE	DBRCK8		: YES, GO TO CHECK STROBING OF DBR
897	002344	005713		TST	2CRS		: NO, CHECK BIT 15
898	002346	100002		BPL	+.6		: BRANCH IF NOT SET
899	002350	104000		HLT			: BIT 15 WAS SET
900	002352	000443		BR	TEST9		: GO TO NEXT TEST AFTER ERROR
901	002354	005013		CLR	2CRS		: DATO TO CRS - SHOULDN'T CLEAR BUSY OR READY
902	002356	022713	001200	CMP	#1200, 2CRS		: CHECK FOR BUSY AND READY
903	002362	001402		BEQ	+.6		: BRANCH IF STILL SET
904	002364	104000		HLT			: CRS IN WRONG STATE
905	002366	000435		BR	TEST9		: GO TO NEXT TEST AFTER ERROR
906	002370	011405		MOV	2CRB1, R5		: STORE DATA
907	002372	012701	000300	MOV	#300, COUNT		: INITIALIZE COUNTER
908	002376	005301		DEC	COUNT		: WAIT FOR 1 MILLISECOND OR LESS
909	002400	001376		BNE	-.2		
910	002402	021405		CMP	2CRB1, R5		: DATA UNCHANGED?
911	002404	001751		BEQ	LOOP8		: OK, CONTINUE
912	002406	104000		HLT			: DATA NOT AVAILABLE FOR 1 MILLISECOND

913	002410	000424			BR	TEST9		; GO TO NEXT TEST AFTER FAILURE
914	002412	017702	176410	DBRCK8:	MOV	2CRB2,R2		; STORE ENCODED DATA IN REGISTER 2
915	002416	012701	000100		MOV	#100,COUNT		; SET UP COUNTER
916	002422	021405		CONT8:	CMP	2CRB1,R5		; READ CARD-IMAGE DATA BUFFER
917	002424	001402			BEQ	+.6		; BRANCH IF UNCHANGED
918	002426	104000			HLT			; CRB1 READ INCORRECTLY
919	002430	000407			BR	REST8		; BRANCH TO RESTORE PROCESSOR STATUS AND EXIT
920	002432	027702	176370		CMP	2CRB2,R2		; READ ENCODED DATA BUFFER
921	002436	001402			BEQ	+.6		; BRANCH IF UNCHANGED
922	002440	104000			HLT			; CRB2 READ INCORRECTLY
923	002442	000402			BR	REST8		; BRANCH AFTER FAILURE
924	002444	005301			DEC	COUNT		; COUNT DOWN
925	002446	001365		REST8:	BNE	CONT8		; LOOP IF NOT DONE
926	002450	016746	176360		MOV	PROC,-(SP)		; RESTORE PROCESSOR STATUS
927	002454	012746	002462		MOV	#TEST9,-(SP)		
928	002460	000002			RTI			
929								
930								
931	002462	104400			TEST9:	SCOPE		
932								; EJECT SHOULD PREVENT FURTHER COLUMN READY'S
933								; CARD DONE SHOULD STILL OCCUR, AND TIMING ERRORS SHOULD BE
934								; PREVENTED IF THE CURRENT COLUMN READY IS CLEARED
935	002464	004767	006654		JSR	%7,INIT		; INITIALIZE STATUS REGISTER
936	002470	004767	006676		JSR	%7,CLRTR		; SAVE PROCESSOR STATUS AND CLEAR T BIT
937	002474	005213			INC	2CRS		; START READ
938	002476	105713			TSTB	2CRS		; WAIT FOR COLUMN READY
939	002500	001776			BEQ	.-2		
940	002502	052713	000002		BIS	#2,2CRS		; SET EJECT
941	002506	005714			TST	2CRB1		; CLEAR COLUMN READY
942	002510	005001			CLR	COUNT		
943	002512	005201			INC	COUNT		; WAIT
944	002514	001376			BNE	.-2		
945	002516	005201			INC	COUNT		
946	002520	001376			BNE	.-2		
947	002522	032713	044200	WAIT9:	BIT	#44200,2CRS		; CARD DONE, TIMING ERROR, OR
948	002526	001002			BNE	CK9		; COLUMN READY SET?- BRANCH IF YES
949	002530	104000			HLT			; NO CARD DONE OCCURRED
950	002532	000411			BR	REST9		; CONTINUE AFTER FAILURE
951	002534	032713	040000	CK9:	BIT	#40000,2CRS		; CHECK FOR CARD DONE
952	002540	001006			BNE	REST9		
953	002542	032713	000200		BIT	#200,2CRS		; CHECK COLUMN READY
954	002546	001402			BEQ	+.6		; BRANCH IF NOT SET
955	002550	104000			HLT			; COLUMN READY WAS SET
956	002552	000401			BR	REST9		
957	002554	104000			HLT			; EJECT DID NOT PREVENT A TIMING ERROR
958	002556	016746	176252	REST9:	MOV	PROC,-(SP)		; RESTORE PROCESSOR STATUS
959	002562	012746	002570		MOV	#TEST10,-(SP)		
960	002566	000002			RTI			
961								
962								
963	002570	104400			TEST10:	SCOPE		
964								; CARD DONE SHOULD CAUSE AN INTERRUPT
965	002572	004767	006546		JSR	%7,INIT		; INITIALIZE
966	002576	012710	002652		MOV	#TINT10,ADINT		; LOAD RETURN POINTER
967	002602	052767	000340	175166	BIS	#340,PSR		; SET PROCESSOR TO LEVEL 7
968	002610	016760	175162	000002	MOV	PSR,2(ADINT)		; LOAD RETURN PROCESSOR STATUS

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969 002616 042767 000340 175152 BIC #340,PSR ;SET PROCESSOR PRIORITY TO 0
970 002624 012713 000103 MOV #103,CRS ;SET EJECT, INTERRUPT ENABLE, AND READ
971 002630 032713 040000 BIT #40000,CRS ;WAIT FOR CARD DONE
972 002634 001775 BEQ -4
973 002636 016067 000002 175132 MOV 2(ADINT),PSR ;RESTORE PROCESSOR TO HIGHEST PRIORITY
974 002644 105013 CLRB CRCS ;CLEAR INTERRUPT ENABLE
975 002646 104000 HLT ;NO INTERRUPT OCCURRED
976 002650 000414 BR CONT10
977 002652 032713 040000 TINT10: BIT #40000,CRS ;CHECK CARD DONE
978 002656 001001 BNE .+4 ;BRANCH IF SET
979 002660 104000 HLT ;CARD DONE NOT SET
980 002662 022626 CMP (SP)+,(SP)+ ;RESTORE STACK POINTER
981 002664 005713 TST CRCS ;MAKE SURE NO ERROR OCCURRED
982 002666 100001 BPL .+4
983 002670 104000 HLT ;BIT 15 WAS SET
984 002672 105713 TSTB CRCS ;CHECK COLUMN READY
985 002674 100001 BPL .+4 ;BRANCH IF NOT SET
986 002676 104000 HLT ;COLUMN READY WAS SET
987 002700 005013 CLR CRCS ;DISABLE INTERRUPTS
988 002702 012710 000232 CONT10: MOV #232,ADINT ;CHANGE INTERRUPT RETURN ADDRESS
989 002706 005037 000232 CLR #232 ;TO CAUSE A HALT IF AN INTERRUPT OCCURS
990
991 002712 104400 TEST11: SCOPE
992 ;EVERY COLUMN READY SHOULD CAUSE AN INTERRUPT
993 002714 004767 006424 JSR %7,INIT ;INITIALIZE
994 002720 012701 000120 MOV #80,COUNT ;CHECK EACH COLUMN
995 002724 012710 002776 MOV #TINT11,ADINT ;LOAD RETURN POINTER
996 002730 052767 000340 175040 BIS #340,PSR ;SET PROCESSOR STATUS TO LEVEL 7
997 002736 016760 175034 000002 MOV PSR,2(ADINT) ;LOAD RETURN PROCESSOR STATUS
998 002744 042767 000340 175024 LOOP11: BIC #340,PSR ;SET PROCESSOR PRIORITY TO 0
999 002752 012713 000101 MOV #101,CRS ;SET READ AND INTERRUPT ENABLE
1000 002756 105713 TSTB CRCS ;WAIT FOR COLUMN READY
1001 002760 100376 BPL -2
1002 002762 016067 000002 175006 MOV 2(ADINT),PSR ;RESTORE PROCESSOR TO HIGHEST PRIORITY
1003 002770 005013 CLR CRCS ;CLEAR INTERRUPT ENABLE
1004 002772 104000 HLT ;COLUMN READY DID NOT INTERRUPT
1005 002774 000411 BR CONT11
1006 002776 005013 TINT11: CLR CRCS ;CLEAR INTERRUPT ENABLE
1007 003000 022626 CMP (SP)+,(SP)+ ;RESTORE STACK POINTER
1008 003002 105713 TSTB CRCS ;MAKE SURE COLUMN READY IS SET
1009 003004 100402 BMI .+6 ;BRANCH IF SET
1010 003006 104000 HLT ;COLUMN READY WASN'T SET
1011 003010 000403 BR CONT11
1012 003012 005714 TST CRB1 ;CLEAR READY FLAG
1013 003014 005301 DEC COUNT ;ALL 40 DONE?
1014 003016 001352 BNE LOOP11 ;NO
1015 003020 012710 000232 CONT11: MOV #232,ADINT ;YES-CHANGE INTERRUPT RETURN ADDRESS
1016 003024 005037 000232 CLR #232 ;TO CAUSE A HALT IF ANOTHER INTERRUPT OCCURS
1017
1018 003030 104400 TEST12: SCOPE
1019 ;CARD DONE SHOULDN'T CAUSE AN INTERRUPT IF THE PROCESSOR IS AT LEVEL 7 PRIORITY
1020 003032 004767 006306 JSR %7,INIT ;INITIALIZE
1021 003036 012710 003072 MOV #TINT12,ADINT ;SETUP RETURN
1022 003042 052767 000340 174726 BIS #340,PSR ;SET PROCESSOR TO LEVEL 7 PRIORITY
1023 003050 016760 174722 000002 MOV PSR,2(ADINT) ;LOAD RETURN PROCESSOR STATUS
1024 003056 012713 000103 MOV #103,CRS ;SET EJECT, INTERRUPT ENABLE, AND READ

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1025	003062	032713	040000		BIT	#40000, @CRS	;WAIT FOR CARD DONE
1026	003066	001775			BEQ	.-4	
1027	003070	000402			BR	+.6	;CONTINUE IF NO INTERRUPT OCCURRED
1028	003072	104000		TINT12:	HLT		;AN INTERRUPT OCCURRED
1029	003074	022626			CMP	(SP)+, (SP)+	;RESTORE STACK POINTER
1030	003076	005013			CLR	@CRS	;CLEAR INTERRUPT ENABLE AND EJECT
1031	003100	012710	000232		MOV	#232, @ADINT	;CHANGE INTERRUPT RETURN ADDRESS
1032	003104	005037	000232		CLR	@#232	;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1033							
1034							;FIND THE LEVEL AT WHICH AN INTERRUPT OCCURS
1035							;PRINT OUT A MESSAGE STATING THIS LEVEL IF IT IS OTHER THAN THE STANDARD (LEVEL 6)
1036							;MAKE CERTAIN THAT IT ALWAYS OCCURS AT THIS LEVEL
1037							;THE MESSAGE STATING THE LEVEL IS PRINTED ONLY ONCE, AND THE PROGRAM MUST
1038							;BE STARTED OVER AT LOCATION 200 FOR IT TO BE PRINTED AGAIN
1039							
1040							
1041							
1042							;TEST FOR AN INTERRUPT ON LEVEL 6
1043							;SINCE THIS IS WHERE THE CARD READER NORMALLY IS, DON'T PRINT OUT A MESSAGE
1044							;IF IT IS FOUND HERE
1045	003322	104400		TEST14:	SCOPE		
1046	003324	004767	006014		JSR	%7, INIT	;INITIALIZE
1047	003330	012710	003440		MOV	#TINT14, @ADINT	;SETUP RETURN ADDRESS
1048	003334	052767	000340	174434	BIS	#340, PSR	;SET PROCESSOR PRIORITY TO 7
1049	003342	016760	174430	000002	MOV	PSR, 2(@ADINT)	;SETUP RETURN PROCESSOR STATUS
1050	003350	042767	000340	174420	BIC	#340, PSR	;SET PROCESSOR PRIORITY TO 0
1051	003356	052767	000240	174412	BIS	#240, PSR	;SET PROCESSOR TO LEVEL 5 PRIORITY
1052	003364	012713	000103		MOV	#103, @CRS	;SET EJECT, INTERRUPT ENABLE, AND READ
1053	003370	032713	040000		BIT	#40000, @CRS	;WAIT FOR CARD DONE
1054	003374	001775			BEQ	.-4	
1055	003376	016067	000002	174372	MOV	2(@ADINT), PSR	;RESTORE PROCESSOR TO HIGHEST PRIORITY
1056	003404	005013			CLR	@CRS	;DISABLE INTERRUPTS
1057	003406	012710	000232		MOV	#232, @ADINT	;CHANGE INTERRUPT RETURN ADDRESS
1058	003412	005037	000232		CLR	@#232	;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1059	003416	005767	175370		TST	INTFLG	;CHECK TO SEE IF LEVEL ALREADY RECORDED
1060	003422	100034			BPL	TEST15	;IF NO, GO TO NEXT TEST
1061	003424	026727	175362	100006	CMP	INTFLG, #100006	;IF SO, CHECK TO SEE THAT THE
1062	003432	100430			BMI	TEST15	;INTERRUPT LEVEL RECORDED IS BELOW
1063							;THE CURRENT LEVEL
1064	003434	104000			HLT		;INTERRUPT DIDN'T OCCUR WITH
1065							;STATUS AT LEVEL 5
1066							;BUT PREVIOUSLY OCCURRED AT OR ABOVE
1067							;THIS LEVEL
1068	003436	000426			BR	TEST15	
1069	003440	032713	040000	TINT14:	BIT	#40000, @CRS	;MAKE SURE CARD DONE IS SET
1070	003444	001001			BNE	+.4	;BRANCH IF SET
1071	003446	104000			HLT		;CARD DONE WASN'T SET
1072	003450	005013			CLR	@CRS	;DISABLE FURTHER INTERRUPTS
1073	003452	012710	000232		MOV	#232, @ADINT	;CHANGE INTERRUPT RETURN ADDRESS
1074	003456	005037	000232		CLR	@#232	;TO CAUSE A HALT IF AN INTERRUPT OCCURS
1075	003462	022626			CMP	(SP)+, (SP)+	;RESTORE STACK POINTER
1076	003464	005767	175322		TST	INTFLG	;CHECK FOR PREVIOUS FLAG
1077	003470	100404			BMI	SET14	;BRANCH IF FLAG SET
1078	003472	012767	100006	175312	MOV	#100006, INTFLG	;SET FLAG AND LEVEL
1079	003500	000405			BR	TEST15	
1080	003502	026727	175304	100006	SET14: CMP	INTFLG, #100006	;CHECK PREVIOUS LEVEL

1081	003510	100001		BPL	TEST15	
1082	003512	104000		HLT		; INTERRUPT PREVIOUSLY OCCURRED ONLY AT A LOWER LEVEL
1083						
1084						
1085						
1086						
1087						
1088						
1089						
1090	004776	104400				
1091	005000	004767	004340			
1092	005004	012710	005056			
1093	005010	052767	000340	172760		
1094	005016	016760	172754	000002		
1095	005024	012713	000101			
1096	005030	032713	004000			
1097	005034	001775				
1098	005036	042767	000340	172732		
1099	005044	000240				
1100	005046	016067	000002	172722		
1101	005054	000402				
1102	005056	104000				
1103	005060	022626				
1104	005062	012710	000232			
1105	005066	005037	000232			
1106	005072	032713	040000			
1107	005076	001775				
1108	005100	005013				
1109						
1110	005102	104400				
1111						
1112	005104	004767	004234			
1113	005110	012710	005160			
1114	005114	052767	000340	172654		
1115	005122	016760	172650	000002		
1116	005130	005067	172642			
1117	005134	012713	000100			
1118	005140	005001				
1119	005142	005201				
1120	005144	001376				
1121	005146	016067	000002	172622		
1122	005154	005013				
1123	005156	000403				
1124	005160	104000				
1125	005162	022626				
1126	005164	005013				
1127	005166	005037	000232			
1128	005172	012710	000232			
1129						
1130	005176	104400				
1131						
1132	005200	004767	004140			
1133	005204	012710	005242			
1134	005210	052767	000340	172560		
1135	005216	016760	172554	000002		
1136	005224	042767	000340	172544		


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; A TIMING ERROR SHOULDN'T CAUSE AN INTERRUPT
TEST20: SCOPE
        JSR      %7, INIT          ; INITIALIZE
        MOV      #TINT20, @ADINT  ; LOAD RETURN POINTER
        BIS      #340, PSR        ; SET PROCESSOR TO HIGHEST PRIORITY
        MOV      PSR, 2(ADINT)    ; LOAD RETURN PROCESSOR STATUS
        MOV      #101, @CRS      ; SET INTERRUPT ENABLE AND READ
        BIT      #4000, @CRS     ; WAIT FOR TIMING ERROR TO SET
        BEQ      .-4
        BIC      #340, PSR        ; MOVE PROCESSOR TO LOWEST PRIORITY
        NOP
        MOV      2(ADINT), PSR    ; CLOCK INTERRUPT IF IT OCCURRED
        BR       .+6             ; MOVE PROCESSOR BACK TO HIGHEST PRIORITY
TINT20: HLT
        CMP      (SP)+, (SP)+    ; TIMING ERROR CAUSED AN INTERRUPT
        MOV      #232, @ADINT    ; RESTORE STACK POINTER
        CLR      @#232          ; CHANGE INTERRUPT ADDRESS TO CAUSE A
        BIT      #40000, @CRS    ; HALT IF AN INTERRUPT OCCURS
        BEQ      .-4            ; WAIT FOR CARD DONE
        CLR      @CRS           ; CLEAR INTERRUPT ENABLE

TEST21: SCOPE
; TEST FOR NO INTERRUPT OCCURING WITH INTERRUPT ENABLE SET AND REST CLEARED
        JSR      %7, INIT          ; INITIALIZE CSR TO ZERO
        MOV      #TNINT, @ADINT   ; SETUP RETURN ADDRESS
        BIS      #340, PSR        ; SET PROCESSOR TO LEVEL 7
        MOV      PSR, 2(ADINT)    ; STORE PROCESSOR STATUS
        CLR      PSR             ; SET PROCESSOR TO LEVEL 0
        MOV      #100, @CRS      ; ENABLE INTERRUPTS
        CLR      COUNT          ; INITIALIZE COUNTER
        INC      COUNT          ; WAIT AWHILE
        BNE      .-2
        MOV      2(ADINT), PSR    ; RESTORE PROCESSOR TO LEVEL 7
        CLR      @CRS           ; DISABLE FURTHER INTERRUPTS
        BR       CONT21
TNINT:  HLT
        CMP      (SP)+, (SP)+    ; AN INTERRUPT OCCURRED
        CLR      @CRS           ; RESTORE STACK
        CLR      @#232          ; DISABLE FURTHER INTERRUPTS
        MOV      #232, @ADINT    ; CHANGE INTERRUPT RETURN ADDRESS TO
        ; CAUSE A HALT IF AN INTERRUPT OCCURS

TEST22: SCOPE
; CHECK FOR SIMULTANEOUS INTERRUPTS ON MORE THAN ONE LEVEL
        JSR      %7, INIT          ; INITIALIZE CSR TO ZERO
        MOV      #T2INT, @ADINT   ; SETUP RETURN ADDRESS
        BIS      #340, PSR        ; SET PROCESSOR TO LEVEL 7
        MOV      PSR, 2(ADINT)    ; STORE PROCESSOR STATUS
        BIC      #340, PSR        ; SET PROCESSOR TO LEVEL 0
    
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1137	005232	012713	000103	MOV	#103, @CRS	; SET INTERRUPT ENABLE AND EJECT A CARD
1138	005236	000001		WAIT		; WAIT FOR INTERRUPT
1139	005240	000776		BR	.-2	; SIT IF TRACE BIT IS SET
1140	005242	022626		T2INT: CMP	(6)+, (6)+	; RESTORE STACK POINTER
1141	005244	012710	005266	MOV	#T2INTA, @ADINT	; CHANGE RETRUN ADDRESS
1142	005250	005067	172522	CLR	PSR	; SET PROCESSOR TO LEVEL 0
1143	005254	000240		NOP		; WAIT
1144	005256	016067	000002 172512	MOV	2(ADINT), PSR	; RESTORE PROCESSOR TO LEVEL 7
1145	005264	000402		BR	CONT22	
1146	005266	022626		T2INTA: CMP	(6)+, (6)+	; RESTORE STACK
1147	005270	104000		HLT		; THE INTERRUPT OCCURRED AT 2 LEVELS
1148	005272	005013		CONT22: CLR	@CRS	; DISABLE INTERRUPTS
1149	005274	005037	000232	CLR	@#232	; CHANGE INTERRUPT RETURN ADDRESS TO
1150	005300	012710	000232	MOV	#232, @ADINT	; CAUSE A HALT IF AN INTERRUPT OCCURS
1151						
1152	005304	104400		TEST23: SCOPE		
1153				; ALL MODES OF	ADDRESSING CRB1 OR CRB2 (DATO, DATOB, DATI) SHOULD CLEAR	
1154				; COLUMN READY		
1155	005306	004767	004032	JSR	%7, INIT	; INITIALIZE
1156	005312	005213		INC	@CRS	; START READING A CARD
1157	005314	105713		TSTB	@CRS	; WAIT FOR COLUMN READY
1158	005316	100376		BPL	.-2	
1159	005320	005014		CLR	@CRB1	; DATO TO CRB1
1160	005322	105713		TSTB	@CRS	; CHECK COLUMN READY
1161	005324	100002		BPL	CNT23A	; BRANCH IF CLEARED
1162	005326	104000		HLT		; DATO TO CRB1 DIDN'T CLEAR READY
1163	005330	000467		BR	TEST24	; GO TO NEXT TEST
1164	005332	105713		CNT23A: TSTB	@CRS	; WAIT FOR COLUMN READY
1165	005334	100376		BPL	.-2	
1166	005336	105014		CLRB	@CRB1	; DATOB TO LOW BYTE OF CRB1
1167	005340	105713		TSTB	@CRS	; CHECK COLUMN READY
1168	005342	100002		BPL	CNT23B	; BRANCH IF CLEARED
1169	005344	104000		HLT		; DATOB TO CRB1 LOW BYTE DIDN'T CLEAR READY
1170	005346	000460		BR	TEST24	; GO TO NEXT TEST
1171	005350	105713		CNT23B: TSTB	@CRS	; WAIT FOR COLUMN READY
1172	005352	100376		BPL	.-2	
1173	005354	105064	000001	CLRB	1(CRB1)	; DATOB TO HIGH BYTE OF CRB1
1174	005360	105713		TSTB	@CRS	; CHECK COLUMN READY
1175	005362	100002		BPL	CNT23C	; BRANCH IF CLEARED
1176	005364	104000		HLT		; DATOB TO CRB1 HIGH BYTE DIDN'T CLEAR READY
1177	005366	000450		BR	TEST24	; GO TO NEXT TEST
1178	005370	105713		CNT23C: TSTB	@CRS	; WAIT FOR COLUMN READY
1179	005372	100376		BPL	.-2	
1180	005374	005714		TST	@CRB1	; DATI TO CRB1
1181	005376	105713		TSTB	@CRS	; CHECK COLUMN READY
1182	005400	100002		BPL	CNT23D	; BRANCH IF CLEARED
1183	005402	104000		HLT		; DATI TO CRB1 DIDN'T CLEAR READY
1184	005404	000441		BR	TEST24	; GO TO NEXT TEST
1185	005406	105713		CNT23D: TSTB	@CRS	; WAIT FOR COLUMN READY
1186	005410	100376		BPL	.-2	
1187	005412	005077	173410	CLR	@CRB2	; DATO TO CRB2
1188	005416	105713		TSTB	@CRS	; CHECK COLUMN READY
1189	005420	100002		BPL	CNT23E	; BRANCH IF CLEARED
1190	005422	104000		HLT		; DATO TO CRB2 DIDN'T CLEAR READY
1191	005424	000431		BR	TEST24	; GO TO NEXT TEST
1192	005426	105713		CNT23E: TSTB	@CRS	; WAIT FOR COLUMN READY

1193	005430	100376		BPL	.-2	
1194	005432	105077	173370	CLRB	QCRB2	;DAT08 TO LOW BYTE OF CRB2
1195	005436	105713		TSTB	QCRS	;CHECK COLUMN READY
1196	005440	100002		BPL	CNT23F	;BRANCH IF CLEARED
1197	005442	104000		HLT		;DAT08 TO CRB2 LOW BYTE DIDN'T CLEAR READY
1198	005444	000421		BR	TEST24	;GO TO NEXT TEST
1199	005446	105713		CNT23F: TSTB	QCRS	;WAIT FOR COLUMN READY
1200	005450	100376		BPL	.-2	
1201	005452	016702	173350	MOV	CRB2,R2	;LOAD POINTER
1202	005456	105062	000001	CLRB	1(R2)	;DAT08 TO HIGH BYTE OF CRB2
1203	005462	105713		TSTB	QCRS	;CHECK COLUMN READY
1204	005464	100002		BPL	CNT23G	;BRANCH IF CLEARED
1205	005466	104000		HLT		;DAT08 TO CRB2 HIGH BYTE DIDN'T CLEAR READY
1206	005470	000407		BR	TEST24	;GO TO NEXT TEST
1207						
1208	005472	105713		CNT23G: TSTB	QCRS	;WAIT FOR COLUMN READY
1209	005474	100376		BPL	.-2	
1210	005476	005777	173324	TST	QCRB2	;DAT1 TO CRB2
1211	005502	105713		TSTB	QCRS	;CHECK COLUMN READY
1212	005504	100001		BPL	TEST24	;BRANCH IF CLEARED
1213	005506	104000		HLT		;DAT1 TO CRB2 DIDN'T CLEAR READY
1214						
1215	005510	104400		TEST24: SCOPE		
1216						;SETTING EJECT AFTER A COLUMN READY WITHOUT CLEARING THE COLUMN READY
1217						;SHOULD SET TIMING ERROR (WHICH IN TURN SHOULD CLEAR COLUMN READY)
1218	005512	004767	003626	JSR	%7,INIT	;INITIALIZE
1219	005516	005213		INC	QCRS	;START READING A CARD
1220	005520	105713		TSTB	QCRS	;CHECK COLUMN READY - WAIT
1221	005522	100376		BPL	.-2	
1222	005524	052713	000002	BIS	#2,QCRS	;SET EJECT
1223	005530	105713		TSTB	QCRS	;CHECK COLUMN READY
1224	005532	100402		BMI	CNT24A	;BRANCH IF STILL SET
1225	005534	104000		HLT		;SETTING EJECT CLEARED COLUMN READY
1226	005536	000421		BR	END24	;BRANCH TO WAIT FOR DONE AFTER ERROR
1227	005540	032713	004000	CNT24A: BIT	#4000,QCRS	;CHECK TIMING ERROR
1228	005544	001013		BNE	TIM24	;BRANCH IF SET
1229	005546	032713	040400	BIT	#40400,QCRS	;CHECK CARD DONE AND OFF-LINE
1230	005552	001772		BEQ	CNT24A	;LOOP IF NONE SET
1231	005554	032713	040000	BIT	#40000,QCRS	;CARD DONE SET?
1232	005560	001003		BNE	CNT24B	;YES - BRANCH TO ERROR PRINTOUT
1233	005562	004767	003720	JSR	%7,CKBIT8	;NO - BIT 8 WAS SET SO OUTPUT MESSAGE
1234	005566	000415		BR	ENDCK	;BRANCH AFTER COMING BACK ON-LINE
1235	005570	104000		CNT24B: HLT		;CARD DONE SET BUT TIMING ERROR DIDN'T
1236	005572	000413		BR	ENDCK	;BRANCH TO NEXT SECTION
1237	005574	105713		TIM24: TSTB	QCRS	;CHECK COLUMN READY
1238	005576	100001		BPL	+.4	;BRANCH IF NOT SET
1239	005600	104000		HLT		;TIMING ERROR DIDN'T CLEAR READY
1240	005602	032713	040400	END24: BIT	#40400,QCRS	;WAIT FOR CARD DONE OR OFF-LINE
1241	005606	001775		BEQ	END24	
1242	005610	032713	000400	BIT	#400,QCRS	;CHECK OFF LINE
1243	005614	001402		BEQ	ENDCK	;BRANCH IF NOT SET
1244	005616	004767	003664	JSR	%7,CKBIT8	;OUTPUT ERROR MESSAGE
1245						
1246						;CHECK SW7 AND RETURN TO TEST1 IF SET, AFTER RINGING BELL
1247						;OTHERWISE GO INTO THE DATA TEST
1248	005622	104400		ENDCK: SCOPE		

1249	005624	032767	000200	171736	BIT	#200,SR	
1250	005632	001417			BEQ	DATST	
1251	005634	004767	003560		JSR	%7,BELL	
1252	005640	005167	173166		COM	TRFLG	;TOGGLE TRACE FLAG
1253	005644	000167	173306		JMP	RESTRT	
1254					;FAKE LOGICAL END OF TEST		
1255					;THIS PROGRAM SHOULD NOT BE EXECUTED IN CHAIN MODE		
1256	005650	000240			LOGICAL:	NOP	
1257	005652	000240			NOP		
1258	005654	000240			NOP		
1259	005656	000240			NOP		
1260	005660	000240			NOP		
1261	005662	000240			NOP		
1262	005664	000240			NOP		
1263	005666	000167	173264		JMP	RESTRT	;DO LOGIC TEST AGAIN
1264							
1265							
1266					;DATA RELIABILITY TEST FOR CM11		
1267							
1268					;CHECK SR FOR TYPE OF DECK BEING TESTED, AND INITIALIZE POINTERS		
1269	005672	012767	000056	001202	DATST:	MOV #56,CDCNT	;SETUP CARD COUNT TO ENTER TABLE CORRESPONDING TO NEXT C
1270	005700	000402			BR	DATST2	;SKIP NEXT INSTRUCTION
1271	005702	005067	001174		DATST1:	CLR CDCNT	;SETUP CARD COUNT TO ENTER DATA TABLE AT BEGINNING
1272	005706	005067	173124		DATST2:	CLR ERFLG	;FLAG SET PREVENTS PRINTING OUT ERROR HEADING
1273	005712	032767	000010	171650	BIT	#10,SR	;CHECK FOR TYPE OF DECK
1274	005720	001412			BEQ	DATST3	
1275	005722	012767	014556	001146	MOV	#MRKCD,TSTART	
1276	005730	012767	015260	001142	MOV	#MRKEND,TEND	
1277	005736	012767	013344	001130	MOV	#MSG20,DECK	
1278	005744	000427			BR	CONTD	
1279	005746	032767	000020	171614	DATST3:	BIT #20,SR	;CHECK BIT 4 OF SR FOR TYPE OF DECK
1280	005754	001412			BEQ	ALP1	;BRANCH IF NOT SET TO LOAD ALPHANUMERIC POINTERS
1281	005756	012767	014056	001112	MOV	#BINCD,TSTART	;BIT 2 SET, LOAD BINARY TABLE POINTERS
1282	005764	012767	014554	001106	MOV	#BINEND,TEND	
1283	005772	012767	013165	001074	MOV	#MSG15,DECK	
1284	006000	000411			BR	CONTD	;BRANCH AROUND ALPHANUMERIC POINTERS
1285	006002	012767	013356	001066	ALP1:	MOV #ALPCD,TSTART	;LOAD ALPHANUMERIC TABLE POINTERS
1286	006010	012767	014054	001062	MOV	#ALPEND,TEND	
1287	006016	012767	013154	001050	MOV	#MSG14,DECK	
1288	006024	012746	000340		CONTD:	MOV #340,-(SP)	;PUSH STATUS ON STACK
1289	006030	012746	006062		MOV	#DCNT1,-(SP)	;PUSH PC ON STACK
1290	006034	005767	172772		TST	TRFLG	;CHECK FLAG
1291	006040	100007			BPL	PSSET1	;IF IT IS POSITIVE, CLEAR T BIT
1292	006042	032767	010000	171520	BIT	#10000,SR	;TRACE TRAPPING INHIBITED?
1293	006050	001003			BNE	PSSET1	;BRANCH IF YES
1294	006052	012766	000360	000002	MOV	#360,2(SP)	;SET T BIT ON STACK
1295	006060	000002			PSSET1:	RTI	
1296	006062	004767	003256		DCNT1:	JSR %7,INIT	;INITIALIZE CARD READER STATUS REGISTER
1297							
1298					;SET UP INTERRUPT SERVICING, AND START READING		
1299	006066	012710	006122		MOV	#SRVC,ADINT	;SETUP RETURN POINTER
1300	006072	042767	000340	171676	BIC	#340,PSR	;SET PROCESSOR TO LEVEL 0
1301	006100	016760	171672	000002	MOV	PSR,2(ADINT)	;STORE CURRENT STATUS
1302	006106	004767	000706		JSR	%7,NXCRD	;ADJUST POINTER AND START READING
1303	006112	052713	000100		BIS	#100,2CRS	;ENABLE INTERRUPTS
1304	006116	000001			WAIT		;WAIT FOR INTERRUPTS

1305	006120	000776			BR	.-2	
1306							
1307							: INTERRUPT SERVICE ROUTINE WHICH RUNS DATA RELIABILITY TEST
1308	006122	032713	000400		SRVC:	BIT #400, JCRS	: TEST OFF-LINE
1309	006126	001402				.+6	: BRANCH IF NOT SET
1310	006130	000167	001234			OFFSET	: IF SET, GO CHECK WHY
1311	006134	005713				JCRS	: CHECK SPECIAL CONDITION (BIT 15)
1312	006136	100460				ERSET	: BRANCH IF SET
1313	006140	105713				JCRS	: CHECK COLUMN READY
1314	006142	100402				.+6	: BRANCH IF SET
1315	006144	000167	000466			NOTCOL	: JUMP IF NOT SET
1316	006150	005267	000730			CLCNT	: KEEP TRACK OF COLUMN NUMBER
1317	006154	011467	000726			JCRB1, DAT1	: STORE DATA OF FIRST READ
1318	006160	105713				JCRS	: MAKE SURE COLUMN READY CLEARED
1319	006162	100006				BPL SCNT1	: BRANCH IF IT DID
1320	006164	052767	000340	171604		BIS #340, PSR	: SET PROCESSOR TO LEVEL 7
1321	006172	104000				HLT	: READING DATA DIDN'T CLEAR COLUMN READY
1322	006174	000157	000456			JMP LASTCK	: GO TO NEXT CARD AFTER ERROR PRINTOUT
1323	006200	017767	172622	000704	SCNT1:	MOV JCRB2, DATENC	: STORE ENCODED DATA
1324	006206	012701	000010			MOV #10, COUNT	: WAIT AWHILE
1325	006212	005301				DEC COUNT	
1326	006214	001376				BNE .-2	
1327	006216	011467	000666			MOV JCRB1, DAT2	: STORE DATA OF SECOND READ
1328	006222	005067	000666			CLR PTOFF	: CLEAR POINTER OFFSET
1329	006226	026715	000654			CMP DAT1, JRS	: CHECK FIRST DATA READ
1330	006232	001046				BNE FAIL	: PRINTOUT IF WRONG
1331	006234	012767	000002	000652		MOV #2, PTOFF	: SET POINTER OFFSET
1332	006242	026725	000642			CMP DAT2, (RS)+	: CHECK SECOND READING OF SAME DATA
1333	006246	001040				BNE FAIL	: BRANCH IF WRONG
1334	006250	012767	000004	000636		MOV #4, PTOFF	: SET POINTER OFFSET
1335	006256	026725	000630			CMP DATENC, (RS)+	: CHECK ENCODED DATA
1336	006262	001032				BNE FAIL	: BRANCH IF WRONG
1337	006264	020567	000610			CMP RS, TEND	: CHECK FOR END OF TABLE
1338	006270	100402				BMI .+6	: IF NOT THERE, RTI
1339	006272	016705	000600			MOV TSTART, RS	: MOVE POINTER TO LOOP THRU TABLE
1340	006276	000002				RTI	
1341							
1342							: SPECIAL CONDITION BIT 15 WAS SET BUT BIT 8 WASN'T WHEN INTERRUPT SERVICE ROUTINE
1343							: WAS ENTERED
1344	006300	052767	000340	171470	ERSET:	BIS #340, PSR	: LOCK OUT INTERRUPTS
1345	006306	104000				HLT	: SPECIAL CONDITION WAS SET AND OFF LINE WASN'T
1346	006310	032713	000400			BIT #400, JCRS	: OFF-LINE SET NOW?
1347	006314	001002				BNE .+6	: YES-SKIP OVER
1348	006316	000167	000334			JMP LASTCK	: NO-GO START NEXT CARD
1349	006322	022767	000144	000552	ER1:	CMP #100., CDCNT	: CHECK FOR LAST CARD
1350	006330	001002				BNE .+6	: IF NOT, PRINT OUT MESSAGE
1351	006332	000167	000560			JMP ALLDON	
1352	006336	004767	003144			JSR %7, CKBIT8	: OUTPUT MESSAGE, WAIT FOR ON-LINE
1353	006342	004767	000452			JSR %7, NXCRD	: START NEXT CARD
1354	006346	000002				RTI	
1355							
1356							: DATA ERROR WAS DETECTED, OUTPUT ERROR PRINTOUT
1357	006350	052767	000340	171420	FAIL:	BIS #340, PSR	: LOCK OUT INTERRUPTS
1358	006356	052713	000002			BIS #2, JCRS	: SET EJECT TO PREVENT TIMING ERROR
1359	006362	005714				TST JCRB1	: MAKE CERTAIN COLUMN READY IS CLEAR
1360	006364	032767	020000	171176		BIT #20000, SR	: CK SW13 FOR INHIBIT PRINTOUT

1361	006372	001002			BNE	+.6	
1362	006374	004767	000056		JSR	%7,FPRINT	
1363	006400	005767	171164		TST	SR	;CHECK FOR HALT ON ERROR
1364	006404	100001			BPL	+.4	;BRANCH IF HALT ON ERROR NOT SET
1365	006406	000000			HALT		;HALT ON ERROR SET
1366	006410	032713	000400	FTEST:	BIT	#400,ACRS	
1367	006414	001005			BNE	FCNT	
1368	006416	032713	040000		BIT	#40000,ACRS	;CHECK FOR CARD DONE
1369	006422	001772			BEQ	FTEST	
1370	006424	000167	000226		JMP	LASTCK	;INHIBIT PRINTOUT AFTER CARD DONE SET
1371	006430	022767	000144	000444	FCNT:	CMP	#100.,CDCNT
1372	006436	001002			BNE	+.6	
1373	006440	000167	000452		JMP	ALLDON	
1374	006444	004767	003036		JSR	%7,CKBIT8	
1375	006450	004767	000344		JSR	%7,NXCRD	
1376	006454	000002			RTI		
1377							
1378							
1379	006456	005767	172354		FPRINT:	TST	ERFLG
1380	006462	001006			BNE	NOHD	;TEST FLAG FOR PREVIOUS PRINTOUT
1381	006464	005267	172346		INC	ERFLG	;IF SET, DON'T OUTPUT HEADING
1382	006470	012702	013066		MOV	#MSG13,R2	;SET FLAG
1383	006474	004767	003430		JSR	%7,TOUT	;OUTPUT HEADING FOR DATA ERROR PRINTOUT
1384	006500	016702	000370	NOHD:	MOV	DECK,R2	;OUTPUT TYPE OF DECK
1385	006504	004767	003420		JSR	%7,TOUT	
1386	006510	004767	003026		JSR	%7,SPACE	
1387	006514	016702	000362		MOV	CDCNT,R2	;OUTPUT CARD NUMBER WHERE ERROR OCCURRED
1388	006520	004767	006536		JSR	%7,DECP	
1389	006524	004767	003012		JSR	%7,SPACE	
1390	006530	016702	000350		MOV	CLCNT,R2	;OUTPUT COLUMN NUMBER WHERE ERROR OCCURRED
1391	006534	004767	006522		JSR	%7,DECP	
1392	006540	004767	002776		JSR	%7,SPACE	
1393	006544	166705	000344		SUB	PTOFF,R5	;SUBTRACT OFFSET FROM POINTER TO POINT TO
1394							;ADDRESS OF DESIRED PATTERN
1395	006550	012502			MOV	(R5)+,R2	;OUTPUT CORRECT DATA PATTERN (NOT ENCODED)
1396	006552	004767	003136		JSR	%7,PROCT	
1397	006556	004767	002760		JSR	%7,SPACE	
1398	006562	016702	000320		MOV	DAT1,R2	;OUTPUT DATA READ ON FIRST READING OF BUFFER
1399	006566	004767	003122		JSR	%7,PROCT	
1400	006572	004767	002744		JSR	%7,SPACE	
1401	006576	016702	000306		MOV	DAT2,R2	;OUTPUT DATA READ ONE MILLISECOND LATER
1402	006602	004767	003106		JSR	%7,PROCT	
1403	006606	004767	002730		JSR	%7,SPACE	
1404	006612	011502			MOV	AR5,R2	;OUTPUT CORRECT DATA PATTERN (ENCODED FORM)
1405	006614	004767	003074		JSR	%7,PROCT	
1406	006620	004767	002716		JSR	%7,SPACE	
1407	006624	016702	000262		MOV	DATENC,R2	;OUTPUT DATA READ (ENCODED)
1408	006630	004767	003060		JSR	%7,PROCT	
1409	006634	000207			RTS	%7	
1410							
1411							
1412	006636	032713	040000		NOTCOL:	BIT	#40000,ACRS
1413	006642	001500			BEQ	NOTCD	;CHECK FOR CARD DONE
1414	006644	022767	000120	000232	CMP	#80.,CLCNT	;BRANCH IF NOT SET
1415	006652	001401			BEQ	+.4	;CHECK COLUMN COUNT
1416	006654	104000			HLT		;SKIP ERROR HALT IF 80 COLUMNS WERE READ
							;LESS THAN 80 COLUMNS WERE READ

1417	006656	022767	000144	000216	LASTCK:	CMP	#100, CDCNT	:CHECK FOR LAST CARD
1418	006664	001403				BEQ	LASTWT	:BRANCH IF LAST CARD
1419	006666	001767	000126			JSR	%7, NXCRD	:IF NOT LAST CARD
1420	006672	000002				RTI		:GO ON
1421	006674	052767	000340	171074	LASTWT:	BIS	#340, PSR	
1422	006702	005027	000000			CLR	#0	
1423		006704				LACNT=	.-2	
1424	006706	005367	177772			DEC	LACNT	
1425	006712	001375				BNE	.-4	
1426	006714	005367	177764			DEC	LACNT	
1427	006720	001375				BNE	.-4	
1428	006722	005367	177756			DEC	LACNT	
1429	006726	001375				BNE	.-4	
1430	006730	005367	177750			DEC	LACNT	
1431	006734	001375				BNE	.-4	
1432	006736	032713	000400			BIT	#100, JCRS	
1433	006742	001402				BEQ	.-5	
1434	006744	000167	000146			JMP	ALL.DON	
1435								
1436	006750	022626			LASTCD:	CMP	(SP)+, (SP)+	:RESTORE STACK
1437	006752	004767	002442			JSR	%7, BELL	:RING BELL TO SIGNIFY "PASS COMPLETE"
1438	006756	032767	000040	170604		BIT	#40, SR	:CHECK SR FOR CONTINUATION TO ANOTHER DECK
1439	006764	001002				BNE	+6	:BRANCH TO HALT IF SMS SET
1440	006766	000167	000002			JMP	DECKCK	:CONTINUE TO ANOTHER DECK
1441	006772	000000				HALT		:DATA TEST DONE
1442								
1443								:WHEN CONTINUING FROM ONE DECK TO ANOTHER, CHECK SW6 FOR TYPE
1444								:OF TESTING TO BE PERFORMED
1445	006774	005167	172032		DECKCK:	COM	TRFLG	:TOGGLE TRACE FLAG
1446	007000	032767	000100	170562		BIT	#100, SR	:CHECK SW6
1447	007006	001402				BEQ	+6	:BRANCH IF NOT SET
1448	007010	000167	172142			JMP	RESTR1	:RERUN COMBINED INSTRUCTION AND DATA TEST
1449	007014	000167	176662			JMP	DATST1	
1450								
1451	007020	016705	000052		NXCRD:	MOV	TSTART R5	:YES - ALL CARDS IDENTICAL
1452	007024	042713	000002			BIC	#2, JCRS	:CLEAR EJECT IF SET
1453	007030	005213				INC	JCRS	:READ ANOTHER CARD
1454	007032	005267	000044			INC	CDCNT	:KEEP TRACK OF CARD NUMBER
1455	007036	005067	000042			CLR	CLCNT	:INITIALIZE COLUMN COUNT
1456	007042	000207				RTS	%7	:RETURN
1457								: INTERRUPT NOT CAUSED BY ERROR, COLUMN READY, OR CARD DONE
1458								
1459	007044	052767	000340	170724	NOTCD:	BIS	#340, PSR	:LOCK OUT FURTHER INTERRUPTS
1460	007052	032713	002000			BIT	#200, JCRS	:TEST ON-LINE TRANSITION BIT
1461	007056	001003				BNE	NOTCD1	:BRANCH IF SET
1462	007060	104000				HLT		:NO BITS SET TO CAUSE AN INTERRUPT
1463	007062	000167	177570			JMP	LASTCK	:START NEXT CARD
1464	007066	104000			NOTCD1:	HLT		:ON-LINE TRANSITION CAUSED AN INTERRUPT
1465	007070	000167	177562			JMP	LASTCK	:START NEXT CARD
1466								
1467	007074	000000			DECK:	0		: POINTER TO LITERAL "ALPHA" OR "BINARY"
1468	007076	000000			TSTART:	0		: STARTING ADDRESS OF DATA TABLE
1469	007100	000000			TEND:	0		: END ADDRESS OF DATA TABLE
1470	007102	000000			CDCNT:	0		: NUMBER OF CARD BEING READ
1471	007104	000000			CLCNT:	0		: NUMBER OF COLUMN BEING CHECKED
1472	007106	000000			DAT1:	0		: DATA ON FIRST READ FROM CRB1

1473	007110	000000				DAT2: 0		: DATA ON SECOND READ OF CRB1
1474	007112	000000				DATENC: 0		: DATA READ FROM CRB2
1475	007114	000000				PTOFF: 0		: OFFSET TO POINTER FOR DATA PRINTOUT
1476								
1477							: 80 CARDS DONE	
1478	007116	004767	002276			ALLDON: JSR	%7, BELL	: RING BELL
1479	007122	032767	000040	170440		BIT	#40, SR	: CHECK SR FOR HALT AT END OF DECK
1480	007130	001403				BEG	ALCNT	: CONTINUE IF NOT SET
1481	007132	000000				HALT		: END OF DECK, SMS SET
1482	007134	000167	177634			JMP	DECKCK	: CHECK FOR TYPE OF TESTING
1483	007140	005013				ALCNT: CLR	CRS	: CLEAR ERROR
1484	007142	032713	156377			BIT	#156377, CRS	: ONLY BITS 8, 9 AND 13 MAY STILL BE SET
1485								: BIT 9 MAY BE SET SINCE CARD MAY NOT
1486								: YET HAVE CLEARED THE READER TO CAUSE
1487								: CARD DONE
1488	007146	001401				BEG	.+4	: BRANCH IF OK
1489	007150	104000				HLT		: STATUS REGISTER INCORRECT
1490	007152	032713	020000			BIT	#20000, CRS	: CHECK BIT 13
1491	007156	001001				BNE	.+4	
1492	007160	104000				HLT		: BIT 13 NOT SET
1493	007162	052767	000340	170606		BIS	#340, PSR	: SET PROCESSOR TO LEVEL 7
1494	007170	016760	170602	000002		MOV	PSR, 2(ADINT)	: SETUP RETURN STATUS
1495	007176	105213				INCB	CRS	: ATTEMPT TO READ- SHOULD RESET ERROR
1496	007200	005713				TST	CRS	: CHECK BIT 15
1497	007202	100402				BMI	ALLOK	: BRANCH IF OK
1498	007204	104000				HLT		: SETTING READ DIDN'T RESET ERROR
1499	007206	000416				BR	ALWAIT	: BRANCH TO WAIT FOR ON-LINE
1500	007210	012710	007242			ALLOK: MOV	#SRVC1, ADINT	: LOAD INTERRUPT RETURN ADDRESS
1501	007214	005067	170556			CLR	PSR	: SET PROCESSOR TO LEVEL 0
1502	007220	012713	000101			MOV	#101, CRS	: ENABLE INTERRUPTS, KEEP ERROR SET BY SETTING READ
1503	007224	000240				NOP		: CLOCK IN INTERRUPT
1504	007226	016067	000002	170542		MOV	2(ADINT), PSR	: SET PROCESSOR TO LEVEL 7
1505	007234	005013				CLR	CRS	: CLEAR INTERRUPT ENABLE AND ERROR
1506	007236	104000				HLT		: BIT 15 DIDN'T CAUSE AN INTERRUPT
1507	007240	000401				BR	.+4	
1508	007242	022626				SRVC1: CMP	(SP)+, (SP)+	: RESTORE STACK POINTER
1509	007244	005013				ALWAIT: CLR	CRS	: CLEAR INTERRUPT ENABLE AND ERROR
1510	007246	032713	040000			BIT	#40000, CRS	: WAIT FOR CARD DONE
1511	007252	001775				BEG	.-4	
1512	007254	012710	007312			MOV	#SRVC2, ADINT	: CHANGE INTERRUPT RETURN ADDRESS
1513	007260	112713	000100			MOV	#100, CRS	: ENABLE INTERRUPTS
1514	007264	042767	000340	170504		BIC	#340, PSR	: SET PROCESSOR TO LEVEL 0
1515	007272	032713	000400			BIT	#400, CRS	: CHECK OFF-LINE BIT
1516	007276	001375				BNE	.-4	: LOOP UNTIL CLEAR
1517	007300	016067	000002	170470		MOV	2(ADINT), PSR	: SET PROCESSOR TO LEVEL 7
1518	007306	104000				HLT		: NO INTERRUPT OCCURRED
1519	007310	000403				BR	SRVC2A	: BRANCH AROUND
1520	007312	004767	002102			SRVC2: JSR	%7, BELL	: RING BELL
1521	007316	022626				CMP	(SP)+, (SP)+	: RESTORE STACK POINTER
1522	007320	032713	002000			SRVC2A: BIT	#2000, CRS	: CHECK BIT 10
1523	007324	001001				BNE	.+4	: BRANCH IF SET
1524	007326	104000				HLT		: BIT 10 NOT SET
1525	007330	032713	000400			BIT	#400, CRS	: CHECK BIT 8
1526	007334	001401				BEG	.+4	: BRANCH IF NOT SET
1527	007336	104000				HLT		: BIT 8 WAS SET
1528	007340	032713	030000			BIT	#30000, CRS	: CHECK BITS 12 AND 13

1529	007344	001401			BEQ	.+4		; BRANCH IF NOT SET
1530	007346	104000			HLT			; BIT 12 AND/OR 13 STILL SET IN CRS
1531	007350	005013			CLR	2CRS		; DATO TO CRS
1532	007352	032713	002000		BIT	#2000, 2CRS		; CHECK BIT 10
1533	007356	001401			BEQ	.+4		; BRANCH IF NOT SET
1534	007360	104000			HLT			; DATO DIDN'T CLEAR ON-LINE BIT
1535	007362	022626			CMP	(SP)+, (SP)+		; RESTORE STACK FROM INITIAL INTERRUPT
1536	007364	000167	177404		JMP	DECKCK		; RESTART
1537								
1538								; WHEN INTERRUPT SERVICE WAS ENTERED, OFF-LINE (BIT 8) WAS SET
1539	007370	022767	000144	177504	OFFSET: CMP	#100., CDCNT		; LAST CARD?
1540	007376	001406			BEQ	OFFS1		; YES-BRANCH
1541	007400	104000			HLT			; NO, OFF-LINE SET BUT NOT 100TH CARD
1542	007402	004767	002100		JSR	%7, CKBIT8		
1543	007406	004767	177406		JSR	%7, NXCRD		
1544	007412	000002			RTI			
1545	007414	022767	000120	177462	OFFS1: CMP	#80., CLCNT		; LAST COLUMN?
1546	007422	001002			BNE	.+6		; NO-SKIP OVER
1547	007424	000167	177466		JMP	ALLDON		; YES-GO RUN END OF DECK ROUTINE
1548	007430	104000			HLT			; OFF-LINE SET BEFORE LAST COLUMN OF LAST CARD
1549	007432	004767	001762		JSR	%7, BELL		
1550	007436	032767	000040	170124	BIT	#40, SR		
1551	007444	001403			BEQ	OFFS2		
1552	007446	000000			HALT			; HALT AT END OF DECK SET
1553	007450	000167	177320		JMP	DECKCK		; START NEW DECK
1554	007454	052767	000340	170314	OFFS2: BIS	#340, PSR		; LOCK OUT INTERRUPTS
1555	007462	016760	170310	000002	MOV	PSR, 2(ADINT)		; STORE RETURN STATUS
1556	007470	000167	177550		JMP	ALWAIT		
1557								
1558								; SETUP FOR ERROR FUNCTION TEST
1559	007474	004767	171342		ERCM11: JSR	%7, SETUP		; INITIALIZE REGISTERS
1560	007500	012767	007510	002420	MOV	#TESTA+2, RETURN		; SETUP SCOPE LOOP RETURN ADDRESS
1561								
1562								; THE CARD READER GOING OFF-LINE SHOULD SET SPECIAL CONDITION (BIT 15) AND OFF-LINE (BIT
1563	007506	104400			TESTA: SCOPE			
1564	007510	005067	002406		CLR	ITMAX		; RUN EACH ERROR TEST ONCE ONLY
1565	007514	004767	001624		JSR	%7, INIT		; INITIALIZE STATUS REGISTER
1566	007520	012702	012414		MOV	#MSG3, R2		
1567	007524	004767	002400		JSR	%7, TOUT		; "PRESS CARD READER 'READ STOP'"
1568	007530	012702	012347		MOV	#MSG2, R2		
1569	007534	004767	002370		JSR	%7, TOUT		; "THEN HIT 'CONTINUE' ON THE CONSOLE"
1570	007540	004767	002442		JSR	%7, CRLF		; MOVE MESSAGE UP ON TTY
1571	007544	004767	002436		JSR	%7, CRLF		
1572	007550	004767	002432		JSR	%7, CRLF		
1573	007554	004767	002426		JSR	%7, CRLF		
1574	007560	000000			HALT			
1575	007562	032713	000400		BIT	#400, 2CRS		; CHECK BIT 8
1576	007566	001001			BNE	.+4		; BRANCH IF SET
1577	007570	104000			HLT			; OFF-LINE (BIT 8) WASN'T SET
1578	007572	005713			TST	2CRS		; CHECK BIT 15
1579	007574	100401			BMI	.+4		; BRANCH IF SET
1580	007576	104000			HLT			; BIT 15 WASN'T SET
1581	007600	012702	012254		MOV	#MSG1, R2		
1582	007604	004767	002320		JSR	%7, TOUT		; "PRESS CARD READER 'RESET'";
1583	007610	012702	012347		MOV	#MSG2, R2		
1584	007614	004767	002310		JSR	%7, TOUT		; "THEN HIT 'CONTINUE' ON THE CONSOLE"

1585	007620	004767	002362	JSR	%7,CRLF	;MOVE MESSAGE UP ON TTY
1586	007624	004767	002356	JSR	%7,CRLF	
1587	007630	004767	002352	JSR	%7,CRLF	
1588	007634	004767	002346	JSR	%7,CRLF	
1589	007640	000000		HALT		
1590						
1591						
1592						
1593	007642	104400				
1594	007644	004767	001474	JSR	%7,INIT	;INITIALIZE STATUS REGISTER
1595	007650	012702	012507	MOV	#MSG5,R2	;"REMOVE ALL CARDS FROM THE INPUT HOPPER"
1596	007654	004767	002250	JSR	%7,TOUT	
1597	007660	012702	012347	MOV	#MSG2,R2	;"THEN HIT 'CONTINUE' ON THE CONSOLE"
1598	007664	004767	002240	JSR	%7,TOUT	
1599	007670	004767	002312	JSR	%7,CRLF	;MOVE MESSAGE UP ON TTY
1600	007674	004767	002306	JSR	%7,CRLF	
1601	007700	004767	002302	JSR	%7,CRLF	
1602	007704	004767	002276	JSR	%7,CRLF	
1603	007710	000000		HALT		
1604	007712	032713	000400	BIT	#400,%CRS	;CHECK BIT 8
1605	007716	001001		BNE	.+4	;BRANCH IF SET
1606	007720	104000		HLT		;OFF-LINE (BIT 8) WASN'T SET
1607	007722	005713		TST	%CRS	;CHECK SPECIAL CONDITION BIT
1608	007724	100401		BMI	.+4	;BRANCH IF SET
1609	007726	104000		HLT		;SPECIAL CONDITION NOT SET
1610	007730	032713	020000	BIT	#20000,%CRS	;YES, TEST BIT 13
1611	007734	001001		BNE	.+4	;CONTINUE IF SET
1612	007736	104000		HLT		;CARD SUPPLY ERROR WASN'T SET
1613	007740	012702	012560	MOV	#MSG6,R2	;"RESTORE CARDS IN INPUT HOPPER"
1614	007744	004767	002160	JSR	%7,TOUT	
1615	007750	012702	012254	MOV	#MSG1,R2	;"PRESS CARD READER 'RESET'"
1616	007754	004767	002150	JSR	%7,TOUT	
1617	007760	012702	012347	MOV	#MSG2,R2	;"THEN HIT 'CONTINUE' ON THE CONSOLE"
1618	007764	004767	002140	JSR	%7,TOUT	
1619	007770	004767	002212	JSR	%7,CRLF	;MOVE MESSAGE UP ON TTY
1620	007774	004767	002206	JSR	%7,CRLF	
1621	010000	004767	002202	JSR	%7,CRLF	
1622	010004	004767	002176	JSR	%7,CRLF	
1623	010010	000000		HALT		
1624						
1625						
1626	010012	104400				
1627	010014	004767	001324	JSR	%7,INIT	;INITIALIZE STATUS REGISTER
1628	010020	012702	012624	MOV	#MSG7,R2	;"LOWER THE OUTPUT STACKER PRESSURE ARM"
1629	010024	004767	002100	JSR	%7,TOUT	
1630	010030	012702	012347	MOV	#MSG2,R2	;"THEN HIT 'CONTINUE' ON THE CONSOLE"
1631	010034	004767	002070	JSR	%7,TOUT	
1632	010040	004767	002142	JSR	%7,CRLF	;MOVE MESSAGE UP ON TTY
1633	010044	004767	002136	JSR	%7,CRLF	
1634	010050	004767	002132	JSR	%7,CRLF	
1635	010054	004767	002126	JSR	%7,CRLF	
1636	010060	000000		HALT		
1637	010062	032713	000400	BIT	#400,%CRS	;CHECK BIT 8
1638	010066	001001		BNE	.+4	;BRANCH IF SET
1639	010070	104000		HLT		;OFF-LINE (BIT 8) WASN'T SET
1640	010072	005713		TST	%CRS	;CHECK SPECIAL CONDITION BIT

;INPUT HOPPER EMPTY SHOULD SET SPECIAL CONDITION
;IN THE 200 M/S CARD READER IT SHOULD ALSO SET CARD SUPPLY ERROR

TESTB: SCOPE

RESETB:

;OUTPUT STACKER FULL SHOULD SET BIT 15, AND IN AN MS READER SHOULD ALSO SET BIT 13

TESTC: SCOPE

H03

1641	010074	100401			BMI	.+4	;BRANCH IF SET
1642	010076	104000			HLT		;SPECIAL CONDITION NOT SET
1643	010100	032713	020000		BIT	#20000, @CRS	;YES, TEST BIT 13
1644	010104	001001			BNE	+.4	;CONTINUE IF SET
1645	010106	104000			HLT		;CARD SUPPLY ERROR WASN'T SET
1646	010110	012702	012254	RSETC:	MOV	#MSG1, R2	
1647	010114	004767	002010		JSR	%7, TOUT	; "PRESS CARD READER 'RESET'"
1648	010120	012702	012347		MOV	#MSG2, R2	
1649	010124	004767	002000		JSR	%7, TOUT	; "THEN HIT 'CONTINUE' ON THE CONSOLE"
1650	010130	004767	002052		JSR	%7, CRLF	; MOVE MESSAGE UP ON TTY
1651	010134	004767	002046		JSR	%7, CRLF	
1652	010140	004767	002042		JSR	%7, CRLF	
1653	010144	004767	002036		JSR	%7, CRLF	
1654	010150	000000			HALT		
1655							
1656							
1657							
1658	010152	104400					
1659	010154	004767	001164	TESTD:	JSR	%7, INIT	
1660	010160	012702	012507		MOV	#MSG5, R2	; "REMOVE ALL CARDS FROM THE INPUT HOPPER"
1661	010164	004767	001740		JSR	%7, TOUT	
1662	010170	012702	012347		MOV	#MSG2, R2	; "THEN HIT 'CONTINUE' ON THE CONSOLE"
1663	010174	004767	001730		JSR	%7, TOUT	
1664	010200	012702	012703		MOV	#MSG8, R2	; "HOLD DOWN THE SWITCH AT THE BOTTOM
1665	010204	004767	001720		JSR	%7, TOUT	; OF THE INPUT HOPPER"
1666	010210	012702	012254		MOV	#MSG1, R2	; "PRESS CARD READER 'RESET'"
1667	010214	004767	001710		JSR	%7, TOUT	
1668	010220	004767	001762		JSR	%7, CRLF	; MOVE MESSAGE UP ON TTY
1669	010224	004767	001756		JSR	%7, CRLF	
1670	010230	004767	001752		JSR	%7, CRLF	
1671	010234	004767	001746		JSR	%7, CRLF	
1672	010240	000000			HALT		
1673	010242	032713	002000		BIT	#2000, @CRS	; WAIT FOR CARD READER TO COME ON-LINE
1674	010246	001775			BEQ	.-4	
1675	010250	004767	001070		JSR	%7, INIT	; INITIALIZE STATUS REGISTER
1676	010254	012713	000003		MOV	#3, @CRS	; SET EJECT AND READ
1677	010260	005001			CLR	COUNT	; WAIT AWHILE
1678	010262	005201			INC	COUNT	
1679	010264	001376			BNE	.-2	
1680	010266	005201			INC	COUNT	
1681	010270	001376			BNE	.-2	
1682	010272	005201			INC	COUNT	
1683	010274	001376			BNE	.-2	
1684	010276	005201			INC	COUNT	
1685	010300	001376			BNE	.-2	
1686	010302	032713	000400		BIT	#400, @CRS	; TEST OFF-LINE BIT
1687	010306	001001			BNE	+.4	; BRANCH IF SET
1688	010310	104000			HLT		; BIT 8 WAS NOT SET
1689	010312	005713			TST	@CRS	; CHECK BIT 15
1690	010314	100401			BMI	+.4	; BRANCH IF SET
1691	010316	104000			HLT		; BIT 15 WAS NOT SET
1692	010320	032713	010000		BIT	#10000, @CRS	; TEST CARD READER CHECK BIT ON MS READERS
1693	010324	001001			BNE	+.4	; BRANCH IF SET
1694	010326	104000			HLT		; BIT 12 WASN'T SET
1695	010330	012702	012560	RSETD:	MOV	#MSG6, R2	
1696	010334	004767	001570		JSR	%7, TOUT	; "RESTORE CARDS IN THE INPUT HOPPER"

; A FEED ERROR SHOULD SET BIT 15, AND IN THE MS READER IT SHOULD ALSO SET BIT 12
 ; THIS ERROR OCCURS WHEN THE FEED MECHANISM FAILS TO DELIVER A CARD TO THE READ STATION

1697	010340	012702	012254	MOV	#MSG1,R2	
1698	010344	004767	001560	JSR	%7,TOUT	;"PRESS CARD READER 'START'"
1699	010350	012702	012347	MOV	#MSG2,R2	;"THEN HIT 'CONTINUE' ON THE CONSOLE"
1700	010354	004767	001550	JSR	%7,TOUT	
1701	010360	004767	001622	JSR	%7,CRLF	;MOVE MESSAGE UP ON TTY
1702	010364	004767	001616	JSR	%7,CRLF	
1703	010370	004767	001612	JSR	%7,CRLF	
1704	010374	004767	001606	JSR	%7,CRLF	
1705	010400	000000		HALT		
1706						
1707						
1708						
1709	010402	104400				
1710	010404	004767	000734	JSR	%7,INIT	;INITIALIZE STATUS REGISTER
1711	010410	012702	012414	MOV	#MSG3,R2	;"PRESS CARD READER 'READ STOP'"
1712	010414	004767	001510	JSR	%7,TOUT	
1713	010420	012702	012347	MOV	#MSG2,R2	;"THEN HIT 'CONTINUE' ON THE CONSOLE"
1714	010424	004767	001500	JSR	%7,TOUT	
1715	010430	012702	012761	MOV	#MSG9,R2	;"BLOCK THE CARD READER STATION TO
1716	010434	004767	001470	JSR	%7,TOUT	;"PREVENT A CARD GOING THRU, AND"
1717	010440	012702	012254	MOV	#MSG1,R2	;"PRESS CARD READER 'START'"
1718	010444	004767	001460	JSR	%7,TOUT	
1719	010450	004767	001532	JSR	%7,CRLF	;MOVE MESSAGE UP ON TTY
1720	010454	004767	001526	JSR	%7,CRLF	
1721	010460	004767	001522	JSR	%7,CRLF	
1722	010464	004767	001516	JSR	%7,CRLF	
1723	010470	000000		HALT		
1724	010472	032713	002000	BIT	#2000,%CRS	;MONITOR ON-LINE TRANSITION (BIT 10)
1725	010476	001775		BEG	.-4	;CONTINUE WHEN CARD READER COMES ON-LINE
1726	010500	012713	000003	MOV	#3,%CRS	;READ A CARD AND SET EJECT
1727	010504	032713	140000	BIT	#140000,%CRS	;CHECK DONE AND SPECIAL CONDITION BITS
1728	010510	001775		BEG	.-4	;WAIT
1729	010512	005713		TST	%CRS	;CHECK SPECIAL CONDITION BIT
1730	010514	100401		BMI	.-4	;CONTINUE IF SET
1731	010516	104000		HLT		;SPECIAL CONDITION NOT SET
1732						;NOTE THAT IF THE CARD GETS PAST
1733						;THE READ STATION THIS TEST
1734						;WILL FAIL- MAKE CERTAIN THAT THE CARD
1735						;DIDN'T MAKE IT THRU BEFORE
1736						;CONSIDERING THIS A CARD READER FAILURE
1737	010520	032713	010000	BIT	#10000,%CRS	;YES, CHECK BIT 12
1738	010524	001001		BNE	.-4	;BRANCH IF SET
1739	010526	104000		HLT		;CARD READER CHECK NOT SET
1740	010530	012702	012254	MOV	#MSG1,R2	;"PRESS CARD READER 'RESET'"
1741	010534	004767	001370	JSR	%7,TOUT	
1742	010540	012702	012347	MOV	#MSG2,R2	;"THEN HIT 'CONTINUE' ON THE CONSOLE"
1743	010544	004767	001360	JSR	%7,TOUT	
1744	010550	004767	001432	JSR	%7,CRLF	;MOVE MESSAGE UP ON TTY
1745	010554	004767	001426	JSR	%7,CRLF	
1746	010560	004767	001422	JSR	%7,CRLF	
1747	010564	004767	001416	JSR	%7,CRLF	
1748	010570	000000		HALT		
1749						
1750	010572	104400		TESTG:	SCOPE	
1751	010574	004767	000620	JSR	%7,BELL	;IF SET, RING BELL AND
1752	010600	000000		HALT		;HALT

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1753 010602 012767 007510 001316      MOV      #TESTA+2,RETURN ;SETUP SCOPE LOOP RETURN ADDRESS TO LOOP THRU TESTS
1754 010610 000167 176672      JMP      TESTA          ;START ERROR TESTS OVER ON CONTINUING
1755
1756 ;ROUTINE TO LOOP THRU A SINGLE INSTRUCTION TEST
1757 ;NOTE THAT SW11 MUST BE DOWN AFTER 2ND HALT
1758 TESTX: JSR      %7,SETUP      ;SETUP POINTERS AND FLAGS
1759        HALT                ;WAIT FOR STARTING ADDRESS
1760        MOV      SR,RETRNX    ;STORE STARTING ADDRESS
1761        ADD     #2,RETRNX    ;CHANGE TO FIRST ADDRESS AFTER SCOPE INSTRUCTION
1762        HALT                ;SET SR OPTIONS (BIT 11 MUST = 0)
1763        CLR     ITCNT        ;CLEAR ITERATION COUNTER
1764        MOV     #4000,ITMAX
1765        MOV     #XLOOP,RETURN ;LOAD RETURN ADDRESS
1766        JMP     @RETRNX      ;JUMP TO TEST
1767 XLOOP: CLR     ITCNT        ;KEEP ITERATION COUNTER AT ZERO
1768        JMP     @RETRNX      ;JUMP TO TEST
1769        RETRNX: 0
1770
1771 ;ROUTINE TO CHECK CARDS WHICH HAVE ALL COLUMNS IDENTICALLY PUNCHED.
1772 ;THIS ROUTINE ALLOWS SPECIFIC TYPES OF DATA FAILURES TO BE STUDIED
1773 ;EASILY. THE ROUTINE HALTS ONCE AT THE START. SET THE CORRECT CARD
1774 ;IMAGE PATTERN IN SW11-SW00, THEN HIT CONTINUE (AFTER THE DECK IS
1775 ;LOADED AND CARD READER IS ON-LINE). THE PATTERN IS STORED, AND THEN
1776 ;EACH COLUMN OF EACH CARD IS READ TWICE AND COMPARED WITH IT. IF A
1777 ;DISCREPANCY OCCURS, THE ERROR IS PRINTED OUT ALONG WITH THE TOTAL
1778 ;NUMBER OF CARDS READ AND THE TOTAL NUMBER OF DATA ERRORS DISCOVERED
1779 ;UP TO THAT POINT (ALL PRINTOUTS ARE IN OCTAL). WHEN THE INPUT HOPPER
1780 ;IS EMPTY, THE ROUTINE RINGS THE BELL AND WAITS FOR MORE CARDS TO BE
1781 ;LOADED AND THE CARD READER TO BE PUT BACK ON-LINE.
1782 ;SW15=1 CAUSES A HALT AFTER AN ERROR, AND SW13=1 INHIBITS ERROR PRINTOUTS.
1783
1784 CKSAME: JSR      %7,SETUP      ;INITIALIZE POINTERS
1785        HALT                ;WAIT FOR CARD IMAGE PATTERN
1786        MOV     SR,CARDIM     ;STORE PATTERN
1787        BIC     #17000,CARDIM ;CLEAR UPPER BITS OF PATTERN
1788        CLR     TOTCRD        ;INITIALIZE CARD COUNT
1789        CLR     TOTERR        ;INITIALIZE ERROR COUNT
1790        CLR     ERFLG         ;CLEAR FLAG FOR PRINTING ERROR HEADING
1791        CLR     CLCNT         ;INITIALIZE COLUMN COUNT
1792 CKLOOP: CLR     CLCNT         ;CHECK BIT 8
1793        BIT     #400,@CRS     ;BRANCH IF SET TO WAIT FOR READER TO COME ON-LINE.
1794        BNE     CKSIT         ;START READING CARD
1795        INC     @CRS          ;INCREMENT CARD COUNT
1796        INC     TOTCRD        ;CHECK COLUMN READY
1797        TSTB    @CRS          ;BRANCH IF SET
1798        BMI     CKCOL         ;CHECK CARD DONE
1799        BIT     #40000,@CRS   ;BRANCH IF SET
1800        BNE     CKCRD        ;CHECK SPECIAL CONDITION
1801        TST     @CRS          ;LOOP IF NOT SET
1802        BPL     CKLP1         ;CHECK BIT 8
1803        BIT     #400,@CRS     ;BRANCH IF SET TO WAIT FOR READER ON-LINE.
1804        BNE     CKSIT         ;SPECIAL CONDITION SET, BIT 8 CLEAR
1805        HLT
1806        BR     CKLOOP
1807
1808 CKSIT: JSR      %7,BELL      ;RING BELL TO SIGNIFY READER OFF-LINE

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1809	011010	032713	000400		CKSIT1:	BIT	#400,ACRS	;CHECK BIT 8
1810	011014	001375				BNE	CKSIT1	;LOOP IF STILL SET
1811	011016	000746				BR	CKLOOP	;START NEXT CARD
1812	011020	022767	000120	176056	CKCRD:	CMP	#80,CLCNT	;CHECK FOR 80 COLUMNS READ
1813	011026	001742				BEQ	CKLOOP	;START NEXT CARD IF OK
1814	011030	104000				HLT		;FINAL COLUMN COUNT WASN'T 80
1815	011032	000740				BR	CKLOOP	;START NEXT CARD
1816	011034	011467	176046		CKCOL:	MOV	ACRB1,DAT1	;READ DATA BUFFER
1817	011040	005267	176040			INC	CLCNT	;COUNT COLUMNS
1818	011044	105713				TSTB	ACRS	;CHECK COLUMN READY
1819	011046	100002				BPL	.+5	;BRANCH IF OK
1820	011050	104000				HLT		;READING DCR DIDN'T CLEAR READY
1821	011052	000730				BR	CKLOOP	;START NEXT CARD AFTER ERROR
1822	011054	012701	000200			MOV	#200,COUNT	;WAIT AWHILE
1823	011060	005301			CKLP2:	DEC	COUNT	
1824	011062	001376				BNE	CKLP2	
1825	011064	011467	176020			MOV	ACRB1,DAT2	;READ CRB1 AGAIN
1826	011070	026767	176012	000174		CMP	DAT1,CARDIM	;COMPARE FIRST DATA TO PATTERN
1827	011076	001005				BNE	CKFAIL	;BRANCH IF FAILURE
1828	011100	026767	176004	000164		CMP	DAT2,CARDIM	;COMPARE SECOND READING TO PATTERN
1829	011106	001001				BNE	CKFAIL	;BRANCH IF FAILURE
1830	011110	000721				BR	CKLP1	;WAIT FOR NEXT COLUMN OR END OF CARD
1831	011112	005267	000150		CKFAIL:	INC	TOTERR	;COUNT ERRORS
1832	011116	032767	020000	166444		BIT	#20000,SR	;CHECK FOR INHIBITING PRINTOUT
1833	011124	001047				BNE	CKHLT	;BRANCH AROUND PRINTOUT IF SET
1834	011126	005767	167704			TST	ERFLG	;TEST FLAG TO PRINT HEADING
1835	011132	001006				BNE	CKNOHD	;BRANCH IF ALREADY DONE
1836	011134	005267	167676			INC	ERFLG	;PRINT HEADING ONCE ONLY
1837	011140	012702	013301			MOV	#MSG19,R2	;OUTPUT HEADING
1838	011144	004767	000760			JSR	%7,TOUT	
1839	011150	004767	001032		CKNOHD:	JSR	%7,CRLF	;OUTPUT CARRIAGE RETURN, LINEFEED
1840	011154	016702	175724			MOV	CLCNT,R2	;PRINT COLUMN NUMBER
1841	011160	004767	004076			JSR	%7,DECPR	
1842	011164	004767	000352			JSR	%7,SPACE	
1843	011170	016702	175712			MOV	DAT1,R2	;PRINT FIRST READING
1844	011174	004767	000514			JSR	%7,PROCT	
1845	011200	004767	000336			JSR	%7,SPACE	
1846	011204	016702	175700			MOV	DAT2,R2	;PRINT SECOND READING
1847	011210	004767	000500			JSR	%7,PROCT	
1848	011214	004767	000322			JSR	%7,SPACE	
1849	011220	016702	000044			MOV	TOTCRD,R2	;PRINT TOTAL NUMBER OF CARDS READ
1850	011224	004767	000464			JSR	%7,PROCT	
1851	011230	004767	000306			JSR	%7,SPACE	
1852	011234	016702	000026			MOV	TOTERR,R2	;PRINT TOTAL NUMBER OF DATA ERRORS
1853	011240	004767	000450			JSR	%7,PROCT	
1854	011244	005767	166320		CKHLT:	TST	SR	;CHECK SW15 TO HALT ON ERROR
1855	011250	100002				BPL	CKDONE	;BRANCH IF NOT SET
1856	011252	000000				HALT		;HALT ON ERROR
1857	011254	000627				BR	CKLOOP	;CONTINUE
1858	011256	032713	140000		CKDONE:	BIT	#140000,ACRS	;WAIT FOR SPECIAL CONDITION OR DONE
1859	011262	001775				BEQ	CKDONE	
1860	011264	000623				BR	CKLOOP	;START NEXT CARD AFTER CHECKING BIT 8
1861	011266	000000			TOTERR:	0		
1862	011270	000000			TOTCRD:	0		
1863	011272	000000			CARDIM:	0		
1864								;READ A CARD AND EXECUTE A PROGRAM

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1865 ;DELAY BEFORE READING ANOTHER CARD
1866 ;THIS WILL AID IN TESTING FOR 'PICK ERRORS'
1867 011274 004767 167542 DELAY: JSR %7, SETUP ;SETUP POINTERS
1868 011300 000000 HALT ;WAIT FOR OPR.
1869 011302 016767 166262 000030 1$: MOV SR, DLAYO ;READ SR
1870 011310 005213 INC @CRS ;MOVE CARD
1871 011312 005267 000022 INC DLAYO
1872 011316 005067 000020 CLR DLAY1 ;CLEAR SECOND COUNTER
1873 011322 005367 000014 2$: DEC DLAY1 ;DELAY
1874 011326 001375 BNE 2$
1875 011330 005367 000004 DEC DLAYO ;DELAY FINISHED ?
1876 011334 001372 BNE 2$ ;BR IF NOT
1877 011336 000761 BR 1$ ;BR IF YES
1878
1879 011340 000001 DLAYO: 1
1880 011342 000000 DLAY1: 0
1881 ;ISSUE MESSAGE IF CARD READER IS OFF-LINE
1882 ;WAIT FOR BUSY TO CLEAR IN CASE CARD READER IS STILL READING A CARD
1883 ;INITIALIZE STATUS REGISTER AND USE ERROR HALT IF IT DOESN'T CLEAR PROPERLY
1884 ;NOTE THAT PROGRAM WILL HANG HERE IF BUSY REMAINS SET
1885 011344 004767 000136 INIT: JSR %7, CKBIT8 ;SEE IF OFF-LINE BIT IS SET
1886 011350 032713 001000 BIT #1000, @CRS ;WAIT FOR BUSY TO CLEAR, IN CASE
1887 011354 001375 BNE .-4 ;A CARD IS STILL BEING READ
1888 011356 005013 CLR @CRS ;INITIALIZE STATUS REGISTER
1889 011360 005714 TST @CRB1 ;READ DATA BUFFER TO CLEAR COLUMN READY
1890 011362 005713 TST @CRS ;MAKE SURE INITIALIZATION OK
1891 011364 001401 BEQ .+4 ;BRANCH IF ALL BITS ZERO
1892 011366 104000 HLT ;NOT ALL BITS OF STATUS REGISTER ARE ZERO
1893 011370 000207 RTS %7 ;RETURN
1894
1895 ;SUBROUTINE TO SAVE STATUS AND CLEAR T BIT
1896 011372 016767 166400 167434 CLRTR: MOV PSR, PROC ;SAVE STATUS
1897 011400 011646 MOV (SP), -(SP) ;PUSH RETURN PC
1898 011402 016766 166370 000002 MOV PSR, 2(SP) ;SETUP STATUS WITH T BIT CLEAR
1899 011410 042766 000020 000002 BIC #20, 2(SP)
1900 011416 000002 RTI ;RETURN
1901
1902 ;BELL ON PASS COMPLETE
1903 011420 105777 167372 BELL: TSTB @TCSR ;WAIT FOR TTY READY
1904 011424 100375 BPL .-4
1905 011426 012777 000207 167364 MOV #207, @TDBR ;RING BELL
1906 011434 013702 000042 MOV @#42, R2
1907 011440 001416 BEQ END
1908 011442 105777 167350 TSTB @TCSR
1909 011446 100375 BPL .-4
1910 011450 012777 000000 167342 MOV #0, @TDBR
1911 011456 105777 167334 TSTB @TCSR
1912 011462 100375 BPL .-4
1913 011464 000005 RESET
1914 011466 004712 LOGIC: JSR %7, (R2)
1915 011470 000240 NOP
1916 011472 000240 NOP
1917 011474 000240 NOP
1918 011476 012767 000001 000416 END: MOV #1, ITMAX ;MAKE CERTAIN ITERATION MAXIMUM IS CORRECT
1919 011504 000207 RTS %7 ;RETURN
1920

```

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1921 ;SUBROUTINE TO CHECK FOR BIT 8 (OFF-LINE) BEING SET IN CARD
1922 ;READER CSR, AND PRINT OUT A MESSAGE IF IT IS
1923 011506 032713 000400 CKBIT8: BIT #400, JCRS ;CHECK BIT 8
1924 011512 001001 BNE .+4 ;BRANCH IF SET
1925 011514 000207 RTS %7 ;RETURN IF NOT SET
1926 011516 012702 013261 MOV #MSG18, R2 ;OUTPUT MESSAGE
1927 011522 004767 000402 JSR %7, TOUT ;"BIT 8 WAS SET"
1928 011526 012702 013176 MOV #MSG17, R2 ;"REMEDY THE ERROR CONDITION
1929 011532 004767 000372 JSR %7, TOUT ;AND PRESS 'CONTINUE'"
1930 011536 000000 HALT ;WAIT FOR CONTINUE
1931 011540 000762 BR CKBIT8 ;CHECK AGAIN
1932
1933 ;SUBROUTINE TO ISSUE N SPACES
1934 ;N IS ONE PLUS VALUE CONTAINED IN SPACEX
1935 ;SPACEX IS CLEARED WITHIN THE SUBROUTINE, SO THAT A CALL ON
1936 ;SPACE WITHOUT LOADING SPACEX ISSUES ONLY ONE SPACE
1937 011542 105777 167250 SPACE: TSTB @TCSR ;WAIT FOR TTY READY
1938 011546 100375 BPL .-4
1939 011550 012777 000240 167242 MOV #240, @TDBR ;OUTPUT A SPACE
1940 011556 005367 000010 DEC SPACEX ;DECREMENT COUNT
1941 011562 100367 BPL SPACE ;LOOP IF NOT DONE
1942 011564 005067 000002 CLR SPACEX ;RESET COUNT TO ZERO
1943 011570 000207 RTS %7 ;RETURN
1944 011572 000000 SPACEX: 0
1945
1946
1947
1948 ;ENTERED WITH SYSTEM TRAP CALL (HLT)
1949 ;PRINT OUT THE ERROR PC AND STATUS REGISTER
1950 011574 036727 165770 020000 PRINT: BIT SR, #20000 ;TEST FOR INHIBIT PRINT OUT
1951 011602 001401 BEQ .+4 ;BRANCH TO PRINT
1952 011604 000431 BR B.CK ;INHIBIT, CHECK FOR HALT
1953 011606 012667 000076 MOV (6)+, SAVPC ;PC OF FAILING ROUTINE
1954 011612 012667 000074 MOV (6)+, SAVPSR ;PSR OR ERROR CONDITION
1955 011616 024646 CMP -(6), -(6) ;RESTORE STACK
1956 011620 004767 000362 JSR %7, CRLF ;OUTPUT CARRIAGE RETURN, LINEFEED
1957 011624 010267 000052 MOV %2, SAVR2 ;SAVE R2
1958 011630 016702 000054 MOV SAVPC, %2
1959 011634 004767 000054 JSR %7, PROCT ;PRINT PC+2 IN OCTAL
1960 011640 105777 167152 TSTB @TCSR ;WAIT FOR TTY READY
1961 011644 100375 BPL .-4
1962 011646 012777 000240 167144 MOV #240, @TDBR ;OUTPUT A SPACE
1963 011654 016702 000032 MOV SAVPSR, %2
1964 011660 004767 000030 JSR %7, PROCT ;PRINT PROCESSOR STATUS AT TIME OF FAILURE
1965 011664 016702 000012 MOV SAVR2, %2 ;RESTORE REGISTER 2
1966 011670 005767 165674 B.CK: TST SR ;CHECK SR FOR HALT SWITCH
1967 011674 100001 BPL .+4 ;BRANCH IF NOT SET
1968 011676 000000 HALT ;HALT ON ERROR UP
1969 011700 000002 RTI ;RETURN TO MAIN LINE
1970 011702 000000 SAVR2: 0
1971 011704 000000 SAVR3: 0
1972 011706 000000 SAVR4: 0
1973 011710 000000 SAVPC: 0
1974 011712 000000 SAVPSR: 0
1975
1976 011714 010367 177764 PROCT: MOV %3, SAVR3 ;SAVE R3
    
```

1977	011720	010467	177762		MOV	%4,SAVR4			:SAVE R4
1978	011724	005004			CLR	%4			:CLEAR R4 TO USE AS COUNTER
1979	011726	005001			CLR	COUNT			:CLEAR COUNT TO USE AS CARRY FLAG
1980	011730	012703	000260		MOV	#260,%3			:SETUP ASCII ZERO IN R3
1981	011734	005702			TST	%2			:CHECK BIT 15 OF DESIRED NUMBER
1982	011736	100001			BPL	.+4			:BRANCH IF NOT SET
1983	011740	005203			INC	%3			:CHANGE TO ASCII ONE
1984	011742	006102			ROL	%2			:ROTATE INTO RIGHTMOST BIT
1985	011744	006102			ROL	%2			:TO PREPARE FOR LOOP
1986	011746	005501			ADC	COUNT			:STORE CARRY
1987	011750	105777	167042		TSTB	@TCSR			:WAIT FOR TTY READY
1988	011754	100375			BPL	C.WAIT			
1989	011756	010377	167036		MOV	%3,@TDBR			:OUTPUT ASCII
1990	011762	005204			INC	%4			:COUNT CHARACTERS OUTPUT
1991	011764	020427	000006		CMP	%4,#6			:CHECK FOR DONE
1992	011770	001005			BNE	C.CONT			:BRANCH IF NOT DONE
1993	011772	016703	177706		MOV	SAVR3,%3			:RESTORE REGISTER 3
1994	011776	016704	177704		MOV	SAVR4,%4			:RESTORE REGISTER 4
1995	012002	000207			RTS	%7			:RETURN
1996	012004	000241			CLC				:CLEAR CARRY
1997	012006	005701			TST	COUNT			:TEST CARRY FLAG
1998	012010	001402			BEQ	.+6			:BRANCH IF NOT SET
1999	012012	005001			CLR	COUNT			:CLEAR FLAG
2000	012014	000261			SEC				:SET CARRY
2001	012016	006102			ROL	%2			:ROTATE NEXT 3 BITS INTO RIGHTMOST 3
2002	012020	006102			ROL	%2			
2003	012022	006102			ROL	%2			
2004	012024	005501			ADC	COUNT			:STORE CARRY
2005	012026	010203			MOV	%2,%3			:MOVE DATA FOR OUTPUT
2006	012030	042703	177770		BIC	#177770,%3			:CLEAR ALL BUT RIGHTMOST 3 BITS
2007	012034	052703	000260		BIS	#260,%3			:SET TO ASCII EQUIVALENT
2008	012040	000743			BR	C.WAIT			:LOOP
2009					:SCOPE AND/OR ITERATION LOOP FOR EACH TEST 2 TIMES				
2010	012042	032767	040000	165520	SCOPEC:	BIT	#40000,SR		:TEST SR FOR SCOPE
2011	012050	001012			BNE	D.1			:YES,SCOPE
2012	012052	032767	004000	165510	BIT	#4000,SR			:NO-TEST FOR ITERATION
2013	012060	001013			BNE	D.2			:INHIBIT ITERATION
2014	012062	026767	000036	000032	CMP	ITCNT,ITMAX			:CHECK FOR ITERATIONS COMPLETE
2015	012070	100007			BPL	D.2			:EXIT-DONE
2016	012072	005267	000026		INC	ITCNT			:INCREMENT COUNT
2017	012076	022606			D.1:	CMP	(6)+,%6		:REPOSITION STACK POINTER
2018	012100	012667	165672		MOV	(6)+,PSR			:RESTORE PROCESSOR STATUS
2019	012104	000177	000016		JMP	@RETURN			:RETURN TO RERUN TEST
2020	012110	005067	000010		D.2:	CLR	ITCNT		:CLEAR COUNTER
2021	012114	011667	000006		MOV	@%6,RETURN			:SAVE SCOPE RETURN POINTER
2022	012120	000002			RTI				:RETURN INLINE-NEXT TEST
2023	012122	000001			ITMAX:	1			:MAX NUMBER OF ITERATIONS
2024	012124	000000			ITCNT:	0			:COUNT LOCATION FOR ITERATION LOOP
2025	012126	001224			RETURN:	TEST1+2			:ADDRESS OF LAST TEST
2026					:MOV ADDRESS OF MESSAGE TO REGISTER 2				
2027					:THEN JSR %7, TOUT				
2028					TOUT:	BICB	#177,@TCSR		:CLEAR INT FLAG
2029	012130	142777	000177	166660	MOV	@%2,L.EOMK			:MOVE IN EOM MARKER
2030	012136	111267	000042		L.INC:	INC	%2		:MOVE DATA POINTER TO NEXT BYTE
2031	012142	005202			L.TOUT:	CMP	@%2,L.EOMK		:COMPARE FOR EOM
2032	012144	121267	000034						

2033	012150	001001			BNE	.+4				:BRANCH IF NOT END OF MESSAGE
2034	012152	000207			RTS	%7				:RETURN IF EOM
2035	012154	121227	000100		CMPB	%2	#'2			:CHECK FOR CR,LF REQUEST
2036	012160	001003			BNE	.+10				:BRANCH IF NOT
2037	012162	004767	000020		JSR	%7	CRLF			:OUTPUT CARRIAGE RETURN, LINEFEED
2038	012166	000765			BR	L.INC				:LOOP
2039	012170	105777	166622		TSTB	@TCSR				:WAIT FOR TTY
2040	012174	100375			BPL	.-4				
2041	012176	112277	166616		MOVB	(2)+	@TDBR			:OUTPUT NEXT CHARACTER
2042	012202	000760			BR	L.TOUT				:CONTINUE
2043	012204	000000								
2044										
2045										
2046	012206	105777	166604							
2047	012212	100375								
2048	012214	112777	000215	166576						
2049	012222	105777	166570							
2050	012226	100375								
2051	012230	112777	000212	166562						
2052	012236	105777	166554							
2053	012242	100375								
2054	012244	012777	000000	166546						
2055	012252	000207								
2056										
2057										
2058	012254	040057	051120	051505	MSG1:	.ASCII	;/@PRESS CARD READER 'RESET' AND WAIT FOR THE 'RESET' LIGHT/;			
2059	012262	020123	040503	042122						
2060	012270	051040	040505	042504						
2061	012276	020122	051047	051505						
2062	012304	052105	020047	047101						
2063	012312	020104	040527	052111						
2064	012320	043040	051117	052040						
2065	012326	042510	023440	042522						
2066	012334	042523	023524	046040						
2067	012342	043511	052110	057						
2068	012347	057	052100	042510	MSG2:	.ASCII	;/@THEN HIT 'CONTINUE' ON THE CONSOLE/;			
2069	012354	020116	044510	020124						
2070	012362	041447	047117	044524						
2071	012370	052516	023505	047440						
2072	012376	020116	044124	020105						
2073	012404	047503	051516	046117						
2074	012412	027505								
2075	012414	040057	051120	051505	MSG3:	.ASCII	;/@PRESS CARD READER 'READ STOP' /;			
2076	012422	020123	040503	042122						
2077	012430	051040	040505	042504						
2078	012436	020122	051047	040505						
2079	012444	020104	052123	050117						
2080	012452	027447								
2081	012454	040057	044124	020105	MSG4:	.ASCII	;/@THE INTERRUPT LEVEL WAS /;			
2082	012462	047111	042524	051122						
2083	012470	050125	020124	042514						
2084	012476	042526	020114	040527						
2085	012504	020123	057							
2086	012507	057	051100	046505	MSG5:	.ASCII	;/@REMOVE ALL CARDS FROM THE INPUT HOPPER/;			
2087	012514	053117	020105	046101						
2088	012522	020114	040503	042122						

2089	012530	020123	051106	046517
2090	012536	052040	042510	044440
2091	012544	050116	052125	044040
2092	012552	050117	042520	027522
2093	012560	040057	042522	052123
2094	012566	051117	020105	040503
2095	012574	042122	020123	047111
2096	012602	052040	042510	044440
2097	012610	050116	052125	044040
2098	012616	050117	042520	027522
2099	012624	040057	047514	042527
2100	012632	020122	044124	020105
2101	012640	052517	050124	052125
2102	012646	044040	050117	042520
2103	012654	020122	052123	041501
2104	012662	042513	020122	051120
2105	012670	051505	052523	042522
2106	012676	040440	046522	057
2107	012703	057	052100	042510
2108	012710	020116	042507	052116
2109	012716	054514	042040	050105
2110	012724	042522	051523	052040
2111	012732	042510	044040	050117
2112	012740	042520	020122	046505
2113	012746	052120	020131	053523
2114	012754	052111	044103	057
2115	012761	057	052100	042510
2116	012766	020116	044506	046522
2117	012774	054514	044040	046117
2118	013002	020104	044124	020105
2119	013010	047502	052124	046517
2120	013016	041440	051101	020104
2121	013024	047524	050040	042522
2122	013032	042526	052116	040440
2123	013040	041440	051101	020104
2124	013046	047507	047111	020107
2125	013054	044124	052522	020054
2126	013062	047101	027504	
2127	013066	040057	042504	045503
2128	013074	020040	041440	051101
2129	013102	020104	047503	052514
2130	013110	047115	050040	052101
2131	013116	042524	047122	051040
2132	013124	040505	030504	051040
2133	013132	040505	031104	020040
2134	013140	047503	042504	020104
2135	013146	051040	040505	027504
2136	013154	040057	046101	044120
2137	013162	020101	057	
2138	013165	057	041100	047111
2139	013172	051101	027531	
2140	013176	040057	042522	042515
2141	013204	054504	052040	042510
2142	013212	042440	051122	051117
2143	013220	041440	047117	044504
2144	013226	044524	047117	040440

MSG6: .ASCII ;/RESTORE CARDS IN THE INPUT HOPPER/;

MSG7: .ASCII ;/LOWER THE OUTPUT HOPPER STACKER PRESSURE ARM/;

MSG8: .ASCII ;/THEN GENTLY DEPRESS THE HOPPER EMPTY SWITCH/;

MSG9: .ASCII ;/THEN FIRMLY HOLD THE BOTTOM CARD TO PREVENT A CARD GOING THRU, AND/;

MSG13: .ASCII ;/DECK CARD COLUMN PATTERN READ1 READ2 CODED READ/;

MSG14: .ASCII ;/ALPHA /;

MSG15: .ASCII ;/BINARY/;

MSG17: .ASCII ;/REMEDY THE ERROR CONDITION AND PRESS 'CONTINUE'/;

004

2145	013234	042116	050040	042522	
2146	013242	051523	023440	047503	
2147	013250	052116	047111	042525	
2148	013256	040047	057		
2149	013261	057	041100	052111	MSG18: .ASCII ;/2BIT 8 WAS SET/;
2150	013266	034040	053440	051501	
2151	013274	051440	052105	057	
2152	013301	057	041500	046117	MSG19: .ASCII ;/2COLUMN READ1 READ2 CARDS ERRORS/;
2153	013306	046525	020116	042522	
2154	013314	042101	020061	042522	
2155	013322	042101	020062	041440	
2156	013330	051101	051504	042440	
2157	013336	051122	051117	027523	
2158	013344	040057	045503	041122	MSG20: .ASCII ;/2CKRBRD/;
2159	013352	042122	057		
2160	013356				.EVEN

2161
 2162
 2163
 2164
 2165
 2166
 2167
 2168
 2169 013356 004000
 2170 013360 000200
 2171 013362 004400
 2172 013364 000201
 2173 013366 004200
 2174 013370 000202
 2175 013372 004100
 2176 013374 000203
 2177 013376 004040
 2178 013400 000204
 2179 013402 004020
 2180 013404 000205
 2181 013406 004010
 2182 013410 000206
 2183 013412 004004
 2184 013414 000207
 2185 013416 004002
 2186 013420 000210
 2187 013422 004001
 2188 013424 000220
 2189 013426 004202
 2190 013430 000212
 2191 013432 004102
 2192 013434 000213
 2193 013436 004042
 2194 013440 000214
 2195 013442 004022
 2196 013444 000215
 2197 013446 004012
 2198 013450 000216
 2199 013452 004006
 2200 013454 000217
 2201 013456 002000
 2202 013460 000100
 2203 013462 002400
 2204 013464 000101
 2205 013466 002200
 2206 013470 000102
 2207 013472 002100
 2208 013474 000103
 2209 013476 002040
 2210 013500 000104
 2211 013502 002020
 2212 013504 000105
 2213 013506 002010
 2214 013510 000106
 2215 013512 002004
 2216 013514 000107

;DATA TABLES FOR DATA RELIABILITY TESTS

;ALPHANUMERIC DECK DATA TABLE
 ;FIRST VALUE FOR A COLUMN IS THE DIRECT
 ;CARD IMAGE FOR THAT COLUMN ON CARD I
 ;THE SECOND VALUE IS THE ENCODED FORM OF THAT DATA

ALPCD:	4000	;	COLUMN	CHAR	HOLLERITH
	200	;1	8		12
	4400	;2	A		12 1
	201	;3	B		12 2
	4200	;4	C		12 3
	202	;5	D		12 4
	4100	;6	E		12 5
	203	;7	F		12 6
	4040	;8	G		12 7
	204	;9	H		12 8
	4020	;10	I		12 9
	205	;11	CENT		12 8 2
	4010	;12	.		12 8 3
	206	;13	<		12 8 4
	4004	;14	(12 8 5
	207	;15	+		12 8 6
	4002	;16	1		12 8 7
	210	;17	-		11
	4001	;18	J		11 1
	220	;19	K		11 2
	4202	;20	L		11 3
	212	;21	M		11 4
	4102	;22	N		11 5
	213	;23	O		11 6
	4042	;24	P		11 7
	214				
	4022				
	215				
	4012				
	216				
	4006				
	217				
	2000				
	100				
	2400				
	101				
	2200				
	102				
	2100				
	103				
	2040				
	104				
	2020				
	105				
	2010				
	106				
	2004				
	107				

2217	013516	002002	2002	;25	Q	11 9
2218	013520	000110	110			
2219	013522	002001	2001	;26	R	11 9
2220	013524	000120	120			
2221	013526	002202	2202	;27	:	11 8 2
2222	013530	000112	112			
2223	013532	002102	2102	;28	\$	11 8 3
2224	013534	000113	113			
2225	013536	002042	2042	;29	*	11 8 4
2226	013540	000114	114			
2227	013542	002022	2022	;30)	11 8 5
2228	013544	000115	115			
2229	013546	002012	2012	;31	;	11 8 6
2230	013550	000116	116			
2231	013552	002006	2006	;32	BLANK	11 8 7
2232	013554	000117	117			
2233	013556	001000	1000	;33	0	0
2234	013560	000040	40			
2235	013562	001400	1400	;34	/	0 1
2236	013564	000041	41			
2237	013566	001200	1200	;35	S	0 2
2238	013570	000042	42			
2239	013572	001100	1100	;36	T	0 3
2240	013574	000043	43			
2241	013576	001040	1040	;37	U	0 4
2242	013600	000044	44			
2243	013602	001020	1020	;38	V	0 5
2244	013604	000045	45			
2245	013606	001010	1010	;39	W	0 6
2246	013610	000046	46			
2247	013612	001004	1004	;40	X	0 7
2248	013614	000047	47			
2249	013616	001002	1002	;41	Y	0 8
2250	013620	000050	50			
2251	013622	001001	1001	;42	Z	0 9
2252	013624	000060	60			
2253	013626	001202	1202	;43		0 8 2
2254	013630	000052	52			
2255	013632	001102	1102	;44	,	0 8 3
2256	013634	000053	53			
2257	013636	001042	1042	;45	%	0 8 4
2258	013640	000054	54			
2259	013642	001022	1022	;46	-	0 8 5
2260	013644	000055	55			
2261	013646	001012	1012	;47	>	0 8 6
2262	013650	000056	56			
2263	013652	001006	1006	;48	?	0 8 7
2264	013654	000057	57			
2265	013656	000000	0000	;49		BLANK
2266	013660	000000	0			
2267	013662	000400	0400	;50	1	1
2268	013664	000001	1			
2269	013666	000200	0200	;51	2	2
2270	013670	000002	2			
2271	013672	000100	0100	;52	3	3
2272	013674	000003	3			

2273	013676	000040	0040	;53	4	4
2274	013700	000004	4			
2275	013702	000020	0020	;54	5	5
2276	013704	000005	5			
2277	013706	000010	0010	;55	6	6
2278	013710	000006	6			
2279	013712	000004	0004	;56	7	7
2280	013714	000007	7			
2281	013716	000002	0002	;57	8	8
2282	013720	000010	10			
2283	013722	000001	0001	;58	9	9
2284	013724	000020	20			
2285	013726	000202	0202	;59	:	8 2
2286	013730	000012	12			
2287	013732	000102	0102	;60	*	8 3
2288	013734	000013	13			
2289	013736	000042	0042	;61	A	8 4
2290	013740	000014	14			
2291	013742	000022	0022	;62	'	8 5
2292	013744	000015	15			
2293	013746	000012	0012	;63	=	8 6
2294	013750	000016	16			
2295	013752	000006	0006	;64	"	8 7
2296	013754	000017	17			
2297	013756	004000	4000	;65	&	12
2298	013760	000200	200			
2299	013762	004400	4400	;66	A	12 1
2300	013764	000201	201			
2301	013766	004200	4200	;67	B	12 2
2302	013770	000202	202			
2303	013772	004100	4100	;68	C	12 3
2304	013774	000203	203			
2305	013776	004040	4040	;69	D	12 4
2306	014000	000204	204			
2307	014002	004020	4020	;70	E	12 5
2308	014004	000205	205			
2309	014006	004010	4010	;71	F	12 6
2310	014010	000206	206			
2311	014012	004004	4004	;72	G	12 7
2312	014014	000207	207			
2313	014016	004002	4002	;73	H	12 8
2314	014020	000210	210			
2315	014022	004001	4001	;74	I	12 9
2316	014024	000220	220			
2317	014026	004202	4202	;75	CENT	12 8 2
2318	014030	000212	212			
2319	014032	004102	4102	;76	.	12 8 3
2320	014034	000213	213			
2321	014036	004042	4042	;77	<	12 8 4
2322	014040	000214	214			
2323	014042	004022	4022	;78	(12 8 5
2324	014044	000215	215			
2325	014046	004012	4012	;79	+	12 8 6
2326	014050	000216	216			
2327	014052	004006	4006	;80	1	12 8 7
2328	014054	000217	217			

ALPEND: 217

2329					
2330					
2331	014056	002577	BINCD: 2577	:1	CARD COLUMN
2332	014060	000137	137		
2333	014062	007252	7252	:2	
2334	014064	000356	356		
2335	014066	005777	5777	:3	
2336	014070	000277	277		
2337	014072	006777	6777	:4	
2338	014074	000337	337		
2339	014076	000000	0000	:5	
2340	014100	000000	0		
2341	014102	003777	3777	:6	
2342	014104	000177	177		
2343	014106	005777	5777	:7	
2344	014110	000277	277		
2345	014112	007737	7737	:8	
2346	014114	000377	377		
2347	014116	007757	7757	:9	
2348	014120	000377	377		
2349	014122	007767	7767	:10	
2350	014124	000377	377		
2351	014126	003773	3773	:11	
2352	014130	000177	177		
2353	014132	006775	6775	:12	
2354	014134	000327	327		
2355	014136	007776	7776	:13	
2356	014140	000357	357		
2357	014142	002001	2001	:14	
2358	014144	000120	120		
2359	014146	003002	3002	:15	
2360	014150	000150	150		
2361	014152	004404	4404	:16	
2362	014154	000207	207		
2363	014156	004210	4210	:17	
2364	014160	000206	206		
2365	014162	002120	2120	:18	
2366	014164	000107	107		
2367	014166	002040	2040	:19	
2368	014170	000104	104		
2369	014172	004120	4120	:20	
2370	014174	000207	207		
2371	014176	004210	4210	:21	
2372	014200	000206	206		
2373	014202	002404	2404	:22	
2374	014204	000107	107		
2375	014206	003002	3002	:23	
2376	014210	000150	150		
2377	014212	007777	7777	:24	
2378	014214	000377	377		
2379	014216	000000	0000	:25	
2380	014220	000000	0		
2381	014222	006000	6000	:26	
2382	014224	000300	300		
2383	014226	003001	3001	:27	
2384	014230	000160	160		

2385	014232	004402	4402	;28
2386	014234	000211	211	
2387	014236	004204	4204	;29
2388	014240	000207	207	
2389	014242	002110	2110	;30
2390	014244	000107	107	
2391	014246	002060	2060	;31
2392	014250	000105	105	
2393	014252	004060	4060	;32
2394	014254	000205	205	
2395	014256	004110	4110	;33
2396	014260	000207	207	
2397	014262	002204	2204	;34
2398	014264	000107	107	
2399	014266	002402	2402	;35
2400	014270	000111	111	
2401	014272	005001	5001	;36
2402	014274	000260	260	
2403	014276	007777	7777	;37
2404	014300	000377	377	
2405	014302	007777	7777	;38
2406	014304	000377	377	
2407	014306	000000	0000	;39
2408	014310	000000	0	
2409	014312	000577	0577	;40
2410	014314	000037	037	
2411	014316	007252	7252	;41
2412	014320	000356	356	
2413	014322	000777	0777	;42
2414	014324	000037	37	
2415	014326	001000	1000	;43
2416	014330	000040	40	
2417	014332	006000	6000	;44
2418	014334	000300	300	
2419	014336	002477	2477	;45
2420	014340	000137	137	
2421	014342	001777	1777	;46
2422	014344	000077	77	
2423	014346	006537	6537	;47
2424	014350	000337	337	
2425	014352	005757	5757	;48
2426	014354	000277	277	
2427	014356	002767	2767	;49
2428	014360	000137	137	
2429	014362	005773	5773	;50
2430	014364	000277	277	
2431	014366	002775	2775	;51
2432	014370	000127	127	
2433	014372	005776	5776	;52
2434	014374	000257	257	
2435	014376	002001	2001	;53
2436	014400	000120	120	
2437	014402	005002	5002	;54
2438	014404	000250	250	
2439	014406	002404	2404	;55
2440	014410	000107	107	

2441	014412	005210	5210	;56
2442	014414	000246	246	
2443	014416	002120	2120	;57
2444	014420	000107	107	
2445	014422	005040	5040	;58
2446	014424	000244	244	
2447	014426	002120	2120	;59
2448	014430	000107	107	
2449	014432	005210	5210	;60
2450	014434	000246	246	
2451	014436	002404	2404	;61
2452	014440	000107	107	
2453	014442	003002	3002	;62
2454	014444	000150	150	
2455	014446	007777	7777	;63
2456	014450	000377	377	
2457	014452	000000	0000	;64
2458	014454	000000	0	
2459	014456	006000	6000	;65
2460	014460	000300	300	
2461	014462	003001	3001	;66
2462	014464	000160	160	
2463	014466	004402	4402	;67
2464	014470	000211	211	
2465	014472	004204	4204	;68
2466	014474	000207	207	
2467	014476	002110	2110	;69
2468	014500	000107	107	
2469	014502	002060	2060	;70
2470	014504	000105	105	
2471	014506	004060	4060	;71
2472	014510	000205	205	
2473	014512	004110	4110	;72
2474	014514	000207	207	
2475	014516	002204	2204	;73
2476	014520	000107	107	
2477	014522	002402	2402	;74
2478	014524	000111	111	
2479	014526	005001	5001	;75
2480	014530	000260	260	
2481	014532	007777	7777	;76
2482	014534	000377	377	
2483	014536	007777	7777	;77
2484	014540	000377	377	
2485	014542	002525	2525	;78
2486	014544	000127	127	
2487	014546	005252	5252	;79
2488	014550	000256	256	
2489	014552	007777	7777	;80
2490	014554	000377		
2491				
2492				
2493				
2494	014556	007777		
2495	014560	000377		
2496	014562	007777		

BINEND: 377
;MARK SENSE CARD TABLE
MRKCD: 7777
377
7777

2497	014564	000377	377
2498	014566	004000	4000
2499	014570	000200	200
2500	014572	002000	2000
2501	014574	000100	100
2502	014576	001000	1000
2503	014600	000040	40
2504	014602	000400	400
2505	014604	000001	1
2506	014606	000200	200
2507	014610	000002	2
2508	014612	000100	100
2509	014614	000003	3
2510	014616	000040	40
2511	014620	000004	4
2512	014622	000020	20
2513	014624	000005	5
2514	014626	000010	10
2515	014630	000006	6
2516	014632	000004	4
2517	014634	000007	7
2518	014636	000002	2
2519	014640	000010	10
2520	014642	000001	1
2521	014644	000020	20
2522	014646	003777	3777
2523	014650	000177	177
2524	014652	005777	5777
2525	014654	000277	277
2526	014656	006777	6777
2527	014660	000337	337
2528	014662	007377	7377
2529	014664	000377	377
2530	014666	007577	7577
2531	014670	000377	377
2532	014672	007677	7677
2533	014674	000377	377
2534	014676	007737	7737
2535	014700	000377	377
2536	014702	007757	7757
2537	014704	000377	377
2538	014706	007767	7767
2539	014710	000377	377
2540	014712	007773	7773
2541	014714	000377	377
2542	014716	007775	7775
2543	014720	000367	367
2544	014722	007776	7776
2545	014724	000357	357
2546	014726	005252	5252
2547	014730	000256	256
2548	014732	002525	2525
2549	014734	000127	127
2550	014736	005252	5252
2551	014740	000256	256
2552	014742	002525	2525

2553	014744	000127	127
2554	014746	005252	5252
2555	014750	000256	256
2556	014752	002525	2525
2557	014754	000127	127
2558	014756	005252	5252
2559	014760	000256	256
2560	014762	002525	2525
2561	014764	000127	127
2562	014766	005252	5252
2563	014770	000256	256
2564	014772	002525	2525
2565	014774	000127	127
2566	014776	005252	5252
2567	015000	000256	256
2568	015002	002525	2525
2569	015004	000127	127
2570	015006	005252	5252
2571	015010	000256	256
2572	015012	002525	2525
2573	015014	000127	127
2574	015016	007777	7777
2575	015020	000377	377
2576	015022	007777	7777
2577	015024	000377	377
2578	015026	004000	4000
2579	015030	000200	200
2580	015032	002000	2000
2581	015034	000100	100
2582	015036	001000	1000
2583	015040	000040	40
2584	015042	000400	400
2585	015044	000001	1
2586	015046	000200	200
2587	015050	000002	2
2588	015052	000100	100
2589	015054	000003	3
2590	015056	000040	40
2591	015060	000004	4
2592	015062	000020	20
2593	015064	000005	5
2594	015066	000010	10
2595	015070	000006	6
2596	015072	000004	4
2597	015074	000007	7
2598	015076	000002	2
2599	015100	000010	10
2600	015102	000001	1
2601	015104	000020	20
2602	015106	003777	3777
2603	015110	000177	177
2604	015112	005777	5777
2605	015114	000277	277
2606	015116	006777	6777
2607	015120	000337	337
2608	015122	007377	7377

2609	015124	000377	377
2610	015126	007577	7577
2611	015130	000377	377
2612	015132	007677	7677
2613	015134	000377	377
2614	015136	007737	7737
2615	015140	000377	377
2616	015142	007757	7757
2617	015144	000377	377
2618	015146	007767	7767
2619	015150	000377	377
2620	015152	007773	7773
2621	015154	000377	377
2622	015156	007775	7775
2623	015160	000367	367
2624	015162	007776	7776
2625	015164	000357	357
2626	015166	005252	5252
2627	015170	000256	256
2628	015172	002525	2525
2629	015174	000127	127
2630	015176	005252	5252
2631	015200	000256	256
2632	015202	002525	2525
2633	015204	000127	127
2634	015206	005252	5252
2635	015210	000256	256
2636	015212	002525	2525
2637	015214	000127	127
2638	015216	005252	5252
2639	015220	000256	256
2640	015222	002525	2525
2641	015224	000127	127
2642	015226	005252	5252
2643	015230	000256	256
2644	015232	002525	2525
2645	015234	000127	127
2646	015236	005252	5252
2647	015240	000256	256
2648	015242	002525	2525
2649	015244	000127	127
2650	015246	005252	5252
2651	015250	000256	256
2652	015252	002525	2525
2653	015254	000127	127
2654	015256	000000	0
2655	015260	000000	0

MRKEND: 0

;END MARK SENSE DIAG TABLE

2656											
2657											
2658	015262	012767	177773	000146							
2659	015270	012767	015444	000144							
2660	015276	012767	000040	000134							
2661	015304	012767	177777	000122							
2662	015312	005267	000116								
2663	015316	167702	000120								
2664	015322	100373									
2665	015324	067702	000112								
2666	015330	004767	000020								
2667	015334	005267	000076								
2668	015340	001001									
2669	015342	000207									
2670	015344	062767	000002	000070							
2671	015352	000754									
2672	015354	005767	000054								
2673	015360	001010									
2674	015362	022767	177777	000046							
2675	015370	001404									
2676	015372	016767	000042	000034							
2677	015400	000406									
2678	015402	012767	000060	000030							
2679	015410	052767	000060	000016							
2680	015416	105777	163374								
2681	015422	100375									
2682	015424	016777	000004	163366							
2683	015432	000207									
2684	015434	000000									
2685	015436	000000									
2686	015440	000040									
2687	015442	015444									
2688	015444	023420									
2689	015446	001750									
2690	015450	000144									
2691	015452	000012									
2692	015454	000001									
2693											
2694		000001									

```

:PRINT DECIMAL VALUE IN R2
DECPR: MOV #-5,DIGCNT
        MOV #DECPNT+2,DECPNT
        MOV #40,ZERO
TYPT1: MOV #-1,DIGIT
TYPT2: INC DIGIT
        SUB @DECPNT,%2
        BPL TYPT2
        ADD @DECPNT,%2
        JSR %7,DECOUT
        INC DIGCNT
        BNE TYPT3
        RTS %7
TYPT3: ADD #2,DECPNT
        BR TYPT1
DECOUT: TST DIGIT
        BNE DEC1
        CMP #-1,DIGCNT
        BEQ DEC1
        MOV ZERO,DIGIT
        BR DEC2
DEC1:  MOV #60,ZERO
        BIS #60,DIGIT
DEC2:  TSTB @TCSR
        BPL -4
        MOV DIGIT,@TDBR
        RTS %7
DIGIT: 0
DIGCNT: 0
ZERO:  40
DECPNT: +2
        10000.
        1000.
        100.
        10.
        1.
        .END
  
```

ADINT =%000000

ALCNT 007140
ALLDON 007116
ALLOK 007210
ALPCD 013356
ALPEND 014054
ALP1 006002
ALWAIT 007244
BEGIN 001150
BELL 011420
BINCO 014056
BINEND 014554
B.CK 011670
CARDIN 011272
CDCNT 007102
CKBITS 011506
CKCOL 011034
CKCRD 011020
CKDNE 011256
CKFAIL 011112
CKHLT 011244
CKLOOP 010734
CKLP1 010754
CKLP2 011060
CKNOMD 011150
CKSAFE 010676
CKSIT 011004
CKSIT1 011010
CK4 001556
CK5 001722
CK9 002534
CLCNT 007104
CLRTR 011372
CNT23A 005332
CNT23B 005350
CNT23C 005370
CNT23D 005406
CNT23E 005426
CNT23F 005446
CNT23G 005472
CNT24A 005540
CNT24B 005570
CONTD 006024
CONT10 002702
CONT11 003020
CONT2 001414
CONT21 005166
CONT22 005272
CONT4 001576
CONT8 002422
COUNT =%000001

533*	594*	966*	968*	973	988*	995*	997*	1002	1015*	1021*	1023*	1031*
1041*	1047*	1049*	1055	1057*	1073*	1084*	1085*	1086*	1087*	1088*	1092*	1094*
1100	1104*	1113*	1115*	1121	1128*	1133*	1135*	1141*	1144	1150*	1299*	1301*
1494*	1500*	1504	1512*	1517	1555*							
1480	1483*											
1351	1373	1434	1478*	1547								
1497	1500*											
1285	2169*											
1286	2328*											
1280	1285*											
1499	1509*	1556										
558	608*											
1251	1437	1478	1520	1549	1751	1808	1903*					
1281	2331*											
1282	2490*											
1952	1966*											
1787*	1788*	1826	1828	1863*								
1269*	1271*	1349	1371	1387	1417	1454*	1470*	1539				
622	654	685	1233	1244	1352	1374	1542	1885	1923*	1931		
1798	1816*											
1800	1812*											
1855	1858*	1859										
1827	1829	1831*										
1833	1854*											
1792*	1806	1811	1813	1815	1821	1857	1860					
1797*	1802	1830										
1823*	1824											
1835	1839*											
568	1785*											
1794	1804	1808*										
1809*	1810											
717	722	724*										
758	771*											
948	951*											
1316*	1390	1414	1455*	1471*	1545	1792*	1812	1817*	1840			
623	655	891	936	1896*								
1161	1164*											
1168	1171*											
1175	1178*											
1182	1185*											
1189	1192*											
1196	1199*											
1204	1208*											
1224	1227*	1230										
1232	1235*											
1278	1284	1288*										
976	988*											
1005	1011	1015*										
673	677*											
1123	1127*											
1145	1148*											
727	731*											
916*	925											
534*	624*	625*	627*	629*	660*	661*	663*	665*	667*	711*	718*	734*
753*	763	765*	777	797*	802*	841*	850*	860	907*	908*	915*	924*
942*	943*	945*	994*	1013*	1118*	1119*	1324*	1325*	1677*	1678*	1680*	1682*

H05

MD-11-DZCMB-B CMIIF DOCUMENTATION <80 COLUMN> CARD READER MACY11 27(732) 08-SEP-75 09:02 PAGE 61
DZCMBB.P11 CROSS REFERENCE TABLE -- MACRO NAMES

INT 1040# 1041 1084 1085 1086 1087 1088

ADC	1986	2004													
ADD	1761	2665	2670												
BEQ	636 805 917 1230 1511 2675	642 809 921 1241 1526	648 816 939 1243 1529	658 819 954 1250 1533	679 828 972 1274 1540	701 843 1026 1280 1551	715 851 1041 1309 1674	738 855 1054 1369 1725	745 861 1084 1413 1728	756 869 1085 1415 1813	772 876 1086 1418 1859	778 880 1087 1433 1891	782 894 1088 1447 1907	786 903 1097 1480 1951	790 911 1107 1488 1998
BIC	969 1899	998 2006	1041	1050	1084	1085	1086	1087	1088	1098	1136	1300	1452	1514	1788
BICB	2029														
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K05

MD-11-DZCMB-B CM11F DOCUMENTATION <80 COLUMN> CARD READER MACY11 27(732) 08-SEP-76 09:02 PAGE 65
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