

TR79F

TIMING PROGRAM
MD-11-DZTRB-A

EP-DZTRB-A-DL-A
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B01

TR79 UTILITY DRIVER
DZTRB.P11

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IDENTIFICATION

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

PRODUCT NAME: TR79F TIMING PROGRAM

DATE RELEASED: MAY 1976

MANTAINER: DIAGNOSTIC ENGINEERING

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DIAGNOSTIC GROUP

TR79 UTILITY DRIVER

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1. ABSTRACT

THIS PROGRAM IS A BRUTE FORCE DRIVER INTENDED TO PROVIDE THE USER WITH A TOOL FOR TROUBLESHOOTING THE TR-79 MAGTAPE SYSTEM. ANY ONE FUNCTION OR SERIES OF FUNCTIONS CAN BE PERFORMED IN ANY DESIRED ORDER REGARDLESS OF ERROR(S) ENCOUNTERED. THERE ARE NO ERROR CHECKS OR PRINT-OUTS. ANY DEVIATION FROM THE PROGRAMMED DEFAULT PARAMETERS REQUIRES THE USER TO MODIFY THE APPROPRIATE PROGRAM LOCATIONS. INCLUDED IN THE PROGRAM ARE TWO (2) SPECIFIC ROUTINES TO ASSIST THE USER IN THE BASIC SET-UP OF THE DELAY LINES OF THE TR-79F MAGTAPE CONTROLLER.

2. REQUIREMENTS

2.1 HARDWARE

- A. PDP-11 PROCESSOR
- B. TR79 MAGTAPE TRANSPORT (HP-7970E)
- C. TR79-F MAGTAPE CONTROLLER

E01

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DESCRIPTION OF EACH, AND THEIR ADDRESSES IN CORE.

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PARAMETER	LOCATION	DESCRIPTION
UNIT SELECT	700	BITS 8 & 9 REPRESENT THE UNIT NUMBER. A MAX OF FOUR IS ALLOWED.
BYTE COUNT	702	SET THIS TO THE TWO'S COMPLIMENT OF THE NUMBER OF WORDS TRANSFERRED.
READ ADDRESS	704	SET TO DESIRED START ADDRESS OF READ BUFFER.
WRITE ADDRESS	706	SET TO DESIRED START ADDRESS OF WRITE BUFFER.

A. THERE ARE FOUR (4) WRITE BUFFERS.

1. 2000 (8) THIS IS AN ALL 1'S (ONE'S) PATTERN THE PARITY BIT = 1 FOR THIS DATA PATTERN.
2. 2400 (8) THIS IS AN ALTERNATING ALL ZERO'S (0'S) WORD AND ALL ONE'S (1'S) WORD PATTERN. THE PARITY BIT = 1 FOR THIS DATA PATTERN.
3. 3000 (8) THIS IS AN ALTERNATING 525/252 DATA PATTERN. THE PARITY BIT = 1 FOR THIS DATA PATTERN.
4. 3400 (8) THIS IS A WALKING ONE IN A FIELD OF ZERO'S PATTERN. THE PARITY BIT = 0 FOR THIS DATA PATTERN.

READY DELAY	710	THIS DELAY VALUE IS USED BY THE PROGRAM TO SET THE AMOUNT OF TIME TO WAIT FOR CURDY BEFORE CONTINUING.
READY DELAY MULTIPLIER	712	THIS NUMBER DETERMINES THE NUMBER OF TIMES THE "READY DELAY" TIME WILL BE REPEATED BEFORE CONTINUING.
OPERATION DELAY	714	THIS DELAY VALUE IS USED TO ALLOW A TIME LAPSE BETWEEN EACH OPERATION.
OPERATION DELAY MULTIPLIER	716	THIS NUMBER DETERMINES THE NUMBER OF TIMES THE "OPERATION DELAY" WILL BE REPEATED BEFORE CONTINUING.
OPERATION NUMBER	720	THIS IS THE NUMBER OF OPERATIONS TO BE EXECUTED IN A SEQUENCE. IT SHOULD EQUAL THE NUMBER OF OPERATIONS IN THE OPERATION TABLE.

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OPERATION TABLE 722

THIS TABLE IS LOADED WITH THE
FUNCTION CODE FOR EACH OPERA-
TION IN THE DESIRED SEQUENCE
TO A MAX OF 27 (8) OPERATIONS.
THE NUMBER OF OPERATIONS IN
THIS TABLE SHOULD EQUAL THE
NUMBER IN 720 (8) (OPER. #)

6.1 FUNCTION CODES

- 01 = WRITE
- 02 = READ FORWARD
- 04 = SPACE REVERSE
- 07 = ERASE
- 10 = REWIND
- 13 = FAST FORWARD
- 15 = WRITE IDB
- 16 = WRITE TAPE MARK
- 17 = OFF LINE

NOTE: ALL OTHER FUNCTIONS ARE ILLEGAL.

7. PROGRAM FLOW

7.1 NORMAL START

START;	HOUSEKEEPING
(A) LEGAL FUNC. CHK;	CHECK IF FUNCTION IS LEGAL. IF NOT, HALT WITH DISPLAY REG = 777777
CLR TRS;	CLEAR OUT INHIBIT BIT
CHK FUNC;	GO TO PROPER ROUTINE
SET-UP;	SET-UP REGISTERS
GO;	EXECUTE FUNCTION
READY DELAY;	WAIT FOR READY
HALT AFTER OPER;	CHECK SW15; IF = 1 HALT WITH DISPLAY REG = 000000
OPER DELAY;	DELAY BETWEEN OPERATIONS
MORE OPERATIONS ?;	YES - GOTO (A) NO - CONT.
HALT AFTER SEQ;	CHECK SW14; IF = 1 HALT WITH DISPLAY REG = 000001

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RETURN; GO TO START

7.2 POWER CLEAR ROUTINE

START; SET DELAY TIMES

POWER CLEAR; BIS BIT 11 OF TRC

DELAY; WAIT FOR POWER CLEAR TO HAPPEN.

RETURN; GO TO START

7.3 FORCE ERROR ROUTINE

START; SET-UP BAD DATA ADDRESS

WRITE; SET-UP WRITE FUNC

GO; EXECUTE FUNCTION

RETURN; GO TO START

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000200 000167 000574
000204 000167 001100
000210 000167 001124

8. PROGRAM LISTING

.TITLE TR79 UTILITY DRIVER
.ENABL ABS
.NLIST TTM

7/28/75
D.A.WILLIAMS

REGISTER DEF.

R0=%0
R1=%1
R2=%2
R3=%3
R4=%4
R5=%5
R6=%6
R7=%7
PC=%7
SP=%6

TRAP CATCHERS

.=0
.REPT 200
.+2
HALT
.ENDR

.=200 ;START ADDRESS
JMP START ;POWER CLEAR ROUTINE
JMP PWRCLR ;FORCE ERROR ROUTINE
JMP FORCER


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317
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319
320      000600
321      ;          =600
322      ;          TR79 REGISTERS
323      000600 164000      TRC: 164000      ; TR79 CONTROL REG.
324      000602 164002      TRS: 164002      ; TR79 STATUS REG.
325      000604 164004      TRWC: 164004     ; TR79 WORD CONT REG.
326      000606 164006      TRBA: 164006     ; TR79 BUS ADDRESS REG.
327
328      ;
329      000610 177776      PSW: 177776     ; PROCESSOR STATUS WORD
330      000612 177570      SWR: 177570     ; SWITCH REGISTER
331
332      ;
333      ;          =700
334      ;          ; START OF PARAMETER TABLE
335      000700 000000      UNIT: 0         ; UNIT SELECT - BITS 8&9
336      000702 177760      BCNT: -20      ; BYTE COUNT
337      000704 004000      RADDR: 4000    ; READ ADDRESS
338      000706 002000      WADDR: 2000    ; WRITE ADDRESS - -1'S PATTERN
339      000710 100000      RDYDLY: 100000 ; READY DELAY
340      000712 000001      RDYDLX: 1      ; READY DELAY MULTIPLEXER
341      000714 010000      OPDLY: 10000   ; OPERATION DELAY
342      000716 000001      OPDLX: 1       ; OPER. DELAY MUTIPLEXER
343      000720 000001      OPNUM: 1       ; NUMBER OF OPERATIONS
344      000722 000001      OPTBL: 1       ; OPERATION TABLE DEFAULT WRITE
345      000724 000000
346      000726 000000
347      000730 000000
348      000732 000000
349
350      ;
351      ;          0
352      ;          0
353      ;          0
354      ;          0
355      ;          0
356      ;          ; MAX.OF 27-OCTAL OPERATIONS
```



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349
350
351
352
353 001000 001000 000600
354 001004 012777 000340 177576
355 001012 016703 177702
356 001016 012704 000722
357 001022 012700 000011
358 001026 012701 001266
359 001032 012405
360 001034 020521
361 001036 001403
362 001040 005300
363 001042 001374
364 001044 000504
365 001046 016702 177626
366 001052 042702 176377
367 001056 005077 177520
368 001062 162701 001270
369 001066 060107
370 001070 000413
371 001072 000416
372 001074 000420
373 001076 000410
374 001100 000240
375 001102 000240
376 001104 000240
377 001106 000240
378 001110 006305
379 001112 050205
380 001114 005205
381 001116 000413
382 001120 016777 177562 177460
383 001126 000403
384 001130 016777 177550 177450
385 001136 016777 177540 177440
386 001144 000761

;
START:  =1000
        MOV #600, SP
        MOV #340, @PSW
        MOV OPNUM, R3
        MOV #OPTBL, R4
LOOP:   MOV #9, R0
        MOV #LEGAL, R1
        MOV (R4)+, R5
A:      CMP R5, (R1)+
        BEQ B
        DEC R0
        BNE A
        BR OPERR
B:      MOV UNIT, R2
        BIC #176377, R2
        CLR @TRS
        SUB #LEGAL+2, R1
        ADD R1, PC
        BR WRITE
        BR READ
        BR D
        BR WRITE
        NOP
        NOP
        NOP
        NOP
C:      ASL R5
        BIS R2, R5
        INC R5
        BR GO
WRITE:  MOV WADDR, @TRBA
        BR D
READ:  MOV RADDR, @TRBA
D:     MOV BCNT, @TRWC
        BR C

; PRIORITY 7
; R3<= # OF OPERATIONS
; R4<= START OF OPERATIONS
; # OF LEGAL FUNCTIONS
; TABLE OF LEGAL FUNCTIONS
; GET THE FUNCTION
; SEE IF VALID
; BRANCH IF IT IS
; ONE LESS TO CHECK
; CHECK IT
; NO MATCH - OP ERROR
; GET UNIT #
; ONLY THE UNIT #
; CLEAR THE INHIBIT BIT
; GET OFFSET TO FUNC.
; GO TO IT
; WRITE
; READ
; SPACE REVERSE
; --ERASE--
; REWIND
; FAST FORWARD
; WRITE IDB
; WRITE TAPE MARK
; OFFLINE - SHIFT FUNC.
; SET UNIT #
; SET GO BIT
; GO DO IT
; ADDR. OF DATA TO BE WRITTEN
; GET WC
; ADDR. OF READ DATA
; SET WORD COUNT
; GET UNIT & GO

```



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387
388
389 001146 016700 177536      GO:  MOV  RDYDLY,RO      ;
390 001152 016701 177534      MOV  RDYDLX,R1      ;
391 001156 010577 177416      MOV  R5,@TRC        ;INITIATE FUNCTION
392 001162 105777 177412      E:   TSTB @TRC       ;SEE IF UNIT READY
393 001166 100404                BMI  F               ;BR IF YES
394 001170 005300                DEC  RO              ;DEC DELAY
395 001172 001373                BNE  E               ;TRY AGAIN
396 001174 005301                DEC  R1              ;WAIT TILL ZERO OR READY
397 001176 001371                BNE  E
398 001200 005777 177406      F:   TST  @SWR        ;HALT BETWEEN OP'S
399 001204 100002                BPL  G               ;NO-BRANCH
400 001206 005000                CLR  RO              ;YES
401 001210 000000                HALT                  ;STOP
402 001212 016700 177476      G:   MOV  OPDLY,RO    ;SET DELAY BETWEEN OP'S
403 001216 016701 177474      MOV  OPDLX,R1
404 001222 005300      H:   DEC  RO          ;WAIT.....
405 001224 001376                BNE  H
406 001226 005301                DEC  R1
407 001230 001374                BNE  H
408 001232 005303                DEC  R3              ;ANY MORE OP'S IN TABLE
409 001234 001272                BNE  LOOP            ;YES - GOTO LOOP
410 001236 032777 040000 177346  BIT  #40000,@SWR     ;HALT ON END OF PASS?
411 001244 001655                BEQ  START           ;IF EQUAL...NO
412 001246 012700 000001      MOV  #1,RO
413 001252 000000                HALT                  ;STOP
414 001254 000651                BR   START           ;CONT
415 001256 012700 177777      OPERR: MOV  #-1,RO    ;OP ERROR - TURN ON SOME LIGHTS
416 001262 000000                HALT                  ;STOP
417 001264 000776                BR   -.2
418
419 001266 000001 000002 000004 LEGAL: .WORD 1,2,4,7,10,13,15,16,17;      LEGAL FUNCTIONS
420 001274 000007 000010 000013
421 001302 000015 000016 000017

```



```

422
423
424
425 001310 012700 177777      PWRCLR: MOV      #-1,RO      ;SET DELAY TIME
426 001314 012701 000003      MOV      #3,R1
427 001320 052777 004000 177252  A1:    BIS      #4000,@TRC ;POWER CLEAR!
428 001326 005300      DEC      RO
429 001330 001376      BNE     A1      ;WAIT...
430 001332 005301      DEC      R1
431 001334 001374      BNE     A1
432 001336 000764      BR      PWRCLR ;DO IT AGAIN!
433
434
435 001340 012777 001364 177240  FORCER: MOV      #BADATA,@TRBA ;ADDRESS OF BAD DATA TO BUS ADDR. REG.
436 001346 012777 177770 177230  MOV      #177770,@TRWC ;SET WORD COUNT
437 001354 012777 000003 177216  MOV      #3,@TRC ;WRITE & GO !
438 001362 000766      BR      FORCER ;DO IT AGAIN!!!!
439 001364 000000 000002 000004  BADATA: .WORD 0,2,4,401,600,555,333; BAD PARITY
440 001372 000401 000600 000555
441 001400 000333

```



```

442
443
444
445      002000      ;      .=2000
446      ;          .REPT    200      ;400 BYTES
447      ;          .WORD    000777  ;A 11111111
448      ;          .ENDR      ; 11111111 PATTERN
449
450      002400      ;      .=2400
451      ;          .REPT    100      ;2ND WRITE BUFFER
452      ;          .WORD    000400  ;400 BYTES
453      ;          .WORD    000777  ;A 00000000
454      ;          .ENDR      ; 11111111 PATTERN
455
456      003000      ;      .=3000
457      ;          .REPT    100      ;400 BYTES
458      ;          .WORD    000525  ;A 01010101
459      ;          .WORD    000652  ; 10101010 PATTERN
460      ;          .ENDR
461
462      003400      ;      .=3400
463      ;          .REPT    10
464      ;          .WORD    1
465      ;          .WORD    2
466      ;          .WORD    4
467      ;          .WORD    10
468      ;          .WORD    20
469      ;          .WORD    40
470      ;          .WORD    100
471      ;          .WORD    200
472      ;          .WORD    200
473      ;          .WORD    100
474      ;          .WORD    40
475      ;          .WORD    20
476      ;          .WORD    10
477      ;          .WORD    4
478      ;          .WORD    2
479      ;          .WORD    1
480      ;          .ENDR
481
482      ;
483      004000      ;      .=4000      ;READ BUFFER
484      ;          .REPT    200
485      ;          .WORD    0      ;400 BYTES 0
486      ;          .ENDR
487
488      000001      ;      .END

```


ADD	369															
ASL	378															
BDF	361	411														
BDFC	366															
BDFCS	379	427														
BDFCS	410															
BDFCS	393															
BDFCS	362	395	397	405	407	409	429	431								
BDFCS	392															
BDFCS	364	370	371	372	373	381	383	386	414	417	432	438				
BDFCS	367	400														
BDFCS	360															
BDFCS	360	394	396	404	406	408	428	430								
BDFCS	360	401	413	416												
BDFCS	380															
BDFCS	314	315	316													
BDFCS	353	354	355	356	357	358	359	365	382	384	385	389	390	391	402	
BDFCS	403	412	415	425	426	435	436	437								
BDFCS	374	375	376	377												
NOB	374															
SUB	368															
TST	398															
TSTB	392															
.ENABL	288															
.END	488															
.NLIST	289															
.REM	1															
.REPT	308	446	451	457	463	484										
.TITLE	287															
.WORD	419	439	449	455	461	481	487									

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

*.DZTRB.SEQ/SOL/CRF=DZTRB.P11
 RUN-TIME: 34.5 SECONDS
 RUN-TIME RATIO: 89/8=10.3
 CORE USED: 6K (11 PAGES)

