BM792YC

CARD READER BOOTSTRAP
MD-11-DZBMC-A
LOADER

EP-DZBMC-A-DL

FICHE 1 OF 1

MAY 1978
digital
MADE IN USA

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZBMC-A-D

PRODUCT NAME: BM792YC (CARD READER BOOTSTRAP LOADER)

DATE CREATED: JAN 15, 1972

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: JOHN ADAMS

1. ABSTRACT

THE DZBMC DIAGNOSTIC PROGRAM IS WRITTEN TO BE USED AS
AN AID TO HARDWARE DEBUGGING AND MAINTENANCE OF THE BM792YC MODULE
(CARD READER BOOTSTRAP LOADER). THESE PROGRAMS MAY ALSO BE USED
AS A DATA RELIABILITY TEST.

THE AVAILABLE TESTS ARE

PRG0 - LOGIC TESTS
PRG1 - ROM DATA DUMP
PRG2 - SINGLE ROM ADDRESS READ DATA LOOP

2. REQUIREMENTS

2.1 EQUIPMENT

A. PDP 11 FAMILY CENTRAL PROCESSOR
B.

2.2 STORAGE

THIS PROGRAM USES CORE 0-4848(8)

3. LOADING PROCEDURE

THE ABSOLUTE LOADER IS USED TO LOAD THE PROGRAM

4. USE PROCEDURE

A) LOAD ADDRESS = 000200
B) SET SR = DESIRED STANDARD PDP-11 DIAGNOSTIC OPTIONS
(SEE SECT 6.0)
C) DEPRESS START
THE PROGRAM WILL TYPE OUT INSTRUCTIONS, ALL USER
RESPONSES ARE VIA THE KEYBOARD (CARRIAGE RETURN
TERMINATES THE RESPONSE)
D) TO RESTART THE SELECTED PROGRAM LOAD ADDRESS = 000210
AND DEPRESS START

5. PROGRAM DESCRIPTIONS

5.1 PRG0 - LOGIC TESTS

THE LOGIC TESTS CONSIST OF 4 ROUTINES TO TEST THE M792-YB LOGIC

5.1.1 ROUTINE DESCRIPTIONS

ROUTINE	TESTS
T1	ADDRESSABILITY OF BM792YC
T2	DATA RELIABILITY
T3	THAT BM792YC TIMES OUT WHEN REFERENCED BY A DATIP BUS CYCLE
T4	THAT DATA READ IS CORRECT

5.1.2 ERROR PRINTOUT

IF A ROUTINE FAILS AND THE INHIBIT PRINTOUT SWITCH IS NOT ENABLED (SR13) A PRINTOUT RESULTS. THE PC AT THE TIME OF FAILURE IS TYPED.

IF AN ERROR OCCURS IN T4 THE ROM DATA AND CORRECT DATA AND THE ADDRESS OF EACH IS TYPED OUT (THE ERROR TYPEOUT CANNOT BE DISABLED). THE FORMAT IS

ROM ADDRESS/ROM DATA
IMAGE ADDRESS*CORRECT DATA

5.2 PRG1 - ROM DATA DUMP

THIS PROGRAM TYPES OUT THE 32 WORDS OF ROM DATA AND HALTS.

5.3 PRG2 - SINGLE ROM ADDRESS READ DATA LOOP

THIS PROGRAM CONTINIOUSLY READS DATA FROM A TYPED IN ROM ADDRESS, TO CHANGE THE ADDRESS TYPE IN A NEW ADDRESS.(MUST BE EVEN)

6.0 PDP11 STANDARD OPTIONS

SW15	1 OR UP	HALT ON ERROR
SW14	1 OR UP	SCOPE LOOP
SW13	1 OR UP	INHIBIT PRINTOUT
SW12	1 OR UP	INHIBIT TRACE TRAPPING (NOT USED)
SW11	1 OR UP	INHIBIT ITERATION

C1

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    1                                   .TITLE TEST DZBMC
                                        .NLIST SEQ,MC
                                        .LIST ME
                                        .ABS
                                ;M792-YC (CARD READER BOOTSTRAP LOADER) DIAGNOSTIC
                                ;LOAD ADDRESS=0200
                                ;DEPRESS START
                                ;RESTART ADDRESS=0210
                                ;STACK POINTER IS AT 500
               000000                   .=0
        000000 000002                   .+2
        000002 000000                   HALT
        000004 000006                   .+2
        000006 000000                   HALT
        000010 000012                   .+2
        000012 000000                   HALT
        000014 000016                   .+2
        000016 000000                   HALT
        000020 000022                   .+2
        000022 000000                   HALT
        000024 000026                   .+2
        000026 000000                   HALT
        000030 000032                   .+2
        000032 000000                   HALT
        000034 000036                   .+2
        000036 000000                   HALT
        000040 000042                   .+2
        000042 000000                   HALT
        000044 000046                   .+2
        000046 000000                   HALT
        000050 000052                   .+2
        000052 000000                   HALT
        000054 000056                   .+2
        000056 000000                   HALT
        000060 000062                   .+2
        000062 000000                   HALT
        000064 000066                   .+2
        000066 000000                   HALT
        000070 000072                   .+2
        000072 000000                   HALT
        000074 000076                   .+2
        000076 000000                   HALT
               000030                   .=30
        000030 002314                   ERROR
        000032 000340                   340
        000034 002224                   SCOPEC
        000036 000000                   0
                                ;EQUATE STATEMENTS
               104000                   HLT=EMT
               104400                   SCOPE=TRAP
               177560                   TKCSR=177560
               177562                   TKDBR=177562
               177564                   TPCSR=177564
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D1

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                177566                          TPDBR=177566
                177776                          PSW=177776
                177570                          SR=177570
                000500                          STKPTR=500              ;INITIAL STACK SETTING
                000060                  TKINTA=60
                000062                  TKINTP=62
                000200                          .=200
000200          000167  000622          START1: JMP     PRMTRS
                000210                          .=210
000210          000167  000652          START3: JMP     RESTART
                001000                          .=1000
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                001000                          .=1000
001000  000040            WORDS:  32.
001002  004000            IMAGE:  4000
001004  000000            DUMP:   0
001006  000000            LAST:   0
001010  000000            CHAR:   0
001012  000000            TERM:   0
001014  000000            SRT:    0
001016  000000            ROMADD: 0
001020  001106            PRGTAB: PRG0
001022  001572                    PRG1
001024  001720                    PRG2
001026  012706  000500    PRMTRS: MOV     #STKPTR,%6      ;SET STACK PTR
001032  005067  000020            CLR     PRGNUM
001036  005737  177570            TST     @#SR
001042  001411                    BEQ     RESTART
001044  004567  000746            JSR     5,TYPEM         ;TYPE MESSAGE 'PRG#=
001050  002534                    M0
001052  004567  001056            JSR     5,RECD          ;RECEIVE DATA AND PUT
001056  000000    PRGNUM: 0               ;!? WERE
001060  004567  000732            JSR     5,TYPEM
001064  002560                    M0

001066  012767  173200  177722  RESTART:MOV     #173200,ROMADD  ;GET FIRST ROM ADDRESS
001074  016700  177756            MOV     PRGNUM,%0       ;GET PROGRAM #
001100  006300                    ASL     %0              ;SHIFT PROGRAM #
001102  000170  001020            JMP     @PRGTAB(0)      ;GO TO PROGRAM

                        ;PROGRAM 0 LOGIC TESTS
001106  012706  000500    PRG0:   MOV     #STKPTR,%6
001112  012767  001066  001160            MOV     #RESTART,RETURN
                        ;TEST1 TEST ABILITY TO REFERENCE ROM WITHOUT TIMING OUT

001120  016700  177672    T1:     MOV     ROMADD,%0       ;GET ROM ADDRESS
001124  016701  177650            MOV     WORDS,%1        ;GET ADDRESS COUNTER
001130  012767  001172  176640            MOV     #ERROR1,4       ;SET UP TIME OUT VECTOR
001136  011003            T1A:    MOV     (0),%3          ;REFERENCE
001140  005720                    TST     (0)+            ;ROM
001142  064067  177636            ADD     -(0),DUMP       ;
001146  021010                    CMP     (0),(0)         ;
001150  132020                    BITB    (0)+,(0)+       ;
001152  000005                    RESET                   ;DELAY
001154  164067  177624            SUB     -(0),DUMP
001160  062700  000002            ADD     #2,%0           ;INCREMENT POINTER
001164  005301                    DEC     %1              ;DECREMENT ADDRESS COUNTER
001166  001363                    BNE     T1A             ;BRANCH IF NOT FINISHED
001170  000403                    BR      T1B             ;GO TO SCOPE LOOP
001172  022626  ERROR1: CMP     (6)+,(6)+       ;REPOSITION STACK
001174  104000                    HLT                     ;HERE IF ERROR
001176  000757                    BR      T1A             ;LOOP ON ERROR
001200  104400    T1B:    SCOPE
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                                        ;TEST2  TEST THAT ROM DATA CAN BE READ RELIABLY.

001202  016700  177610        T2:     MOV     ROMADD,R0       ;GET ROM ADDRESS
001206  016701  177566                MOV     WORDS,R1        ;GET ADDRESS COUNTER
001212  012767  000006  176564        MOV     #6,4            ;INITIALIZE TIME OUT VECTOR
001220  005067  177560        T2A:    CLR     DUMP            ;INITIALIZE DUMP
001224  011003                        MOV     (R0),R3         ;GET DATA
001226  062067  177552                ADD     (R0)+,DUMP      ;ADD DATA TO DUMP
001232  166703  177546                SUB     DUMP,R3         ;SUBTRACT DATA FROM DATA
001236  001402                        BEQ     T2B             ;BRANCH IF EQUAL
001240  104000        ERROR2: HLT                             ;DATA ERROR
001242  000766                        BR      T2A             ;LOOP ON ERROR
001244  000005        T2B:    RESET                           ;DELAY
001246  044067  177532                BIC     -(R0),DUMP      ;CLEAR DUMP BITS
001252  001402                        BEQ     T2C             ;BRANCH IF EQUAL TO 0
001254  104000                        HLT                     ;DATA ERROR
001256  000772                        BR      T2B             ;LOOP ON ERROR
001260  021010        T2C:    CMP     (R0),(R0)               ;COMPARE DATA
001262  001402                        BEQ     T2D             ;BRANCH IF EQUAL
001264  104000                        HLT                     ;DATA ERROR
001266  000774                        BR      T2C             ;LOOP ON ERROR
001270  122040        T2D:    CMPB    (R0)+,-(R0)             ;COMPARE DATA (BYTE OPERATION)
001272  001402                        BEQ     T2E             ;BRANCH IF EQUAL
001274  104000                        HLT                     ;DATA ERROR
001276  000774                        BR      T2D             ;LOOP ON ERROR
001300  005720        T2E:    TST     (R0)+                   ;INCREMENT ADDRESS POINTER
001302  005301                        DEC     R1              ;DECREMENT ADDRESS COUNTER
001304  001345                        BNE     T2A             ;RETURN IF NOT DONE
001306  104400                        SCOPE

                                        ;TEST3 TEST THAT ROM TIMES OUT IF REFERENCED BY OTHER
                                        ;THAN DATI BUS CYCLE

001310  012706  000500        T3:     MOV     #STKPTR,R6      ;SET STACK PTR
001314  016700  177476                MOV     ROMADD,R0       ;GET ROM ADDRESS
001320  016701  177454                MOV     WORDS,R1        ;GET ADDRESS COUNTER
001324  012767  001340  176452 T3AA:   MOV     #T3B,4          ;SET UP TIME OUT VECTOR
001332  010010        T3A:    MOV     R0,(R0)                 ;ATTEMPT TO ALTER DATA
001334  104000                        HLT                     ;HERE IF DID NOT TIME OUT
001336  000775                        BR      T3A             ;LOOP ON ERROR
001340  012767  001356  176436 T3B:    MOV     #T3D,4          ;SET UP TIME OUT VECTOR
001346  022626                        CMP     (R6)+,(R6)+     ;REPOSITION STACK
001350  005210        T3C:    INC     (R0)                    ;ATTEMPT TO ALTER DATA
001352  104000                        HLT                     ;HERE IF DID NOT TIME OUT
001354  000775                        BR      T3C             ;LOOP ON ERROR
001356  012767  001376  176420 T3D:    MOV     #T3F,4          ;SET UP TIME OUT VECTOR
001364  022626                        CMP     (R6)+,(R6)+     ;REPOSITION STACK
001366  005077  177424        T3E:    CLR     @ROMADD         ;ATTEMPT TO ALTER DATA
001372  104000                        HLT                     ;HERE IF DID NOT TIME OUT
001374  000774                        BR      T3E             ;LOOP ON ERROR
001376  005720        T3F:    TST     (R0)+                   ;INCREMENT ADDRESS POINTER
001400  022626                        CMP     (R6)+,(R6)+     ;REPOSITION STACK
001402  005301                        DEC     R1              ;DECREMENT ADDRESS COUNTER
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001404  001347                          BNE     T3AA            ;RETURN IF NOT DONE
001406  012737  000026  000004          MOV     #6,@#4          ;RESTORE TIME OUT TRAP
001414  104400                          SCOPE                   ;SCOPE LOOP
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                                ;THIS TEST COMPARES ROM AND IMAGE DATA
                                ;AND TYPES OUT DIFFERENCES

001416  012706  000500      T4:   MOV     #STKPTR,%6      ;SET STACK PTR
001422  016701  177352            MOV     WORDS,%1        ;GET # OF WORDS
001426  016700  177364            MOV     ROMADD,%0       ;GET ROM ADDRESS
001432  016703  177344            MOV     IMAGE,%3        ;GET IMAGE ADDRESS
001436  021013              T4B:  CMP     (0),(3)         ;COMPARE DATA
001440  001004                    BNE     T4D
001442  005301              T4C:  DEC     %1              ;ALL DATA BEEN COMPARED
001444  001437                    BEQ     T4E
001446  022023                    CMP     (0)+,(3)+       ;INCREMENT ADDRESS POINTERS
001450  000772                    BR      T4B
001452  010067  000700      T4D:  MOV     %0,D2BTYP       ;TYPE
001456  004767  000676            JSR     7,02A           ;ROM ADDRESS
001462  004567  000330            JSR     5,TYPEM         ;TYPE
001466  002644                    M10                     ;SEPARATOR
001470  011067  000662            MOV     (0),D2BTYP      ;TYPE
001474  004767  000660            JSR     7,02A           ;ROM DATA
001500  004567  000312            JSR     5,TYPEM         ;TYPE
001504  002560                    M8                      ;CR/LF
001506  010367  000644            MOV     %3,D2BTYP       ;TYPE
001512  004767  000642            JSR     7,02A           ;IMAGE ADDRESS
001516  004567  000274            JSR     5,TYPEM         ;TYPE
001522  002652                    M12                     ;SEPARATOR
001524  011367  000626            MOV     (3),D2BTYP      ;TYPE
001530  004767  000624            JSR     7,02A           ;IMAGE DATA
001534  004567  000256            JSR     5,TYPEM         ;TYPE
001540  002560                    M8                      ;CR/LF
001542  000737                    BR      T4C             ;GO TO T4C
001544  104408              T4E:  SCOPE
001546  004567  000244      END:  JSR     5,TYPEM
001552  002652                    M12
001554  005737  000042            TST     @#42            ;RETURN TO MONITOR?
001560  001402                    BEQ     .+6
001562  013707  000042            MOV     @#42,%7         ;RETURN TO MONITOR
001566  000167  177314            JMP     PRG0

                                ;THIS PROGRAM TYPES OUT ROM DATA

001572  012706  000500      PRG1: MOV     #STKPTR,%6      ;INITIALIZE STACK
001576  004567  000214            JSR     5,TYPEM         ;TYPE MESSAGE
001602  002544                    M7                      ;'ROM DATA'
001604  016701  177170            MOV     WORDS,%1        ;GET # OF WORDS
001610  016700  177202      PRG1A:MOV     ROMADD,%0       ;GET STARTING ADDRESS
001614  012702  000012            MOV     #12,%2          ;GET ADDRESS INDICATOR
001620  105767  175740            TSTB    TPCSR           ;WAIT FOR
001624  100375                    BPL     .-4             ;TELEPRINTER FLAG
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001626  010067  000524          PRG1B:  MOV     %0,DZBTYP       ;GET ADDRESS
001632  004767  000522                  JSR     7,02A           ;AND TYPE IT
001636  004567  000154                  JSR     5,TYPEM         ;TYPE
001642  002560                          MB                      ;CR/LF
001644  012067  000506          PRG1C:  MOV     (0)+,DZBTYP     ;TYPE
001650  004767  000504                  JSR     7,02A           ;DATA
001654  105767  175784                  TSTB    TPCSR           ;WAIT FOR
001660  100375                          BPL     .-4             ;TELEPRINTER FLAG
001662  012767  000040  175676          MOV     #' ,TPDBR       ;TYPE SPACE
001670  005301                          DEC     %1              ;ALL DATA TYPED
001672  001410                          BEQ     PRG1D           ;GO TO FINISH
001674  005302                          DEC     %2
001676  001362                          BNE     PRG1C           ;RETURN TO PRG1B
001700  012702  000012                  MOV     #12,%2          ;GET ADDRESS INDICATOR
001704  004567  000106                  JSR     5,TYPEM         ;TYPE
001710  002560                          MB                      ;CR/LF
001712  000745                          BR      PRG1B           ;RETURN TO PRG1B
001714  000167  177106          PRG1D:  JMP     PRMTRS          ;GO GET NEXT TEST

                                ;THIS PROGRAM CYCLES A SINGLE ADDRESS (ADDRESS MUST BE EVEN) TO CHANGE
                                ;THE ADDRESS TYPE NEW ADDRESS ON THE TTY.
001720  012706  000500          PRG2:   MOV     #STKPTR,%6      ;INITIALIZE STACK POINTER
001724  012737  002012  000004          MOV     #PRG2C,@#4      ;LOAD TRAP ERROR VECTOR
001732  005067  176040                  CLR     PSW             ;CLEAR PROCESSOR STATUS
001736  012767  001770  176114          MOV     #PRG2A,TKINTA   ;LOAD KEYBOARD INTERRUPT VECTOR
001744  012767  000340  176110          MOV     #340,TKINTP     ;LOAD KEYBOARD PRIORITY
001752  012767  000100  175600          MOV     #100,TKCSR      ;SET INTERRUPT ENABLE BIT
001760  016700  177032                  MOV     ROMADD,%0       ;GET ROM ADDRESS
001764  005710                          TST     (0)             ;READ ROM ADDRESS
001766  000776                          BR      .-2             ;LOOP
001770  004567  000140          PRG2A:  JSR     5,RECD          ;GO GET ADDRESS &
001774  000000          PRG2B:  0                               ;PUT IT HERE
001776  016700  177772                  MOV     PRG2B,%0
002002  004567  000010                  JSR     5,TYPEM         ;TYPE
002006  002560                          MB                      ;CR/LF
002010  000002                          RTI                     ;EXIT KEYBOARD INTERRUPT SERVICE
002012  104000          PRG2C:  HLT                             ;ERROR! DID YOU TYPE AN ODD ADDRESS?
002014  000777                  BR      .                       ;SIT HERE UNTIL CORRECT ADDRESS IS TYPED IN


002016  010026          TYPEM:  MOV     %0,(6)+         ;SAVE REGISTER 0
002020  012500                  MOV     (5)+,%0         ;PLACE MESSAGE ADDRESS IN R0
002022  112067  176764          MOVB    (0)+,TERM       ;GET TERMINATOR CHARACTER
002026  112067  176756  TYPEMA: MOVB    (0)+,CHAR       ;GET NEXT CHARACTER
002032  126767  176752  176752  CMPB    CHAR,TERM       ;WAS NEXT CHARACTER THE TERM
002040  001005                  BNE     TYPEMB          ;CHARACTER
002042  014600                  MOV     -(6),%0         ;RESTORE R0
002044  105767  175514          TSTB    TPCSR
002050  100375                  BPL     .-4
002052  000205                  RTS     5               ;AND EXIT
002054  126727  176730  000045  TYPEMB: CMPB    CHAR,#'%        ;WAS CHARACTER %
002062  001015                  BNE     TYPEMC
002064  105767  175474          TSTB    TPCSR           ;TEST TELEPRINTER FLAG
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002070  100375                          BPL     .-4             ;AND WAIT FOR DONE
002072  012767  000215  175466          MOV     #215,TPDBR      ;LOAD TELEPRINTER WITH CAR. RET
002100  105767  175460                  TSTB    TPCSR           ;TEST TELEPRINTER FLAG
002104  100375                          BPL     .-4             ;AND WAIT FOR DONE
002106  012767  000212  175452          MOV     #212,TPDBR      ;LOAD TELEPRINTER WITH LINE FEED
002114  000744                          BR      TYPEMA          ;GET NEXT CHARACTER
002116  105767  175442          TYPEMC: TSTB    TPCSR           ;TEST TELEPRINTER FLAG
002122  100375                          BPL     .-4             ;AND WAIT FOR DONE
002124  016767  176662  175434          MOV     CHAR,TPDBR      ;LOAD TELEPRINTER BUFFER
002132  000735                          BR      TYPEMA          ;AND GET NEXT CHARACTER
002134  005015                  RECD:   CLR     (5)             ;CLEAR OUT OLD DATA
002136  105767  175416          RECDA:  TSTB    TKCSR           ;TEST KEYBOARD FLAG
002142  100375                          BPL     .-4             ;AND WAIT FOR CHARACTER
002144  116767  175412  176630          MOVB    TKDBR,CHAR      ;GET CHARACTER
002152  016767  176632  175406          MOV     CHAR,TPDBR      ;ECHO CHARACTER
002160  126727  176624  000215          CMPB    CHAR,#215       ;WAS CHARACTER CARRIAGE RETURN
002166  001005                          BNE     RECDB
002170  005725                          TST     (5)+            ;INCREMENT RETURN ADDRESS
002172  105767  175366                  TSTB    TPCSR
002176  100375                          BPL     .-4
002200  000205                          RTS     5               ;AND EXIT
002202  042767  177770  176600  RECDB:  BIC     #177770,CHAR    ;STRIP AWAY ALL BUT 3 LSB
002210  006315                          ASL     (5)             ;ROTATE
002212  006315                          ASL     (5)             ;PREVIOUS
002214  006315                          ASL     (5)             ;DATA
002216  056715  176566                  BIS     CHAR,(5)        ;AND INSERT CHARACTER
002222  000745                          BR      RECDA           ;GET NEXT CHARACTER
                        ;SCOPE OR/AND ITERATION LOOP FOR EACH TEST 100.TIMES

002224  032767  040000  175336  SCOPEC: BIT     #40000,SR       ;TEST SR FOR SCOPE
002232  001023                          BNE     SCOPEB          ;YES SCOPE
002234  032767  004000  175326          BIT     #4000,SR        ;TEST FOR ITERATION
002242  001007                          BNE     SCOPEG          ;INHIBIT ITERATION
002244  026767  000026  000022          CMP     SCOPEF,ICOUNT   ;ITERATION COMPLETE
002252  001403                          BEQ     SCOPEG          ;ITERATION COMPLETE GO TO SCOPEG
002254  005267  000016                  INC     SCOPEF          ;INCREMENT ITERATION COUNT
002260  000410                          BR      SCOPEB          ;GO TO SCOPEB
002262  005067  000010          SCOPEG: CLR     SCOPEF          ;CLEAR ITERATION COUNT
002266  011667  000006                  MOV     @X6,RETURN      ;GET ADDRESS OF NEXT TEST
002272  000002                          RTI                     ;EXIT
002274  000144                  ICOUNT: 100.
002276  000000                  SCOPEF: 0                       ;CONTAINS SUBTEST ITERATION COUNT
002300  001066                  RETURN: RESTART
002302  005726                  SCOPEB: TST(6)+                 ;POP PC
002304  012667  175466                  MOV     (6)+,PSW        ;RESTORE CONDITION CODES
002310  000177  177764                  JMP     @RETURN
002314  036727  175250  020000  ERROR:  BIT     SR,#20000       ;INHIBIT PRINTOUT?
002322  001401                          BEQ     .+4             ;BRANCH IF ERROR PRINT OUT
002324  000002                          RTI                     ;RETURN TO TEST
002326  004567  177464                  JSR     %5,TYPEM        ;TYPE ERROR MESSAGE
002332  002464                          ERRORM                  ;'PC=     '
002334  011667  000016                  MOV     (6),D2BTYP      ;TYPE PROGRAM COUNTER
002340  004767  000014                  JSR     7,02A
002344  005767  175220                  TST     SR              ;HALT ON ERROR?
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        002350  100001                  BPL     .+4             ;
        002352  000000                  HALT                    ;YES HALT
        002354  000002                  RTI                     ;RETURN TO TEST
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002356  000000                  D2BTYP: 0
002360  016746  175200          D2A:    MOV     TPCSR,-(6)      ;SAVE TPCSR
002364  010246                          MOV     %2,-(6)         ;SAVE R2
002366  010146                          MOV     %1,-(6)         ;SAVE R1
002370  010046                          MOV     %0,-(6)         ;SAVE R0
002372  016700  177760                  MOV     D2BTYP,%0       ;GET DATA TO BE TYPED
002376  012701  000006                  MOV     #6,%1           ;GET COUNTER
002402  005002                          CLR     %2              ;CLEAR WORKING REGISTER
002404  006100                          ROL     %0              ;MOV FIRST BIT (MSB) INTO
002406  006102                          ROL     %2              ;R2
002410  062702  000260          D2AA:   ADD     #260,%2         ;FORM ASCII CODE
002414  105767  175144                  TSTB    TPCSR           ;TEST TELEPRINTER
002420  100375                          BPL     .-4             ;FLAG AND WAIT UNTIL DONE
002422  010267  175140                  MOV     %2,TPDBR        ;LOAD TELEPRINTER BUFFER
002426  005002                          CLR     %2              ;CLEAR WORKING REGISTER
002430  006100                          ROL     %0              ;ROTATE THE
002432  006102                          ROL     %2              ;NEXT
002434  006100                          ROL     %0              ;OCTAL CHARACTER
002436  006102                          ROL     %2              ;INTO
002440  006100                          ROL     %0              ;REGISTER
002442  006102                          ROL     %2              ;TWO
002444  005301                          DEC     %1              ;DECREMENT COUNTER
002446  001360                          BNE     D2AA            ;GO TO D2AA IF NOT 0
002450  012600                          MOV     (6)+,%0         ;FINISHED,  RESTORE REGISTERS
002452  012601                          MOV     (6)+,%1         ;
002454  012602                          MOV     (6)+,%2         ;
002456  012667  175142                  MOV     (6)+,TPCSR      ;AND TPCSR
002462  000207                          RTS     7               ;AND EXIT
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                                        ;ASCII MESSAGES
        022464  022500  050040  036523  ERRORM: ,ASCII '%% PC= %'
        022472  040040
        022474  022500  054524  042520  M5:     ,ASCII  '%%TYPE MATRIX STARTING ADDRESS %'
        022522  046440  052101  044522
        022510  020130  052123  051101
        022516  044524  043516  040440
        022524  042124  042522  051523
        022532  040040
        022534  022500  051122  021507  M6:     ,ASCII  '%%PRG#=%'
        022542  040075
        022544  022500  047522  020115  M7:     ,ASCII  '%%ROM DATA%'
        022552  040504  040524  040045
        022560  022500    100           M8:     ,ASCII  '%%'
        022563    100   051045  046517  M9:     ,ASCII  '%%ROM ADDRESS/IMAGE ADDRESS ROM DATA=IMAGE DATA%'
        022570  040440  042104  042522
        022576  051523  044457  040515
        022604  042507  040440  042104
        022612  042522  051523  051040
        022620  046517  042040  052101
        022626  025101  046511  043501
        022634  020105  040504  040524
        022642  040045
        022644  027500    100           M10:    ,ASCII  '%/%'
        022647    100   040040          M11:    ,ASCII  '% %'
        022652  025100    100           M12:    ,ASCII  '%=%'
```

```
                003776                          .=3776
          003776  000000                        .WORD
                                              ;DATA CUT INTO THE M792YC
          004000  000005                        000005
          004002  012700  177160                012700,177160
          004006  010001                        010001
          004010  032721  001400                032721,001400
          004014  001371                        001371
          004016  005210                        005210
          004020  005003                        005003
          004022  005004                        005004
          004024  031027  040000                031027,040000
          004030  001372                        001372
          004032  105710                        105710
          004034  100373                        100373
          004036  000303                        000303
          004040  151103                        151103
          004042  005104                        005104
          004044  100772                        100772
          004046  121761  000001                121761,000001
          004052  001405                        001405
          004054  003002                        003002
          004056  010302                        010302
          004060  000757                        000757
          004062  010322                        010322
          004064  000755                        000755
          004066  031027  040000                031027,040000
          004072  001775                        001775
          004074  000005                        000005
          004076  000113                        000113
                  000001                        .END
```

DZBMCA SYMBOL TABLE

```
CHAR    001010          DUMP    001004          DZBTYP  002350          END     001546
ERROR   002314          ERRORM  002404          ERROR1  001172          ERROR2  001240
HLT   = 104000          ICOUNT  002274          IMAGE   001002          LAST    001006
M10     002644          M11     002647          M12     002652          M5      002474
M6      002534          M7      002544          M8      002560          M9      002563
O2A     002360          O2AA    002410          PRGNUM  001050          PRGTAB  001020
PRG0    001106          PRG1    001572          PRG1A   001610          PRG1B   001626
PRG1C   001644          PRG1D   001714          PRG2    001720          PRG2A   001770
PRG2B   001774          PRG2C   002012          PRMTRS  001020          PSW   = 177776
RECD    002134          RECDA   002136          RECDB   002202          RESTAR  001066
RETURN  002300          ROMADD  001016          SCOPE   = 104400        SCOPEB  002302
SCOPEC  002224          SCOPEF  002276          SCOPEG  002262          SR    = 177570
SRT     001014          START1  000200          START3  000210          STKPTR = 000500
TERM    001012          TKCSR   = 177560        TKDBR   = 177562        TKINTA = 000060
TKINTP = 000062         TPCSR   = 177564        TPDBR   = 177566        TYPEM   002016
TYPEMA  002026          TYPEMB  002054          TYPEMC  002110          T1      001120
T1A     001136          T1B     001200          T2      001202          T2A     001220
T2B     001244          T2C     001260          T2D     001270          T2E     001300
T3      001310          T3A     001332          T3AA    001324          T3B     001340
T3C     001350          T3D     001356          T3E     001366          T3F     001376
T4      001416          T4B     001436          T4C     001442          T4D     001452
T4E     001544          WORDS   001000          .     = 004100
```

ERRORS DETECTED: 0