

1 .NLIST TOC

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3 IDENTIFICATION

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5 PRODUCT CODE: AC-E642B-MC

6 PRODUCT NAME: CZTMIB0 TM78 CTRL/LGC TST

7 MAINTAINER: DIAGNOSTIC ENGINEERING

8 DATE: OCTOBER 1,1980

9 AUTHOR: G. COOKE

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24 DECTAPE

25 MASSBUS

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TM78 CONTROLLER LOGIC TEST
ZTMIB1.P11 17-OCT-80 14:04

MACY11 30(1046) 17-OCT-80 16:27 C 1
HISTORY PAGE 1-1

SEQ 0002

.SBTTL HISTORY
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HISTORY

JUNE 1, 1980
OCTOBER 1, 1980

INITIAL RELEASE
SECOND RELEASE

CZTMIA
CZTMIB

CHANGES TO CZTMIA

1. CHANGED MODULE CALLOUT AFTER FAULT INSERTION INFORMATION
WAS AVAILABLE.
2. EXACT ROUTINE PRINTS 2 SETS OF ACTUAL AND EXPECTED MESSAGES
3. CALX9 WAS MULTIPLYING BY WRONG NUMBER
4. TEST 17 WAS NOT READING ALL CAS
5. CHANGE DXTUID FROM KKTMAA TO KKTMA8 SO WE USE NEW MICRO
DIAGNOSTIC PAK FILE

\

.REM \

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1.2.2 SOFTWARE REQUIREMENTS

TM78 CONTROL LOGIC TEST PROGRAM
MICRO DIAGNOSTIC FILE

1.3 RELATED DOCUMENTS AND STANDARDS

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

1.5 ASSUMPTIONS

THIS DIAGNOSTIC ASSUMES THAT ALL HARDWARE OTHER THAN THE TM78/TU78 ARE OPERATIONAL. THIS ALSO INCLUDES THE RH11/RH70 AS THE BASIC TESTS PERFORMED ON THE RH11/RH70 THAT ARE UNSUCCESSFUL DEDUCE THAT THE SUBSYSTEM UNDER TEST IS RESPONSIBLE FOR THE FAILURE, NOT THE RH11/RH70.

2.0 OPERATING INSTRUCTIONS

2.1 HARDWARE QUESTIONS

THE FOLLOWING SERIES OF QUESTIONS COMPRISE THE PARAMETERS NECESSARY TO IDENTIFY EACH TU78 TO BE TESTED.

2.1.1 RH ADDRESS

THIS PARAMETER DEFINES THE BASE UNIBUS ADDRESS OF THE MASSBUS CONTROLLER FOR THE TU78 TO BE TESTED.

2.1.2 RH VECTOR ADDRESS

THIS PARAMETER DEFINES THE INTERRUPT VECTOR ADDRESS FOR THE RH SPECIFIED BY RH ADDRESS. THE LOCATION SPECIFIED WILL BE LOADED WITH THE INTERRUPT SERVICE ROUTINE ADDRESS AND THE VALUE SPECIFIED PLUS TWO WILL BE LOADED WITH THE INTERRUPT SERVICE ROUTINE PSW.

2.1.3 TM78 #

THIS PARAMETER DEFINES THE MASSBUS DRIVE NUMBER (0-7) ASSIGNED TO THE TM78 UNDER TEST.

2.1.4 TU78 #

THIS PARAMETER DEFINES THE NUMBER (0-3) OF THE TU78 UNDER TEST.

2.1.5 TM78 PORT #

THIS PARAMETER DEFINES THE PORT (0-1) ON THE TM78 THAT THE MASSBUS IS CONNECTED TO.

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2.1.6 RH TYPE

THIS PARAMETER DEFINES THE RH TYPE (RH11 OR RH70) ON THE SYSTEM AND DETERMINES WHETHER SILO TESTS (RH11 ONLY) WILL BE RUN.

2.2 SOFTWARE QUESTIONS

THE FOLLOWING SERIES OF QUESTIONS ARE INTENDED TO PROVIDE A MECHANISM OF ALTERING THE NORMAL OPERATION OF THE PROGRAM. THEY ARE ONLY USED BY TEST 40.

2.2.1 SKIP MTA MICRO-DIAGNOSTICS

ANSWERING YES TO THIS QUESTION WILL INHIBIT THE RUNNING OF ALL MICRO-DIAGNOSTICS THAT REQUIRE A TU78 TO BE ATTACHED. THIS IS NECESSARY FOR FORMATTER (TM78) ONLY TESTING. ANSWERING NO WILL RUN ALL MICRO-DIAGNOSTICS AND REQUIRE A TU78 TO BE ATTACHED.

2.2.2 MICRO-DIAGNOSTIC RELIABILITY MODE

THIS PARAMETER CONTROLS WHETHER THE MICRO DIAGNOSTICS WILL BE EXECUTED 1 TIME OR 11 TIMES:

N = 1 TIME
Y = 11 TIMES

2.2.3 MANUAL MICRO-DIAGNOSTIC SELECTION

THIS PARAMETER CONTROLS WHETHER THE MICRO DIAGNOSTICS WILL BE RUN AS A SCRIPT OR ALLOW THE OPERATOR TO SELECT THE MICRO DIAGNOSTICS INDIVIDUALLY.

NOTE: IF THIS OPTION IS SELECTED, THE FLAG SWITCH UAM CANNOT BE SET OR AN ERROR WILL BE PRINTED AND THE TEST ABORTED.

IF THE FLAG SWITCH UAM (UNATTENDED MODE) IS SET, THIS
OPTION WILL BE IGNORED AND THE NORMAL MICRO-DIAGNOSTIC
SCRIPT WILL RUN.

2.3 AUTO DROP MODE

USING THE DRS COMMAND '/FLAG:ADR' WILL CAUSE THE AUTODROP
FEATURE TO BE ENABLED. WHEN THIS OCCURS ALL DEVICES TO BE
TESTED WILL BE VERIFIED FOR PROPER RESPONSE BEFORE EXECUTING
HARDWARE TEST NO. 1. IF A DEVICE DOES NOT RESPOND IT WILL
BE DROPPED FROM THE TESTING LIST. CAUTION MUST BE EXERSIZED
WHEN USING THIS FEATURE TO AVOID DROPPING A DEVICE, OR
ATTEMPTING TO TEST A NON EXISTENT DEVICE BECAUSE OF A
HARDWARE MALFUNCTION.

2.4 MANUAL INTERVENTION TESTS

IF THE USER HAS NOT STARTED THE DIAGNOSTIC WITH
THE FLAG '/FLAG:UAM' (UNATTENDED MODE), THE
MANUAL INTERVENTION TESTS WILL BE PERFORMED.
IN ORDER FOR THIS TO BE SUCCESSFUL A TU78 MAGNETIC
TAPE DRIVE MUST BE INSTALLED AND A SCRATCH TAPE
MUST BE LOADED AND WRITE ENABLED. THESE TESTS WILL
VERIFY THE CORRECT OPERATION OF THE TU78 PANEL SWITCHES
AND BASIC TAPE MOTION. OPERATOR INPUT IS REQUIRED
DURING EXECUTION OF THESE TESTS. THESE TESTS CAN
ALSO BE AVOIDED BY SETTING THE SOFTWARE SWITCH
MENTIONED AT 2.2.1 .

3.0 ERROR INFORMATION

THIS PROGRAM HAS TWO TYPES OF ERROR CLASSIFICATIONS, SYSTEM FATAL
AND DEVICE FATAL.

3.1 SYSTEM FATAL ERRORS

SYSTEM FATAL ERRORS ARE USED TO INDICATE THAT AN ERROR WAS
DETECTED IN RELATION TO LOADING/CONTROLLING THE MICRO DIAGNOSTIC
PROCESS. WHEN A SYSTEM FATAL ERROR IS DETECTED THE TEST IN PROGRESS
IS ABORTED AND THE NEXT TEST (IF ANY) IS EXECUTED.

THE FORMAT OF A SYSTEM FATAL ERROR IS AS FOLLOWS AND IS PRINTED
ON THE SYSTEM CONSOLE DEVICE UNLESS A LINE PRINTER IS BEING
UTILIZED. THE CONTENT OF EACH ERROR IS SUCH THAT IT SHOULD BE
SELF EXPLANATORY. HOWEVER, THE MESSAGES UTILIZE SOME TERMS THAT
ARE SPECIFIC TO THE TM78.

3.2 DEVICE FATAL ERRORS

4.0 PERFORMANCE AND PROGRESS REPORTS

NONE

5.0 DEVICE INFORMATION TABLES

RH11/RH70 ADDRESS SUMMARY

UNIBUS ADDRESS	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	
BASE +0	SC	!	TRE!	MCPE!	0	!	DVA!	PSSEL!	A17!	A16!	RDY!	IE	!	DT. FUNCTION CODE	!	GO	
2	WORD COUNT																
4	BUS ADDRESS																
6	BYTE COUNT																
10	DLT!	WCE!	PE	!	NED!	NEM!	PGE!	MXF!	MDPE!	OR	!	IR	!	CLR!	PAT!	BAI!	UNIT
12	DT. FAILURE CODE								!	0	!	DPR!	0	!	DT. INTERRUPT CODE		

- 1 COMMON ADDRESS SPACE (CAS)
2 TM78 HARDWARE CONTROL REGISTERS
3 RH11/RH70 REGISTERS

* = DIAGNOSTIC USE ONLY
** = SEE PDP-11 PERIPHERALS HANDBOOK

TM78 REGISTER CROSS REFERENCE CHART

UNIBUS ADDRESS	MASSBUS ADDRESS	8085 ADDRESS	LOCATION
BASE + 0	0	200-201	RH & CAS
2	***	***	RH ONLY
4	***	***	RH ONLY
6	5	212-213	CAS
10	***	***	RH ONLY
12	1	202-203	CAS
14	2	204-205	CAS
16	4	210-211	TM78 F/F
20	7	216-217	CAS
22	***	***	RH ONLY
24	3	206-207	CAS DIAG REG
26	6	214-215	CAS
30	10	220-221	CAS
32	11	222-223	CAS DIAG REG
34	12	224-225	CAS DIAG REG
36	13	226-227	CAS
40	14	230-231	CAS
42	15	232-233	CAS
44	16	234-235	CAS
46	17	236-237	CAS

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50	20	***	TM78 HDWR REG
52	22	***	TM78 HDWR REG

*** = NON EXISTENT REGISTER
DEFAULT BASE = 172400
CAS = COMMON ADDRESS SPACE
RH = RH11 OR RH70

TM78 RH11/70 BIT DEFINITION TABLE

RH CS1 BIT DEFINITIONS

UNIBUS ADDRESS	BIT PLACE	ABRIEV	NAME	LOCATION
BASE+0	100000	SC	SPECIAL CONDITION	RH
0	40000	TRE	TRANSFER ERROR	RH & CAS
0	20000	MCPE	MASSBUS CBUS PAR ERR	RH
0	4000	DVA	DRIVE AVAILABLE	RH & CAS
0	2000	PSEL	UNIBUS PORT SELECT	RH
0	1000	A17	UNIBUS ADDRESS BIT 17	RH
0	400	A16	UNIBUS ADDRESS BIT 16	RH
0	200	RDY	RH READY	RH
0	100	IE	INTERUPT ENABLE	RH
0	1	GO	DATA XFER GO BIT	RH & CAS

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10	400	MDPE	MASSBUS DATA BUS PAR ERR	RH
10	200	OR	OUTPUT READY	RH
10	100	IR	INPUT READY	RH
10	40	CLR	CONTROLLER CLEAR	RH
10	20	PAT	PARITY TEST	RH
10	10	BAI	BUS ADDRESS INCREMENT INHIBIT	RH

TU78 DRIVE STATUS REGISTER BITS

20	100000	RDY	TU78 READY BIT	CAS
20	40000	PRES	TU78 PRESENT BIT	CAS
20	20000	ONL	TU78 ONLINE	CAS
20	10000	REW	TU78 REWINDING	CAS
20	4000	PE	1600 BPI MODE SET	CAS
20	2000	BOT	TU78 AT BEGINNING OF TAPE	CAS
20	1000	EOT	TU78 AT END-OF-TAPE	CAS
20	400	FPT	FILE PROTECTED	CAS
20	200	AVAIL	AVAILABLE TO MASSBUS	CAS
20	100	SHR	SHARED	CAS
20				

TM78 CONTROLLER LOGIC TEST
ZTMIB1.P11 17-OCT-80 14:04

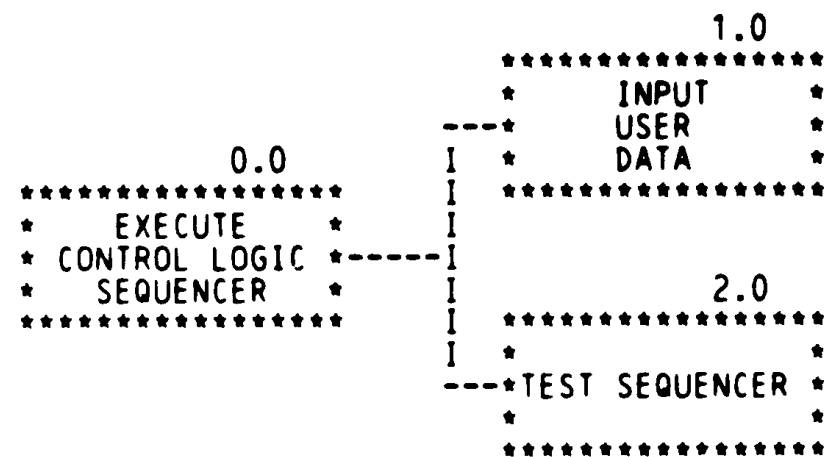
MACY11 30(1046) 17-OCT-80 16:27 L 1
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HISTORY

SEQ 0011

```
514      ! 52      ! 400      ! HOLD      ! 8085 HOLD      ! TM78      !
515      +-----+-----+-----+-----+-----+-----+
516
517      BASE DEFAULT ADDRESS = 172400
518      RH = RH11 OR RH70
519      CAS = COMMON ADDRESS SPACE
520      TM78 = BITS RESIDE WITHIN TM78
521      NOTE : SEE TM78 HARDWARE MANUAL FOR BIT DESCRIPTIONS
522
523
524      \
525      .NLIST  CND
531
532
533      .SBTTL  PROGRAM HEADER
560
561      :++
562      : THE PROGRAM HEADER IS THE INTERFACE BETWEEN
563      : THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
564      :--
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                                2.1.2.1
                                *****
                                *   STOP THE   *
                                * TM78 MICRO-  *
                                * PROCESSOR    *
                                *****
                                2.1.2.2
                                *****
                                *   WRITE A    *
                                * PROGRAM TO    *
                                * TM78 MP WCS   *
                                *****
                                2.1.2.3
                                *****
                                *   VERIFY TM78 *
                                * MP WCS        *
                                * WITH WRITTEN  *
                                *****
                                2.1.2
                                *****
                                * INPUT/LOAD THE *
                                * TM78 MICRO-    *
                                * DIAGNOSTIC    *
                                *****
                                2.1.2.4
                                *****
                                *   START TM78  *
                                * MP DIAGNOSTIC *
                                * MONITOR       *
                                *****
                                2.1.2.5
                                *****
                                * PACK TM78 MP  *
                                * LOAD MODULE   *
                                * FROM LOAD MEDIA*
                                *****
                                2.1.2.5.1
                                *****
                                *   READ        *
                                * A            *
                                * CHARACTER    *
                                *****
                                2.1.2.6
                                *****
                                *   LOAD THE    *
                                * MESSAGE       *
                                * MODULE        *
                                *****
                                2.1.2.7
                                *****
                                *DIAGNOSTIC MON.*
                                * SYSTEM ERROR *
                                * REPORTING    *
                                *****
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                                2.1.3.1
                                *****
                                *   START   *
                                * THE TM78  *
                                * MP TEST   *
                                *****
                                2.1.3.2
                                *****
                                * WAIT/TIMEOUT *
                                * TM78 MP-HOST *
                                * COMMUNICATION *
                                *****
                                2.1.3
                                *****
                                * TM78 MP *
                                * TEST CONTROL *
                                * MODULE *
                                *****
                                2.1.3.3
                                *****
                                * PROCESS TM78 *
                                * MP DETECTED *
                                * ERRORS *
                                *****
                                2.1.3.3.1
                                *****
                                * PRINT *
                                * ACTUAL/EXPECTED *
                                * DATA *
                                *****
                                2.1.3.4
                                *****
                                * PROCESS TM78 *
                                * MP UTILITY *
                                * REQUEST *
                                *****
                                2.1.3.4.1
                                *****
                                * CALCULATE *
                                * BYTE *
                                * COUNT *
                                *****
                                2.1.3.4.2
                                *****
                                * GENERATE *
                                * A DATA *
                                * PATTERN *
                                *****
                                2.1.3.5
                                *****
                                * QUEUE A PRINT *
                                * LINE/MANUAL *
                                * INTERVENTION *
                                *****
```

.TITLE TM78 CONTROLLER LOGIC TEST

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855
856 002000          POINTER BGNSW,BGNSFT,BGNAU,BGNDU
857
865
866          .NLIST BEX
867 002000          HEADER CZTMIB,0,0,1800.,0
868 002122          DEVTYP <TU78>
869 002130          DESCRIPT <TEST TM78 CONTROLLER LOGIC>
870
876          .SBTTL DISPATCH TABLE
877
878          ;++
879          ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
880          ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
881          ;--
882
883 002164          DISPATCH          40
884
889          .SBTTL DEFAULT HARDWARE P-TABLE
890          ;++
891          ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
892          ; THE TEST-DEVICE PARAMETERS. THE STRUCTURE OF THIS TABLE
893          ; IS IDENTICAL TO THE STRUCTURE OF THE RUN-TIME P-TABLE.
894          ;--
895          BGNHW      DFPTBL
896          .WORD      172400          ;RH ADDRESS DEFAULT VALUE
897          .WORD      0              ;TM78 NUMBER DEFAULT VALUE
898          .WORD      0              ;TU78 NUMBER DEFAULT VALUE
899          .WORD      0              ;TM78 PORT NUMBER
900          .WORD      224           ;RH VECTOR ADDRESS DEFAULT VALUE
901          .WORD      70            ;RH TYPE (RH70)
902          ENDSW
903
904          .SBTTL SOFTWARE P-TABLE
905          ;++
906          ; THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
907          ; PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
908          ;--
909          BGNSW      SFPTBL
910          MTATST: .WORD 0              ;SKIP MTA TESTING FLAG DEVAULT = NO
911          RELI78: .WORD 0              ;TM78 RELIABILITY FLAG DEFAULT = NO
912          MANTST: .WORD 0              ;MANUAL TEST SELECTION FLAG DEFAULT - NO
913          RUNSKP: .WORD 0              ;INDIV. MICRO MODULE RUN/SKIP FLAG DEFAULT - NO
914          ENDSW
915
922          ;++
923          ; THE REPORT CODING SECTION CONTAINS THE
924          ; 'PRINTS' CALLS THAT GENERATE STATISTICAL REPORTS.
925          ;--
926
927          BGNRPT
928 002336
929
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936 002336          EXIT      RPT
937
944
945 002342          ENDRPT

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1416      : : : ELSE-ERROR
1417      : : : ENDF
1418      : : : ENDSEG EMPTY SILO READ
1419      : : : BGNSEG IR/OR CHECK
1420      : : : INIT RH
1421      : : : IF 'IR' SET
1422      : : : : THEN-CONTINUE
1423      : : : : ELSE-ERROR
1424      : : : ENDF
1425      : : : IF 'OR' CLEAR
1426      : : : : THEN-CONTINUE
1427      : : : : ELSE-ERROR
1428      : : : ENDF
1429      : : : LOAD SILO WITH 0
1430      : : : IF 'OR' CLEAR
1431      : : : : THEN-CONTINUE
1432      : : : : ELSE-ERROR
1433      : : : ENDF
1434      : : : LOAD SILO WITH -1
1435      : : : IF 'OR' SET
1436      : : : : THEN-CONTINUE
1437      : : : : ELSE-ERROR
1438      : : : ENDF
1439      : : : ENDSEG IR/OR CHECK
1440      : : : BGNSEG-SILO DATA TEST
1441      : : : INIT RH
1442      : : : LOAD SILO WITH DATA
1443      : : : DO FOR DATA=0 TO DATA=102
1444      : : : : LOAD DATA INTO SILO
1445      : : : : INCREMENT DATA
1446      : : : ENDDO FOR
1447      : : : IF 'IR' RESET
1448      : : : : THEN-CONTINUE
1449      : : : : ELSE-ERROR
1450      : : : ENDF
1451      : : : READ DATA FROM SILO
1452      : : : DO FOR DATA=0 TO DATA=102
1453      : : : : READ DATA
1454      : : : : COMPARE TO EXPECTED
1455      : : : : IF MISCOMPARE
1456      : : : : : THEN-ERROR
1457      : : : : ENDF
1458      : : : ENDDO FOR
1459      : : : ENDSEG-SILO DATA TEST
1460      : : : BGNSEG-SILO OVERFLOW
1461      : : : INIT RH
1462      : : : LOAD SILO FULL PLUS 1 WORD
1463      : : : DO FOR DATA=0 TO DATA=103
1464      : : : : LOAD DATA INTO SILO
1465      : : : ENDDO FOR
1466      : : : IF 'DLT' SET
1467      : : : : THEN-CONTINUE
1468      : : : : ELSE-ERROR
1469      : : : ENDF
1470      : : : ENDSEG-SILO OVERFLOW
1471      : : : BGNSEG-SILO RESET

```