

# BM792YB

DECTAPE + DISK BOOTSTRAP  
MD-11-DZBMB-A  
LOADER

EP-DZBMB-A-DL  
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MAY 1978  
**digital**  
MADE IN USA

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IDENTIFICATION

PRODUCT CODE: KATNDEC-11-DEPLY-2-1  
REPLACES: KATN.EC-11-DIRA-2

PRODUCT NAME: ROT-32YH DECTAPE & DISK  
BOOTSTRAP LOADER

DATE CREATED: JUNE 30, 1972

CONTAINER: DIAGNOSTIC TROU

ARTICLE: 1. PAGES

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## 1. ABSTRACT

THE DDM99 DIAGNOSTIC PROGRAM IS WRITTEN TO BE USED AS AN AID TO HARDWARE DEBUGGING AND MAINTENANCE OF THE DM792VB DFCVAPE AND DISK BOOTSTRAP LOADER). THESE PROGRAMS MAY ALSO BE USED AS A DATA RELIABILITY TEST.

THE AVAILABLE TESTS ARE

- PG00 = LOGIC TESTS
- PG01 = ROM DATA DUMP
- PG02 = SINGLE ROM ADDRESS READ DATA LOOP

## 2. REQUIREMENTS

## 2.1 EQUIPMENT

- A. PDP 11 FAMILY CENTRAL PROCESSOR
- B. DM792VB MODULE

## 2.2 STORAGE

THIS PROGRAM USES CORE 0-410P(8)

## 3. LOADING AND STARTING PROCEDURE

LOAD PROGRAM INTO MEMORY USING ABS LOADER,  
 LOAD ADDRESS = 00200  
 SET SW 0 DESIRED STANDARD PDP-11 DIAGNOSTIC OPTIONS (SEE SECT 0.0)  
 NOTE! ALL SWITCHES AUTOMATICALLY SELECTS AND STARTS PROGRAM  
 P.  
 DEPRESS START THE PROGRAM WILL TYPE OUT INSTRUCTIONS. ALL USER RESPONSES ARE VIA THE KEYBOARD (CARRIAGE RETURN TERMINATES THE RESPONSE)  
 TO RESTART THE SELECTED PROGRAM LOAD ADDRESS 0 0P021P AND DEPRESS START

## 4.0 SWITCH SETTINGS

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

## 5. PROGRAM DESCRIPTIONS

## 5.1 PRG0 - LOGIC TESTS

THE LOGIC TESTS CONSIST OF 4 ROUTINES TO TEST THE 047024B LOGIC

## 5.1.1 ROUTINE DESCRIPTIONS

ROUTINE	TESTS
T1	ADDRESSABILITY OF 047024B
T2	DATA RELIABILITY
T3	THAT 047024B TIMES OUT WHEN REFERENCED BY A DATA 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
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## 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 CONTINUOUSLY READS DATA FROM A TYPED IN ROM ADDRESS, TO CHANGE THE ADDRESS TYPE IN A NEW ADDRESS, (MUST BE EVEN)

1

.TITLE TEST DEBMB DECTAPE & DISK BOOT LDR  
.NLIST SEQ,MC  
.LIST ME  
.ABS  
ILOAD ADDRESS=7200  
IDEPRESS START  
IRESTART ADDRESS=0021F  
ISTACK POINTER IS AT 500

000030 P00030  
000032 P02362  
000034 P00340  
000036 P00030  
  
104000  
104400  
177960  
177962  
177964  
177966  
177970  
177972  
177974  
000900  
000902  
000904  
P00200 P00167 P00024  
000210 P00167 P00054  
P01000

.030  
ERROR  
SAP  
SCOPEC  
P  
IEQUATE STATEMENTS  
MLY0EMT  
SCOPY0TRAP  
TKCSR0177960  
TKDR0177962  
TPCSR0177964  
TPDR0177966  
PSW0177776  
BR0177970  
DISPLAY0177970  
SYNDR0500  
TKINT000  
TKINT002  
START11 JMP P00200  
START31 JMP P00210  
P01000

ADDRESS OF DISPLAY REGISTER  
INITIAL STACK SETTING



701214 104400

T101 SCOPE

ITEST2 TEST THAT ROM DATA CAN BE READ RELIABLY.

001216 716700 177996  
 001222 716701 177994  
 001226 012767 000000 176950  
 001234 009067 177946  
 001240 011003  
 001242 062067 177948  
 001246 166723 177934  
 001252 001402  
 001254 104000  
 001256 000766  
 001260 000029  
 001262 044067 177928  
 001266 001402  
 001270 104000  
 001272 000792  
 001274 021010  
 001276 001402  
 001300 104000  
 001302 000794  
 001304 122040  
 001306 001402  
 001310 104000  
 001312 000794  
 001314 009780  
 001316 009301  
 001320 001345  
 001322 104400

T21 MOV ROMADD,X0 IGET ROM ADDRESS  
 MOV WORDS,X1 IGET ADDRESS COUNTER  
 MOV 00,4 INITIALIZE TIME OUT VECTOR  
 T2A1 CLR DUMP INITIALIZE DUMP  
 MOV (0),X3 IGET DATA  
 ADD (0),DUMP IADD DATA TO DUMP  
 SUB DUMP,X3 ISUBTRACT DATA FROM DATA  
 BEQ T20 IBRANCH IF EQUAL  
 ERROR21 MLY IDATA ERROR  
 BR T2A ILOOP ON ERROR  
 T201 RESET IDELAY  
 BIC =(0),DUMP ICLEAR DUMP BITS  
 BEQ T2C IBRANCH IF EQUAL TO 0  
 MLY IDATA ERROR  
 BR T20 ILOOP ON ERROR  
 T2C1 CMP (0),(0) ICCMPARE DATA  
 BEQ T20 IBRANCH IF EQUAL  
 MLY IDATA ERROR  
 BR T2C ILOOP ON ERROR  
 T2D1 CMPS (0)+,(0) ICCMPARE DATA (BYTE OPERATION)  
 BEQ T2E IBRANCH IF EQUAL  
 MLY IDATA ERROR  
 BR T2D ILOOP ON ERROR  
 T2E1 TST (0)+ IINCREMENT ADDRESS POINTER  
 DEC X1 IDECREMENT ADDRESS COUNTER  
 ONE T2A IRETURN IF NOT DONE  
 SCOPE

ITEST3 TEST THAT ROM TIMES OUT IF REFERENCED BY OTHER  
 THAN DATA BUS CYCLE

001324 012706 000500  
 001330 016700 177464  
 001334 016701 177442  
 001340 012767 001304 176436  
 001346 010010  
 001350 104000  
 001352 000795  
 001394 012767 001392 176422  
 001362 022626  
 001364 005210  
 001366 104000  
 001390 000795  
 001392 012767 001412 176404  
 001400 022626  
 001402 005077 177412  
 001406 104000  
 001410 000794  
 001412 009780  
 001414 022626

T31 MOV 00XPTR,X6 ISET STACK PTR  
 MOV ROMADD,X0 ISET ROM ADDRESS  
 MOV WORDS,X1 IGET ADDRESS COUNTER  
 T3A11 MOV 0T30,4 ISET UP TIME OUT VECTOR  
 T3A1 MOV X0,(0) IATTEMPT TO ALTER DATA  
 MLY IHERE IF DID NOT TIME OUT  
 BR T3A ILOOP ON ERROR  
 T301 MOV 0T30,4 ISET UP TIME OUT VECTOR  
 CMP (0)+,(0)+ IREPOSITION STACK  
 T3C1 INC (0) IATTEMPT TO ALTER DATA  
 MLY IHERE IF DID NOT TIME OUT  
 BR T3C ILOOP ON ERROR  
 T3D1 MOV 0T30,4 ISET UP TIME OUT VECTOR  
 CMP (0)+,(0)+ IREPOSITION STACK  
 T3E1 CLR 0ROMADD IATTEMPT TO ALTER DATA  
 MLY IHERE IF DID NOT TIME OUT  
 BR T3E ILOOP ON ERROR  
 T3F1 TST (0)+ IINCREMENT ADDRESS POINTER  
 CMP (0)+,(0)+ IREPOSITION STACK



ITMIS PROGRAM TYPES CUT ROM DATA

PC1640 P12776 P00500  
 P01644 P04567 P00214  
 P01690 P02552  
 P01692 P16721 177124  
 P01696 P16720 177136  
 P01662 P12772 P00012  
 P01666 105767 175672  
 P01672 100375  
 P01674 P10067 P00324  
 P01700 P04767 P00322  
 P01704 P04567 P00154  
 P01710 P02566  
 P01712 P12067 P00326  
 P01716 P04767 P00324  
 P01722 105767 175636  
 P01726 100375  
 P01730 P12767 P00040 175638  
 P01736 P05321  
 P01740 P01410  
 P01742 P05322  
 P01744 P01362  
 P01746 P12722 P00012  
 P01752 P04567 P00100  
 P01756 P02566  
 P01760 P00745  
 P01762 P00167 177042

PRG11 MOV 05TKPTR,X6 INITIALIZE STACK  
 JSR 9,TYPEH ITYPE MESSAGE  
 M7 IFROM DATAI  
 MOV WORDS,X1 IGET # OF WORDS  
 PRG1A1 MOV ROMADD,X7 IGET STARTING ADDRESS  
 MOV 012,X2 IGET ADDRESS INDICATOR  
 TSTB TPCSR INAIT FOR  
 BPL ,04 ITELEPRINTER FLAG  
 PRG1B1 MOV X0,DZBTYP IGET ADDRESS  
 JSR 7,02A IAND TYPE IT  
 JSR 9,TYPEH ITYPE  
 M0 ICR/LF  
 PRG1C1 MOV (0)+,DZBTYP ITYPE  
 JSR 7,02A IDATA  
 TSTB TPCSR INAIT FOR  
 BPL ,04 ITELEPRINTER FLAG  
 MOV 01 ,TPDBR ITYPE SPACE  
 DEC X1 IALL DATA TYPED  
 BEQ PRB1D IGO TO FINISH  
 DEC X2  
 ONE PRG1C IRETURN TO PRG1B  
 MOV 012,X2 IGET ADDRESS INDICATOR  
 JSR 9,TYPEH ITYPE  
 M0 ICR/LF  
 BR PRB1D IRETURN TO PRG1B  
 PRG1D1 JMP PRMTRB IGO GET NEXT TEST

ITMIS PROGRAM CYCLES A SINGLE ADDRESS (ADDRESS MUST BE EVEN) TO CHANGE  
 THE ADDRESS TYPE NEW ADDRESS ON THE TTY.

P01766 P12706 P00500  
 P01772 P12737 P02060 P00004  
 P02000 P05067 175772  
 P02004 P12767 P02036 176046  
 P02012 P12767 P00360 176042  
 P02020 P12767 P00100 175532  
 P02026 P16700 176766  
 P02032 P05710  
 P02034 P00776  
 P02036 P04567 P00140  
 P02042 P00000  
 P02044 P16720 177772  
 P02050 P04567 P00010  
 P02054 P02566  
 P02056 P00002  
 P02060 104000  
 P02062 P00777

PRG21 MOV 05TKPTR,X6 INITIALIZE STACK POINTER  
 MOV 0PRG2C,004 ILOAD TRAP ERROR VECTOR  
 CLR PSH ICLR PROCESOR STATUS  
 MOV 0PRG2A,TKINTA ILOAD KEYBOARD INTERRUPT VECTOR  
 MOV 0340,TKINTP ILOAD KEYBOARD PRIORITY  
 MOV 0100,TKCSR ISET INTERRUPT ENABLE BIT  
 MOV ROMADD,XE IGET ROM ADDRESS  
 TST (0) IREAD ROM ADDRESS  
 BR ,02 ILOOP  
 PRG2A1 JSR 9,RECD IGO GET ADDRESS &  
 PRG2B1 B IPUT IT HERE  
 MOV PRG2B,X0  
 JSR 9,TYPEH ITYPE  
 M0 ICR/LF  
 RTI IEXIT KEYBOARD INTERRUPT SERVICE  
 PRG2C1 MLE IERROR! DID YOU TYPE AN ODD ADDRESS?  
 BR IBIT HERE UNTIL CORRECT ADDRESS IS TYPED IN

ROUTINE TO TYPE A MESSAGE

P02064 P10026  
 P02066 P12570

TYPEM1 MOV X0,(0)+ ISAVE REGISTER 0  
 MOV (5)+,X0 IPLACE MESSAGE ADDRESS IN R0

002070	112067	176720			MOV	(0),TERM	I GET TERMINATOR CHARACTER
002074	112067	176712			MOV	(0),CHAR	I GET NEXT CHARACTER
002100	126767	176700	176706		CMPS	CHAR,TERM	INLS NEXT CHARACTER THE TERM
002106	001005				BNE	TYPEMB	IC CHARACTER
002110	014600				MOV	=(0),XB	IRESPOND NO
002112	105767	175440			TSTB	TPCSR	
002116	100375				BPL	,04	
002120	000205				RTS	0	I AND EXIT
002122	126727	176664	000045		CMPS	CHAR,01X	INLS CHARACTER X
002130	001015				BNE	TYPEMC	
002132	105767	175420			TSTB	TPCSR	I TEST TELEPRINTER FLAG
002136	100375				BPL	,04	I AND WAIT FOR DONE
002140	012767	000215	175420		MOV	0215,TPDRR	I LOAD TELEPRINTER WITH CAR; DEY
002146	105767	175412			TSTB	TPCSR	I TEST TELEPRINTER FLAG
002152	100375				BPL	,04	I AND WAIT FOR DONE
002154	012767	000212	175424		MOV	0212,TPDRR	I LOAD TELEPRINTER WITH LINE FEED
002162	000766				OR	TYPEMA	I GET NEXT CHARACTER
002164	105767	175374			TSTB	TPCSR	I TEST TELEPRINTER FLAG
002170	100375				BPL	,04	I AND WAIT FOR DONE
002172	016767	176614	175366		MOV	CHAR,TPDRR	I LOAD TELEPRINTER BUFFER
002200	000735				OR	TYPEMA	I AND GET NEXT CHARACTER

I ROUTINE TO RECEIVE DATA TYPED IN ON THE KEYBOARD; THE DATA IS PLACED IN  
I THE ADDRESS FOLLOWING THE JSR CALL I

002202	005015				JSR	0,RECD	I CALL RECEIVE DATA ROUTINE
002204	105767	175300			B	0	I DATA IS PLACED HERE
002210	100375				BPL	,04	I CLEAR OUT OLD DATA
002212	116767	175344	176572		MOV	TKDRR,CHAR	I TEST KEYBOARD FLAG
002220	016767	176566	175340		MOV	CHAR,TPDRR	I AND WAIT FOR CHARACTER
002226	126727	176560	000215		CMPS	CHAR,0215	I GET CHARACTER
002234	001005				BNE	RECD0	I ECHO CHARACTER
002236	005725				TST	(5)0	I INLS CHARACTER CARRIAGE RETURN
002240	105767	175320			TSTB	TPCSR	
002244	100375				BPL	,04	
002246	000205				RTS	0	I INCREMENT RETURN ADDRESS
002250	042767	177770	176534		BIC	017770,CHAR	I AND EXIT
002256	006315				ASL	(5)	I STRIP AWAY ALL BUT 3 LSR
002260	006315				ASL	(5)	I ROTATE
002262	006315				ASL	(5)	I PREVIOUS
002264	056715	176522			BIS	CHAR,(5)	I DATA
002270	000745				OR	RECD0	I AND INSERT CHARACTER
							I GET NEXT CHARACTER

I SCOPE ROUTINE, THIS ROUTINE IS ENTERED AT THE END OF EACH SUBTEST;

002272	032767	040000	175270		BIF	040000,SR	I TEST SR FOR SCOPE
002300	001023				BNE	SCOPEB	I YES SCOPE
002302	032767	004000	175260		BIF	040000,SR	I TEST FOR ITERATION
002310	001007				BNE	SCOPEG	I INHIBIT ITERATION
002312	026767	000026	000022		CMPS	SCOPEF,ICOUNT	I ITERATION COMPLETE
002320	001403				REQ	SCOPEG	I ITERATION COMPLETE GO TO SCOPEG
002322	005267	000016			INC	SCOPEF	I INCREMENT ITERATION COUNT
002326	000410				RR	SCOPEB	I GO TO SCOPEB
002330	005067	000010			SCOPEG	SCOPEF	I CLEAR ITERATION COUNT

002334 R11607 200000  
 002340 R000F2  
 002342 R000F3  
 002344 R000F0  
 002346 R000F0  
 002350 R05726  
 002352 R12667 175420  
 002356 R00177 177764

MOV 0X0,RETURN  
 RTI  
 ICOUNTI 5  
 SCOPEFI 0  
 RETURNI ,WORD 0  
 SCOPEBI TST (0)  
 MOV (0),PSW  
 JMP 0RETURN

IGET ADDRESS OF NEXT TEST  
 IEXIT  
 ICONTAINS SUBTEST ITERATION COUNT  
 ICONTAINS RETURN PC FOR SCOPE  
 IPOP PC  
 IRESTORE CONDITION CODES

002362 R36727 1752P2 P200FE  
 002370 R01401  
 002372 R000F2  
 002374 R04967 177464  
 002400 R02532  
 002402 R11607 000016  
 002406 R04767 R00014  
 002412 R05767 175152  
 002416 100001  
 002420 R000F0  
 002422 R000F2

ERROR ROUTINE; THIS ROUTINE IS ENTERED WHEN AN ERROR IS DETECTED.  
 ERRORI BIT SR,020F0  
 BEO ,04  
 RTI  
 JSR X5,TYPEM  
 ERRORM  
 MOV (0),D20TVP  
 JSR 7,02A  
 TST SR  
 BPL ,04  
 HALT  
 RTI

IINHIBIT PRINTOUT  
 IBRANCH IF ERROR PRINT OUT  
 IRETURN TO TEST  
 ITYPE ERROR MESSAGE  
 I/PC  
 ITYPE PROGRAM COUNTER  
 IHALT ON ERROR  
 IYES HALT  
 IRETURN TO TEST

002424 R00000  
 002426 R16746 175132  
 002432 R10246  
 002434 R10146  
 002436 R10046  
 002440 R16770 177760  
 002444 R12771 R000F6  
 002450 R050F2  
 002452 R061F0  
 002454 R061F2  
 002456 R02772 R00260  
 002462 105767 175076  
 002466 100375  
 002470 R10207 175072  
 002474 R050F2  
 002476 R061F0  
 002500 R061F2  
 002502 R061F0  
 002504 R061F2  
 002506 R061F0  
 002510 R061F2  
 002512 R053F1  
 002514 R01300  
 002516 R12600  
 002520 R12671  
 002522 R12602  
 002524 R12667 175034  
 002530 R00207

THIS ROUTINE CONVERTS AN OCTAL NUMBER TO ASCII AND TYPES IT ON THE TTY.  
 D20TVPI 0  
 02A1 MOV TPCSR,(0)  
 MOV X2,(0)  
 MOV X1,(0)  
 MOV X0,(0)  
 MOV D20TVP,X  
 MOV 00,X1  
 CLR X2  
 ROL X0  
 ROL X2  
 02AA1 ADD 0200,X2  
 TSTB TPCSR  
 BPL ,04  
 MOV X2,TPCSR  
 CLR X2  
 ROL X0  
 ROL X2  
 ROL X0  
 ROL X2  
 ROL X0  
 ROL X2  
 DEC X1  
 ONE 02AA  
 MOV (0),X0  
 MOV (0),X1  
 MOV (0),X2  
 MOV (0),TPCSR  
 RTS 7

ISAVE TPCSR  
 ISAVE X2  
 ISAVE X1  
 ISAVE X0  
 IGET DATA TO BE TYPED  
 IGET COUNTER  
 ICLEAR WORKING REGISTER  
 IMOV FIRST BIT (MSB) INTO IR  
 IFROM ASCII CODE  
 ITEST TELEPRINTER  
 IFLAG AND WAIT UNTIL DONE  
 ILOAD TELEPRINTER BUFFER  
 ICLEAR WORKING REGISTER  
 IROTATE THE  
 INEXT  
 IOCTAL CHARACTER  
 IINTO  
 IREGISTER  
 ITWO  
 IDECREMENT COUNTER  
 IGO TO 02AA IF NOT 0  
 IFINISHED; RESTORE REGISTERS  
 I  
 I  
 IAND TPCSR  
 IAND EXIT

```
ASCII MESSAGES
ERRORM1 ,ASCII '0X PC= 0'
M01 ,ASCII '0XPRG0001'
M71 ,ASCII '0XROM DATA01'
M01 ,ASCII '0X0'
M01 ,ASCII '0XROM ADDRESS/IMAGE ADDRESS ROM DATA01IMAGE DATA01'
M121 ,ASCII '0/0'
M111 ,ASCII '0 0'
M121 ,ASCII '000'
,03776
,WORD
!DATA CUT INTO THE 04792-YR
R137P1,17797P,00P0P5,01010P
P12710,17740P,02P027,177944
001007,012740,0040P2,0P571P
100376,005740,10P363,022P2P
012740,000005,105710,1P0576
005710,100794,105010,000139
0000P0,000001,177777,177777
177777,177777,177777,177777
,END
```

CHAN	001012	DISPLA	017757F	DONE	001002	DONES	001034
NUMP	001006	72BTVP	002024	END	001362	FRORP	002362
ERRORH	002932	ERROR1	001206	ERROR2	001254	WLP	010400F
ICNT	001000F	ICOUNT	002342	IMAGE	001704	LANT	001010
M10	002052	M11	002059	M12	002060F	M6	002542
M7	002552	M8	002560	M9	002571	M21	002020
O2AA	002056	PRNUM	001060F	PRGTAB	001022	PR00	001110F
PRGR	001114	PRG1	001040F	PRG1A	001056	PR010	001070
PRG1C	001712	PR01D	001762	PRG2	001766	PR02A	002036
PRG2B	002042	PR02C	002060	PRMTR	001030	PSM	017770F
RECD	002202	RECD0	002204	RECD0	002250	RESTAR	001070
RETURN	002546	ROMADD	001020F	SCOPE	0104000	SCOPE0	002350
SCOPEC	002272	SCOPEF	002344	SCOPEG	002330	9R	017790F
SRY	001010	START1	000200	START3	000210	QWPTA	000900
TERM	001014	TKCR	017756F	TKDBR	0177562	TKINTA	000060
TKINTP	000062	TPCR	0177564	TPDBR	0177566	TYPEW	002064
TYPLMA	002074	TYPEMB	002122	TYPEMC	002164	T1	001134
T1A	001152	T10	001214	T2	001216	T2A	001234
T2B	001260	T2C	001274	T2D	001304	T2E	001314
T3	001324	T3A	001346	T3AA	001360	T3E	001354
T3C	001364	T3D	001372	T3E	001402	T3F	001412
T4	001432	T40	001452	T4C	001456	T40	001466
T4E	001960	WORDS	001002	.	004100		

ERRORS DETECTED: 0