

TMA-11

UTILITY DRIVER
MD-11-DZTMG-C

EP-DZTMG-C-DL-A
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NOV 1976
digital
MADE IN USA

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1. ABSTRACT

THIS PROGRAM IS INTENDED AS A BRUTE FORCE ROUTINE TO EXECUTE AN OPERATION OR SERIES OF OPERATIONS, CONTINUOUSLY REGARDLESS OF THE RESULTS OF THE OPERATION. THIS UTILITY DRIVER WILL ALLOW AN OPERATOR TO EXECUTE ANYTHING DESIRED IN ANY ORDER. THERE ARE NO ERROR CHECKS OR PRINTOUTS MADE, AND ANY VARIATION FROM PRESET SEQUENCES AND VALUES ARE MADE BY CHANGING THE APPROPRIATE MEMORY LOCATIONS. THIS PROGRAM IS NOT ELIGABLE FOR CHAIN MODE.

2. REQUIREMENTS

2.1 HARDWARE:

- A. ANY PDP-11 PROCESSOR
- B. TM, A, B-11 TAPE CONTROLLER
- C. AT LEAST ONE TUID, N, W MAG TAPE DRIVE

2.2 STORAGE:

THIS PROGRAM REQUIRES AT LEAST 1K OF CORE

3. LOADING PROCEDURE:

USE STANDARD BINARY LOADING PROCEDURE

4. STARTING PROCEDURE

THE PROGRAM IS ALWAYS STARTED AT LOCATION 200 (8)

5. CONTROL SWITCH SETTINGS (LOC. 176)

- BIT 0: 1=STOP AFTER EACH OPERATION
0=PROCEED
- BIT 1: 1=STOP AT THE END OF THE OPERATION SEQUENCE
0=PROCEED

E. OPERATION

THE PROGRAM OPERATION IS QUITE SIMPLE, BUT DOES REQUIRE THE OPERATOR TO HAVE KNOWLEDGE OF THE MAG TAPE SYSTEM AS OPERATED ON THE TMA-11 OR TM-11 CONTROLLER. THE OPERATOR MUST BE ABLE TO DECIDE WHICH SEQUENCE OF OPERATION IS REQUIRED, AND WHAT VALUES TO ASSIGN TO THE VARIOUS PARAMETERS REQUIRED TO EXECUTE THEM. THE OPERATION SEQUENCE IS SET UP BY LOADING A TABLE WITH THE FUNCTION CODES OF THE DESIRED OPERATIONS AND SETTING THE NUMBER OF OPERATIONS IN A COUNTER. THE PROGRAM IS SET UP TO DO A WRITE OF TWENTY (20) FRAMES OF ALL ONES DATA TO TAPE UNIT ZERO (0) WITH A DENSITY OF 800 BPI IN A NINE TRACK DRIVE. THE DATA ADDRESS IS 3000 (8). THE OPERATION SEQUENCE IS SET TO DO A SINGLE WRITE. IF LOADED AND STARTED AT 200(8) WITH NO CHANGES MADE AND LOC. 176 SET TO A ZERO (0), THIS OPERATION WILL BE EXECUTED CONTINUOUSLY. THE FOLLOWING IS THE LIST OF PARAMETERS WHICH MAY BE VARIED AND A DESCRIPTION OF EACH ALONG WITH THEIR CORE LOCATION:

PARAMETER	LOCATION	DESCRIPTION
CONTROL SETTINGS	176	PRESET FOR CONTINUOUS OPERATION
TM,A,B-11 ADDRESS	600	ADDRESS OF TM,A,B-11 (THE FIRST REGISTER ADDRESS: MTS)
UNIT DESCRIPTION	700	SET SELECTED SLAVE NUMBER (0-7) IN BITS 8,9,10 SELECT PARITY IN BIT 11 (0=ODD 1=EVEN) SELECT DENSITY IN BITS 13,14
BYTE COUNT	702	SET NUMBER OF BYTES PER RECORD IN TWO'S COMPLEMENT
READ ADDRESS	704	SET DESIRED ADDRESS FOR START OF READ BUFFER.
WRITE ADDRESS	706	SET DESIRED ADDRESS FOR START OF WRITE BUFFER.
SPACE COUNT	710	SET NUMBER OF RECORDS TO SPACE ON SPACE COMMAND IN TWO'S COMPLEMENT.
		NOTE: WHEN SPACING MULTIPLE RECORDS INSURE THAT SUFFICIENT TIME IS ALLOWED BY SETTING THE REAL MULTIPLIER TO THE NUMBER OF RECORDS SPACED.

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162	READY DELAY	712	THIS DELAY VALUE IS USED BY THE PROGRAM TO ESTABLISH A MAXIMUM TIME TO AWAIT THE COMPLETION OF AN OPERATION BEFORE PROCEEDING TO THE NEXT
163			
164			
165			
166	READY MULTIPLIER	714	IF THE VALUE SET INTO 712 DOES NOT ALLOW ENOUGH TIME, INCREASE THE SIZE OF THE MULTIPLIER. EACH INCREMENT OF THE MULTIPLIER WILL CAUSE THE 712 DELAY TO BE EXECUTED THAT MANY MORE TIMES.
167			
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170			
171	OPERATION DELAY	716	THIS DELAY IS USED TO ALLOW FOR SOME AMOUNT OF TIME BETWEEN THE EXECUTION OF EACH OPERATION. IT IS LOADED AND USED JUST AS IN THE READY DELAY(712)
172			
173			
174			
175	OPER MULTIPLIER	720	THIS IS USED JUST AS THE READY DELAY MULTIPLIER(714)
176			
177	OPERATION NUMBER	722	THIS IS THE NUMBER OF OPERATIONS TO BE PERFORMED IN A SEQUENCE AND SHOULD REFLECT THE NUMBERS OF OPERATIONS SET INTO THE OPERATION TABLE.
178			
179			
180			
181	OPERATION TABLE	724-754	THIS TABLE (CONSISTING OF 15 LOCATIONS) IS TO BE LOADED WITH THE FUNCTION CODES FOR EACH OPERATION TO BE PERFORMED IN SEQUENCE. THE NUMBER OF ENTIRES MAY BE FROM ONE (1) TO FIFTEEN (15). MAKE SURE THAT THE NUMBER OF FUNCTION CODES SET IN THE TABLE IS REFLECTED BY THE NUMBER IN LOCATION 722 (OPNUM)
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188	6.1	FUNCTION CODES	
189			
190		0=OFFLINE	
191		1=READ	
192		2=WRITE	
193		3=WRITE EOF	
194		4=SPACE FORWARD	
195		5=SPACE REVERSE	
196		6=WRITE WITH EXTENDED IRG	
197		7=REWIND	
198			
199	6.2	DENSITY (BITS 13,14 OF UNIT DESCRIPTION)	
200			
201		00=200 BPI -- 7 TRACK	
202		01=556 BPI -- 7 TRACK	
203		02=800 BPI -- 7 TRACK	
204		03=800 BPI -- 9 TRACK	
205			
206	6.3	PARITY (BIT 11 OF UNIT DESCRIPTION)	
207			
208		1=EVEN PARITY	
209		0=ODD PARITY	
210			
211	6.4	UNIT SELECT (BITS 8,9,10 OF UNIT DESCRIPTIONS)	
212			
213		SET TO DESIRED UNIT NUMBER (0-7)	
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2517. PROGRAM DESCRIPTION

IN ORDER TO MAINTAIN THE CONTINUOUS EXECUTION OF
THE OPERATIONS DESCRIBED THE PROGRAM IS ORGANIZED AS
FOLLOWS:

START
INITIALIZE THE TM,A,B-11
SET UP TAPE PARAMETERS (DENSITY, PARITY, BYTE COUNT, DATA ADDRESS)
SELECT DEVICE TO TEST (UNIT NUMBER)
EXECUTE OPERATION (SET FUNCTION FROM OP TABLE AND SET GO=1)
AWAIT END OF OPERATION (TAPE UNIT READY)
STOP IF LOC. 176 BIT 0:=1
DO OPERATION DELAY (OP DELAY)
STOP IF LAST OPERATION IN SEQUENCE AND LOC 176 BIT 1:=1
POINT TO NEXT FUNCTION CODE IN OP TABLE
JUMP BACK TO START

7.1 FLOW: START: HOUSEKEEPING
 INIT: CLEAR TM,A,B-11
 SET UP: SET UP REQUIRED REGISTERS
 EXECUTE: SET FUNCTION AND GO=1
 AWAIT END: LOOP ON TUR=0 AS LONG AS ALLOWED BY READY DELAY
 STOP: IF BIT 0:=1 (LOC 176)
 DELAY: PER OP DELAY
 END OF SEQUENCE? IF NOT JUMP TO START
 STOP: IF BIT 1:=1 (LOC 176)
 JUMP TO START RESTART SEQUENCE

8. LISTING

.ENDR

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.TITLE TM,A,B-11 UTILITY DRIVER
;MAINDEC-11-DZTMG-C-D
;AUGUST 76
;R. B. BARNES
.ABS

;CONTROL SWITCH SETTINGS (LOC. 176)

;BIT 0:=1 STOP ON EACH OPERATION
; 0 CONTINUE

;BIT 1:=1 STOP AT END OF SEQUENCE
; 0 CONTINUE

;REGISTER EQUIVALENTS

000000
000001
000002
000003
000004
000005
000006
000007

R0=%0
R1=%1
R2=%2
R3=%3
R4=%4
R5=%5
SP=%6
PC=%7

;TRAP CATCHERS*****

000000
.=0

000176 000176
000000 SWITCH: 0

;STARTING ADDRESS

000200 000200 000574
000167
000600
.=200
JMP START
.=600

;TM,A,B-11 REGISTERS

000600 172520
000602 172522
000604 172524
000606 172526

MTS: 172520
MTC: 172522
BRC: 172524
CMA: 172526

;PROCESSOR ADDRESSES

000610 177776
000612 177570

PSW: 177776 ;PROCESSOR STATUS
SWR: 177570 ;SWITCH REGISTER


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303
304      000700
305
306
307 000700 060000
308 000702 177760
309 000704 003000
310 000706 002000
311 000710 177777
312 000712 100000
313 000714 000001
314 000716 010000
3.5 000720 000001
316 000722 000001
317

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.=700
;SET PARAMETERS DESIRED FOR UNIT UNDER TEST*****

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      UDES: 60000      ;UNIT DESCRIPTION
      BCNT: -20      ;BYTE COUNT
      RADDR: 3000    ;READ ADDRESS
      WADDR: 2000    ;WRITE ADDRESS
      SCNT: -1       ;SPACE COUNT
      RDYDLY: 100000 ;READY DELAY
      RDYDX: 1       ;READ DELAY MULTIPLEXER
      OPDLY: 10000   ;OPERATION DELAY
      OPDX: 1        ;OPERATION DELAY MULTIPLEXER
      OPNUM: 1       ;NUMBER OF OPERATIONS (1 TO 5)

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336 000724 000002
337 000726 000000
338 000730 000000
339 000732 000000
340 000734 000000
341 000736 000000
342 000740 000000
343 000742 000000
344 000744 000000
345 000746 000000
346 000750 000000
347 000752 000000
348 000754 000000
349

```

```

;OPERATION TABLE*****
;ENTER OPERATION SEQUENCE DESIRED.
;MUST HAVE AT LEAST 1 OPERATION, AND
;MAY HAVE UP TO 15(8).
;SET THE OPERATION COUNTER EQUAL
;TO THE NUMBER OF OPERATIONS IN
;THE SEQUENCE.
;
;0 = OFFLINE
;1 = READ
;2 = WRITE
;3 = WRITE EOF
;4 = SPACE FORWARD
;5 = SPACE REVERSE
;6 = WRITE WITH EXTENDED IRG
;7 = REWIND

```

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OPTBL: 2
        0
        0
        0
        0
        0
        0
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        0
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        0
        0
        0
        0

```

;FILL WITH OPERATION SEQUENCE

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350
351          001000          . = 1000
352                                     ; START OF PROGRAM*****
353
354 001000 012706 000500          START:  MOV      #500, SP
355 001004 012777 000340 177576      MOV      #340, @PSW
356 001012 016700 177704          MOV      OPNUM, R0          ; SET COUNTER
357 001016 012701 000724          MOV      #OPTBL, R1        ; SET POINTER
358 001022 012777 010000 177552 LOOP:  MOV      #10000, @MTC      ; POWER CLEAR THE CONTROLLER
359 001030 016702 177644          MOV      UDES, R2        ; GET UNIT DESCRIPTION
360 001034 012103          MOV      (R1)+, R3       ; GET OP CODE
361 001036 022703 000004          CMP      #4, R3         ; IS IT A SPACE FORWARD OP?
362 001042 001403          BEQ      A              ; IF SO: BR
363 001044 022703 000005          CMP      #5, R3         ; IS IT A SPACE REVERSE OP?
364 001050 001004          BNE      B              ; IF NOT: BR
365 001052 016777 177632 177524 A:    MOV      SCNT, @BRC      ; SPACE PER SPACE COUNT
366 001060 000414          BR       C              ; GO AND FORM COMMAND
367 001062 016777 177614 177514 B:    MOV      BCNT, @BRC   ; SET BYTE COUNT
368 001070 016777 177612 177510      MOV      WADDR, @CMA    ; SET WRITE ADDRESS
369 001076 022703 000001          CMP      #1, R3        ; IS IT A READ OP?
370 001102 001003          BNE      C              ; IF NOT: BR
371 001104 016777 177574 177474      MOV      RADDR, @CMA    ; SET READ ADDRESS
372 001112 006303          C:    ASL      R3         ; SHIFT OP CODE LEFT
373 001114 050302          BIS      R3, R2        ; BUILD COMMAND WORD
374 001116 052702 000001          BIS      #1, R2        ; SET GO BIT
375 001122 010277 177454          MOV      R2, @MTC      ; START OPERATION
376 001126 016703 177560          MOV      RDYDLY, R3     ; SET READY DELAY
377 001132 016704 177556          MOV      RDYDX, R4     ; SET DELAY MULTIPLEXER
378 001136 032777 000001 177434 D:    BIT      #1, @MFS
379 001144 001004          BNE      E              ; IF TUR: BR
380 001146 005303          DEC      R3
381 001150 001372          BNE      D
382 001152 005304          DEC      R4              ; DELAY FOR TAPE READY
383 001154 001370          BNE      D
384 001156 032767 000001 177012 E:    BIT      #1, SWITCH    ; SHOULD STOP ON OPERATION
385 001164 001401          BEQ      F
386 001166 000000          HALT
387 001170 016703 177522          F:    MOV      OPDLY, R3   ; SET OPERATION DELAY
388 001174 016704 177520          MOV      OPDX, R4      ; SET DELAY MULTIPLEXER
389 001200 005303          G:    DEC      R3
390 001202 001376          BNE      G
391 001204 005304          DEC      R4              ; DELAY BETWEEN OPERATIONS
392 001206 001374          BNE      G
393 001210 005300          DEC      R0
394 001212 001303          BNE      LOOP
395 001214 032767 000002 176754      BIT      #2, SWITCH    ; SEE IF HALT ON PASS
396 001222 001666          BEQ      START
397 001224 000000          HALT
398 001226 000167 177546          JMP      START
399

```

```
400  
401      002000      .=2000      ;WRITE BUFFER*****  
402      .REPT      100  
403      -1  
404      .ENDR  
405  
406      003000      .=3000      ;READ BUFFER*****  
407      .REPT      100  
408      0  
409      .ENDR  
410  
411      000001      .END
```


ASL	372																	
BEQ	362	385	396															
BIS	373	374																
BIT	378	384	395															
BNE	364	370	379	381	383	390	392	394										
BR	366																	
CMP	361	363	369															
DEC	330	382	389	391	393													
HALT	280	386	397															
JMP	288	398																
MOV	354	355	356	357	358	359	360	365	367	368	371	375	376	377	387			
	388																	
.ABS	256																	
.END	411																	
.LIST	280																	
.NLIST	280																	
.REPT	1	280	402	407														
.TITLE	252																	

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

* DZTMGC.SEQ/SOL/CRF/PAGNUM/NL:TOC=DZTMGC.SRC
RUN-TIME: 1 2 .3 SECONDS
RUN-TIME RATIO: 50/4=10.0
CORE USED: 7K (13 PAGES)

