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5. PROGRAM DESCRIPTIONS

5.1 PRG0 - LOGIC TESTS

THE LOGIC TESTS CONSIST OF 4 ROUTINES TO TEST THE MR11-DB LOGIC

5.1.1 ROUTINE DESCRIPTIONS

ROUTINE TESTS

- T1 ADDRESSABILITY OF MR11-DB
- T2 DATA RELIABILITY
- T3 THAT MR11-DB 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 64 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)

```

%
.TITLE TEST DZMRA-A
.NLIST SEQ,MC
.LIST ME
.ABS

```

```

;MR11-DB (64 WORD BULK STORAGE BOOTSTRAP LOADER) DIAGNOSTIC
;LOAD ADDRESS=0200
;DEPRESS START
;RESTART ADDRESS=0210
;STACK POINTER IS AT 500

```

000030 000030  
000030 002326  
000032 000340

.=30  
ERROR  
340

```

000034 002236
000036 000000

104000
104400
177560
177562
177564
177566
177776
177570
000500
000060
000062
000200
000200 000622
000210
000210 000652
001000

```

```

SCOPEC
0
;EQUATE STATEMENTS
HLT=EMT
SCOPE=TRAP
TKCSR=177560
TKDBR=177562
TPCSR=177564
TPDBR=177566
PSW=177776
SR=177570
STKPTR=500

TKINTA=60
TKINTP=62

.=200
START1: JMP PRMTRS
.=210
START3: JMP RESTART
.=1000

```

;INITIAL STACK SETTING

```

001000 001000          WORDS: 64.
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 001604          PRG1
001024 001732          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 000760  JSR  5,TYPEM ;TYPE MESSAGE 'PRG#='
001050 002506          M6
001052 004567 001070  JSR  5,RECD ;RECEIVE DATA AND PUT
001056 000000          PRGNUM: 0 ;IT HERE
001060 004567 000744  JSR  5,TYPEM
001064 002532          M8

001066 012767 173100 177722 RESTART:MOV  #173100,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 001172  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 176646  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
    
```



TEST DZMRA-R MRCY11 27(732) 04-NOV-76 12:09 PAGE 7  
DZMRAA.CMB

H01

001414 104400

SCOPE

:SCOPE LOOP

;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	000712	T4D:	MOV	%0,D2BTYP	;TYPE	
001456	004767	000710		JSR	7,02A	;ROM ADDRESS	
001462	004567	000342		JSR	5,TYPEN	;TYPE	
001466	002616			M10		;SEPARATOR	
001470	011067	000674		MOV	(0),D2BTYP	;TYPE	
001474	004767	000672		JSR	7,02A	;ROM DATA	
001500	004567	000324		JSR	5,TYPEN	;TYPE	
001504	002532			MB		;CR/LF	
001506	010367	000656		MOV	%3,D2BTYP	;TYPE	
001512	004767	000654		JSR	7,02A	;IMAGE ADDRESS	
001516	004567	000306		JSR	5,TYPEN	;TYPE	
001522	002624			M12		;SEPARATOR	
001524	011367	000640		MOV	(3),D2BTYP	;TYPE	
001530	004767	000636		JSR	7,02A	;IMAGE DATA	
001534	004567	000270		JSR	5,TYPEN	;TYPE	
001540	002532			MB		;CR/LF	
001542	000737			BR	T4C	;GO TO T4C	
001544	104400		T4E:	SCOPE			
001546	012737	000207	177566	END:	MOV	#207,@#TPDBR	;RING THE BELL
001554	105737	177564		TSTB	@#TPCSR		
001560	100375			BPL	.-4		
001562	013700	000042		MOV	@#42,%0	;RETURN TO DECTAPE MONITOR?	
001566	001404			BEQ	DONE1		
001570	004710			JSR	7,(0)	;RETURN!	
001572	000240			NOP			
001574	000240			NOP			
001576	000240			NOP			
001600	000167	177302	DONE1:	JMP	PRG0		

;THIS PROGRAM TYPES OUT ROM DATA

001604	012706	000500	PRG1:	MOV	#STKPTR,%6	;INITIALIZE STACK
001610	004567	000214		JSR	5,TYPEN	;TYPE MESSAGE
001614	002516			M7		; 'ROM DATA'
001616	016701	177156		MOV	WORDS,%1	;GET # OF WORDS
001622	016700	177170	PRG1A:	MOV	ROMADD,%0	;GET STARTING ADDRESS
001626	012702	000012		MOV	#12,%2	;GET ADDRESS INDICATOR
001632	105767	175726		TSTB	TPCSR	;WAIT FOR
001636	100375			BPL	.-4	;TELEPRINTER FLAG





```

002112 105767 175446          TSTB  TPCSR          ; TEST TELEPRINTER FLAG
002116 100375          BPL    -4           ; AND WAIT FOR DONE
002120 012767 000212 175440    MOV    #212,TPDBR   ; LOAD TELEPRINTER WITH LINE FEED
002126 000744          BR     TYPEMA       ; GET NEXT CHARACTER
002130 105767 175430          TYPEMC: TSTB  TPCSR          ; TEST TELEPRINTER FLAG
002134 100375          BPL    -4           ; AND WAIT FOR DONE
002136 016767 176646 175422    MOV    CHAR,TPDBR   ; LOAD TELEPRINTER BUFFER
002144 000735          BR     TYPEMA       ; AND GET NEXT CHARACTER
002146 005015          RECD: CLR    (5)    ; CLEAR OUT OLD DATA
002150 105767 175404          RECD: TSTB  TKCSR          ; TEST KEYBOARD FLAG
002154 100375          BPL    -4           ; AND WAIT FOR CHARACTER
002156 116767 175400 176624    MOVB  TKDBR,CHAR    ; GET CHARACTER
002164 016767 176620 175374    MOV    CHAR,TPDBR   ; ECHO CHARACTER
002172 126727 176612 000215    CMPB  CHAR,#215     ; WAS CHARACTER CARRIAGE RETURN
002200 001005          BNE   RECD         ; INCREMENT RETURN ADDRESS
002202 005725          TST   (5)+
002204 105767 175354          TSTB  TPCSR
002210 100375          BPL    -4
002212 000205          RTS    5           ; AND EXIT
002214 042767 177770 176566    RECD: BIC   #177770,CHAR ; STRIP AWAY ALL BUT 3 LSB
002222 006315          ASL   (5)          ; ROTATE
002224 006315          ASL   (5)          ; PREVIOUS
002226 006315          ASL   (5)          ; DATA
002230 056715 176554          BIS   CHAR,(5)     ; AND INSERT CHARACTER
002234 000745          BR    RECD         ; GET NEXT CHARACTER
; SCOPE OR/AND ITERATION LOOP FOR EACH TEST 100.TIMES

002236 032767 040000 175324    SCOPE: BIT   #40000,SR ; TEST SR FOR SCOPE
002244 001023          BNE   SCOPEB       ; YES SCOPE
002246 032767 004000 175314    BIT   #4000,SR     ; TEST FOR ITERATION
002254 001007          BNE   SCOPEG       ; INHIBIT ITERATION
002256 026767 000026 000022    CMP   SCOPEF,ICOUNT ; ITERATION COMPLETE
002264 001403          BEQ   SCOPEG       ; ITERATION COMPLETE GO TO SCOPEG
002266 005267 000016          INC   SCOPEF       ; INCREMENT ITERATION COUNT
002272 000410          BR    SCOPEB       ; GO TO SCOPEB
002274 005067 000010          SCOPEG: CLR  SCOPEF ; CLEAR ITERATION COUNT
002300 011667 000006          MOV   #2%6,RETURN  ; GET ADDRESS OF NEXT TEST
002304 000002          RTI
002306 000040          ICOUNT: 40
002310 000000          SCOPEF: 0
002312 001066          RETURN: RESTART
002314 005726          SCOPEB: TST(6)+    ; POP PC
002316 012667 175454          MOV   (6)+,PSW     ; RESTORE CONDITION CODES
002322 000177 177764          JMP   @RETURN
002326 036727 175236 020000    ERROR: BIT   SR,#20000 ; INHIBIT PRINTOUT?
002334 001401          BEQ   .+4          ; BRANCH IF ERROR PRINT OUT
002336 000002          RTI               ; RETURN TO TEST
002340 004567 1774E4          JSR   %5,TYPEM     ; TYPE ERROR MESSAGE
002344 002476          ERRORM
002346 011667 000016          MOV   (6),D2BTYP  ; PC=
002352 004767 000014          JSR   7,02A       ; TYPE PROGRAM COUNTER
002356 005767 175206          TST   SR           ; HALT ON ERROR?
002362 100001          BPL   .+4
002364 000000          HALT
002366 000002          RTI               ; YES HALT
; RETURN TO TEST

```

002370	000000		D2BTYP: 0		
002372	016746	175166	02A: MOV	TPCSR, -(6)	:SAVE TPCSR
002376	010246		MOV	%2, -(6)	:SAVE R2
002400	010146		MOV	%1, -(6)	:SAVE R1
002402	010046		MOV	%0, -(6)	:SAVE R0
002404	016700	177760	MOV	D2BTYP, %0	:GET DATA TO BE TYPED
002410	012701	000006	MOV	#6, %1	:GET COUNTER
002414	005002		CLR	%2	:CLEAR WORKING REGISTER
002416	006100		ROL	%0	:MOV FIRST BIT (MSB) INTO
002420	006102		ROL	%2	:R2
002422	062702	000260	02AA: ADD	#260, %2	:FORM ASCII CODE
002426	105767	175132	TSTB	TPCSR	:TEST TELEPRINTER
002432	100375		BPL	-4	:FLAG AND WAIT UNTIL DONE
002434	010267	175126	MOV	%2, TPDBR	:LOAD TELEPRINTER BUFFER
002440	005002		CLR	%2	:CLEAR WORKING REGISTER
002442	006100		ROL	%0	:ROTATE THE
002444	006102		ROL	%2	:NEXT
002446	006100		ROL	%0	:OCTAL CHARACTER
002450	006102		ROL	%2	:INTO
002452	006100		ROL	%0	:REGISTER
002454	006102		ROL	%2	:TWO
002456	005301		DEC	%1	:DECREMENT COUNTER
002460	001360		BNE	02AA	:GO TO 02AA IF NOT 0
002462	012600		MOV	(6)+, %0	:FINISHED. RESTORE REGISTERS
002464	012601		MOV	(6)+, %1	:
002466	012602		MOV	(6)+, %2	:
002470	012667	175070	MOV	(6)+, TPCSR	:AND TPCSR
002474	000207		RTS	7	:AND EXIT

TEST DZMRA-A MACY11 27(732) 04-NOV-76 12:09 PAGE 12  
 DZMRAA.CMB

```

:ASCII MESSAGES
002476 022500 050040 036503 ERRORM: .ASCII 'a% PC= a'
002504 040040
002506 022500 051120 021507 M6: .ASCII 'a%PRG#=a'
002514 040075
002516 022500 047522 020115 M7: .ASCII 'a%ROM DATA%a'
002524 040504 040524 040045
002532 022500 100 M8: .ASCII 'a%a'
002535 100 051045 046517 M9: .ASCII 'a%ROM ADDRESS/IMAGE ADDRESS ROM DATA*IMAGE DATA%a'
002542 040440 042104 042522
002550 051523 044457 040515
002556 042507 040440 042104
002564 042522 051523 051040
002572 046517 042040 052101
002600 025101 046511 043501
002606 020105 040504 040524
002614 040045
002616 027500 100 M10: .ASCII 'a/a'
002621 100 040040 M11: .ASCII 'a a'
002624 025100 100 M12: .ASCII 'a*a'

```

003776	003776	.=3776
	000000	WORD
		;DATA CUT INTO THE MR11-DB
004000	010702	010702
004002	000451	000451
004004	177462	177462
004006	000005	000005
004010	010702	010702
004012	000445	000445
004014	177406	177406
004016	000005	000005
004020	010702	010702
004022	000417	000417
004024	177344	177344
004026	000005	000005
004030	004003	004003
004032	100000	100000
004034	024000	024000
004036	010702	010702
004040	000410	000410
004042	172524	172524
004044	060003	060003
004046	060011	060011
004050	000200	000200
004052	100000	100000
004054	010702	010702
004056	000423	000423
004060	176716	176716
004062	000005	000005
004064	010200	010200
004066	005720	005720
004070	012001	012001
004072	005311	005311
004074	005720	005720
004076	012041	012041
004100	031011	031011
004102	001776	001776
004104	005720	005720
004106	031041	031041
004110	001406	001406
004112	000112	000112
004114	173100	173100
004116	000340	000340
004120	010702	010702
004122	000401	000401
004124	177450	177450
004126	000005	000005
004130	010200	010200
004132	005720	005720

000001 024881-A  
000001 024881-A

004134	012001		012001
004136	012711	177000	012711,177000
004142	011041		011041
004144	032711	100200	032711,100200
004150	001775		001775
004152	100757		100757
004154	005007		005007
004156	000000		000000
004160	173110		173110
004162	000340		000340
004164	173220		173220
004166	000340		000340
004170	173154		173154
004172	000340		000340
004174	173120		173120
004176	000340		000340
	000001		.END



*XATP =	000062	161#	355#												
*PCSR =	177564	155#	309	327	336	377	382	385	389	401	442	452	467#		
*POBR =	177566	156#	308#	338#	384#	397#	391#	397#	454#						
TYPEA	002030	184	188	291	295	299	303	322	332	344	363	370#	432		
TYPEBA	002040	373#	388	392											
TYPEBB	002066	375	380#												
TYPEBC	002130	381	389#												
T1	001120	201#													
T1A	001136	204#	213	217											
T1B	001200	214	218#												
T2	001202	222#													
T2A	001220	225#	231	247											
T2B	001244	229	232#	236											
T2C	001260	234	237#	240											
T2D	001270	238	241#	244											
T2E	001300	242	245#												
T3	001310	253#													
T3A	001322	257#	259												
T3B	001324	256#	273												
T3C	001340	256	260#												
T3D	001350	262#	264												
T3E	001356	260	265#												
T3F	001366	267#	269												
T3G	001376	265	270#												
T4	001416	279#													
T4B	001436	283#	288												
T4C	001442	285#	305												
T4D	001452	284	289#												
T4E	001544	286	306#												
WORDS	001000	169#	202	223	255	280	324								
	= 004200	145#	162#	164#	166#	168#	310	328	337	359	367	378	393	386	
		390	395	402	430	437	453	489#							



TEST DZMRAA-A  
DZMRAA.CMB

MACY11 27(732) 04-NOV-76 12:09 PAGE 19  
CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

ADD	206	211	227	451													
ASL	193	405	406	407													
BEO	183	229	234	238	242	286	312	340	417	430							
BIC	233	404															
BIS	408																
BIT	412	414	429														
BITB	208																
BPM	213	247	273	284	342	375	381	399	413	415	463						
BPL	310	328	337	378	383	386	390	395	402	437	453						
BR	214	217	231	236	240	244	259	264	269	288	305	346	359	357	386		
	392	409	419														
CLR	181	225	267	353	393	420	448	455									
CMP	207	215	237	261	266	271	283	287	416								
CMPB	241	374	380	398													
DEC	212	246	272	285	339	341	462										
ENT	151																
HALT	145	438															
INC	262	418															
JMP	163	165	194	317	347	428											
JSR	184	186	188	290	291	294	295	298	299	302	303	313	322	331	332		
	335	344	360	363	432	435											
MOV	180	191	192	197	198	201	202	203	204	222	223	224	226	253	254		
	255	256	257	260	265	274	279	280	281	282	289	293	297	301	308		
	311	321	324	325	326	330	334	338	343	351	352	354	355	356	357		
	362	370	371	376	384	387	391	397	421	427	434	442	443	444	445		
	446	447	454	464	465	466	467										
MOV#	372	373	396														
NOP	314	315	316														
RESET	209	232															
RCL	449	450	456	457	458	459	460	461									
RTI	365	422	431	439													
RTS	379	403	468														
SUB	210	228															
TRAP	152																
TST	182	205	245	270	358	400	426	436									
TSTB	309	327	336	377	382	385	389	394	401	452							
.ABS	138																
.ASCII	470	472	474	475	477	486	487	488									
.END	563																
.LIST	137	145															
.NLIST	136	145															
.REM	1																
.REPT	145																
.TITLE	135																
.WORD	490																

ERRORS DETECTED: 0  
DEFAULT GLOBALS GENERATED: 0

\*.NOW.SEO/SOL/CRF/NL:TOC/PAGNUM=DZMRAA.CMB  
RUN-TIME: 13.7 SECONDS  
RUN-TIME RATIO: 26/5=4.6  
CORE USED: 6K (11 PAGES)

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MACY 11 27 732) 04-NOV-76 12:09 PAGE 20  
CROSS REFERENCE TABLE -- PERMANENT SYMBOLS