TM78,TU78 TM78 CTRL/LGC TST
CZTMICO
AH-E643C-MC
FICHE 1 OF 1
AUG 1981

MADE IN USA

B 1

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.NLIST TOC

.REM \
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IDENTIFICATION

PRODUCT CODE:	AC-E642C-MC
PRODUCT NAME:	CZTMIC0 TM78 CTRL/LGC TST
MAINTAINER:	DIAGNOSTIC ENGINEERING
DATE:	FEBRUARY 1, 1981
AUTHOR:	G. COOKE


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                        .SBTTL  HISTORY
                        .REM \

                                              HISTORY
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                        JUNE 1,1980           INITIAL RELEASE          CZTMIA
                        OCTOBER 1,1980        SECOND RELEASE           CZTMIB
                        FEBRUARY 1, 1981      THIRD RELEASE            CZTMIC

                                              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 KKTMAB SO WE USE NEW MICRO
                        DIAGNOSTIC PAK FILE.


                                              CHANGES TO CZTMIB
                                              -------  - ------

                        1. CHANGED DXTUID: FROM KKTMAB TO KKTMAC TO CALL NEW MICRO-
                           DIAGNOSTIC PAK FILE.

SAGE BUFFER SIZE TO 5000. TO PREVENT    2. INCREASED MES
                                           OVERFLOW ERROR.


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.REM    \
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1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

PDP-11 PROCESSOR
24K WORDS OF MEMORY
CONSOLE DEVICE
XXDP BOOT MEDIA CONTAINING THE MICRO DIAGNOSTICS
RH11/RH70
TM78 FORMATTER
TU78 TRANSPORT
LINE PRINTER (OPTIONAL)

1.2.2 SOFTWARE REQUIREMENTS

TM78 CONTROL LOGIC TEST PROGRAM
MICRO DIAGNOSTIC FILE

1.3 RELATED DOCUMENTS AND STANDARDS

1.4 DIAGNOSTIC HIERARCY 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.

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-DIAGNSOTICS 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.

2.2.4 INDIVIDUAL MICRO-DIAGNOSTIC RUN/SKIP

THIS PARAMETER ALLOWS THE USER TO DECIDE ON A MICRO-DIAGNOSTIC MODULE BASIS, IF IT SHOULD BE EXECUTED OR NOT.

N = RUN NORMAL MICRO DIAGNOSTIC SCRIPT

Y = RUN NORMAL MICRO DIAGNOSTIC SCRIP, BUT ALLOW USER TO ANSWER YES OR NO TO SKIPPING ANY TEST DESIRED.

NOTES: IF THE MANUAL MICRO-DIAGNOSTIC SELECTION OPTION IS SELECTED, THIS OPTION HAS NO EFFECT.

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	PSEL	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							
14	SER	FORMAT		SKIP COUNT			RECORD COUNT									CMD ADR
16	0				ATTENTION BIT											
20	RDY	PRES	ONL	REW	PE	BOT	EOT	FPT	AVIL	SHR	MANT	DSE	0			
22	DATA BUFFER															
24	PRNT FLGS		ERROR MSG NR						DIAG TEST NR							
26	NSA	TAP	0		2/MB	0	WCS	DRIVE TYPE (101)								
30	BCD SN 3				BCD SN 2				BCD SN 1				BCD SN 0			
32	AUX PRINT NR			DATA PATTERN NR					LOOP	QV	0	COMP	DIAG REQ			
34	EXPECTED DIAG DATA								ACTUAL DIAG DATA							
36	NDT FAILURE CODE						ATTN ADR		0		NDT INTERRUPT CODE					
40	COMMAND COUNT 0								0		NDT FUNCTION CODE 0					GO
42	COMMAND COUNT 1								0		NDT FUNCTION CODE 1					GO
44	COMMAND COUNT 2								0		NDT FUNCTION CODE 2					GO
46	COMMAND COUNT 3								0		NDT FUNCTION CODE 3					GO
50	INTERNAL ADDRESS															
52	TM RDY	TM CLR	MC PE		ILR	CPE	EV PAR	HLDA	HOLD		INTERNAL DATA					
	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

TYPE

1 1

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

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

RH CS2 REGISTER BITS

10	100000	DLT	DATA LATE	RH
10	40000	WCE	WRITE CHECK ERROR	RH
10	20000	UPE	UNIBUS PARITY ERROR	RH
10	10000	NED	NON EXISTENT DRIVE	RH
10	4000	NEM	NON EXISTENT MEMORY	RH
10	2000	PGE	PROGRAM ERROR	RH
10	1000	MXF	MISSED TRANSFER	RH

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	4C00	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	40	MAINT	MAINTENANCE MODE	CAS
20	20	DSE	SECURITY ERASE IN PROGRESS	CAS

TM78 HARDWARE CONTROL REGISTER BITS

52	100000	TM RDY	TM78 READY	TM78
52	40000	TM CLR	TM78 CLEAR BIT	TM78
52	2000	MCPE	TM78 ROM PARITY ERROR	TM78
52	1000	ILR	ILLEGAL REGISTER ACCESSED	TM78
52	4000	CPE	MASSBUS CBUS PAR ERROR	TM78
52	2000	EV PAR	EVEN PARITY	TM78
52	1000	HLDA	HOLD ACKNOWLEDGED	TM78

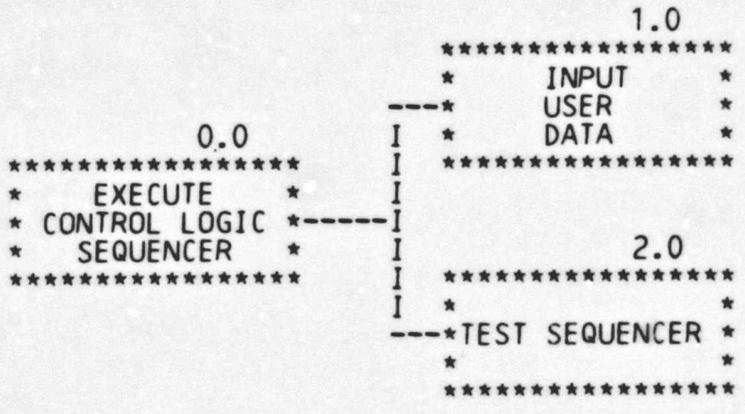
```
                        !  52   ! 400   ! HOLD  ! 8085 HOLD                          !        TM78    !
                        +-------+-------+-------+-------------------------------------+----------------+

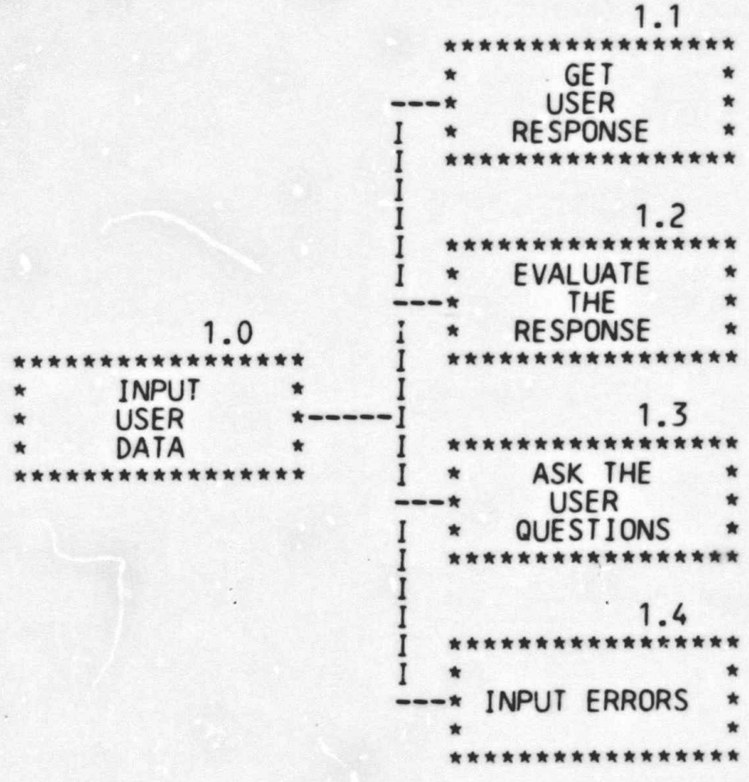
                        BASE DEFAULT ADDRESS = 172400
                        RH = RH11 OR RH70
                        CAS = COMMON ADDRESS SPACE
                        TM78 = BITS RESIDE WITHIN TM78
                        NOTE : SEE TM78 HARDWARE MANUAL FOR BIT DESCRIPTIONS

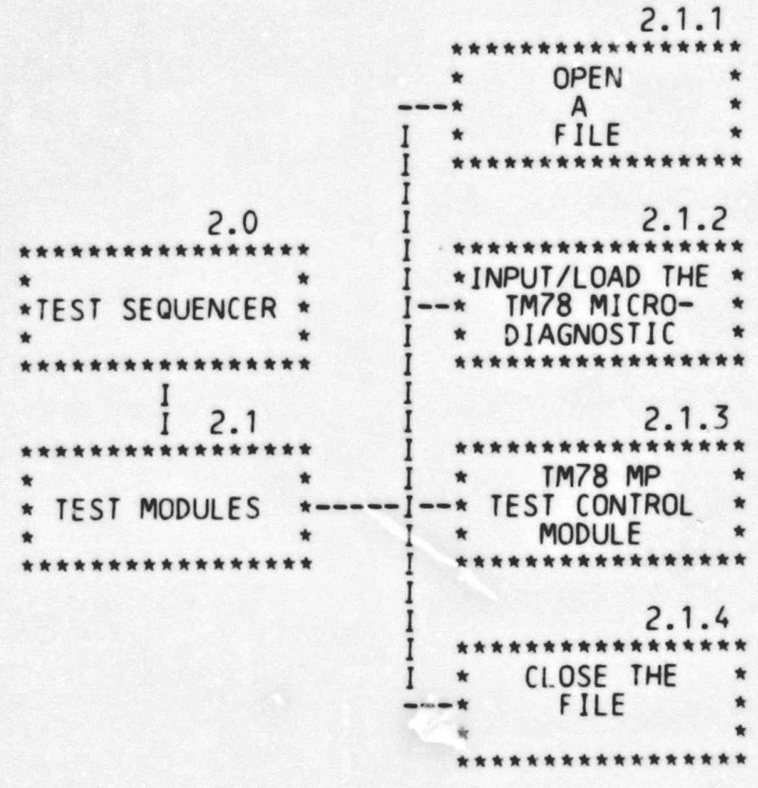

                        \
                        .NLIST  CND


                        .SBTTL  PROGRAM HEADER

                        ;++
                        ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
                        ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
                        ;--
```


1.0
INPUT
USER
DATA
0.0
EXECUTE
CONTROL LOGIC
SEQUENCER
2.0
TEST SEQUENCER


1.0
INPUT USER DATA
1.1
GET USER RESPONSE
1.2
EVALUATE THE RESPONSE
1.3
ASK THE USER QUESTIONS
1.4
INPUT ERRORS


2.0
TEST SEQUENCER
2.1
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2.1.1
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2.1.2
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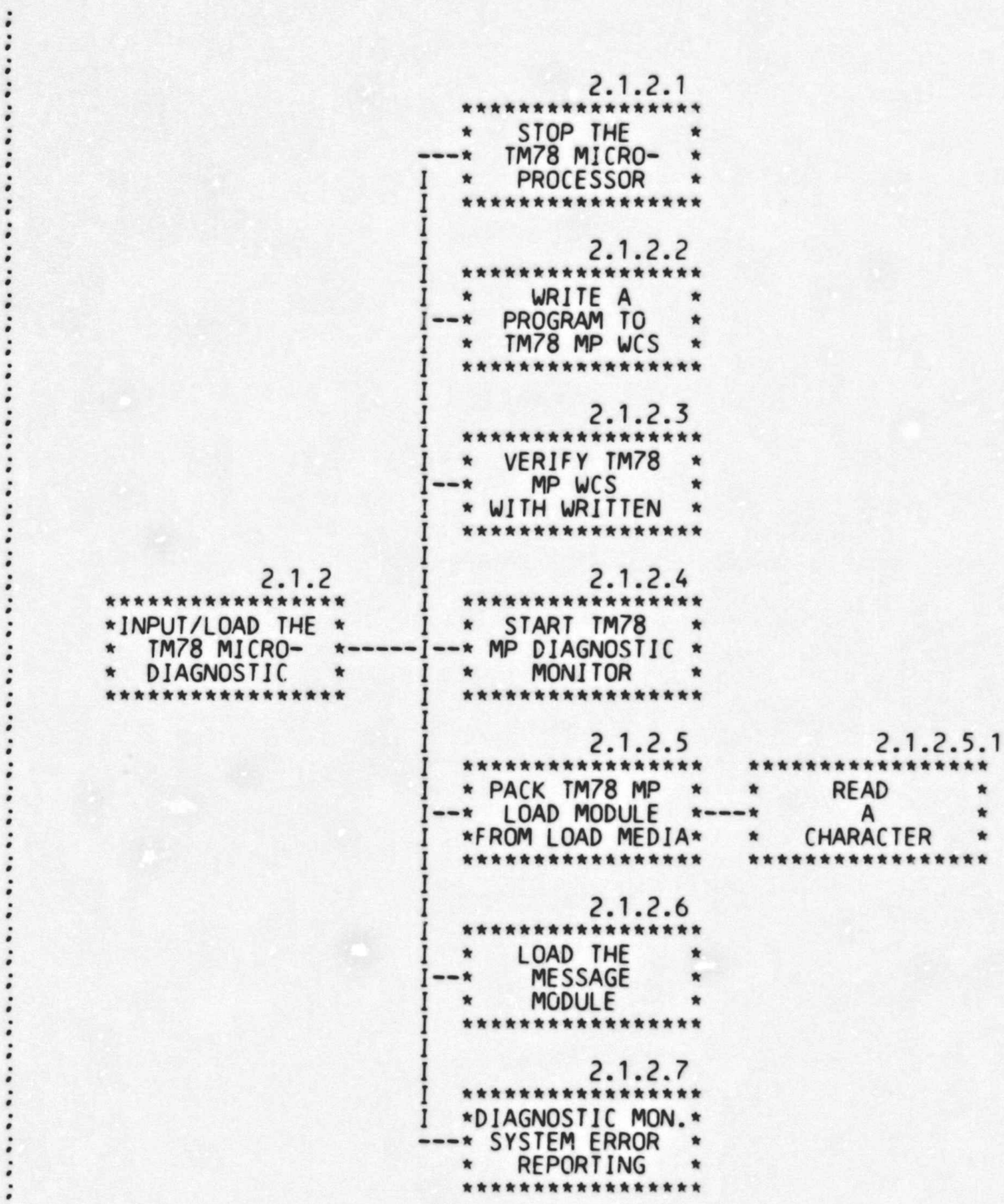
2.1.3
TM78 MP TEST CONTROL MODULE
2.1.4
CLOSE THE FILE


2.1.2
INPUT/LOAD THE TM78 MICRO- DIAGNOSTIC
2.1.2.1
STOP THE TM78 MICRO- PROCESSOR
2.1.2.2
WRITE A PROGRAM TO TM78 MP WCS
2.1.2.3
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2.1.2.4
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2.1.2.5
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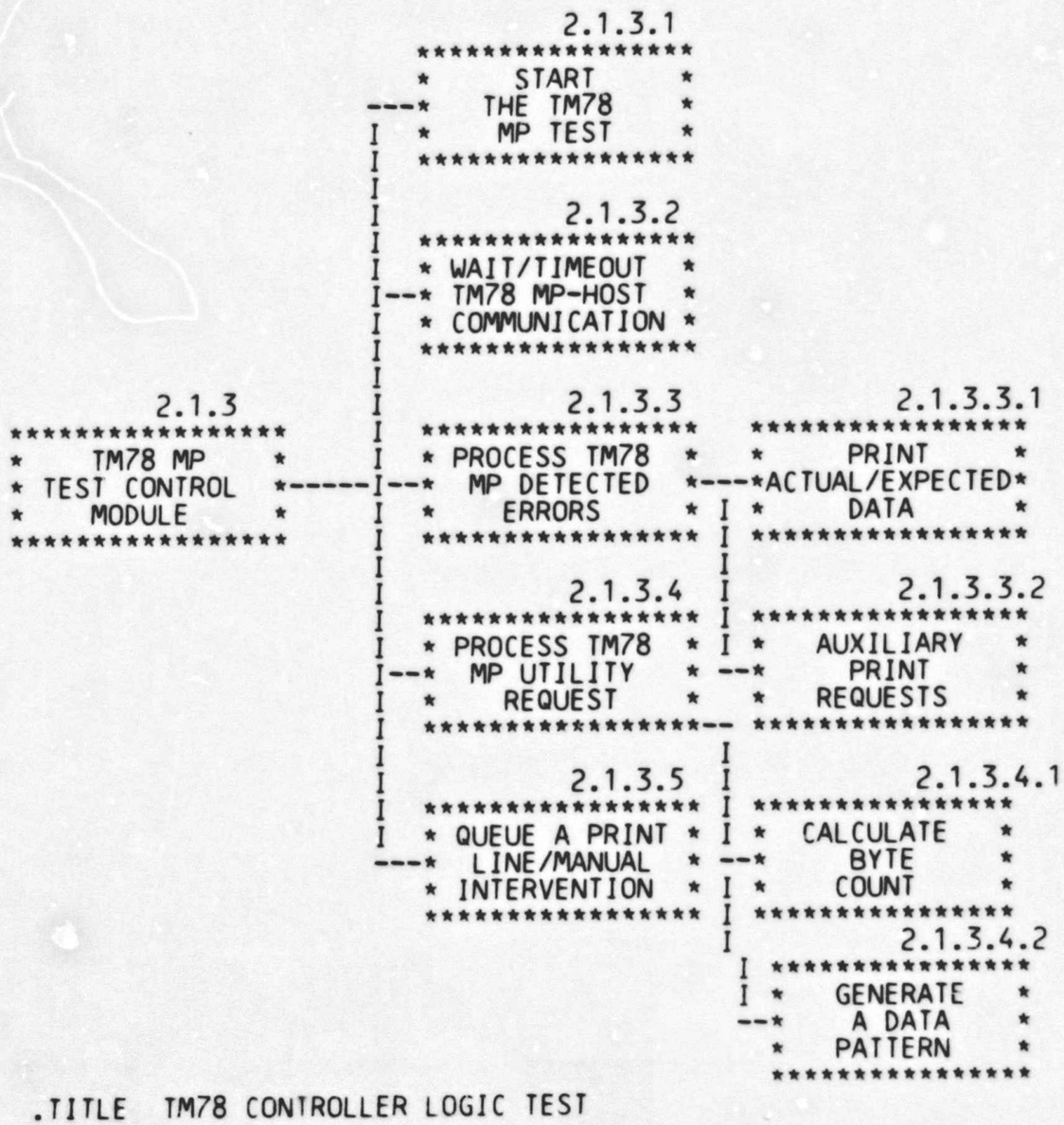
2.1.2.5.1
READ A CHARACTER
2.1.2.6
LOAD THE MESSAGE MODULE
2.1.2.7
DIAGNOSTIC MON. SYSTEM ERROR REPORTING




```
.TITLE  TM78 CONTROLLER LOGIC TEST
```

```
                                        POINTER BGNSW,BGNSFT,BGNAU,BGNDU


                                        .NLIST  BEX
002000                                  HEADER  CZTMIC,0,0,1800.,0
002122                                  DEVTYP  <TU78>
002130                                  DESCRIPT <TEST TM78 CONTROLLER LOGIC>

                                .SBTTL  DISPATCH TABLE

                                ;++
                                ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
                                ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
                                ;--

002164                                  DISPATCH        40

                                .SBTTL  DEFAULT HARDWARE P-TABLE
                                ;++
                                ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                                ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                                ; IS IDENTICAL TO THE STRUCTURE OF THE RUN-TIME P-TABLE.
                                ;--
002306                                  BGNHW   DFPTBL
002310  172400                          .WORD   172400          ;RH ADDRESS DEFAULT VALUE
002312  000000                          .WORD   0               ;TM78 NUMBER DEFAULT VAULE
002314  000000                          .WORD   0               ;TU78 NUMBER DEFAULT VALUE
002316  000000                          .WORD   0               ;TM78 PORT NUMBER
002320  000224                          .WORD   224             ;RH VECTOR ADDRESS DEFAULT VALUE
002322  000070                          .WORD   70              ;RH TYPE (RH70)
002324                                  ENDHW
                                .SBTTL  SOFTWARE P-TABLE
                                ;++
                                ; THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
                                ; PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
                                ;--
002324                                  BGNSW   SFPTBL
002326  000000                  MTATST: .WORD   0               ;SKIP MTA TESTING FLAG DEVAULT = NO
002330  000000                  RELI78: .WORD   0               ;TM78 RELIABILITY FLAG DEFAULT = NO
002332  000000                  MANTST: .WORD   0               ;MANUAL TEST SELECTION FLAG DEFAULT = NO
002334  000000                  RUNSKP: .WORD   0               ;INDIV. MICRO MODULE RUN/SKIP FLAG DEFAULT - NO
002336                                  ENDSW

                                ;++
                                ; THE REPORT CODING SECTION CONTAINS THE
                                ; ''PRINTS'' CALLS THAT GENERATE STATISTICAL REPORTS.
                                ;--

002336                                  BGNRPT


002336                                  EXIT    RPT


002342                                  ENDRPT
```

```
                        .SBTTL  INITIALIZE SECTION

                        ;++
                        ; THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
                        ; AT THE BEGINNING OF EACH PASS.
                        ;--

002344                          BGNINIT
002344                          SETPRI  #PRI07
002352                          READEF  #EF.CONT        ;IS THIS A CONTINUE?
002360                          BCOMPLETE 2$            ;NO-CHECK FOR NEW PASS
002362                          READEF  #EF.NEW
002370                          BCOMPLETE 1$
002372  005237  004326    3$:   INC     UNINUM          ;UPDATE UNIT UNDER TEST
002376  023737  004326  002012  CMP     UNINUM,L$UNIT   ;REACHED LIMIT?
002404  001002                  BNE     2$              ;NO-DO THIS UNIT

002406  005037  004326    1$:   CLR     UNINUM
002412                  2$:   GPHARD  UNINUM,HARDPT
002424                        BNCOMPLETE      3$
002426  013701  004324          MOV     HARDPT,R1       ;GET THE POINTER IN R1
002432  016102  000000          MOV     0(R1),R2        ;GET THE RH ADDRESS
002436  012703  004230          MOV     #XFRCMD,R3      ;GET THE START OF TABLE
                                                        ;STORE THE RH POINTER
002442  010223          INTO:   MOV     R2,(R3)+        ;INTO THE RH ADDRESS TABLE
002444  005202                  INC     R2
002446  005202                  INC     R2
002450  020327  004324          CMP     R3,#NON72+2     ;FINISHED?
002454  001372                  BNE     INTO            ;NO - CONTINUE
                                                        ;YES
002456  016137  000002  004352  MOV     2(R1),MBDRIV    ;GET THE TM78 NUMBER
002464  012703  000001          MOV     #1,R3           ;LOAD THE BINARY UNIT VALUE
002470  016102  000004          MOV     4(R1),R2        ;GET THE TU78 NUMBER
002474  010237  004356          MOV     R2,TMUNIT       ;SAVE THE TU78 NUMBER
002500  001403          1$:     BEQ     2$              ;IF USER ENTERED 0 THEN EXIT
002502  006303                  ASL     R3              ;SHIFT THE BINARY UNIT NUMBER
002504  005302                  DEC     R2              ;DECREMENT THE TU78 NUMBER
002506  001374                  BNE     1$              ;LOOP UNTIL 0
002510  010337  004354    2$:   MOV     R3,BINUNT       ;STORE THE BINARY UNIT NUMBER
002514  016137  000006  004360  MOV     6(R1),TMPORT    ;GET THE TM78 PORT NUMBER
002522  016137  000010  004362  MOV     10(R1),RHVEC    ;GET THE RH VECTOR ADDRESS
002530  016137  000012  004416  MOV     12(R1),RHTYP    ;GET THE RHTYPE
002536                          CLRVEC  RHVEC
002544  005037  004412          CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
002550                          BRESET                  ;ISSUE A BUS RESET
002552                          EXIT    INIT

002556                          ENDINIT

002560                          BGNPROT
002560  000000                  .WORD   0               ;CSR OFFSET
002562  000002                  .WORD   2               ;TM #
002564  000004                  .WORD   4               ;TU #
002566                          ENDPROT

                        ;               AUTO DROP CODE
```

```
                                ;  THIS CODE IS ENVOKED BY THE "/FLAG:ADR" COMMAND UNDER THE
                                ;  DRS.  CAUTION MUST BE TAKEN TO AVOID DROPPING A FAULTY UNIT
                                ;  OR ATTEMPTING TO TEST A NON EXISTENT DEVICE BECAUSE OF
                                ;  FAULTY HARDWARE.

                                ;  AUTO DROP LOCAL SYMBOLS

000004                          NXMLOC = 4                      ;NXM VECTOR LOCATION
000011                          SENSGO = 11                     ;NDT SENSE+GO COMMAND
000001                          SENSDN = 01                     ;DONE INTERUPT CODE
040000                          PRES = 40000                    ;TU78 PRESENT FLAG IN TUSTAT REGISTER

002566                                  BGNAUTO

002566  005037  003450                  CLR     NXMFLG                  ;CLEAR NXM TRAPPED FLAG
002572                                  SETVEC  #NXMLOC,#NXMTRP,#PRI07  ;SET UP NXM TRAP VECTOR
002620  013701  004230                  MOV     XFRCMD,R1               ;GET RH11/70 ADDRESS
002624  005711                          TST     (R1)                    ;ACCESS RH11/70 CS1 REGISTER
002626                                  CLRVEC  #NXMLOC                 ;RELEASE NXM VECTOR LOCATION
002634  005737  003450                  TST     NXMFLG                  ;DID WE TRAP ?
002640  001412                          BEQ     1$                      ;NO , CHECK TM78 #
002642                                  PRINTF  #AU.RH,R1               ;TELL OPERATOR RH TIME OUT
002664  000533                          BR      DROPIT                  ;DROP UNIT

                                ;       NOW CHECK THE TM78# FOR 'NED'

002666  013702  004240          1$:     MOV     CS2,R2                  ;GET CS2 ADDRESS
002672  013712  004352                  MOV     MBDRIV,(R2)             ;SET UNIT #
002676  052711  040000                  BIS     #TRE,(R1)               ;SET UNIT CLEAR
002702  005011                          CLR     (R1)                    ;CLEAR 'TRE' BIT
002704  032712  010000                  BIT     #NED,(R2)               ;NON EXISTENT DRIVE ?
002710  001413                          BEQ     2$                      ;NO , CHECK TU78
002712                                  PRINTF  #AU.TM,MBDRIV           ;TELL OPERATOR TM78 NED
002736  000506                          BR      DROPIT                  ;DROP UNIT

                                ;  NOW CHECK FOR TU78 AVAILABILITY BY ISSUING A SENSE COMMAND

002740  005077  001322          2$:     CLR     @MOINT                  ;CLEAR INTERUPT CODE
002744  013702  004356                  MOV     TMUNIT,R2               ;GET TU78 #
002750  006302                          ASL     R2                      ;MAKE OFFSET FOR COMMAND REG.
002752  012772  000011  004270          MOV     #SENSGO,@MOO(R2)        ;ISSUE SENSE COMMAND
002760  012704  000100                  MOV     #100,R4                 ;SET UP TIMOUT TIMER
002764  005777  001256          3$:     TST     @AS                     ;COMMAND DONE ?
002770  001030                          BNE     4$                      ;YES , PROCESS INT CODE
002772                                  DELAY   250                     ;DELAY FOR COMMAND TO FINISH
003022                                  BREAK                           ;CHECK FOR OPER PANIC "^C"
003024  005304                          DEC     R4                      ;DECREMENT TIMER
003026  001356                          BNE     3$                      ;LOOP UNTIL TIMER EXPIRES
003030                                  PRINTF  #AU.TO                  ;TELL OPERATOR ATTENTION TIME OUT
003050  000441                          BR      DROPIT                  ;TIME OUT DROP UNIT
003052  117703  001210          4$:     MOVB    @MOINT,R3               ;GET INTERUPT CODE
003056  122703  000001                  CMPB    #SENSDN,R3              ;SENSE DONE CODE ?
003062  001412                          BEQ     5$                      ;YES , CHECK FOR PRESENT
003064                                  PRINTF  #AU.TU,TMUNIT           ;TELL OPERATOR TU78 NOT AVAILABLE
003110  017703  001134          5$:     MOV     @TUSTAT,R3              ;GET STATUS OF TU78
```

```
                                        BIS     BINUNT,@AS              ;RELEASE ATTENTION
                                        BIT     #PRES,R3                ;DRIVE PRESENT ?
                                        BNE     EXAUTO                  ;YES , EXIT AUTODROP CODE
                                        PRINTF  #AU.TU,TMUNIT           ;WRONG TU78 #

                                DROPIT: DODU    UNINUM                  ;DROP UNIT UNINUM
                                        PRINTF  #AU.DRP,UNINUM          ;DROP UNIT MESSAGE
                                EXAUTO: ENDAUTO                         ;END OF AUTO DROP CODE

                                AU.TO:  .ASCIZ/%N%AATTENTION TIME OUT FOR TM78 # %02/
                                        .EVEN
                                AU.RH:  .ASCIZ/%N%ANON EXISTENT RH ADDRESS %06/
                                        .EVEN
                                AU.TM:  .ASCIZ/%N%ANON EXISTENT TM78 # %02/
                                        .EVEN
                                AU.TU:  .ASCIZ/%N%ANON EXISTENT TU78 # %02/
                                        .EVEN
                                AU.DRP: .ASCIZ/%N%ADROPPING LOGICAL UNIT # %02%N/
                                        .EVEN

                                ;  NXM FLAG FOR AUTO DROP CODE

                                NXMFLG: .WORD 0                         ;NXM FLAG

                                ;  NON EXISTENT DEVICE TRAP DURING AUTO DROP CODE

                                        BGNSRV  NXMTRP

                                        INC     NXMFLG

                                        ENDSRV


                                .SBTTL  CLEANUP CODING SECTION

                                ;++
                                ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
                                ; AT THE END OF EACH PASS.
                                ;--

                                        BGNCLN
                                        MOV     #MBINIT,@CS2    ;ISSUE A MASSBUS INIT.
                                        DELAY   100             ;WAIT FOR IT TO FINISH
                                        EXIT    CLN

                                        ENDCLN
                                ;++
                                ; THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
                                ; TO NO LONGER BE TESTED.
                                ;--
                                        BGNDU
                                        EXIT    DU
                                        ENDDU
```

```
                                        ;++
                                        ; THE ADD-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
                                        ;  TO BE (A) TESTED FOR THE FIRST TIME, OR (B) RESUMED IN TESTING.  IF
                                        ;  'EF.AUNIT'' IS SET, THE UNIT WILL BE TESTED AS A NEW UNIT.
                                        ;--
003532                                          BGNAU
003532                                          EXIT    AU
003536                                          ENDAU
                                        ;++
                                        ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
                                        ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                        ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                        ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                        ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                        ; WITH THE OPERATOR.
                                        ;--
003540                                          BGNHRD
003542                                          GPRMA   MSG1,0,0,0,177777,YES
003552                                          GPRML   MSG10,12,100000,YES
003560                                          GPRMD   MSG7,10,0,777,0,777,YES
003572                                          GPRMD   MSG2,2,0,7,0,7,YES
003604                                          GPRMD   MSG3,4,0,3,0,3,YES
003616                                          GPRMD   MSG4,6,0,1,0,1,YES
003630                                          ENDHRD
003630  044122  040440  042104  MSG1:   .ASCIZ  /RH ADDRESS/
003643     124  033515  020070  MSG2:   .ASCIZ  /TM78 #/
003652  052524  034067  021440  MSG3:   .ASCIZ  /TU78 #/
003661     124  033515  020070  MSG4:   .ASCIZ  /TM78 PORT #/
003675     123  044513  020120  MSG5:   .ASCIZ  /SKIP MTA MICRODIAGNOSTICS (NO TU ATTACHED)/
003750  044515  051103  026517  MSG6:   .ASCIZ  /MICRO-DIAGNOSTIC RELIABILITY MODE/
004012  044122  053040  041505  MSG7:   .ASCIZ  /RH VECTOR ADDRESS/
004034  040515  052516  046101  MSG8:   .ASCIZ  /MANUAL MICRO-DIAGNOSTIC SELECTION/
004076  047111  044504  044526  MSG9:   .ASCII  /INDIVIDUAL MICRO-DIAGNOSTIC RUN/
004135     057                          .BYTE   57
004136  045523  050111     000          .ASCIZ  /SKIP/
004143     122  033510  037460  MSG10:  .ASCIZ  /RH70? (NO=RH11)/
        004164                          .EVEN

                                .SBTTL  SOFTWARE PARAMETER CODING SECTION

                                ;++
                                ; THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
                                ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                ; WITH THE OPERATOR.
                                ;--
004164                                  BGNSFT
004166                                  GPRML   MSG5,0,1,YES
004174                                  GPRML   MSG6,2,1,YES
004202                                  GPRML   MSG8,4,1,YES
004210                                  GPRML   MSG9,6,1,YES
004216                                  ENDSFT
```

```
                        ;++
                        ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
                        ; ARE USED IN MORE THAN ONE TEST.
                        ;--

                                EQUALS
                        ;
                        ; BIT DIFINITIONS
                        ;
            100000      BIT15== 100000
            040000      BIT14== 40000
            020000      BIT13== 20000
            010000      BIT12== 10000
            004000      BIT11== 4000
            002000      BIT10== 2000
            001000      BIT09== 1000
            000400      BIT08== 400
            000200      BIT07== 200
            000100      BIT06== 100
            000040      BIT05== 40
            000020      BIT04== 20
            000010      BIT03== 10
            000004      BIT02== 4
            000002      BIT01== 2
            000001      BIT00== 1
                        ;
            001000      BIT9==  BIT09
            000400      BIT8==  BIT08
            000200      BIT7==  BIT07
            000100      BIT6==  BIT06
            000040      BIT5==  BIT05
            000020      BIT4==  BIT04
            000010      BIT3==  BIT03
            000004      BIT2==  BIT02
            000002      BIT1==  BIT01
            000001      BIT0==  BIT00
                        ;
                        ; EVENT FLAG DEFINITIONS
                        ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                        ;
            000040      EF.START==      32.     ; START COMMAND WAS ISSUED
            000037      EF.RESTART==    31.     ; RESTART COMMAND WAS ISSUED
            000036      EF.CONTINUE==   30.     ; CONTINUE COMMAND WAS ISSUED
            000035      EF.NEW==        29.     ; A NEW PASS HAS BEEN STARTED
            000034      EF.PWR==        28.     ; A POWER-FAIL/POWER-UP OCCURRED
                        ;
                        ;
                        ; PRIORITY LEVEL DEFINITIONS
                        ;
            000340      PRI07== 340
            000300      PRI06== 300
            000240      PRI05== 240
            000200      PRI04== 200
            000140      PRI03== 140
            000100      PRI02== 100
            000040      PRI01== 40
```

```
(1)  000000                    PRI00== 0
(1)                            ;
(1)                            ;OPERATOR FLAG BITS
(1)                            ;
(1)  000004                    EVL==       4
(1)  000010                    LOT==      10
(1)  000020                    ADR==      20
(1)  000040                    IDU==      40
(1)  000100                    ISR==     100
(1)  000200                    UAM==     200
(1)  000400                    BOE==     400
(1)  001000                    PNT==    1000
(1)  002000                    PRI==    2000
(1)  004000                    IXE==    4000
(1)  010000                    IBE==   10000
(1)  020000                    IER==   20000
(1)  040000                    LOE==   40000
(1)  100000                    HOE==  100000
1231
1232                                   .DSABL  REG
1233                           ;
1234                           ;REGISTER DEFINITIONS
1235  000000                   R0=%0                    ;REGISTER 0 DEFINITION
1236  000001                   R1=%1                    ;REGISTER 1 DEFINITION
1237  000002                   R2=%2                    ;REGISTER 2 DEFINITION
1238  000003                   R3=%3                    ;REGISTER 3 DEFINITION
1239  000004                   R4=%4                    ;REGISTER 4 DEFINITION
1240  000005                   R5=%5                    ;REGISTER 5 DEFINITION
1241  000005                   ERRCOD=%5                ;ERROR CODE
1242  000006                   SP=%6                    ;STACK POINTER
1243  000007                   PC=%7                    ;PROGRAM COUNTER
1244
1245  004216  000000           ROMIDT: .WORD   0        ;ROM IDENTIFICATION INFORMATION STORAGE
1246  004220  000000                   .WORD   0
1247  004222  000000                   .WORD   0
1248  004224  000000                   .WORD   0
1249
1250  004226  000000           ERRLP:  .WORD   0        ;ROM ERROR LOOP FLAG
1251
1252                           ;MASS BUS COMMAND BYTES
1253  000037                   DIGMON=000037            ;BEGIN DIAGNOSTIC MONITOR
1254  000035                   TSTART=000035            ;BEGIN TM78 MP TEST
1255  000031                   CONERR=000031            ;CONTINUE ON ERROR
1256  000033                   LOPERR=000033            ;LOOP ON ERROR
1257
1258                           ;TM78 REGISTER 21 COMMAND/STATUS BITS
1259  010000                   NED=010000               ;NON EXISTENT DRIVE
1260  004000                   CPE=004000               ;CONTROL BUS PARITY ERROR
1261  002000                   EVPAR=002000             ;FORCE PARITY ERROR FROM TM78
1262  010000                   ILR=010000               ;ILLEGAL REGISTER STATUS BIT
1263  020000                   MCPE=020000              ;CONTROL BUS PARITY ERROR
1264  000400                   HOLD=000400              ;HOLD COMMAND BIT
1265  001000                   HLDA=001000              ;HOLD STATUS BIT
1266  040000                   TMCLR=040000             ;TM CLEAR COMMAND BIT
1267  100000                   TMRDY=100000             ;TM READY STATUS BIT
1268
```

```
1269                            ;TM78 STATUS MASKS
1270            035400          CLRSTA=035400           ;STATUS ERROR ON CLEAR COMMAND
1271            034000          HLDSTA=034000           ;STATUS ERROR ON HOLD COMMAND
1272
1273                            ;MASS BUS COMMAND/STATUS BITS
1274            000020          PAT=000020              ;RH PARITY TEST BIT
1275            000040          MBINIT=000040           ;MASS BUS INITIALIZE
1276            040000          TRE=040000              ;TRANSFER ERROR
1277
1278                            ;TM78 INTERNAL ADDRESSES
1279            100340          MBSEL=100340            ;TM78 PORT SELECT ADDRESS
1280            100240          TMRDST=100240           ;ADDRESS OF TM READY CONTROL WORD
1281
1282                            ;TM78 INTERNAL COMMAND BITS
1283            000100          STMRDY=000100           ;SET TM READY
1284
1285                            ;CAS.A78 MEMORY ADDRESS EQUATES
1286            041420          CASCMD=041420           ;CAS READ/WRITE COMMAND ADDRESS X'4300'
1287            042000          CASBUF=042000           ;CAS READ BUFFER ADDRESS X'4210'
1288            042040          CASDAL=042040           ;CAS WRITE DATA BYTE LOW X'4320'
1289            042041          CASDAH=042041           ;CAS WRITE DATA BYTE HIGH X'4321'
1290
1291            000015          CR=000015               ;CARRIAGE RETURN
1292            000012          LF=000012               ;LINE FEED
1293            000011          TAB=000011              ;TAB CHARACTER
1294            000040          SPACE=000040            ;SPACE CHARACTER
1302                            .SBTTL  GLOBAL DATA SECTION
1303
1304                            ;++
1305                            ; THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
1306                            ; IN MORE THAN ONE TEST.
1307                            ;--
1308
1309                            ;
1310    004230  000000          XFRCMD: 0               ;MASS BUS/TM78 DATA TRANSFER WORD
1311    004232  000000          WC:     0               ;MASS BUS WORD COUNT
1312    004234  000000          BA:     0               ;TRANSFER MEMORY ADDRESS
1313    004236  000000          FC:     0               ;FRAME COUNT
1314    004240  000000          CS2:    0               ;MASS BUS CONTROL/STATUS WORD
1315    004242  000000          XFRINT: 0               ;DATA TRANSFER INTERRUPT CODE
1316    004244  000000          TC:     0               ;TAPE CONTROL
1317    004246  000000          AS:     0               ;ATTENTION SUMMARY
1318    004250  000000          TUSTAT: 0               ;TAPE STATUS
1319    004252  000000          DB:     0               ;DATA BUFFER
1320    004254  000000          DI1:    0               ;DIAGNOSTIC REGISTER 1
1321    004256  000000          DT:     0               ;DRIVE TYPE
1322    004260  000000          SN:     0               ;SERIAL NUMBER
1323    004262  000000          DI2:    0               ;DIAGNOSTIC REGISTER 2
1324    004264  000000          DI3:    0               ;DIAGNOSTIC REGISTER 3
1325    004266  000000          MOINT:  0               ;MOTION INTERRUPT CODE
1326    004270  000000          MO0:    0               ;MOTION COMMAND FOR TU0
1327    004272  000000          MO1:    0               ;MOTION COMMAND FOR TU1
1328    004274  000000          MO2:    0               ;MOTION COMMAND FOR TU2
1329    004276  000000          MO3:    0               ;MOTION COMMAND FOR TU3
1330    004300  000000          AD80:   0               ;TM78 MP ADDRESS WORD
1331    004302  000000          DS80:   0               ;TM78 MP DATA/STATUS
```

```
1332  004304  000000          NON54:  0                       ;NON EXISTENT REG. 1
1333  004306  000000          NON56:  0                       ;NON EXISTENT REG. 2
1334  004310  000000          NON60:  0                       ;NON EXISTENT REG. 3
1335  004312  000000          NON62:  0                       ;NON EXISTENT REG. 4
1336  004314  000000          NON64:  0                       ;NON EXISTENT REG. 5
1337  004316  000000          NON66:  0                       ;NON EXISTENT REG. 6
1338  004320  000000          NON70:  0                       ;NON EXISTENT REG. 7
1339  004322  000000          NON72:  0                       ;NON EXISTENT REG. 10
1340                                  ;
1341  004324  000000          HARDPT: .WORD   0               ;RUN TIME P TABLE POINTER
1342  004326  000000          UNINUM: .WORD   0               ;UNIT UNDER TEST-CURRENTLY
1343  004330  000000          CASDTA: .WORD   0               ;DIAGNOSTIC TEST NUMBER
1344  004332  000000          DIAGTS: .WORD   0               ;DIAGNOSTIC TEST NUMBER
1345  004334  000000          DIAGER: .WORD   0               ;DIAGNOSTIC ERROR NUMBER
1346  004336  000000          BYTCNT: .WORD   0               ;BYTE COUNT
1347  004340  000000          CKSUM:  .WORD   0               ;FILE SERVICES CHECKSUM LOCATION
1348  004342  000000          FILERR: .WORD   0               ;FILE HANDLING ERROR
1349  004344  000000          CHAR:   .WORD   0               ;DATA CHARACTER FROM DISK
1350  004346  000000          COUNT:  .WORD   0               ;ITERATION COUNTER
1351  004350  000000          CHKSUM: .WORD   0               ;CHECK SUM WORK REGISTER
1352  004352  000000          MBDRIV: .WORD   0               ;MASS BUS DRIVE NUMBER
1353  004354  000000          BINUNT: .WORD   0               ;TM78 BINARY UNIT NUMBER
1354  004356  000000          TMUNIT: .WORD   0               ;TM78 UNIT UNDER TEST
1355  004360  000000          TMPORT: .WORD   0               ;TM78 PORT NUMBER
1356  004362  000000          RHVEC:  .WORD   0               ;RH VECTOR ADDRESS
1357  004364  000000          DINTCD: .WORD   0               ;TM78 MP DIAGNOSTIC MONITOR INTERRUPT CODE
1358  004366  000000          STAT80: .WORD   0               ;TM78 MP STATUS WORD (MASS BUS REG. 52)
1359  004370  000000          ADATA:  .WORD   0               ;ACTUAL DATA
1360  004372  000000          EDATA:  .WORD   0               ;EXPECTED DATA
1361  004374  000000          PC80:   .WORD   0               ;TM78 MP PROGRAM COUNTER
1362  004376     000          LOAD80: .BYTE   0               ;LOW ORDER WCS ADDRESS
1363  004377     000          HIAD80: .BYTE   0               ;HIGH ORDER WCS ADDRESS
1364  004400  000000          FILNAM: .WORD   0               ;FILE NAME TO BE LOADED
1365  004402  000000          EOF:    .WORD   0               ;END OF FILE FLAG
1366  004404  000000          BYPFLG: .WORD   0               ;BYPASS MICRO MODULE FLAG
1367  004406  000000          SEQNUM: .WORD   0               ;SEQUENCE NUMBER MANUAL MICRO MODULE SELECTION
1368  004410  000000          INTFLG: .WORD   0               ;INTERRUPT FLAG
1369  004412  000000          CASLD:  .WORD   0               ;CAS PROGRAM LOADED FLAG
1370  004414  000000          SAVE:   .WORD   0               ;LINE TERMINATOR BUFFER WORD
1371  004416  000000          RHTYP:  .WORD   0               ;RH TYPE (RH70=1, RH11=0)
1372  004420  000000          DUMFLG: .WORD   0               ;DUMMY FLAG FOR SUPERVISOR COMPATABILITY
1373                                  .EVEN
```

```
                        .SBTTL  TEST 01 - MASS BUS READY TEST
004422                  ST
                        ; ************************************************************************
                        ;*TEST TITLE
                        ;*---- -----
                        ;*TEST 1                 MASS BUS READY TEST
004422                  SD
                        ; ************************************************************************
                        ;*DESCRIPTION
                        ;*-----------
                        ;*THIS TEST CONSISTS OF 2 SUBTESTS.  THE FIRST SUBTEST IS A TEST OF THE
                        ;*RH11 SILO, IT IS PERFORMED ONLY IF THE TU/TM 78 IS INTERFACED WITH AN
                        ;*RH11 AND SKIPPED IF THE SYSTEM IS INTERFACED WITH AN RH70.  THE RH11
                        ;*SUBTEST CONSISTS OF 5 SEGMENTS WHICH TEST THR RH11 SILO FOR:  READ
                        ;*FROM EMPTY SILO, IR/OR, SILO DATA, SILO OVERFLOW, AND SILO RESET RES-
                        ;*PECTIVELY.  THE SECOND SUBTEST IS PERFORMED REGARDLESSOF RH TYPE AND
                        ;*TESTS CS2 BY LOADING -1 TO MASS BUS REGISTER 10 (CS2) WHICH SHOULD
                        ;*CAUSE A MASS BUS INIT TO TAKE PLACE.  A 100 MICROSECOND TIMEOUT
                        ;*IS PERFORMED, AND THE CS1 REGISTER IS THEN TESTED TO VERIFY
                        ;*THAT ALL BITS ARE RESET EXCEPT BIT #6 WHICH IS NOT TESTED.
004422                  SP
                        ; ************************************************************************
                        ;*PROCEDURE
                        ;*---------
                        ;*BGNTST
                        ;*   CLEAR CAS PROGRAM LOADED FLAG
                        ;*   TEST RHTYP
                        ;*   IF RH70
                        ;*   :  THEN-BRANCH MASS BUS READY
                        ;*   :  ELSE-CONTINUE
                        ;*   ENDIF
                        ;*   BGNSUB-RH11 TESTS
                        ;*   :  BGNSEG-CS1 BITS
                        ;*   :  :  INIT THE RH
                        ;*   :  :  CONNECT TO TM UNDER TEST
                        ;*   :  :  WAIT FOR TM TO INITIALIZE
                        ;*   :  :  CLEAR CS1
                        ;*   :  :  TEST ALL BUT 'RDY' CLEARED
                        ;*   :  :  IF CLEAR
                        ;*   :  :  :  THEN-CONTINUE
                        ;*   :  :  :  ELSE-ERROR
                        ;*   :  :  ENDIF
                        ;*   :  ENDSEG-CS1 BITS
                        ;*   :  BGNSEG-EMPTY SILO READ
                        ;*   :  :  INIT RH
                        ;*   :  :  READ DATA BUFFER
                        ;*   :  :  IF 'DLT' SET
                        ;*   :  :  :  THEN-CONTINUE
                        ;*   :  :  :  ELSE-ERROR
                        ;*   :  :  ENDIF
                        ;*   :  :  IF 'SC' SET
                        ;*   :  :  :  THEN-CONTINUE
                        ;*   :  :  :  ELSE-ERROR
                        ;*   :  :  ENDIF
                        ;*   :  :  IF 'TRE' SET
                        ;*   :  :  :  THEN-CONTINUE
```

```
1427                    ;*  :  :  :  ELSE-ERROR
1428                    ;*  :  :  ENDIF
1429                    ;*  :  ENDSEG EMPTY SILO READ
1430                    ;*  :  BGNSEG IR/OR CHECK
1431                    ;*  :  :  INIT RH
1432                    ;*  :  :  IF 'IR' SET
1433                    ;*  :  :  :  THEN-CONTINUE
1434                    ;*  :  :  :  ELSE-ERROR
1435                    ;*  :  :  ENDIF
1436                    ;*  :  :  IF 'OR' CLEAR
1437                    ;*  :  :  :  THEN-CONTINUE
1438                    ;*  :  :  :  ELSE-ERROR
1439                    ;*  :  :  ENDIF
1440                    ;*  :  :  LOAD SILO WITH 0
1441                    ;*  :  :  IF 'OR' CLEAR
1442                    ;*  :  :  :  THEN-CONTINUE
1443                    ;*  :  :  :  ELSE-ERROR
1444                    ;*  :  :  ENDIF
1445                    ;*  :  :  LOAD SILO WITH -1
1446                    ;*  :  :  IF 'OR' SET
1447                    ;*  :  :  :  THEN-CONTINUE
1448                    ;*  :  :  :  ELSE-ERROR
1449                    ;*  :  :  ENDIF
1450                    ;*  :  ENDSEG IR/OR CHECK
1451                    ;*  :  BGNSEG-SILO DATA TEST
1452                    ;*  :  :  INIT RH
1453                    ;*  :  :  LOAD SILO WITH DATA
1454                    ;*  :  :  DO FOR DATA=0 TO DATA=102
1455                    ;*  :  :  :  LOAD DATA INTO SILO
1456                    ;*  :  :  :  INCREMENT DATA
1457                    ;*  :  :  ENDDO FOR
1458                    ;*  :  :  IF 'IR' RESET
1459                    ;*  :  :  :  THEN-CONTINUE
1460                    ;*  :  :  :  ELSE-ERROR
1461                    ;*  :  :  ENDIF
1462                    ;*  :  :  READ DATA FROM SILO
1463                    ;*  :  :  DO FOR DATA=0 TO DATA=102
1464                    ;*  :  :  :  READ DATA
1465                    ;*  :  :  :  COMPARE TO EXPECTED
1466                    ;*  :  :  :  IF MISCOMPARE
1467                    ;*  :  :  :  :  THEN-ERROR
1468                    ;*  :  :  :  ENDIF
1469                    ;*  :  :  ENDDO FOR
1470                    ;*  :  ENDSEG-SILO DATA TEST
1471                    ;*  :  BGNSEG-SILO OVERFLOW
1472                    ;*  :  :  INIT RH
1473                    ;*  :  :  LOAD SILO FULL PLUS 1 WORD
1474                    ;*  :  :  DO FOR DATA=0 TO DATA=103
1475                    ;*  :  :  :  LOAD DATA INTO SILO
1476                    ;*  :  :  ENDDO FOR
1477                    ;*  :  :  IF 'DLT' SET
1478                    ;*  :  :  :  THEN-CONTINUE
1479                    ;*  :  :  :  ELSE-ERROR
1480                    ;*  :  :  ENDIF
1481                    ;*  :  ENDSEG-SILO OVERFLOW
1482                    ;*  :  BGNSEG-SILO RESET
```

```
                                ;*  :  :  INIT RH
                                ;*  :  :  LOAD SILO WITH 4 WORDS
                                ;*  :  :  DO FOR DATA=0 TO DATA=4
                                ;*  :  :  :  LOAD SILO
                                ;*  :  :  ENDDO FOR
                                ;*  :  :  LOAD 1 WORD INTO SILO
                                ;*  :  :  READ 2 WORDS FROM SILO
                                ;*  :  :  DO FOR DATA=0 TO DATA=1
                                ;*  :  :  :  READ SILO
                                ;*  :  :  ENDDO FOR
                                ;*  :  :  IF 'DLT' SET
                                ;*  :  :  :  THEN-CONTINUE
                                ;*  :  :  :  ELSE-ERROR
                                ;*  :  :  ENDIF
                                ;*  :  ENDSEG-SILO RESET
                                ;*  ENDSUB-RH TESTS
                                ;*  BGNSUB-CAS MASSBUS READY
                                ;*  :  SELECT THE TM78 UNDER TEST
                                ;*  :  CLEAR MASSBUS REGISTER 0 (CS1)
                                ;*  :  STORE 177770(8) IN MASSBUS REGISTER 10(8) (CS2)
                                ;*  :  DELAY
                                ;*  :  AND MASSBUS REGISTER 10(8) (CS2) WITH 177670(8)
                                ;*  :  IF RESULT OF THE AND=0
                                ;*  :  :  THEN-CONTINUE
                                ;*  :  :  ELSE-ERROR 1
                                ;*  :  ENDIF
                                ;*  :  SELECT THE TM78 UNDER TEST
                                ;*  :  AND MASSBUS REGISTER 0 (CS1) WITH 177577(8)
                                ;*  :  IF RESULT OF THE AND=0
                                ;*  :  :  THEN-CONTINUE
                                ;*  :  :  ELSE-ERROR 1
                                ;*  :  ENDIF
                                ;*  ENDSUB-CAS MASSBUS READY
                                ;*ENDTST
004422                          SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000001 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM:X  TU:X  PORT:X
                                ;*MB REG. 000000=XXXXXX AFTER MB CLEAR
                                ;*
                                ;*CZTMIA DVC FTL ERR 000040 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*RH11 FAILURE
                                ;*NO 'DLT' AFTER READ FROM EMPTY SILO
                                ;*
                                ;*CZTMIA DVC FTL ERR 000041 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*RH11 FAILURE
                                ;*NO 'SC' AFTER READ FROM EMPTY SILO
                                ;*
                                ;*CZTMIA DVC FTL ERR 000042 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*RH11 FAILURE
                                ;*NO 'TRE' AFTER READ FROM EMPTY SILO
                                ;*
                                ;*CZTMIA DVC FTL ERR 000043 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
```

```
                                        ;*RH11 FAILURE
                                        ;*'IR' NOT SET AFTER RH CLEAR
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000044 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*RH11 FAILURE
                                        ;*'OR' SET AFTER RH CLEAR
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000045 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*RH11 FAILURE
                                        ;*'OR' SET AFTER 1 SILO LOAD
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000046 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*RH11 FAILURE
                                        ;*'OR' RESET AFTER SECOND SILO LOAD
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000047 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*RH11 FAILURE
                                        ;*'IR' NOT RESET BY SILO FULL
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000048 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*RH11 FAILURE
                                        ;*'OR' NOT SET AFTER SILO FULL
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000049 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*RH11 FAILURE
                                        ;*BAD SILO READ
                                        ;*ACT=000000
                                        ;*EXP=000000
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000050 ON  UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*RH11 FAILURE
                                        ;*'DLT' NOT SET BY FILO OVERFLOW
004422                                  S
 (1)                                    ; ************************************************************************
                                            BGNTST
004422
004422  005037  004412                    CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
004426  005737  004416                    TST     RHTYP           ;RH11 OR RH70?
004432  001402                            BEQ     1$              ;BR IF RH11
004434  000137  005262                    JMP     RDYTST          ;JUMP IF RH70

004440                                  1$: BGNSUB                  ;RH11 TESTS
004442                                      BGNSEG                  ;CS1 BITS
004444  052777  000040  177566            BIS     #40,@CS2        ;INIT
004452  013777  004352  177560            MOV     MBDRIV,@CS2     ;SELECT THE TM78 NUMBER
004460  005001                            CLR     R1              ;LOAD MASS BUS REGISTER NUMBER
004462                                      DELAY   2.              ;WAIT .2 MS.
004512  012777  040000  177510            MOV     #40000,@XFRCMD  ;CLR TRE
004520  005077  177504                    CLR     @XFRCMD         ;CLR CS1
004524  032777  177577  177476            BIT     #177577,@XFRCMD ;CS1 STILL CLEAR EXCEPT 'RDY'?
004532  001404                            BEQ     2$              ;IF OK CONTINUE
004534                                      ERRDF   1,RHCAS,ERM001  ;YES-PRINT MASS BUS ERROR
004544                                  2$: CKLOOP
004546                                      ENDSEG                  ;CS1 BITS
004550                                      BGNSEG                  ;EMPTY SILO READ
1590
```

```
1591  004552  012777  000040  177460          MOV     #40,@CS2          ;INIT RH11
1592  004560  013777  004352  177452          MOV     MBDRIV,@CS2       ;SELECT THE TM78 NUMBER
1593  004566                                  DELAY   2.                ;WAIT .2 MS.
1594  004616  012777  040000  177404          MOV     #40000,@XFRCMD    ;CLEAR TRE
1595  004624  005077  177400                  CLR     @XFRCMD           ;CLEAR CS1
1596  004630  017701  177416                  MOV     @DB,R1            ;READ DATA BUFFER
1597  004634  005777  177400                  TST     @CS2              ;SEE IF 'DLT' SET
1598  004640  100404                          BMI     3$                ;IF SO BR
1599  004642                                  ERRDF   40.,RH11,ERM040   ;NO 'DLT' ON READ FROM EMPTY SILO
1600  004652                          3$:     CKLOOP
1601  004654  005777  177350                  TST     @XFRCMD           ;SEE IF 'SC' IS SET
1602  004660  100404                          BMI     4$                ;IF SO BR
1603  004662                                  ERRDF   41.,RH11,ERM041   ;NO 'SC' ON READ FROM EMPTY SILO
1604  004672                          4$:     CKLOOP
1605  004674  032777  040000  177326          BIT     #40000,@XFRCMD    ;SEE IF 'TRE' IS SET
1606  004702  001004                          BNE     5$                ;IF SO BR
1607  004704                                  ERRDF   42.,RH11,ERM042   ;NO 'TRE' ON READ FROM EMPTY SILO
1608  004714                          5$:     CKLOOP
1609  004716                                  ENDSEG                    ;EMPTY SILO READ
1610
1611  004720                                  BGNSEG                    ;IR/OR CHECK
1612
1613  004722  012777  000040  177310          MOV     #40,@CS2          ;INIT THE RH11
1614  004730  032777  000100  177302          BIT     #100,@CS2         ;SEE IF 'IR' IS SET
1615  004736  001004                          BNE     6$                ;IF SO BR
1616  004740                                  ERRDF   43.,RH11,ERM043   ;NO 'IR' AFTER INIT
1617  004750                          6$:     CKLOOP
1618  004752  032777  000200  177260          BIT     #200,@CS2         ;SEE IF 'OR' IS RESET
1619  004760  001404                          BEQ     7$                ;IF SO BR
1620  004762                                  ERRDF   44.,RH11,ERM044   ;'OR' SET AFTER INIT
1621  004772                          7$:     CKLOOP
1622  004774  012777  000000  177250          MOV     #0,@DB            ;LOAD 0 INTO SILO
1623  005002  032777  000200  177230          BIT     #200,@CS2         ;SEE THAT 'OR' RESET
1624  005010  001404                          BEQ     8$                ;IF IT DOES BR
1625  005012                                  ERRDF   45.,RH11,ERM045   ;'OR' SET AFTER 1 SILO LOAD
1626  005022                          8$:     CKLOOP
1627  005024  012777  177777  177220          MOV     #-1,@DB           ;LOAD SILO WITH -1
1628  005032  032777  000200  177200          BIT     #200,@CS2         ;SEE IF 'OR' IS SET
1629  005040  001004                          BNE     9$                ;IF SO BR
1630  005042                                  ERRDF   46.,RH11,ERM046   ;'OR' RESET AFTER 2 SILO LOADS
1631
1632  005052                          9$:     CKLOOP
1633  005054                                  ENDSEG
1634
1635  005056                                  BGNSEG                    ;SILO DATA TEST
1636
1637  005060  012777  000040  177152          MOV     #40,@CS2          ;INIT THE RH11
1638  005066  005001                          CLR     R1                ;PRESET DATA
1639  005070  010177  177156          10$:    MOV     R1,@DB            ;LOAD SILO
1640  005074  005201                          INC     R1                ;BUMP DATA
1641  005076  022701  000102                  CMP     #102,R1           ;SEE IF DONE
1642  005102  001372                          BNE     10$               ;IF NOT BR
1643  005104  032777  000100  177126          BIT     #100,@CS2         ;SEE IF 'IR' IS RESET
1644  005112  001404                          BEQ     11$               ;IF SO BR
1645  005114                                  ERRDF   47.,RH11,ERM047   ;'IR' NOT RESET BY SILO FULL
1646  005124                          11$:    CKLOOP
```

```
1647  005126  032777  000200  177104          BIT     #200,@CS2       ;SEE IF 'OR' IS SET
1648  005134  001004                          BNE     12$             ;IF SO BR
1649  005136                                  ERRDF   48.,RH11,ERM048 ;'OR' NOT SET AFTER FILLING SILO
1650  005146                          12$:    CKLOOP
1651  005150  005001                          CLR     R1              ;PRESET DATA
1652  005152  017702  177074          13$:    MOV     @DB,R2          ;READ SILO
1653  005156  020102                          CMP     R1,R2           ;SEE IF EXPT=RCVD
1654  005160  001005                          BNE     14$             ;
1655  005162  005201                          INC     R1              ;BUMP DATA
1656  005164  022701  000102                  CMP     #102,R1         ;SEE IF DONE
1657  005170  001370                          BNE     13$             ;IF NOT BR
1658  005172  000404                          BR      15$             ;CONTINUE TESTING
1659  005174                          14$:    ERRDF   49.,RH11,ERM049 ;SILO DATA COMPARE ERROR
1660
1661  005204                          15$:    CKLOOP
1662  005206                                  ENDSEG                  ;SILO DATA TEST
1663
1664  005210                                  BGNSEG                  ;SILO OVERFLOW
1665
1666  005212  012777  000040  177020          MOV     #40,@CS2        ;INIT THE RH11
1667  005220  012701  000103                  MOV     #103,R1         ;SET SIZE OF SILO+1
1668  005224  010177  177022          16$:    MOV     R1,@DB          ;LOAD DILO
1669  005230  005301                          DEC     R1              ;SEE IF DONE
1670  005232  001374                          BNE     16$             ;IF NOT BR
1671  005234  005777  177000                  TST     @CS2            ;SEE IF DLT SET
1672  005240  100404                          BMI     17$             ;CONTINUE TESTING
1673  005242                                  ERRDF   50.,RH11,ERM050 ;'DLT' NOT SET BY SILO OVERFLOW
1674
1675  005252                          17$:    CKLOOP
1676  005254                                  ENDSEG                  ;SILO OVERFLOW
1677
1678  005256                                  ENDSUB                  ;RH11 TESTS
1679
1680  005260                                  BGNSUB                  ;MASSBUS READY TEST
1681
1682  005262  013777  004352  176750  RDYTST: MOV     MBDRIV,@CS2     ;SELECT THE TM78 NUMBER
1683  005270  005077  176734                  CLR     @XFRCMD         ;CLEAR CAS REGISTER 0
1684  005274  052777  177770  176736          BIS     #177770,@CS2    ;SET ALL OTHER BITS
1685  005302  012701  000010                  MOV     #10,R1          ;LOAD THE MASS BUS REGISTER NUMBER
1686  005306                                  DELAY   3.              ;WAIT .3 MS.
1687  005336  032777  177670  176674          BIT     #177670,@CS2    ;ANY ERRORS?
1688  005344  001404                          BEQ     18$             ;NO-CONTINUE
1689  005346                                  ERRDF   1,RHCAS,ERM001  ;YES-PRINT MASS BUS ERROR
1690  005356                          18$:    CKLOOP
1691  005360  013777  004352  176652          MOV     MBDRIV,@CS2
1692  005366  005001                          CLR     R1              ;LOAD THE MASS BUS REGISTER NUMBER
1693  005370  032777  173577  176632          BIT     #173577,@XFRCMD ;ANY ERRORS?
1694  005376  001404                          BEQ     19$             ;NO-CONTINUE
1695  005400                                  ERRDF   1.,RHCAS,ERM001 ;YES
1696  005410                          19$:    CKLOOP
1697  005412                                  ENDSUB
1698  005414                                  ENDTST
1699
1700                                  .SBTTL  TEST 02 - TM78 HANDSHAKE TEST
1701  005416                          ST
 (1)                                ; ******************************************************************************
```

```
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 2                    TM78 HANDSHAKE TEST
                                SD
                                ; ************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST READS EACH COMMON ADDRESS SPACE (CAS) LOCATION BY
                                ;*SEQUENTIALLY READING MASS BUS REGISTERS 0, 6, 12, 14. 16, 20,
                                ;*24, 26, 30, 32, 34, 36, 40, 42, 44, 46, 50 AND 52(8).  THE DATA
                                ;*RECEIVED IS NOT USED BUT AFTER EACH ACCESS THE 'NON-EXISTENT-
                                ;*DRIVE'' (NED) STATUS BIT IN MASS BUS REGISTER 10(8) IS EXAMINED.
                                ;*ANY OTHER ERROR CONDITIONS ARE IGNORED.
                                SP
                                ; ************************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*  SELECT THE TM78 UNDER TEST
                                ;*  CLEAR MASSBUS REGISTER 0 (CS1)
                                ;*  CLEAR LOOP COUNT
                                ;*  BGNDO
                                ;*  :  DO WHILE LOOP COUNT < 54(8)
                                ;*  :  READ MASSBUS REGISTER (LOOP COUNTER)
                                ;*  :  IF MASSBUS STATUS BIT 'NED''=1
                                ;*  :  :  THEN-ERROR 2
                                ;*  :  :       ISSUE MASSBUS INIT
                                ;*  :  :       DELAY
                                ;*  :  :       SELECT THE TM78 UNDER TEST
                                ;*  :  :  ELSE-CONTINUE
                                ;*  :  ENDIF
                                ;*  :  BGNDO
                                ;*  :  :  LET LOOP COUNT=LOOP COUNT+2
                                ;*  :  :  DO UNTIL LOOP COUNT NOT=2,4,10(8),22(8)
                                ;*  :  ENDDO
                                ;*  ENDDO
                                ;*ENDTST
                                SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000002 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*'NED'' WHEN READING MB REG. 000000
                                S
                                ; ************************************************************************
                                        BGNTST
                                        CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
                                        MOV     MBDRIV,@CS2     ;LOAD TM78 UNIT NUMBER
                                        CLR     @XFRCMD         ;CLEAR CAS REGISTER 0
                                        CLR     R1              ;CLEAR MASS BUS REGISTER PTR.
                                1$:     CMP     R1,#54          ;FINISHED?
                                        BEQ     3$              ;YES-EXIT
                                        BGNSEG
                                        MOV     @XFRCMD(R1),R2  ;READ MB
```

```
                                                                H 3
1746  005452  032777  010000  176560          BIT     #NED,@CS2       ;NON-EXISTENT DRIVE SET
1747  005460  001426                          BEQ     4$
1748  005462                                  ERRDF   2.,RHCAS,ERM002
1749  005472  012777  000040  176540          MOV     #MBINIT,@CS2    ;CLEAR THE NED ERROR
1750  005500                                  DELAY   5               ;WAIT 1 MS.
1751  005530  013777  004352  176502          MOV     MBDRIV,@CS2
1752  005536                          4$:     CKLOOP
1753  005540                                  ENDSEG
1754  005542  005201                  2$:     INC     R1              ;INCREMENT THE REGISTER NUMBER
1755  005544  005201                          INC     R1              ;INCREMENT THE REGISTER NUMBER
1756  005546  020127  000002                  CMP     R1,#2           ;REGISTER NUMBER=2?
1757  005552  001773                          BEQ     2$              ;YES-DON'T TEST
1758  005554  020127  000004                  CMP     R1,#4           ;REGISTER NUMBER=4?
1759  005560  001770                          BEQ     2$              ;YES-DON'T TEST
1760  005562  020127  000010                  CMP     R1,#10          ;REGISTER NUMBER=10?
1761  005566  001765                          BEQ     2$              ;YES-DON'T TEST
1762  005570  020127  000022                  CMP     R1,#22          ;REGISTER=22?
1763  005574  001762                          BEQ     2$              ;YES-DON'T TEST
1764  005576  000717                          BR      1$              ;CONTINUE
1765  005600                          3$:     ENDTST                  ;END OF TEST
1766                                  .SBTTL  TEST 03 - NON-EXISTENT REGISTER TEST
1767  005602                          ST
  (1)                             ; ******************************************************************************
  (1)                             ;*TEST TITLE
  (1)                             ;*---- -----
1768                              ;*TEST 3                NON-EXISTENT REGISTER TEST
1769  005602                          SD
  (1)                             ; ******************************************************************************
  (1)                             ;*DESCRIPTION
  (1)                             ;*-----------
1770                              ;*THIS TEST READS THE NON-EXISTENT MB REGISTERS (54, 56,
1771                              ;*60, 62, 64, 66, 70 AND 72(8) AND EXPECTS THE READ DATA
1772                              ;*TO BE ZERO, AND THE ILLEGAL REGISTER ''ILR'' BIT IN MB
1773                              ;*REGISTER 52(8) CAS REGISTER 21(8) TO BE SET.  THEN A MASS
1774                              ;*BUS INIT IS ISSUED AND A 100 MICROSECOND TIME PREFORMED.
1775                              ;*THE ''ILR'' BIT IS AGAIN TESTED BUT SHOULD NOW BE RESET.
1776  005602                          SP
  (1)                             ; ******************************************************************************
  (1)                             ;*PROCEDURE
  (1)                             ;*---------
1777                              ;*BGNTST
1778                              ;*  SELECT THE TM78 UNDER TEST
1779                              ;*  CLEAR MASSBUS REGISTER 0 (CS1)
1780                              ;*  SET THE LOOP COUNTER TO 54(8)
1781                              ;*  BGNDO
1782                              ;*  :  READ MASSBUS REGISTER (LOOP COUNTER)
1783                              ;*  :  IF MASSBUS STATUS BIT 'NED'=1
1784                              ;*  :  :  THEN-ERROR 2
1785                              ;*  :  :       ISSUE MASSBUS INIT
1786                              ;*  :  :       DELAY
1787                              ;*  :  :       SELECT THE TM78 UNDER TEST
1788                              ;*  :  :  ELSE-CONTINUE
1789                              ;*  :  ENDIF
1790                              ;*  :  IF THE DATA READ FROM THE MASSBUS REGISTER=0
1791                              ;*  :  :  THEN-ERROR 5
1792                              ;*  :  :  ELSE-CONTINUE
```

```
                                ;*  :  ENDIF
                                ;*  :  READ TM78 CAS REGISTER 21(8)
                                ;*  :  IF TM78 STATUS BIT ''ILR''=0
                                ;*  :  :  THEN-ERROR 6
                                ;*  :  :  ELSE-CONTINUE
                                ;*  :  ENDIF
                                ;*  :  ISSUE MASSBUS INIT
                                ;*  :  DELAY
                                ;*  :  SELECT THE TM78 UNDER TEST
                                ;*  :  SET THE ''HOLD'' BIT IN TM78 CAS REGISTER 21(8)
                                ;*  :  READ TM78 CAS REGISTER 21(8)
                                ;*  :  IF THE ''ILR'' BIT IN TM78 CAS REGISTER 21(8)=1
                                ;*  :  :  THEN-ERROR 19
                                ;*  :  :  ELSE-CONTINUE
                                ;*  :  ENDIF
                                ;*  :  LET LOOP COUNTER=LOOP COUNTER+2
                                ;*  :  DO UNTIL LOOP COUNTER=74(8)
                                ;*  ENDDO
                                ;*ENDTST
1812  C05602                    SE
 (1)                            ; ************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
1813                            ;*CZTMIA DVC FTL ERR 000002 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
1814                            ;*M8956, M8957, MASSBUS
1815                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
1816                            ;*''NED'' WHEN READING MB REG. 000000
1817                            ;*
1818                            ;*CZTMIA DVC FTL ERR 000005 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
1819                            ;*M8956, M8957, MASSBUS
1820                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
1821                            ;*NON-EXISTENT REG. 00 = 000000 SHOULD BE ZERO
1822                            ;*
1823                            ;*CZTMIA DVC FTL ERR 000006 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
1824                            ;*M8956, M8956, MASSBUS
1825                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
1826                            ;*TM78 ''ILR'' NOT SET AFTER REG. 00 READ
1827                            ;*
1828                            ;*CZTMIA DVC FTL ERR 000019 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
1829                            ;*M8956, M8957, MASSBUS
1830                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
1831                            ;*''ILR'' NOT CLEAR WHEN WRITTEN CLEAR
1832  005602                    S
 (1)                            ; ************************************************************************
1833  005602                            BGNTST
1834  005602  005037  004412           CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
1835  005606  013777  004352  176424   MOV     MBDRIV,@CS2     ;LOAD TM78 UNIT NUMBER
1836  005614  005077  176410           CLR     @XFRCMD         ;CLEAR CAS REGISTER 0
1837  005620  012701  000054           MOV     #54,R1          ;SET UP THE REGISTER POINTER
1838  005624                    3$:     BGNSEG
1839  005626  017102  004230           MOV     @XFRCMD(R1),R2  ;READ NON EXISTENT MB REGISTER
1840  005632  032777  010000  176400   BIT     #NED,@CS2
1841  005640  001426                   BEQ     5$
1842  005642                           ERRDF   2.,RHCAS,ERM002
1843  005652  012777  000040  176360   MOV     #MBINIT,@CS2    ;CLEAR THE NED ERROR
1844  005660                           DELAY   5               ;WAIT 1 MS.
```

```
1845  005710  013777  004352  176322          MOV     MBDRIV,@CS2
1846  005716                          5$:     CKLOOP
1847  005720  005702                          TST     R2                  ;DATA=ZERO?
1848  005722  001404                          BEQ     1$                  ;YES-CONTINUE
1849  005724                                  ERRDF   5,RHCAS,ERM005      ;NO-ERROR
1850  005734                          1$:     CKLOOP
1851  005736  017702  176340                  MOV     @DS80,R2            ;READ MB REGISTER 52
1852  005742  032702  010000                  BIT     #ILR,R2             ;''ILR'' SET?
1853  005746  001004                          BNE     2$                  ;YES-CONTINUE
1854  005750                                  ERRDF   6,RHCAS,ERM006      ;NO-ERROR
1855  005760                          2$:     CKLOOP
1856  005762  052777  000040  176250          BIS     #MBINIT,@CS2        ;CLEAR ''ILR''
1857  005770                                  DELAY   5                   ;WAIT 1 MS.
1858  006020  013777  004352  176212          MOV     MBDRIV,@CS2         ;LOAD THE MASS BUSS DRIVE NUMBER
1859  006026  012777  000400  176246          MOV     #HOLD,@DS80         ;HOLD THE TM78 MP
1860  006034  017702  176242                  MOV     @DS80,R2            ;GET THE TM78 MP STATUS
1861  006040  032702  010000                  BIT     #ILR,R2             ;''ILR'' CLEAR?
1862  006044  001404                          BEQ     4$                  ;YES-CONTINUE
1863  006046                                  ERRDF   19.,CASX,ERM019     ;NO-ERROR
1864  006056                          4$:     CKLOOP
1865  006060                                  ENDSEG
1866  006062  062701  000002                  ADD     #2,R1               ;INC ILR REGISTER NUMBER
1867  006066  020127  000074                  CMP     R1,#74              ;DONE
1868  006072  001254                          BNE     3$                  ;NO
1869  006074                                  ENDTST                      ;YES
1870                                  .SBTTL  TEST 04 - HOLD TOGGLE TEST
1871  006076                          ST
  (1)                             ;*********************************************************************
  (1)                             ;*TEST TITLE
  (1)                             ;*---- -----
1872                              ;*TEST 4                    HOLD TOGGLE TEST
1873  006076                      SD
  (1)                             ;*********************************************************************
  (1)                             ;*DESCRIPTION
  (1)                             ;*-----------
1874                              ;*THIS TEST SETS THE TM78MP ''HOLD'' BIT IN MB REGISTER 52(8),
1875                              ;*AND TESTS FOR ''HLDA''.
1876                              ;*THEN MB REGISTER 50(8) IS READ AND THE ADDRESS BITS SAVED,
1877                              ;*A TIME DELAY IS PERFORMED THE REGISTER IS REREAD AND
1878                              ;*COMPARED TO THE INITIAL ADDRESS READ. - THESE ADDRESSES
1879                              ;*SHOULD BE EQUAL.
1880                              ;*
1881                              ;*THEN MB REGISTER 52(8) IS READ
1882                              ;*AND THE DATA BITS SAVED, A TIME DELAY IS PERFORMED AND
1883                              ;*THE REGISTER 52(8) DATA BITS ARE COMPARED WITH THE PREVIOUS
1884                              ;*READING - THESE VALUES SHOULD BE EQUAL.
1885                              ;*
1886                              ;*THEN ''HOLD'' IS SET TO ZERO AND THE PROGRAM VERIFIES THAT
1887                              ;*''HOLD'' AND ''HLDA'' EQUAL ZERO.
1888  006076                      SP
  (1)                             ;*********************************************************************
  (1)                             ;*PROCEDURE
  (1)                             ;*---------
1889                              ;*BGNTST
1890                              ;*  CALL SUBROUTINE HOLDMP
1891                              ;*  CLEAR TM78 CAS REGISTER 20(8)
```

```
                        ;*  READ TM78 CAS REGISTER 20(8)
                        ;*  CALL SUBROUTINE NONEX
                        ;*  DELAY
                        ;*  READ TM78 CAS REGISTER 20(8) AGAIN
                        ;*  CALL SUBROUTINE NONEX
                        ;*  IF FIRST READ OF CAS REGISTER 20=SECOND READ
                        ;*  :  THEN-CONTINUE
                        ;*  :  ERROR 11
                        ;*  ENDIF
                        ;*  READ TM78 CAS REGISTER 21(8)
                        ;*  CALL SUBROUTINE NONEX
                        ;*  DELAY
                        ;*  READ TM78 CAS REGISTER 21(8) AGAIN
                        ;*  IF FIRST READ OF CAS REGISTER 21(8)=SECOND READ
                        ;*  :  THEN-CONTINUE
                        ;*  :  ELSE-ERROR 10
                        ;*  ENDIF
                        ;*  WRITE -1 TO TM78 CAS REGISTER 20(8)
                        ;*  CLEAR TM78 CAS REGISTER 21(8)
                        ;*  CALL SUBROUTINE NONEX
                        ;*  IF TM78 CONTROL BIT ''HOLD''=0
                        ;*  :  THEN-CONTINUE
                        ;*  :  ELSE-ERROR 12
                        ;*  ENDIF
                        ;*  IF TM78 STATUS BIT ''HLDA''=0
                        ;*  :  THEN-CONTINUE
                        ;*  :  ELSE-ERROR 13
                        ;*  ENDIF
                        ;*ENDTST
                        SE
                        ; ************************************************************************
                        ;*ERRORS
                        ;*------
                        ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8956, M8957, MASSBUS
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                        ;*''NED'' WHEN READING MB REG.
                        ;*
                        ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8957, M8960
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                        ;*''HLDA'' NOT SET  STATUS = 000000
                        ;*
                        ;*CZTMIA DVC FTL ERR 000010 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8957, M8960
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                        ;*TM78 DATA BUS CHANGING WHEN ''HLDA'' SET
                        ;*
                        ;*CZTMIA DVC FTL ERR 000011 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8957, M8960
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                        ;*TM78 ADDR BUS CHANGING WHEN ''HLDA'' SET
                        ;*
                        ;*CZTMIA DVC FTL ERR 000012 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8957, M8960
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
```

```
                                        ;*''HOLD'' DID NOT RESET
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000013 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8957, M8960
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*''HLDA'' DID NOT RESET
                                        ;*
1952  006076                          S
 (1)                                    ; ***************************************************************************
1953
1954  006076                                BGNTST
1955  006076  005037  004412                 CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
1956  006102                                  BGNSEG                  ;
1957  006104  004737  035154                 CALL    HOLDMP          ;HOLD THE TM78 MP-WAIT FOR HLDA
1958  006110  012777  000000  176162         MOV     #0,@AD80        ;LOAD THE TM78 ADDRESS BUS REGISTER WITH ZERO
1959  006116  000240                         NOP                     ;WAIT
1960  006120  000240                         NOP                     ;WAIT
1961  006122  017702  176152                 MOV     @AD80,R2        ;READ TM78 MP ADDRESS BUS
1962  006126  004737  035132                 CALL    NONEX           ;CHECK FOR NONEX
1963  006132                                  CKLOOP
1964                                                                  ;
1965  006134                                  DELAY   1.              ;WAIT 100 MICRO SECONDS
1966                                                                  ;
1967  006164  017703  176110                 MOV     @AD80,R3        ;READ TM78 MP ADDRESS BUS AGAIN
1968  006170  004737  035132                 CALL    NONEX           ;CHECK FOR NONEX
1969  006174                                  CKLOOP
1970  006176  020203                         CMP     R2,R3           ;COMPARE BOTH ADDRESSES
1971  006200  001404                         BEQ     2$              ;CONTINUE IF EQUAL
1972  006202                                  ERRDF   11.,PROCAS,ERM011
1973  006212                          2$:     CKLOOP
1974  006214                                  ENDSEG
1975  006216                                  BGNSEG
1976  006220  017702  176056                 MOV     @DS80,R2        ;READ TM78 MP DATA BUS
1977  006224  004737  035132                 CALL    NONEX           ;CHECK FOR NONEX
1978  006230                                  CKLOOP
1979  006232                                  DELAY   1.              ;WAIT 100 MICRO SECONDS
1980  006262  017703  176014                 MOV     @DS80,R3        ;READ TM78 MP DATA BUS AGAIN
1981  006266  004737  035132                 CALL    NONEX           ;CHECK FOR NONEX
1982  006272                                  CKLOOP
1983  006274  120203                         CMPB    R2,R3           ;COMPARE BOTH BUS ADDRESSES
1984  006276  001404                         BEQ     1$
1985  006300                                  ERRDF   10.,PROCAS,ERM010  ;ERROR
1986  006310                          1$:     CKLOOP
1987  006312                                  ENDSEG                  ;
1988  006314  012777  177777  175756         MOV     #-1,@AD80       ;LOAD A NONEXISTENT ADDRESS
1989  006322  005077  175754                 CLR     @DS80           ;DROP HOLD
1990  006326  004737  035132                 CALL    NONEX           ;
1991  006332                                  CKLOOP
1992  006334  017702  175742                 MOV     @DS80,R2        ;READ THE STATUS
1993  006340  032702  000400                 BIT     #HOLD,R2        ;HOLD=0?
1994  006344  001404                         BEQ     3$              ;YES CONTINUE
1995  006346                                  ERRDF   12.,PROCAS,ERM012  ;NO
1996
1997  006356                          3$:     CKLOOP
1998  006360  032702  001000                 BIT     #HLDA,R2        ;HLDA=0?
1999  006364  001404                         BEQ     4$              ;YES-CONTINUE
```

```
                        ERRDF   13.,PROCAS,ERM013  ;NO

                4$:     CKLOOP
                        ENDTST

                .SBTTL  TEST 05 - REGISTER 20 INTEGRITY CHECK
                ST
                ; ************************************************************************
                ;*TEST TITLE
                ;*---- -----
                ;*TEST 5                 REGISTER 20 INTEGRITY CHECK
                SD
                ; ************************************************************************
                ;*DESCRIPTION
                ;*-----------
                ;*THIS TEST SETS 'HOLD' AND WAITS FOR 'HLDA' TO SET, THEN
                ;*DATA FROM 000000(8)-177777(8) IS WRITTEN TO THE MB
                ;*REGISTER 50(8), CAS REGISTER 20 READ BACK AN COMPARED.
                ;*THIS PROVIDES A TEST OF BOTH THE ADDRESS REGISTER AND
                ;*THE MASS BUS TRANSCEIVERS.
                SP
                ; ************************************************************************
                ;*PROCEDURE
                ;*---------
                ;*BGNTST
                ;*  CALL SUBROUTINE HOLDMP
                ;*  CLEAR THE LOOP COUNTER
                ;*  BGNDO
                ;*  :  WRITE (LOOP COUNTER) TO CAS REGISTER 20(8)
                ;*  :  READ CAS REGISTER 20(8)
                ;*  :  IF VALUE WRITTEN=VALUE READ
                ;*  :  :  THEN-CONTINUE
                ;*  :  :  ELSE-ERROR 16
                ;*  :  ENDIF
                ;*  :  LET LOOP COUNTER=LOOP COUNTER+1
                ;*  :  DO UNTIL THE LOOP COUNTER=0
                ;*  ENDDO
                ;*ENDTST
                SE
                ; ************************************************************************
                ;*ERRORS
                ;*------
                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                ;*M8957, M8960
                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                ;*'HLDA' NOT SET  STATUS = 000000
                ;*
                ;*CZTMIA DVC FTL ERR 000016 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                ;*M8956, M8957
                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                ;*REG. 20 COMPARE FAIL
                ;*ACT = 000000
                ;*EXP = 000000
                S
                ; ************************************************************************
                        BGNTST
```

```
2043  006402  005037  004412                  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
2044  006406  004737  035154                  CALL    HOLDMP          ;HOLD TM78 MP-WAIT FOR HLDA
2045  006412  005003                          CLR     R3
2046  006414  005001                          CLR     R1              ;CLEAR THE ADDRESS
2047  006416                                  BGNSEG
2048  006420  010177  175654          1$:     MOV     R1,@AD80        ;MOVE TO ADDRESS REG IN TM78
2049  006424  017702  175650                  MOV     @AD80,R2        ;READ THE ADDRESS FROM REG IN TM78
2050  006430  020102                          CMP     R1,R2           ;=?
2051  006432  001406                          BEQ     2$              ;YES-CONTINUE
2052  006434                                  ERRDF   16.,CASX,ERM016  ;NO-ERROR
2053  006444  012703  000001                  MOV     #1,R3
2054  006450  005703                  2$:     TST     R3
2055  006452  001401                          BEQ     3$
2056  006454                                  CKLOOP
2057  006456  005201                  3$:     INC     R1              ;INCREMENT THE ADDRESS
2058  006460  001357                          BNE     1$              ;CONTINUE UNTIL DONE
2059  006462                                  ENDSEG
2060  006464                                  ENDTST
2061                                  .SBTTL  TEST 06 - CLEAR FROM HOLD TEST
2062  006466                          ST
  (1)                             ; ******************************************************************************
  (1)                             ;*TEST TITLE
  (1)                             ;*---- -----
2063                              ;*TEST 6                 CLEAR FROM HOLD TEST
2064  006466                          SD
  (1)                             ; ******************************************************************************
  (1)                             ;*DESCRIPTION
  (1)                             ;*-----------
2065                              ;*THIS TEST SETS THE TM78MP ''HOLD'' BIT IN MB REGISTER 52(8),
2066                              ;*CAS REGISTER 21 AND TESTS FOR ''HLDA''.  THEN THE PDP11
2067                              ;*PROCESSOR ATTEMPTS TO SET ''TMRDY'', AND CHECKS THAT
2068                              ;*IT SETS.
2069                              ;*
2070                              ;*THEN MB REGISTER 52(8), CAS REGISTER 21 IS WRITTEN WITH
2071                              ;*THE ''CLEAR'' AND ''HOLD'' BITS SET, AND THE FOLLOWING CON-
2072                              ;*DITIONS ARE TESTED.
2073                              ;*
2074                              ;*       .''HLDA'' IS STILL SET
2075                              ;*       .''TMRDY'' IS RESET
2076  006466                          SP
  (1)                             ; ******************************************************************************
  (1)                             ;*PROCEDURE
  (1)                             ;*---------
2077                              ;*BGNTST
2078                              ;*  CALL SUBROUTINE HOLDMP
2079                              ;*  LOAD THE TM78 INTERNAL ADDRESS FOR TM READY BIT 100240(8) TO TM78
2080                              ;*       CAS REGISTER 20(8)
2081                              ;*  LOAD THE ''HOLD'' BIT+200(8) TO CAS REGISTER 21(8)
2082                              ;*  READ CAS REGISTER 21(8)
2083                              ;*  IF STATUS BIT ''TMRDY''=0
2084                              ;*  :  THEN-ERROR 4
2085                              ;*  :  ELSE-CONTINUE
2086                              ;*  ENDIF
2087                              ;*  LOAD -1 TO CAS REGISTER 20(8)
2088                              ;*  LOAD THE ''HOLD'' AND ''CLR'' BITS IN CAS REGISTER 21(8)
2089                              ;*  WAIT
```

```
                                ;*  IF THE ''HODA'' STATUS BIT IN CAS REGISTER 21(8)=0
                                ;*  :  THEN-ERROR 14
                                ;*  :  ELSE-CONTINUE
                                ;*  ENDIF
                                ;*  IF THE ''TMRDY'' STATUS BIT IN CAS REGISTER 21(8)=0
                                ;*  :  THEN-CONTINUE
                                ;*  :  ELSE-ERROR 15
                                ;*  ENDIF
                                ;*ENDTST
006466                          SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000004 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''TMRDY'' NOT SET
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000014 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' RESETS WHEN ''HOLD'' + ''CLEAR'' SET
                                ;*
                                ;*CZTMIA DVC FTL ERR 000015 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''TMRDY'' DID NOT RESET
                                ;*
006466                          S
                                ; ************************************************************************

                                        BGNTST
006466                                  
005037  004412                  CLR     CASLD               ;CLEAR THE CAS PROGRAM LOADED FLAG
004737  035154                  CALL    HOLDMP              ;HOLD THE TM78 MP-WAIT FOR HLDA
012777  100240  175574          MOV     #TMRDST,@AD80       ;LOAD ADDRESS OF TM-READY
012777  000500  175570          MOV     #HOLD+#STMRDY,@DS80  ;SET TM READY
000240                          NOP                         ;
017702  175562                  MOV     @DS80,R2            ;GET THE STATUS
032702  100000                  BIT     #TMRDY,R2           ;TM READY SET?
001004                          BNE     1$                  ;YES-CONTINUE
006526                          ERRDF   04.,CASX,ERM004      ;NO ERROR
006536                  1$:     CKLOOP
012777  077777  175532          MOV     #077777,@AD80       ;LOAD A NON EXISTENT ADDRESS
012777  040400  175526          MOV     #TMCLR+#HOLD,@DS80  ;SET HOLD AND CLEAR
006554                          DELAY   1.                  ;WAIT 100 MICRO SECONDS
017702  175472                  MOV     @DS80,R2            ;GET TM78 MP STATUS
032702  001000                  BIT     #HLDA,R2            ;HLDA SET?
001004                          BNE     2$                  ;YES-CONTINUE
006616                          ERRDF   14.,PRO,ERM014      ;NO-ERROR

006626                  2$:     CKLOOP
```

```
2142  006630  032702  100000          BIT     #TMRDY,R2       ;TM READY SET?
2143  006634  001404                  BEQ     3$              ;NO-CONTINUE
2144  006636                          ERRDF   15.,PROCAS,ERM015  ;YES-ERROR
2145
2146  006646                  3$:     CKLOOP
2147  006650                          ENDTST
2148
2149                          .SBTTL  TEST 07 - PORT SELECT TEST
2150  006652                  ST
 (1)                          ; ************************************************************************
 (1)                          ;*TEST TITLE
 (1)                          ;*---- -----
2151                          ;*TEST 7                 PORT SELECT TEST
2152  006652                  SD
 (1)                          ; ************************************************************************
 (1)                          ;*DESCRIPTION
 (1)                          ;*-----------
2153                          ;*THIS TEST CHECKS THE ABILITY OF THE PORT SELECT LOGIC IN THE TM78 TO
2154                          ;*SELECT TO THE USER SPECIFIED MASS BUS PORT.
2155  006652                  SP
 (1)                          ; ************************************************************************
 (1)                          ;*PROCEDURE
 (1)                          ;*---------
2156                          ;*BGNTST
2157                          ;*  CALL SUBROUTINE HOLDMP
2158                          ;*  LOAD THE INTERNAL ADDRESS OF THE PORT SELECT BYTE 100340(8) TO CAS
2159                          ;*      REGISTER 20(8)
2160                          ;*  GET THE USER SPECIFIED MASS BUS PORT # (0 OR 1)
2161                          ;*  IF USER SPECIFIED PORT=0
2162                          ;*  :  THEN-LOAD THE ''HOLD'' BIT TO CAS REGISTER 21(8)
2163                          ;*  :  ELSE-LOAD THE ''HOLD'' BIT+200(8) TO CAS REGISTER 21(8)
2164                          ;*  ENDIF
2165                          ;*  LOAD THE INTERNAL ADDRESS OF THE PORT SELECT BYTE 100340(8) TO CAS
2166                          ;*      REGISTER 20(8)
2167                          ;*  READ CAS REGISTER 21(8)
2168                          ;*  IF THE VALUE READ=THE VALUE WRITTEN
2169                          ;*  :  THEN-CONTINUE
2170                          ;*  :  ELSE-ERROR 17
2171                          ;*  ENDIF
2172                          ;*ENDTST
2173  006652                  SE
 (1)                          ; ************************************************************************
 (1)                          ;*ERRORS
 (1)                          ;*------
2174                          ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
2175                          ;*M8957, M8960
2176                          ;*RH: AAAAAA  TM: X  TU: X  PORT: X
2177                          ;*''HLDA'' NOT SET  STATUS = 000000
2178                          ;*
2179                          ;*CZTMIA DVC FTL ERR 000017 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
2180                          ;*M8960
2181                          ;*RH: AAAAAA  TM: X  TU: X  PORT: X
2182                          ;*PORT X SELECT BIT NOT SET
2183  006652                  S
 (1)                          ; ************************************************************************
2184
```

```
 2185  006652
 2186  006652  005037  004412                    BGNTST
 2187  006656  004737  035154                    CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
 2188  006662  012777  100340  175410            CALL    HOLDMP          ;HOLD TM78MP-WAIT FOR HLDA
 2189  006670  005003                            MOV     #MBSEL,@AD80    ;ADDRESS THE PORT SELECT BYTE
 2190  006672  013701  004360                    CLR     R3              ;CLEAR THE EXPECTED DATA BYTE
 2191  006676  001403                            MOV     TMPORT,R1       ;GET THE PORT SELECTED
 2192  006700  012701  000200                    BEQ     1$              ;BRANCH IF PORT 0
 2193  006704  005203                            MOV     #200,R1         ;ELSE-LOAD PORT 1 SELECT BIT
 2194  006706  062701  000400            1$:     INC     R3              ;UPDATE THE EXPECTED DATA BYTE
 2195  006712  010177  175364                    ADD     #HOLD,R1        ;ADD IN HOLD BIT
 2196  006716  000240                            MOV     R1,@DS80        ;LOAD PORT SELECT BYTE
 2197  006720  012777  100340  175352            NOP
 2198  006726  017702  175350                    MOV     #MBSEL,@AD80
 2199  006732  042701  177400                    MOV     @DS80,R2
 2200  006736  042702  177577                    BIC     #177400,R1      ;REMOVE HOLD BIT FROM PORT BYTE
 2201  006742  020102                            BIC     #177577,R2      ;REMOVE BITS FROM ACTUAL
 2202  006744  001404                            CMP     R1,R2           ;PROPER PORT SELECTED
 2203                                            BEQ     2$              ;YES-EXIT TEST
 2204  006746                                                            ;NO-ERROR
 2205                                            ERRDF   17.,PRO,ERM017
 2206  006756                            2$:     CKLOOP
 2207  006760                                    ENDTST
 2208
 2209                                    .SBTTL  TEST 08 - MASS BUS INIT FROM HOLD TEST
 2210  006762                            ST
   (1)                                  ; ******************************************************************************
   (1)                                  ;*TEST TITLE
   (1)                                  ;*---- -----
 2211                                   ;*TEST 8                    MASS BUS INIT FROM HOLD TEST
 2212  006762                            SD
   (1)                                  ; ******************************************************************************
   (1)                                  ;*DESCRIPTION
   (1)                                  ;*-----------
 2213                                   ;*THIS TEST SETS THE TM78MP ''HOLD'' BIT IN MB REGISTER 52(8),
 2214                                   ;*CAS REGISTER 21 AND TESTS FOR ''HLDA''.  THEN THE PDP11
 2215                                   ;*PROCESSOR ATTEMPTS TO SET ''TMRDY'', AND CHECKS THAT IT
 2216                                   ;*SETS.
 2217                                   ;*
 2218                                   ;*MB CLEAR IS THEN ISSUED, AND THE FOLLOWING CONDITIONS
 2219                                   ;*ARE TESTED:
 2220                                   ;*
 2221                                   ;*      .''HOLD'' IS RESET
 2222                                   ;*      .''HLDA'' IS RESET
 2223                                   ;*      .''TMRDY'' IS RESET
 2224  006762                            SP
   (1)                                  ; ******************************************************************************
   (1)                                  ;*PROCEDURE
   (1)                                  ;*---------
 2225                                   ;*BGNTST
 2226                                   ;*  CALL SUBROUTINE HOLDMP
 2227                                   ;*  LOAD THE TM78 INTERNAL ADDRESS FOR TM READY 100240(8) TO CAS
 2228                                   ;*      REGISTER 20(8)
 2229                                   ;*  LOAD THE ''HOLD'' BIT+100(8) TO CAS REGISTER 21(8)
 2230                                   ;*  CLEAR CAS REGISTER 20(8)
 2231                                   ;*  IF ''TMRDY''=1
```

```
                                ;*   :  THEN-CONTINUE
                                ;*   :  ELSE-ERROR 4
                                ;*  ENDIF
                                ;*  SET THE ''CLEAR'' BIT IN MB REGISTER 10(8)
                                ;*  DELAY
                                ;*  SELECT THE TM78 UNDER TEST
                                ;*  IF THE ''HOLD'' CONTROL BIT IN CAS REGISTER 21(8)=0
                                ;*   :  THEN-CONTINUE
                                ;*   :  ELSE-ERROR 12
                                ;*  ENDIF
                                ;*  IF THE ''HOLD ACTIVE'' STATUS BIT IN CAS REGISTER 21(8)=0
                                ;*   :  THEN-CONTINUE
                                ;*   :  ELSE-ERROR 13
                                ;*  ENDIF
                                ;*  IF ''TM READY'' STATUS BIT IN CAS REGISTER 21(8)=0
                                ;*   :  THEN-CONTINUE
                                ;*   :  ELSE-ERROR 15
                                ;*  ENDIF
                                ;*ENDTST
C06762                          SE
 (1)                            ; ************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
                                ;*CZTMIA DVC FTL ERR 000004 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''TMRDY'' NOT SET
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000012 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HOLD'' DID NOT RESET
                                ;*
                                ;*CZTMIA DVC FTL ERR 000013 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' DID NOT RESET
                                ;*
                                ;*CZTMIA DVC FTL ERR 000015 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''TMRDY'' DID NOT RESET
                                ;*
006762                          S
 (1)                            ; ************************************************************************

                                BGNTST
006762                          
006762  005037  004412          CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
006766  004737  035154          CALL    HOLDMP          ;HOLD TM78 MP-WAIT FOR HLDA
006772  012777  100240  175300  MOV     #TMRDST,@AD80   ;LOAD ADDRESS OF TM READY
007000  012777  000500  175274  MOV     #HOLD+#STMRDY,@DS80  ;SET TM READY
```

```
2284  007006  017702  175270          MOV     @DS80,R2        ;GET THE STATUS
2285  007012  032702  100000          BIT     #TMRDY,R2       ;TM READY SET?
2286  007016  001004                  BNE     1$              ;YES-CONTINUE
2287  007020                          ERRDF   4.,CASX,ERM004  ;NO-ERROR
2288
2289  007030                  1$:     CKLOOP
2290  007032  052777  000040  175200  BIS     #MBINIT,@CS2    ;ISSUE MASS BUS INIT
2291  007040  000240                  NOP
2292  007042  000240                  NOP
2293  007044  013777  004352  175166  MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
2294  007052  017702  175224          MOV     @DS80,R2        ;READ THE STATUS
2295  007056  032702  000400          BIT     #HOLD,R2        ;HOLD SET?
2296  007062  001404                  BEQ     2$              ;NO-CONTINUE
2297  007064                          ERRDF   12.,PROCAS,ERM012  ;YES-ERROR
2298  007074                  2$:     CKLOOP
2299  007076  032702  001000          BIT     #HLDA,R2        ;HLDA SET?
2300  007102  001404                  BEQ     3$              ;NO-CONTINUE
2301  007104                          ERRDF   13.,PROCAS,ERM013  ;YES-ERROR
2302  007114                  3$:     CKLOOP
2303  007116  032702  100000          BIT     #TMRDY,R2       ;TM READY SET?
2304  007122  001404                  BEQ     4$              ;NO-CONTINUE
2305  007124                          ERRDF   15.,PROCAS,ERM015  ;YES-ERROR
2306
2307  007134                  4$:     CKLOOP
2308  007136                          ENDTST
2309                          .SBTTL  TEST 09 - TM78 CONTROL BUS PARITY ERROR DETECT TEST
2310  007140                  ST
  (1)                           ;*********************************************************************
  (1)                           ;*TEST TITLE
  (1)                           ;*----- -----
2311                            ;*TEST 9                TM78 CONTROL BUS PARITY ERROR DETECT TEST
2312  007140                  SD
  (1)                           ;*********************************************************************
  (1)                           ;*DESCRIPTION
  (1)                           ;*-----------
2313                            ;*THIS TEST SETS THE ''PAT'' BIT IN MB CONTROLLER AND THEN
2314                            ;*WRITES CAS REGISTER 3 (MB REGISTER 24) WITH THE TM78 MP
2315                            ;*IN ''HOLD''.  CAS REGISTER 21 (MB REGISTER 52) IS READ AND
2316                            ;*THE ''CPE'' BIT IS EXPECTED.  THEN THE ''PAT'' BIT IN THE MB
2317                            ;*CONTROLLER IS RESET, THE ''CPE'' BIT IN CAS REGISTER 21
2318                            ;*(MB REGISTER 52) IS RESET, AND CAS REGISTER 3 (MB REGISTER 24)
2319                            ;*IS AGAIN WRITTEN. THE ''CPE'' BIT IS THEN TESTED FOR THE
2320                            ;*RESET CONDITION.
2321  007140                  SP
  (1)                           ;*********************************************************************
  (1)                           ;*PROCEDURE
  (1)                           ;*---------
2322                            ;*BGNTST
2323                            ;*   CALL SUBROUTINE HOLDMP
2324                            ;*   SET THE ''PAT'' BIT IN MB REGISTER 10(8)
2325                            ;*   CLEAR CAS REGISTER 3
2326                            ;*   IF THE ''CPE'' STATUS BIT IN CAS REGISTER 21(8)=1
2327                            ;*   :  THEN-CONTINUE
2328                            ;*   :  ELSE-ERROR 23
2329                            ;*   ENDIF
2330                            ;*   SET THE ''CLEAR'' BIT IN MB REGISTER 10(8)
```

```
                        ;*  DELAY
                        ;*  SELECT THE TM78 UNDER TEST
                        ;*  SET THE ''HOLD'' BIT IN CAS REGISTER 21(8)
                        ;*  IF THE ''CPE'' STATUS BIT IN CAS REGISTER 21(8)=0
                        ;*  :  THEN-CONTINUE
                        ;*  :  ELSE-ERROR 24
                        ;*  ENDIF
                        ;*  CLEAR CAS REGISTER 3
                        ;*  IF THE ''CPE'' STATUS BIT IN CAS REGISTER 21(8)=0
                        ;*  :  THEN-CONTINUE
                        ;*  :  ELSE-ERROR 25
                        ;*  ENDIF
                        ;*ENDTST
007140                  SE
  (1)                   ; ************************************************************************
  (1)                   ;*ERRORS
  (1)                   ;*------
                        ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8957, M8960
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                        ;*''HLDA'' NOT SET  STATUS = 000000
                        ;*
                        ;*CZTMIA DVC FTL ERR 000023 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8956, M8957, MASSBUS
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                        ;*TM78 ''CPE'' NOT SET WHEN ''PAT'' IS SET
                        ;*
                        ;*CZTMIA DVC FTL ERR 000024 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8956, M8957, MASSBUS
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                        ;*TM78 ''CPE'' NOT RESET WHEN ''PAT'' IS CLEAR
                        ;*
                        ;*CZTMIA DVC FTL ERR 000025 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                        ;*M8956, M8957, MASSBUS
                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                        ;*TM78 ''CPE'' SET WHEN ''PAT'' CLEAR
                        ;*
007140                  S
  (1)                   ; ************************************************************************
                        
                        BGNTST
007140  005037  004412  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
007144  004737  035154  CALL    HOLDMP          ;HOLD TM78 MP - WAIT FOR HLDA
007150  013701  004352  MOV     MBDRIV,R1
007154  052701  000020  BIS     #PAT,R1
007160  010177  175054  MOV     R1,@CS2
007164  005077  175064  CLR     @DI1            ;WRITE A MB REGISTER
007170  017701  175106  MOV     @DS80,R1        ;GET TM78 CONTROL BUS STATUS
007174  032701  004000  BIT     #CPE,R1         ;CPE SET?
007200  001004          BNE     1$              ;YES-CONTINUE
007202                  ERRDF   23.,RHCAS,ERM023  ;NO-ERROR
                        
007212                  1$:     CKLOOP
007214  052777  000040  175016  BIS     #MBINIT,@CS2    ;CLEAR ''PAT''
007222                  DELAY   5               ;WAIT 1 MS.
007252  013777  004352  174760  MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
```

```
2383  007260  012777  000400  175014          MOV     #HOLD,@DS80     ;CLEAR ''CPE'' IN THE TM78
2384  007266  017701  175010                  MOV     @DS80,R1        ;DID IT CLEAR?
2385  007272  032701  004000                  BIT     #CPE,R1
2386  007276  001404                          BEQ     2$              ;YES-CONTINUE
2387  007300                                  ERRDF   24.,RHCAS,ERM024  ;NO-ERROR
2388
2389  007310                          2$:     CKLOOP
2390  007312  005077  174736                  CLR     @DI1            ;WRITE AGAIN
2391  007316  017701  174760                  MOV     @DS80,R1        ;''CPE'' SET?
2392  007322  032701  004000                  BIT     #CPE,R1         ;
2393  007326  001404                          BEQ     3$              ;NO-EXIT TEST
2394  007330                                  ERRDF   25.,RHCAS,ERM025  ;YES-ERROR
2395  007340                          3$:     CKLOOP
2396  007342                                  ENDTST                  ;END OF TEST
2397
2398                                  .SBTTL  TEST 10 - TM78 CONTROL BUS PARITY ERROR FORCE TEST
2399  007344                          ST
  (1)                               ; ******************************************************************************
  (1)                               ;*TEST TITLE
  (1)                               ;*---- -----
2400                                ;*TEST 10       TM78 CONTROL BUS PARITY ERROR FORCE TEST
2401  007344                          SD
  (1)                               ; ******************************************************************************
  (1)                               ;*DESCRIPTION
  (1)                               ;*-----------
2402                                ;*THIS TEST ''HOLDS'' THE TM78 MICRO PROCESSOR AND SETS THE EVEN
2403                                ;*PARITY ''EVPAR'' BIT IN CAS REGISTER 21 (MB REGISTER 52).
2404                                ;*THEN CAS REGISTER 3 (MB REGISTER 24) IS READ AND THE MB
2405                                ;*STATUS BIT ''MCPE'' IS EXPECTED.  THEN A MB INIT IS ISSUED
2406                                ;*AND THE TM78 MP AGAIN HELD.  CAS REGISTER 3 (MB REGISTER 24)
2407                                ;*IS THEN READ AGAIN, AND NO ERROR IS EXPECTED.
2408  007344                          SP
  (1)                               ; ******************************************************************************
  (1)                               ;*PROCEDURE
  (1)                               ;*---------
2409                                ;*BGNTST
2410                                ;*  CALL SUBROUTINE HOLDMP
2411                                ;*  LOAD THE ''HOLD'' BIT AND ''EVPAR'' BIT IN CAS REGISTER 21(8)
2412                                ;*  READ CAS REGISTER 3
2413                                ;*  IF THE ''MCPE'' STATUS BIT IN MB REGISTER 0=1
2414                                ;*  :  THEN-CONTINUE
2415                                ;*  :  ELSE-ERROR 26
2416                                ;*  ENDIF
2417                                ;*  LOAD THE ''CLEAR'' BIT IN MB REGISTER 10(8)
2418                                ;*  DELAY
2419                                ;*  SELECT THE TM78 UNDER TEST
2420                                ;*  LOAD THE ''HOLD'' BIT IN CAS REGISTER 21(8) CLEAR ''EVPAR''
2421                                ;*  READ CAS REGISTER 3
2422                                ;*  IF THE ''MCPE'' BIT IN MB REGISTER 0=0
2423                                ;*  :  THEN-CONTINUE
2424                                ;*  :  ELSE-ERROR 27
2425                                ;*  ENDIF
2426                                ;*ENDTST
2427  007344                          SE
  (1)                               ; ******************************************************************************
  (1)                               ;*ERRORS
```

```
  (1)                                   ;*------
 2428                                   ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 2429                                   ;*M8957, M8960
 2430                                   ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 2431                                   ;*''HLDA'' NOT SET  STATUS = 000000
 2432                                   ;*
 2433                                   ;*CZTMIA DVC FTL ERR 000026 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 2434                                   ;*M8956, M8957, MASSBUS
 2435                                   ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 2436                                   ;*MP ''MCPE'' NOT SET
 2437                                   ;*
 2438                                   ;*CZTMIA DVC FTL ERR 000027 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 2439                                   ;*M8956, M8957, MASSBUS
 2440                                   ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 2441                                   ;*MB ''MCPE'' SET
 2442  007344                           $
  (1)                                   ; **************************************************************************
 2443
 2444  007344                                   BGNTST
 2445  007344  005037  004412                  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
 2446  007350  004737  035154                  CALL    HOLDMP          ;HOLD TM78 MP-WAIT FOR HLDA
 2447  007354  012777  002400  174720          MOV     #HOLD+#EVPAR,@DS80  ;SET THE EVEN PARITY BIT
 2448  007362  017701  174666                  MOV     @DI1,R1         ;READ A CAS REGISTER
 2449  007366  017701  174636                  MOV     @XFRCMD,R1      ;GET MASS BUS REGISTER 0
 2450  007372  032701  020000                  BIT     #MCPE,R1        ;MASS BUS PARITY ERROR
 2451  007376  001004                          BNE     1$              ;YES-CONTINUE
 2452  007400                                   ERRDF   26.,RHCAS,ERM026  ;NO-ERROR
 2453
 2454  007410                           1$:     CKLOOP
 2455  007412  052777  000040  174620          BIS     #MBINIT,@CS2    ;ISSUE MB INIT
 2456  007420                                   DELAY   5               ;WAIT 1 MS.
 2457  007450  013777  004352  174562          MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
 2458  007456  012777  000400  174616          MOV     #HOLD,@DS80     ;HOLD THE TM78 MP
 2459  007464  000240                          NOP
 2460  007466  017701  174562                  MOV     @DI1,R1         ;READ A CAS REGISTER
 2461  007472  017701  174532                  MOV     @XFRCMD,R1      ;GET THE MASS BUS REG. 0
 2462  007476  032701  020000                  BIT     #MCPE,R1        ;MASS BUS PARITY ERROR?
 2463  007502  001404                          BEQ     2$              ;NO-EXIT
 2464  007504                                   ERRDF   27.,RHCAS,ERM027  ;YES-ERROR
 2465
 2466  007514                           2$:     CKLOOP
 2467  007516                                   ENDTST                  ;END OF TEST
 2468                                   .SBTTL  TEST 11 - TM78 ROM MEMORY TEST
 2469
 2470  007520                           ST
  (1)                                   ; **************************************************************************
  (1)                                   ;*TEST TITLE
  (1)                                   ;*----- -----
 2471                                   ;*  TEST 11 TM78 ROM MEMORY TEST
 2472  007520                           SD
  (1)                                   ; **************************************************************************
  (1)                                   ;*DESCRIPTION
  (1)                                   ;*-----------
 2473                                   ;*  THIS TEST CHECKS PARITY IN ROM FROM 00000 (8) TO 37777 (8)
 2474                                   ;*  BY READING FROM THE LAST 4 LOCATIONS IN EACH ROM CHIP.  THESE
 2475                                   ;*  4 LOCATIONS CONTAIN ROM SEGMENT IDENTIFICATION NUMBER, VERSION NUMBER,
```

```
                        ;*  AND ADDRESS OF LAST LOCATION USED IN THE ROM.  BY CHECKING PARITY
                        ;*  BIT THERE SHOULD BE PARITY ERRORS FOR ALL UNUSED LOCATIONS.  ANY DEVIATION
                        ;*  FROM THIS WILL CAUSE AN ERROR TO BE PRINTED.
007520                  SP
 (1)                    ; ****************************************************************************
 (1)                    ;*PROCEDURE
 (1)                    ;*---------
                        ;*  BGNTST
                        ;*    CALL SUBROUTINE HOLD MP
                        ;*    INITIALIZE THE ADDRESS TO 37777 (8)
                        ;*    INITIALIZE ROM SEGMENT IDENTIFICATION #
                        ;*    BGNDO
                        ;*    :  CLEAR ERROR LOOP FLAG
                        ;*    :  INITIALIZE COUNTER 2K
                        ;*    :  DECREMENT ROM ID #
                        ;*    :  INITIALIZE ROM INFORMATION COUNTER = 4
                        ;*    :  BGNDO
                        ;*    :  :  LOAD ROM ADDRESS
                        ;*    :  :  READ ROM
                        ;*    :  :  IF PARITY ERROR
                        ;*    :  :  :  THEN - ERROR IN ROM INFORMATION
                        ;*    :  :  :         CLEAR PARITY ERROR
                        ;*    :  :  ENDIF
                        ;*    :  :  DEC ROM INFORMATION COUNTER
                        ;*    :  :  DEC ROM ADDRESS
                        ;*    :  :  DEC COUNTER 2K
                        ;*    :  UNTIL COUNTER = 0 OR ERROR IN ROM INFORMATION
                        ;*    :  GET ROM ID #
                        ;*    :  IF NO PARITY ERROR IN ROM INFORMATION
                        ;*    :  :  THEN-IF NOT EXPECTED #
                        ;*    :  :        :  THEN-ERROR
                        ;*    :  :        :       SET ERROR FLAG FOR ROM INFORMATION
                        ;*    :  :        :  ELSE-DO UNTIL FIND ABOVE ADDRESS
                        ;*    :  :        :       :  DECREMENT COUNTER
                        ;*    :  :        :       :  DECREMENT ADDRESS
                        ;*    :  :        :       :  CHECK PARITY
                        ;*    :  :        :       :  IF PARITY ERROR NOT SET
                        ;*    :  :        :       :  :    THEN-ERROR
                        ;*    :  :        :       :  ENDIF
                        ;*    :  :        :       :  CLEAR PARITY ERROR BIT
                        ;*    :  :        :       ENDDO
                        ;*    :  :        :       DO UNTIL COUNTER = -1
                        ;*    :  :        :       :  DECREMENT ADDRESS
                        ;*    :  :        :       :  DECREMENT COUNTER
                        ;*    :  :        :       :  IF PARITY ERROR SET
                        ;*    :  :        :       :  :  THEN-ERROR
                        ;*    :  :        :       :  :        CLEAR PARITY ERROR
                        ;*    :  :        :       :  ENDIF
                        ;*    :  :        :       ENDDO
                        ;*    :  :        ENDIF
                        ;*    :  ENDIF
                        ;*    UNTIL ALL IDENTIFICATION #'S USED OR ERROR IN ROM INFORMATION
                        ;*  ENDTEST
007520                  SE
 (1)                    ; ****************************************************************************
 (1)                    ;*ERRORS
```

```
 (1)                    ;*------
2527                    ;*  TM78CLT DVC FTL ERR 000034 ON UNIT NN TST NNN SUB 000 PL:  XXXXXX
2528                    ;*  M8960
2529                    ;*  RH: AAAAAA TM: X TU: X PORT: X
2530                    ;*  TM78 ROM PARITY FAILURE
2531                    ;*  ADD = 000000
2532                    ;*
2533                    ;*  TM78CLT DVC FTL ERR 000035 ON UNIT NN TST NNN SUB 000 PL: XXXXXX
2534                    ;*  M8960
2535                    ;*  RH: AAAAAA  TM: X  TU: X  PORT: X
2536                    ;*  TM78 ROM IDENTIFICATION WRONG, CAN'T LOOP ON THIS ERROR
2537                    ;*  ADD = 000000
2538                    ;*  IDEN = 000
2539                    ;*  VER = 000
2540                    ;*
2541                    ;*  TM78CLT DVC FTL ERROR 000036 ON UNIT NN TST NNN SUB 000 PL: XXXXXX
2542                    ;*  M8960
2543                    ;*  RH: AAAAAA  TM: X  TU: X  PORT: X
2544                    ;*  ROM PARITY ERROR NOT SET AND SHOULD BE
2545                    ;*  ADD = 000000
2546                    ;*  IDEN = 000
2547                    ;*  VER = 000
2548                    ;*
2549                    ;*  TM78CLT DVC FTL ERR 000037 ON UNIT NN TST NNN SUB 000 PL: XXXXXX
2550                    ;*  M8960
2551                    ;*  RH: AAAAAA  TM: X  TU: X  PORT: X
2552                    ;*  ROM PARITY ERROR
2553                    ;*  ADD = 000000
2554                        IDEN = 000
2555                    ;*  VER = 000
2556  007520            S
 (1)                    ; ***************************************************************************
2557  007520                    BGNTST                      ;CLEAR ERROR LOOP FLAG
2558  007520  005037  004412    CLR     CASLD               ;CLEAR THE CAS PROGRAM LOADED FLAG
2559  007524  004737  035154    CALL    HOLDMP              ;HOLD THE TM78 - WAIT FOR HLDA
2560  007530  012703  037777    MOV     #37777,R3           ;GET LAST ADDRESS
2561  007534  012702  000010    MOV     #10,R2              ;GET ROM ID #
2562  007540  005037  004226  1$:CLR     ERRLP
2563  007544  012704  004000    MOV     #4000,R4            ;INITIALIZE COUNTER
2564  007550  005302            DEC     R2                  ;DECREMENT ROM ID #
2565  007552  002002            BGE     2$                  ;BRANCH IF NOT DONE
2566  007554  000137  010116    JMP     10$                 ;DONE
2567  007560  012705  004216  2$:MOV     #ROMIDT,R5          ;R5 CONTAINS ROM STORAGE INFORMATION ADDRESS
2568  007564  012701  000004    MOV     #4,R1               ;SET UP COUNTER
2569  007570                  3$:BGNSEG
2570  007572  010377  174502    MOV     R3,@AD80            ;LOAD STARTING ADDRESS
2571  007576  017725  174500    MOV     @DS80,(R5)+         ;STORE ROM INFORMATION
2572  007602  032777  020000  174472 BIT  #20000,@DS80       ;SEE IF PARITY ERROR
2573  007610  001414            BEQ     4$                  ;BRANCH IF NO ERROR
2574  007612                    ERRDF   34.,PRO,ERM034
2575  007622  052777  040400  174452 BIS  #40400,@DS80       ;CLEAR PARITY ERROR
2576  007630  012737  000001  004226 MOV  #1,ERRLP           ;SET ERROR FLAG
2577  007636  162705  000002    SUB     #2,R5               ;RESTORE ERROR INFORMATION
2578  007642                  4$:CKLOOP
2579  007644                    ENDSEG
2580  007646  005737  004226    TST     ERRLP               ;SEE IF ERROR
```

```
2581  007652  001404                          BEQ     11$             ;ERROR, GO GET ANOTHER ROM
2582  007654  062701  003774                  ADD     #3774,R1
2583  007660  160103                          SUB     R1,R3
2584  007662  000726                          BR      1$
2585  007664  005304                  11$:    DEC     R4              ;DECREMENT # OF ADDRESSES LEFT TO TEST
2586  007666  005303                          DEC     R3              ;DECREMENT ADDRESS
2587  007670  005301                          DEC     R1              ;DECREMENT ROM INFORMATION COUNTER
2588  007672  001336                          BNE     3$              ;BRANCH IF NOT DONE
2589  007674  012705  004216                  MOV     #ROMIDT,R5      ;GET ROM ID #
2590  007700  042715  177400                  BIC     #177400,(R5)    ;CLEAR OFF GARBAGE BITS
2591  007704  020215                          CMP     R2,(R5)         ;SEE IF ROM HAS CORRECT ID #
2592  007706  001411                          BEQ     5$              ;BRANCH IF YES
2593  007710  062703  000004                  ADD     #4,R3           ;GET ID ADDRESS
2594  007714                                  ERRDF   35.,PRO,ERM035
2595  007724  162703  004000                  SUB     #4000,R3        ;GET ADDRESS OF NEXT ROM
2596  007730  000703                          BR      1$              ;GO GET ANOTHER ROM
2597  007732  042765  177400  000004  5$:     BIC     #177400,4(R5)   ;MASK OFF HIGH BITS
2598  007740  042765  177400  000006          BIC     #177400,6(R5)   ;MASK OFF HIGH BITS
2599  007746  000365  000004                  SWAB    4(R5)           ;COMBINED HIGH & LOW BYTES TO MAKE ADDRESS
2600  007752  056565  000006  000004          BIS     6(R5),4(R5)     ;
2601  007760  020365  000004          6$:     CMP     R3,4(R5)        ;SEE IF LAST USED ADDRESS IN ROM
2602  007764  001426                          BEQ     8$              ;BRANCH IF YES
2603  007766                                  BGNSEG
2604  007770  010377  174304                  MOV     R3,@AD80        ;LOAD ADDRESS
2605  007774  017701  174302                  MOV     @DS80,R1        ;DUMMY READ
2606  010000  032777  020000  174274          BIT     #20000,@DS80    ;SEE IF PARITY ERROR SET
2607  010006  001004                          BNE     7$              ;BRANCH IF YES (NO ERROR)
2608  010010                                  ERRDF   36.,PRO,ERM036
2609  010020  052777  040400  174254  7$:     BIS     #40400,@DS80    ;RESET PARITY ERROR BIT
2610  010026                                  CKLOOP
2611  010030                                  ENDSEG
2612  010032  005303                          DEC     R3              ;GET NEXT ADDRESS
2613  010034  005304                          DEC     R4              ;DECREMENT COUNTER
2614  010036  001640                          BEQ     1$              ;BRANCH IF DONE WITH ROM
2615  010040  000747                          BR      6$              ;CONTINUE LOOP
2616  010042                          8$:     BGNSEG
2617  010044  010377  174230                  MOV     R3,@AD80        ;LOAD ADDRESS
2618  010050  017701  174226                  MOV     @DS80,R1        ;DUMMY READ
2619  010054  032777  020000  174220          BIT     #20000,@DS80    ;SEE IF PARITY ERROR
2620  010062  001407                          BEQ     9$              ;BRANCH IF NO PARITY ERROR
2621  010064                                  ERRDF   37.,PRO,ERM037
2622  010074  052777  040400  174200          BIS     #40400,@DS80    ;RESET PARITY ERROR
2623  010102                          9$:     CKLOOP
2624  010104                                  ENDSEG
2625  010106  005303                          DEC     R3              ;GET NEXT ADDRESS
2626  010110  005304                          DEC     R4              ;AM I DONE YET
2627  010112  001612                          BEQ     1$              ;YES?
2628  010114  000752                          BR      8$              ;GO GET MORE
2629  010116                          10$:    ENDTST
2630
2631
2632                                  .SBTTL  TEST 12 - TM78 MEMORY TEST - LOW ADDRESS LINES
2633
2634  010120                          ST
 (1)                                ; ******************************************************************************
 (1)                                ;*TEST TITLE
```

```
  (1)
2635
2636  010120                    SD
  (1)                           ;*********************************************************************
  (1)                           ;*DESCRIPTION
  (1)                           ;*-----------
2637                            ;*THIS TEST CHECKS THE TM78 RAM FROM LOCATION 40000(8) TO 50000(8) BY
2638                            ;*WRITING THE LEAST SIGNIFICANT 8 BITS OF THE ADDRESS INTO THE BYTE AT
2639                            ;*THAT ADDRESS.
2640  010120                    SP
  (1)                           ;*********************************************************************
  (1)                           ;*PROCEDURE
  (1)                           ;*---------
2641                            ;*BGNTST
2642                            ;*  CALL SUBROUTINE HOLDMP
2643                            ;*  INITIALIZE THE ADDRESS TO 40000(8)
2644                            ;*  BGNDO
2645                            ;*  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
2646                            ;*  :  LOAD THE LEAST SIGNIFICANT 8 BITS OF THE ADDRESS AND THE HOLD BIT
2647                            ;*  :       IN CAS REGISTER 21(8)
2648                            ;*  :  INCREMENT THE ADDRESS BY 1
2649                            ;*  :  DO UNTIL THE ADDRESS=50000(8)
2650                            ;*  ENDDO
2651                            ;*  INITIALIZE THE ADDRESS TO 40000(8)
2652                            ;*  BGNDO
2653                            ;*  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
2654                            ;*  :  INPUT CAS REGISTER 21(8) LOW 8 BITS
2655                            ;*  :  IF LOW 8 BITS OF CAS REGISTER 21(8)=LOW 8 BITS OF ADDRESS
2656                            ;*  :  :  THEN-CONTINUE
2657                            ;*  :  :  ELSE-ERROR 28
2658                            ;*  :  ENDIF
2659                            ;*  :  INCREMENT THE ADDRESS BY 1
2660                            ;*  :  DO UNTIL THE ADDRESS=50000(8)
2661                            ;*  ENDDO
2662                            ;*ENDTST
2663  010120                    SE
  (1)                           ;*********************************************************************
  (1)                           ;*ERRORS
  (1)                           ;*------
2664                            ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
2665                            ;*M8957, M8960
2666                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
2667                            ;*''HLDA'' NOT SET  STATUS = 000000
2668                            ;*
2669                            ;*CZTMIA DVC FTL ERR 000028 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
2670                            ;*M8960
2671                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
2672                            ;*TM78 MEMORY FAILURE
2673                            ;*ADD = 000000
2674                            ;*ACT = 000000
2675                            ;*EXP = 000000
2676  010120                    S
  (1)                           ;*********************************************************************
2677
2678  010120                          BGNTST
2679  010120  005037  004412          CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
```

```
2680  010124  004737  035154                CALL    HOLDMP          ;HOLD THE TM78MP-WAIT FOR HLDA
2681  010130  012703  040000                MOV     #040000,R3      ;LOAD STARTING MEMORY ADDRESS
2682  010134  010377  174140        1$:     MOV     R3,@AD80        ;ADDRESS THE TM78
2683  010140  010302                        MOV     R3,R2           ;COPY THE ADDRESS
2684  010142  042702  177400                BIC     #177400,R2      ;AND OFF LO BYTE
2685  010146  052702  000400                BIS     #HOLD,R2        ;ADD IN THE HOLD BIT
2686  010152  010277  174124                MOV     R2,@DS80        ;WRITE IT TO THE TM78MP
2687  010156  005203                        INC     R3              ;INCREMENT THE MEMORY ADDRESS
2688  010160  022703  050000                CMP     #050000,R3      ;COMPARE TO FINAL ADDRESS
2689  010164  001363                        BNE     1$              ;CONTINUE UNTIL DONE
2690
2691  010166  012703  040000                MOV     #040000,R3      ;LOAD THE STARTING MEMORY ADDRESS
2692  010172                        3$:     BGNSEG
2693  010174  010377  174100                MOV     R3,@AD80        ;ADDRESS TM78 RAM
2694  010200  010302                        MOV     R3,R2           ;COPY ADDRESS TO R2
2695  010202  042702  177400                BIC     #177400,R2      ;REMOVE LO BYTE
2696  010206  017704  174070                MOV     @DS80,R4        ;GET CONTENTS OF TM78 RAM
2697  010212  042704  177400                BIC     #177400,R4      ;REMOVE DATA BYTE
2698  010216  020204                        CMP     R2,R4           ;EXPECTED=ACTUAL?
2699  010220  001410                        BEQ     2$              ;YES-CONTINUE
2700                                                                ;NO-PRINT ERROR
2701  010222                                ERRDF   28.,PRO,ERM028
2702  010232  052702  000400                BIS     #HOLD,R2        ;REWRITE THE FAILING LOCATION
2703  010236  010277  174040                MOV     R2,@DS80
2704
2705  010242                        2$:     CKLOOP
2706  010244                                ENDSEG
2707  010246  005203                        INC     R3              ;INCREMENT THE TM78 ADDRESS
2708  010250  022703  050000                CMP     #050000,R3      ;DONE?
2709  010254  001346                        BNE     3$              ;NO-KEEP ON TRUKIN'
2710  010256                                ENDTST                  ;YES-HANG IT UP
2711
2712
2713                                .SBTTL  TEST 13 - TM78 MEMORY TEST - HIGH ADDRESS LINES
2714
2715  010260                        ST
 (1)                                ; ***************************************************************************
 (1)                                ;*TEST TITLE
 (1)                                ;*---- -----
2716                                ;TEST 13        TM78 MEMORY TEST - HIGH ADDRESS BITS AS DATA
2717  010260                        SD
 (1)                                ; ***************************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
2718                                ;*THIS TEST CHECKS THE TM78 RAM FROM LOCATION 40000(8) TO 50000(8) BY
2719                                ;*WRITING THE MOST SIGNIFICANT 8 BITS OF THE ADDRESS INTO THE BYTE AT
2720                                ;*THAT ADDRESS.
2721  010260                        SP
 (1)                                ; ***************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
2722                                ;*BGNTST
2723                                ;*  CALL SUBROUTINE HOLDMP
2724                                ;*  INITIALIZE THE ADDRESS TO 40000(8)
2725                                ;*  BGNDO
2726                                ;*  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
```

```
                                ;*  :  LOAD THE MOST SIGNIFICANT 8 BITS OF THE ADDRESS AND THE HOLD BIT
                                ;*  :       IN CAS REGISTER 21(8)
                                ;*  :  INCREMENT THE ADDRESS BY 1
                                ;*  :  DO UNTIL THE ADDRESS=50000(8)
                                ;*  ENDDO
                                ;*  INITIALIZE THE ADDRESS TO 40000(8)
                                ;*  BGNDO
                                ;*  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
                                ;*  :  INPUT CAS REGISTER 21(8) LOW 8 BITS
                                ;*  :  IF LOW 8 BITS OF CAS REGISTER 21(8)=HIGH 8 BITS OF ADDRESS
                                ;*  :  :  THEN-CONTINUE
                                ;*  :  :  ELSE-ERROR 28
                                ;*  :  ENDIF
                                ;*  :  INCREMENT THE ADDRESS BY 1
                                ;*  :  DO UNTIL THE ADDRESS=50000(8)
                                ;*  ENDDO
                                ;*ENDTST
010260                          SE
  (1)                           ; ************************************************************************
  (1)                           ;*ERRORS
  (1)                           ;*------
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000028 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*TM78 MEMORY FAILURE
                                ;*ADD = 000000
                                ;*ACT = 000000
                                ;*EXP = 000000
010260                          S
  (1)                           ; ************************************************************************

010260                                  BGNTST
010260  005037  004412                  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
010264  004737  035154                  CALL    HOLDMP          ;HOLD THE TM78MP-WAIT FOR HLDA
010270  012703  040000                  MOV     #040000,R3      ;LOAD STARTING MEMORY ADDRESS
010274  010377  174000          1$:     MOV     R3,@AD80        ;ADDRESS THE TM78
010300  010302                          MOV     R3,R2           ;COPY THE ADDRESS
010302  000302                          SWAB    R2              ;SWAP HI/LO BYTES
010304  042702  177400                  BIC     #177400,R2      ;AND OFF LO BYTE
010310  052702  000400                  BIS     #HOLD,R2        ;ADD IN THE HOLD BIT
010314  010277  173762                  MOV     R2,@DS80        ;WRITE IT TO THE TM78MP
010320  005203                          INC     R3              ;INCREMENT THE MEMORY ADDRESS
010322  022703  050000                  CMP     #050000,R3      ;COMPARE TO FINAL ADDRESS
010326  001362                          BNE     1$              ;CONTINUE UNTIL DONE

010330  012703  040000                  MOV     #040000,R3      ;LOAD THE STARTING MEMORY ADDRESS
010334                          3$:     BGNSEG
010336  010377  173736                  MOV     R3,@AD80        ;ADDRESS TM78 RAM
010342  010302                          MOV     R3,R2           ;COPY ADDRESS TO R2
010344  000302                          SWAB    R2              ;SWAP HI/LO BYTES
010346  042702  177400                  BIC     #177400,R2      ;REMOVE LO BYTE
```

```
2779  010352  017704  173724                  MOV     @DS80,R4        ;GET CONTENTS OF TM78 RAM
2780  010356  042704  177400                  BIC     #177400,R4      ;REMOVE DATA BYTE
2781  010362  020204                          CMP     R2,R4           ;EXPECTED=ACTUAL?
2782  010364  001410                          BEQ     2$              ;YES-CONTINUE
2783                                                                  ;NO-PRINT ERROR
2784  010366                                  ERRDF   28.,PRO,ERM028
2785  010376  052702  000400                  BIS     #HOLD,R2        ;REWRITE FAILING LOCATION
2786  010402  010277  173674                  MOV     R2,@DS80
2787
2788  010406                          2$:     CKLOOP
2789  010410                                  ENDSEG
2790  010412  005203                          INC     R3              ;INCREMENT THE TM78 ADDRESS
2791  010414  022703  050000                  CMP     #050000,R3      ;DONE?
2792  010420  001345                          BNE     3$              ;NO-KEEP ON TRUKIN'
2793  010422                                  ENDTST                  ;YES-HANG IT UP
2794
2795                                  .SBTTL  TEST 14 - TM78 MEMORY TEST - DATA RELIABILITY
2796  010424                          ST
 (1)                                ; ******************************************************************************
 (1)                                ;*TEST TITLE
 (1)                                ;*---- -----
2797                                ;*TEST 14       TM78 MEMORY TEST - DATA RELIABILITY
2798  010424                          SD
 (1)                                ; ******************************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
2799                                ;*THIS TEST CHECKS THE TM78 RAM FROM LOCATION 40000(8) TO 50000(8) BY
2800                                ;*WRITING DATA OF 000-377(8) TO EACH RAM LOCATION AND CHECKING THE DATA.
2801  010424                          SP
 (1)                                ; ******************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
2802                                ;*BGNTST
2803                                ;*  CALL SUBROUTINE HOLDMP
2804                                ;*  CLEAR THE DATA PATTERN
2805                                ;*  BGNDO
2806                                ;*  :  INITIALIZE THE ADDRESS TO 40000(8)
2807                                ;*  :  BGNDO
2808                                ;*  :  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
2809                                ;*  :  :  LOAD THE DATA PATTERN + THE HOLD BIT IN CAS REGISTER 21(8)
2810                                ;*  :  :  INCREMENT THE ADDRESS BY 1
2811                                ;*  :  :  DO UNTIL THE ADDRESS=50000(8)
2812                                ;*  :  ENDDO
2813                                ;*  :  INITIALIZE THE ADDRESS TO 40000(8)
2814                                ;*  :  BGNDO
2815                                ;*  :  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
2816                                ;*  :  :  INPUT CAS REGISTER 21(8) LOW 8 BITS
2817                                ;*  :  :  IF LOW 8 BITS OF CAS REGISTER 21(8)=
2818                                ;*  :  :  :  THEN-CONTINUE
2819                                ;*  :  :  :  ELSE-ERROR 28
2820                                ;*  :  :  ENDIF
2821                                ;*  :  :  INCREMENT THE ADDRESS BY 1
2822                                ;*  :  :  DO UNTIL THE ADDRESS=50000(8)
2823                                ;*  :  ENDDO
2824                                ;*  :  INCREMENT THE DATA PATTERN BY 1
2825                                ;*  :  DO UNTIL THE DATA PATTERN=0
```

```
                                        ;*  ENDDO
                                        ;*ENDTST
                                        SE
                                        ; ************************************************************************
                                        ;*ERRORS
                                        ;*------
                                        ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8957, M8960
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*''HLDA'' NOT SET  STATUS = 000000
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000028 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8960
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*TM78 MEMORY FAILURE
                                        ;*ADD = 000000
                                        ;*ACT = 000000
                                        ;*EXP = 000000
                                        ;
                                        S
                                        ; ************************************************************************

                                            BGNTST
010424                                      CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
010424  005037  004412                      CALL    HOLDMP          ;HOLD THE TM78MP-WAIT FOR HLDA
010430  004737  035154                      CLR     R2              ;SET UP STARTING DATA PATTERN
010434  005002                              CLR     R1              ;CLEAR THE ERROR OCCURED FLAG
010436  005001                      4$:     MOV     #040000,R3      ;LOAD STARTING MEMORY ADDRESS
010440  012703  040000              1$:     MOV     R3,@AD80        ;ADDRESS THE TM78
010444  010377  173630                      BIC     #177400,R2      ;REMOVE JUNK BITS
010450  042702  177400                      BIS     #HOLD,R2        ;ADD IN THE HOLD BIT
010454  052702  000400                      MOV     R2,@DS80        ;WRITE IT TO THE TM78MP
010460  010277  173616                      INC     R3              ;INCREMENT THE MEMORY ADDRESS
010464  005203                            CMP     #050000,R3      ;COMPARE TO FINAL ADDRESS
010466  022703  050000                      BNE     1$              ;CONTINUE UNTIL DONE
010472  001364                            MOV     #040000,R3      ;LOAD THE STARTING MEMORY ADDRESS
010474  012703  040000                      BGNSEG
010500                              3$:     MOV     R3,@AD80        ;ADDRESS TM78 RAM
010502  010377  173572                      BIC     #177400,R2      ;REMOVE JUNK BITS
010506  042702  177400                      MOV     @DS80,R4        ;GET CONTENTS OF TM78 RAM
010512  017704  173564                      BIC     #177400,R4      ;REMOVE DATA BYTE
010516  042704  177400                      CMP     R2,R4           ;EXPECTED=ACTUAL?
010522  020204                            BEQ     2$              ;YES-CONTINUE
010524  001412                            ERRDF   28.,PRO,ERM028  ;NO - PRINT ERROR
010526                                      MOV     #1,R1           ;SET THE ERROR OCCURED FLAG
010536  012701  000001                      BIS     #HOLD,R2        ;REWRITE THE FAILING LOCATION
010542  052702  000400                      MOV     R2,@DS80
010546  010277  173530              2$:     TST     R1              ;HAVE ANY ERRORS OCCURED?
010552  005701                            BEQ     5$              ;NO - SKIP THE CKLOOP TO SAVE TIME
010554  001401                            CKLOOP
010556                              5$:     INC     R3              ;INCREMENT THE TM78 ADDRESS
010560  005203                            CMP     #050000,R3      ;DONE?
010562  022703  050000                      BNE     3$              ;NO-KEEP ON TRUKIN'
010566  001345                            ENDSEG
010570                                      INC     R2              ;YES-INCREMENT THE DATA BYTE
010572  005202                            CMP     R2,#400         ;ALL PATTERNS RUN?
010574  020227  000400                      BNE     4$              ;NO-KEEP ON TRUKIN'
010600  001317
```

```
                        ENDTST                          ;YES-HANG IT UP
                .SBTTL  TEST 15 - CAS WRITE/READ TEST - ADDRESS TO ADDRESS
010602                  ST
                ; ******************************************************************************
                ;*TEST TITLE
                ;*---- -----
                ;*TEST 15        CAS WRITE/READ TEST - ADDRESS TO ADDRESS
010604                  SD
                ; ******************************************************************************
                ;*DESCRIPTION
                ;*-----------
                ;*THIS TEST PERFORMS A BASIC CHECK OF THE COMMON ADDRESS SPACE (CAS)
                ;*ADDRESSING LOGIC BY WRITING THE NUMBER OF THE CAS REGISTER TO ITS
                ;*RESPECTIVE REGISTER.
010604                  SP
                ; ******************************************************************************
                ;*PROCEDURE
                ;*---------
                ;*BGNTST
                ;*   CALL SUBROUTINE HOLDMP
                ;*   SET CPU INTERRUPT PRIORITY TO IGNORE INTERRUPTS
                ;*   INITIALIZE N TO ZERO
                ;*   INITIALIZE THE DATA BYTE TO 2
                ;*   BGNDO
                ;*   :   WRITE DATA BYTE TO CAS N
                ;*   :   INCREMENT THE CAS REGISTER NUMBER BY 1
                ;*   :   INCREMENT THE DATA BYTE BY 1
                ;*   :   DO UNTIL ALL CAS REGISTERS WRITTEN
                ;*   ENDDO
                ;*   CALL SUBROUTINE CASWRT
                ;*   CALL SUBROUITNE CASRED
                ;*   CALL SUBROUTINE CASCMP
                ;*ENDTST
010604          SE
                ; ******************************************************************************
                ;*ERRORS
                ;*------
                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                ;*M8956, M8957, MASSBUS
                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                ;*''NED'' WHEN READING MB REG.
                ;*
                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                ;*M8957, M8960
                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                ;*''HLDA'' NOT SET  STATUS = 000000
                ;*
                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                ;*M8956, M8957
                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                ;*CAS DATA COMPARE FAIL
                ;*CAS REG. 000000
                ;*
                ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                ;*M8956, M8957, MASSBUS
                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
```

```
                                        ;*PARITY ERR. READING CAS REG. 000000
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8956, M8957, MASSBUS
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*PARITY ERR. WRITING CAS REG. 000000
                                        S
                                        ; ************************************************************************
                                              BGNTST
010604                                        CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
010604  005037  004412                      CALL    HOLDMP          ;STOP THE 8085
010610  004737  035154                      MOV     #2,R2           ;INITIALIZE THE DATA BYTE
010614  012702  000002                      CLR     R1              ;CLEAR THE BUFFER POINTER
010620  005001                      1$:     MOV     R2,MBBUF(R1)    ;WRITE DATA TO THE BUFFER
010622  010261  033642                      INC     R1              ;ADD #2 TO THE BUFFER POINTER
010626  005201                              INC     R1
010630  005201                              INC     R2              ;ADD #1 TO THE DATA BYTE
010632  005202                              CMP     R1,#30.         ;END OF BUFFER?
010634  020127  000036                      BNE     1$              ;NO-CONTINUE
010640  001370                              CALL    CASWRT          ;GO WRITE CAS FROM HOST
010642  004737  034350                      CALL    CASRED          ;GO READ CAS FROM HOST
010646  004737  034452                      CALL    CASCMP          ;GO COMPARE DATA
010652  004737  035020                      ENDTST
010656                                  .SBTTL  TEST 16 - TM78 BASIC CONFIDENCE TEST
                                        ST
                                        ; ************************************************************************
                                        ;*TEST TITLE
                                        ;*---- -----
                                        ;*TEST 16        TM78 BASIC CONFIDENCE TEST
010660                                  SD
                                        ; ************************************************************************
                                        ;*DESCRIPTION
                                        ;*-----------
                                        ;*THIS TEST LOADS A PROGRAM (MICRO-DIAGNOSTIC) TO THE TM78 RAM AND
                                        ;*STARTS IT RUNNING.  THE PURPOSE OF THE DIAGNOSTIC IS TO GAIN CON-
                                        ;*FIDENCE IN THE TM78 MICRO-DIAGNOSTIC RAM THE ADDRESSING CAPABILITY
                                        ;*OF THE 8085.
010660                                  SP
                                        ; ************************************************************************
                                        ;*PROCEDURE
                                        ;*---------
                                        ;*BGNTST
                                        ;*  CALL SUBROUTINE CASBOT
                                        ;*  IF ERRCOD=0
                                        ;*  :  THEN-CALL SUBROUTINE HOLDMP
                                        ;*  :       DEPOSIT 3 INTO TM78 RAM LOCATION 41420(8)
                                        ;*  :       CALL SUBROUTINE DIAGST
                                        ;*  :       IF ERRCOD=0
                                        ;*  :       :  THEN-LOAD 35(8) INTO CAS LOCATION 0
                                        ;*  :       :       DELAY
                                        ;*  :       :       IF INTERRUPT CODE=372(8)
                                        ;*  :       :       :  THEN-CONTINUE
                                        ;*  :       :       :  ELSE-ERROR
                                        ;*  :       :       ENDIF
                                        ;*  :       ENDIF
                                        ;*  ENDIF
```

```
                                        ;*ENDTST
010660                                  SE
                                        ; ************************************************************************
                                        ;*ERRORS
                                        ;*------
                                        ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8957, M8960
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
010660                                  S
                                        ; ************************************************************************

010660                                          BGNTST
010660  004737  034242                          CALL    CASBOT
010664  005705                                  TST     ERRCOD
010666  001402                                  BEQ     2$
010670                                          EXIT    TST
010674  004737  035154              2$:         CALL    HOLDMP          ;STOP THE TM78
010700  012777  041420  173372                  MOV     #CASCMD,@AD80   ;ADDRESS THE COMMAND LOCATION
010706  012777  000403  173366                  MOV     #HOLD+3,@DS80   ;STORE THE MEMORY TEST COMMAND
010714  004737  014762                          CALL    DIAGST          ;START THE DIAGNOSTIC MONITOR
010720  005705                                  TST     ERRCOD          ;ERROR?
010722  001402                                  BEQ     5$              ;NO - CONTINUE
010724                                          EXIT    TST             ;YES - EXIT THE TEST
010730  012777  000035  173272      5$:         MOV     #TSTART,@XFRCMD ;ISSUE CODE 35
010736  012702  000214                          MOV     #140.,R2        ;TIMES TO DELAY TO EQUAL 35 SEC .
010742                                  6$:     DELAY   250             ;DELAY 25 MS.
010772                                          BREAK                   ;
010774  005302                                  DEC     R2              ;DECREMENT LOOP COUNT
010776  001361                                  BNE     6$              ;DO IT AGAIN
011000  013777  004352  173232                  MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
011006  122777  000372  173214                  CMPB    #372,@XFRCMD    ;DID PROC TEST FINISH.
011014  001404                                  BEQ     1$              ;YES-DONE
011016                                          ERRDF   8.,PROCAS,ERM008
011026                                  1$:     CKLOOP
011030  004737  021660                          CALL    CLOSEX          ;CLOSE THE CHANNEL

011034                                          ENDTST


                                        .SBTTL  TEST 17 - CAS CONTENTION INTERRUPT TEST
011036                                  ST
                                        ; ************************************************************************
                                        ;*TEST TITLE
                                        ;*---- -----
                                        ;*TEST 17       CAS CONTENTION INTERRUPT TEST
011036                                  SD
                                        ; ************************************************************************
                                        ;*DESCRIPTION
                                        ;*-----------
                                        ;*THIS TEST CHECKS THE OPERATION OF THE CAS CONTENTION (BETWEEN THE
                                        ;*HOST AND THE 8085.) ERROR LOGIC.  TO TEST THE PROPER OPERATION OF
                                        ;*THE LOGIC A PROGRAM MUST BE LOADED AND EXECUTED IN THE TM78 THAT
                                        ;*ACCESSES CAS WHILE THE HOST ACCESSES CAS.
011036                                  SP
                                        ; ************************************************************************
```

```
  (1)                                   ;*PROCEDURE
  (1)                                   ;*---------
 3013                                   ;*BGNTST
 3014                                   ;*  CALL SUBROUTINE CASBOT (LOAD THE CAS PROGRAM)
 3015                                   ;*  IF A BOOT ERROR
 3016                                   ;*  :  THEN-EXIT TEST
 3017                                   ;*  :  ELSE-CONTINUE
 3018                                   ;*  ENDIF
 3019                                   ;*  CALL SUBROUTINE HOLDMP
 3020                                   ;*
 3021                                   ;*  LOAD THE ADDRESS OF THE CAS CONTROL BYTE 41420 TO CAS REGISTER 20(8)
 3022                                   ;*  LOAD THE ''HOLD'' BIT+002 TO CAS REGISTER 21(8)
 3023                                   ;*  CALL SUBROUTINE CONT
 3024                                   ;*  LOAD THE DIAGNOSTIC START/RESTART COMMAND 35(8) TO MB REGISTER 0
 3025                                   ;*  SET UP A TIMEOUT COUNT
 3026                                   ;*  BGNDO
 3027                                   ;*  :  READ ALL THE MB REGISTERS 000-052(8)
 3028                                   ;*  :  DECREMENT THE TIMEOUT COUNT
 3029                                   ;*  :  DO UNTIL TIMEOUT COUNT=0 OR MB REGISTER 0=372(8)
 3030                                   ;*  ENDDO
 3031                                   ;*  IF TIMEOUT COUNT=0
 3032                                   ;*  :  THEN-ERROR 18
 3033                                   ;*  :  ELSE-CONTINUE
 3034                                   ;*  ENDIF
 3035                                   ;*ENDTST
 3036  011036                           SE
                                       ; ************************************************************************
  (1)                                  ;*ERRORS
  (1)                                  ;*------
  (1)
 3037                                   ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 3038                                   ;*M8957, M8960
 3039                                   ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 3040                                   ;*''HLDA'' NOT SET  STATUS = 000000
 3041                                   ;*
 3042                                   ;*CZTMIA DVC FTL ERR 000018 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 3043                                   ;*M8956, M8957
 3044                                   ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 3045                                   ;*NO CONTENTION ERROR OCCURRED
 3046  011036                           S
                                       ; ************************************************************************
  (1)
 3047
 3048  011036                                   BGNTST
 3049  011036  004737  034242                  CALL    CASBOT          ;BOOT UP THE CAS PROGRAM
 3050  011042  005705                          TST     ERRCOD
 3051  011044  001402                          BEQ     5$
 3052  011046                                   EXIT    TST
 3053  011052  004737  035154          5$:     CALL    HOLDMP
 3054  011056  012737  000777  004346          MOV     #777,COUNT      ;LOAD TIMEOUT COUNT
 3055  011064  012777  041420  173206          MOV     #CASCMD,@ADS80  ;ADDRESS THE COMMAND BYTE
 3056  011072  012777  000402  173202          MOV     #HOLD+2,@DS80   ;WRITE THE CONTENTION TEST COMMAND
 3057  011100  004737  014762                  CALL    DIAGST
 3058  011104  005705                          TST     ERRCOD          ;ERROR?
 3059  011106  001402                          BEQ     4$              ;NO - CONTINUE
 3060  011110                                   EXIT    TST             ;YES - EXIT THE TEST
 3061  011114  012777  000035  173106  4$:     MOV     #TSTART,@XFRCMD ;
 3062  011122  013701  004230          2$:     MOV     XFRCMD,R1       ;LOAD STARTING CAS ADDRESS
```

```
3063  011126  012100                  1$:     MOV     (R1)+,R0        ;READ MASS BUS REGISTER
3064  011130  023701  004300                  CMP     AD80,R1
3065  011134  001374                          BNE     1$
3066  011136  122777  000372  173064          CMPB    #372,@XFRCMD    ;DID A CONTENTION INTERRUPT OCCUR?
3067  011144  001407                          BEQ     6$              ;YES-CONTENTION ERROR OCCURRED
3068  011146  005337  004346                  DEC     COUNT           ;NO-TRY AGAIN?
3069  011152  001363                          BNE     2$              ;YES-CONTINUE
3070                                                                  ;NO-ERROR
3071  011154                                  ERRDF   18.,CASX,ERM018
3072
3073  011164                          6$:     CKLOOP
3074  011166                                  ENDTST
3075
3076                                  .SBTTL  TEST 18 - CAS WRITE TEST - ALL ZEROS
3077  011170                          ST
 (1)                                ; ******************************************************************************
 (1)                                ;*TEST TITLE
 (1)                                ;*---- -----
3078                                ;*TEST 18       CAS WRITE TEST - ALL ZEROS
3079  011170                        SD
 (1)                                ; ******************************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
3080                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3081                                ;*HOST CPU WITH A DATA PATTERN OF 000000(8), READING THE PATTERN FROM
3082                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
3083                                ;*ARE LOGGED.
3084  011170                        SP
 (1)                                ; ******************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
3085                                ;*BGNTST
3086                                ;*  SET UP THE DATA PATTERN 000000(8)
3087                                ;*  CALL SUBROUTINE CASCOW
3088                                ;*ENDTST
3089  011170                        SE
 (1)                                ; ******************************************************************************
 (1)                                ;*ERRORS
 (1)                                ;*------
3090                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3091                                ;*M8956, M8957, MASSBUS
3092                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3093                                ;*''NED'' WHEN READING MB REG.
3094                                ;*
3095                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3096                                ;*M8957, M8960
3097                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3098                                ;*''HLDA'' NOT SET  STATUS = 000000
3099                                ;*
3100                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3101                                ;*M8957, M8960
3102                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3103                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3104                                ;*
3105                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3106                                ;*M8956, M8957
```

```
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. WRITING CAS REG. 000000
011170                          S
 (1)                            ; ************************************************************************
                                ;
                                        BGNTST
011170                                  CLR     R2
011170  005002                          CALL    CASCOW
011172  004737  034006                  ENDTST
011176
                                .SBTTL  TEST 19 - CAS WRITE TEST - ALL ONES
011200                          ST
 (1)                            ; ************************************************************************
 (1)                            ;*TEST TITLE
 (1)                            ;*---- -----
                                ;*TEST 19       CAS WRITE TEST - ALL ONES
011200                          SD
 (1)                            ; ************************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*HOST CPU WITH A DATA PATTERN OF 177777(8), READING THE PATTERN FROM
                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
                                ;*ARE LOGGED.
011200                          SP
 (1)                            ; ************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 177777(8)
                                ;*  CALL SUBROUTINE CASCOW
                                ;*ENDTST
011200                          SE
 (1)                            ; ************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
```

```
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. WRITING CAS REG. 000000
                                S
                                ; ************************************************************************
                                
                                        BGNTST
011200  012702  177777          MOV     #177777,R2      ;LOAD ALL ONES DATA PATTERN
011204  004737  034006 .        CALL    CASCOW          ;
                                ENDTST

                                .SBTTL  TEST 20 - CAS WRITE TEST - DATA PATTERN 153271
                                ST
                                ; ************************************************************************
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 20        CAS WRITE TEST - DATA PATTERN 153271
                                SD
                                ; ************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*HOST CPU WITH A DATA PATTERN OF 153271(8), READING THE PATTERN FROM
                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
                                ;*ARE LOGGED.
                                SP
                                ; ************************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 153271(8)
                                ;*  CALL SUBROUTINE CASCOW
                                ;*ENDTST
                                SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
```

```
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. WRITING CAS REG. 000000
011212                          S
 (1)                            ; ****************************************************************************
                                
                                        BGNTST
011212                          
011212  012702  153271                  MOV     #153271,R2      ;LOAD ALTERNATE ZEROS AND ONES
011216  004737  034006                  CALL    CASCOW
011222                                  ENDTST
                                
                                .SBTTL  TEST 21 - CAS WRITE TEST - DATA PATTERN 175747
011224                          ST
 (1)                            ; ****************************************************************************
 (1)                            ;*TEST TITLE
 (1)                            ;*---- -----
                                ;*TEST 21       CAS WRITE TEST - DATA PATTERN 175747
011224                          SD
 (1)                            ; ****************************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*HOST CPU WITH A DATA PATTERN OF 175747(8), READING THE PATTERN FROM
                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
                                ;*ARE LOGGED.
011224                          SP
 (1)                            ; ****************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 175747(8)
                                ;*  CALL SUBROUTINE CASCOW
                                ;*ENDTST
011224                          SE
 (1)                            ; ****************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
```

```
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. WRITING CAS REG. 000000
011224                          S
                                ; ************************************************************************
                                
                                        BGNTST
011224                                  MOV     #175747,R2      ;LOAD ALTERNATE ZEROS AND ONES
011230  004737  034006                  CALL    CASCOW
011234                                  ENDTST
                                
                                .SBTTL  TEST 22 - CAS WRITE TEST - DATA PATTERN 062232
011236                          ST
                                ; ************************************************************************
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 22        CAS WRITE TEST - DATA PATTERN 062232
011236                          SD
                                ; ************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*HOST CPU WITH A DATA PATTERN OF 062132(8), READING THE PATTERN FROM
                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
                                ;*ARE LOGGED.
011236                          SP
                                ; ************************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 062132(8)
                                ;*  CALL SUBROUTINE CASCOW
                                ;*ENDTST
011236                          SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
```

```
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*"HLDA" NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. WRITING CAS REG. 000000
011236                          S
 (1)                            ; ************************************************************************
                                
011236                                  BGNTST
011236  012702  062132                  MOV     #062132,R2      ;LOAD ALTERNATE ZEROS AND ONES
011242  004737  034006                  CALL    CASCOW
011246                                  ENDTST
                                
                                .SBTTL  TEST 23 - CAS WRITE TEST - DATA PATTERN 042002
011250                          ST
 (1)                            ; ************************************************************************
 (1)                            ;*TEST TITLE
 (1)                            ;*---- -----
                                ;*TEST 23       CAS WRITE TEST - DATA PATTERN 042002
011250                          SD
 (1)                            ; ************************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*HOST CPU WITH A DATA PATTERN OF 042002(8), READING THE PATTERN FROM
                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
                                ;*ARE LOGGED.
011250                          SP
 (1)                            ; ************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 042002(8)
                                ;*  CALL SUBROUTINE CASCOW
                                ;*ENDTST
011250                          SE
 (1)                            ; ************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
```

```
                                ;*'NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*'HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. WRITING CAS REG. 000000
011250                          S
 (1)                            ; **********************************************************************

                                        BGNTST
011250                                  MOV     #042002,R2      ;LOAD ALTERNATE ZEROS AND ONES
011250  012702  042002                  CALL    CASCOW
011254  004737  034006                  ENDTST
011260

                                .SBTTL  TEST 24 - CAS WRITE TEST - DATA PATTERN 070066
011262                          ST
 (1)                            ; **********************************************************************
 (1)                            ;*TEST TITLE
 (1)                            ;*---- -----
                                ;*TEST 24       CAS WRITE TEST - DATA PATTERN 070066
011262                          SD
 (1)                            ; **********************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*HOST CPU WITH A DATA PATTERN OF 070066(8), READING THE PATTERN FROM
                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
                                ;*ARE LOGGED.
011262                          SP
 (1)                            ; **********************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 070066(8)
                                ;*  CALL SUBROUTINE CASCOW
                                ;*ENDTST
011262                          SE
 (1)                            ; **********************************************************************
 (1)                            ;*ERRORS
```

```
 (1)                                ;*------
3366                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3367                                ;*M8956, M8957, MASSBUS
3368                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3369                                ;*''NED'' WHEN READING MB REG.
3370                                ;*
3371                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3372                                ;*M8957, M8960
3373                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3374                                ;*''HLDA'' NOT SET  STATUS = 000000
3375                                ;*
3376                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3377                                ;*M8957, M8960
3378                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3379                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3380                                ;*
3381                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3382                                ;*M8956, M8957
3383                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3384                                ;*CAS DATA COMPARE FAIL
3385                                ;*CAS REG. 000000
3386                                ;*
3387                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3388                                ;*M8956, M8957, MASSBUS
3389                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3390                                ;*PARITY ERR. WRITING CAS REG. 000000
3391  011262                        S
 (1)                                ; ***************************************************************************
3392
3393  011262                            BGNTST
3394  011262  012702  070066           MOV     #070066,R2      ;LOAD ALTERNATE ZEROS AND ONES
3395  011266  004737  034006           CALL    CASCOW
3396  011272                            ENDTST
3397
3398                                .SBTTL  TEST 25 - CAS WRITE TEST - DATA PATTERN 102332
3399  011274                        ST
 (1)                                ; ***************************************************************************
 (1)                                ;*TEST TITLE
 (1)                                ;*---- -----
3400                                ;*TEST 25       CAS WRITE TEST - DATA PATTERN 102332
3401  011274                        SD
 (1)                                ; ***************************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
3402                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3403                                ;*HOST CPU WITH A DATA PATTERN OF 102332(8), READING THE PATTERN FROM
3404                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
3405                                ;*ARE LOGGED.
3406  011274                        SP
 (1)                                ; ***************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
3407                                ;*BGNTST
3408                                ;*  SET UP THE DATA PATTERN 102332(8)
3409                                ;*  CALL SUBROUTINE CASCOW
3410                                ;*ENDTST
```

```
                                SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. WRITING CAS REG. 000000
                                S
                                ; ************************************************************************

                                        BGNTST
                                        MOV     #102332,R2      ;LOAD ALTERNATE ZEROS AND ONES
                                        CALL    CASCOW
                                        ENDTST

                                .SBTTL  TEST 26 - CAS WRITE TEST - FLOAT A 1
                                ST
                                ; ************************************************************************
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 26        CAS WRITE TEST - FLOAT A 1
                                SD
                                ; ************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*HOST CPU WITH A DATA PATTERN THAT FLOATS A ONE THROUGH A FIELD OF ZEROS,
                                ;*READING THE PATTERN FROM THE TM78 SIDE, AND COMPARING THE WRITTEN WITH
                                ;*THE READ FOR EACH SHIFT OF THE PATTERN.  DATA COMPARE ERRORS ARE LOGGED.
                                SP
                                ; ************************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
```

```
3454                                    ;*  CALL SUBROUTINE CASBOT
3455                                    ;*  IF ERRCOD=0
3456                                    ;*  :  THEN-CONTINUE
3457                                    ;*  :  ELSE-EXIT TEST
3458                                    ;*  ENDIF
3459                                    ;*  LOAD STARTING DATA PATTERN 000001(8)
3460                                    ;*  BGNDO
3461                                    ;*  :  CALL SUBROUTINE CASDAT
3462                                    ;*  :  CALL SUBROUTINE CASWRT
3463                                    ;*  :  CALL SUBROUTINE CASTMR
3464                                    ;*  :  CALL SUBROUTINE CASCMP
3465                                    ;*  :  ROTATE THE DATA PATTERN LEFT
3466                                    ;*  :  DO UNTIL THE DATA PATTERN=ZERO
3467                                    ;*  ENDDO
3468                                    ;*ENDTST
3469  011306                            SE
 (1)                                    ; ***************************************************************************
 (1)                                    ;*ERRORS
 (1)                                    ;*------
3470                                    ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3471                                    ;*M8956, M8957, MASSBUS
3472                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3473                                    ;*''NED'' WHEN READING MB REG.
3474                                    ;*
3475                                    ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3476                                    ;*M8957, M8960
3477                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3478                                    ;*''HLDA'' NOT SET  STATUS = 000000
3479                                    ;*
3480                                    ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3481                                    ;*M8957, M8960
3482                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3483                                    ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3484                                    ;*
3485                                    ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3486                                    ;*M8956, M8957
3487                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3488                                    ;*CAS DATA COMPARE FAIL
3489                                    ;*CAS REG. 000000
3490                                    ;*
3491                                    ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3492                                    ;*M8956, M8957, MASSBUS
3493                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3494                                    ;*PARITY ERR. WRITING CAS REG. 000000
3495  011306                            S
 (1)                                    ; ***************************************************************************
3496
3497  011306                                    BGNTST
3498  011306  004737  034242                   CALL    CASBOT          ;BOOT UP THE CAS PROGRAM
3499  011312  005705                           TST     ERRCOD
3500  011314  001402                           BEQ     5$
3501  011316                                    EXIT    TST
3502  011322  012702  000001           5$:     MOV     #1,R2           ;LOAD THE STARTING DATA PATTERN
3503  011326  010237  004330           1$:     MOV     R2,CASDTA       ;STORE THE DATA PATTERN
3504  011332                                    BGNSEG
3505  011334  004737  014566                   CALL    START           ;START THE TM78
```

```
3506  011340  004737  034324          CALL    CASDAT          ;FILL THE CAS DATA BUFFER
3507  011344  004737  035154          CALL    HOLDMP
3508  011350  012777  041420  172722  MOV     #CASCMD,@AD80   ;ADDRESS COMMAND BYTE
3509  011356  012777  000400  172716  MOV     #HOLD,@DS80     ;ISSUE THE READ CAS FROM TM78MP COMMAND
3510  011364  004737  014566          CALL    START
3511  011370  004737  034350          CALL    CASWRT          ;GO WRITE CAS FROM HOST
3512  011374                          CKLOOP
3513  011376  012777  000035  172624  MOV     #TSTART,@XFRCMD
3514  011404                          DELAY   100             ;PERFORM A 10MS. TIMEOUT
3515  011434  122777  000372  172566  CMPB    #372,@XFRCMD    ;DONE
3516  011442  001406                  BEQ     3$              ;YES-CONTINUE
3517  011444                          ERRDF   8.,PROCAS,ERM008  ;NO-PRINT THE ERROR
3518  011454                          CKLOOP
3519  011456  000406                  BR      6$              ;EXIT THE MODULE
3520  011460                  3$:     CKLOOP
3521  011462  004737  034560          CALL    CASTMR          ;GO READ CAS FROM TM78
3522  011466  004737  035020          CALL    CASCMP          ;GO COMPARE WRITTEN/READ
3523  011472                          CKLOOP
3524  011474                  6$:     ENDSEG
3525  011476  013702  004330          MOV     CASDTA,R2       ;GET THE PATTERN JUST WRITTEN
3526  011502  000241                  CLC                     ;CLEAR THE C BIT
3527  011504  006102                  ROL     R2              ;SHIFT THE PATTERN LEFT
3528  011506  103307                  BCC     1$
3529  011510                          ENDTST
3530
3531                          .SBTTL  TEST 27 - CAS WRITE TEST - FLOAT A ZERO
3532  011512                  ST
 (1)                      ; ******************************************************************************
 (1)                      ;*TEST TITLE
 (1)                      ;*---- -----
3533                      ;*TEST 27       CAS WRITE TEST - FLOAT A ZERO
3534  011512              SD
 (1)                      ; ******************************************************************************
 (1)                      ;*DESCRIPTION
 (1)                      ;*-----------
3535                      ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3536                      ;*HOST CPU WITH A DATA PATTERN THAT FLOATS A ZERO THROUGH A FIELD OF ONES.
3537                      ;*READING THE PATTERN FROM THE TM78 SIDE, AND COMPARING THE WRITTEN WITH
3538                      ;*THE READ FOR EACH SHIFT OF THE PATTERN.  DATA COMPARE ERRORS ARE LOGGED.
3539  011512              SP
 (1)                      ; ******************************************************************************
 (1)                      ;*PROCEDURE
 (1)                      ;*---------
3540                      ;*BGNTST
3541                      ;*  CALL SUBROUTINE CASBOT
3542                      ;*  IF ERRCOD=0
3543                      ;*  :  THEN-CONTINUE
3544                      ;*  :  ELSE-EXIT TEST
3545                      ;*  ENDIF
3546                      ;*  LOAD STARTING DATA PATTERN 177776(8)
3547                      ;*  BGNDO
3548                      ;*  :  CALL SUBROUTINE CASDAT
3549                      ;*  :  CALL SUBROUTINE CASWRT
3550                      ;*  :  CALL SUBROUTINE CASTMR
3551                      ;*  :  CALL SUBROUTINE CASCMP
3552                      ;*  :  ROTATE THE DATA PATTERN LEFT
```

```
                                ;*   :  DO UNTIL THE DATA PATTERN=177777(8)
                                ;*  ENDDO
                                ;*ENDTST
011512                          SE
 (1)                            ; ************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. WRITING CAS REG. 000000
                                ;*M8956, M8957, MASSBUS
011512                          S
 (1)                            ; ************************************************************************
                                        BGNTST
011512                                  CALL    CASBOT          ;BOOT UP THE CAS PROGRAM
011512  004737  034242                  TST     ERRCOD
011516  005705                          BEQ     5$
011520  001402                          EXIT    TST
011522                          5$:     MOV     #177776,R2      ;LOAD THE DATA PATTERN
011526  012702  177776          1$:     MOV     R2,CASDTA       ;STORE THE DATA PATTERN
011532  010237  004330                  BGNSEG
011536                                  CALL    START           ;START THE TM78
011540  004737  014566                  CALL    CASDAT          ;FILL THE CAS DATA BUFFER
011544  004737  034324                  CALL    HOLDMP
011550  004737  035154                  MOV     #CASCMD,@AD80   ;ADDRESS COMMAND BYTE
011554  012777  041420  172516          MOV     #HOLD,@DS80     ;ISSUE THE READ CAS FROM TM78MP COMMAND
011562  012777  000400  172512          CALL    START
011570  004737  014566                  CALL    CASWRT          ;GO WRITE CAS FROM HOST
011574  004737  034350                  CKLOOP
011600                                  MOV     #TSTART,@XFRCMD
011602  012777  000035  172420          DELAY   100             ;PERFORM A 10MS. TIMEOUT
011610                                  CMPB    #372,@XFRCMD    ;DONE
011640  122777  000372  172362          BEQ     3$              ;YES-CONTINUE
011646  001406                          ERRDF   8.,PROCAS,ERM008  ;NO-PRINT THE ERROR
011650
```

```
3605  011660                                    CKLOOP
3606  011662  000406                            BR      6$              ;EXIT THE MODULE
3607  011664                                3$: CKLOOP
3608  011666  004737  034560                    CALL    CASTMR          ;GO READ CAS FROM TM78
3609  011672  004737  035020                    CALL    CASCMP          ;GO COMPARE WRITTEN/READ
3610  011676                                    CKLOOP
3611  011700                                6$: ENDSEG
3612  011702  013702  004330                    MOV     CASDTA,R2       ;GET THE PATTERN JUST WRITTEN
3613  011706  000261                            SEC                     ;SET THE C BIT
3614  011710  006102                            ROL     R2              ;MAKE NEXT DATA PATTERN
3615  011712  103707                            BCS     1$
3616  011714                                    ENDTST
3617
3618                                    .SBTTL  TEST 28 - CAS READ TEST - ALL ZEROS
3619  011716                            ST
 (1)                                    ;*********************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*----- -----
3620                                    ;*TEST 28       CAS READ TEST - ALL ZEROS
3621  011716                            SD
 (1)                                    ;*********************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
3622                                    ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3623                                    ;*TM78 SIDE WITH A DATA PATTERN OF 000000(8), READING THE PATTERN FROM
3624                                    ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
3625                                    ;*ERRORS ARE LOGGED.
3626  011716                            SP
 (1)                                    ;*********************************************************************
 (1)                                    ;*PROCEDURE
 (1)                                    ;*---------
3627                                    ;*BGNTST
3628                                    ;*  SET UP THE DATA PATTERN 000000(8)
3629                                    ;*  CALL SUBROUTINE CASCOR
3630                                    ;*ENDTST
3631  011716                            SE
 (1)                                    ;*********************************************************************
 (1)                                    ;*ERRORS
 (1)                                    ;*------
3632                                    ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3633                                    ;*M8956, M8957, MASSBUS
3634                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3635                                    ;*''NED'' WHEN READING MB REG.
3636                                    ;*
3637                                    ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3638                                    ;*M8957, M8960
3639                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3640                                    ;*''HLDA'' NOT SET  STATUS = 000000
3641                                    ;*
3642                                    ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3643                                    ;*M8957, M8960
3644                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3645                                    ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3646                                    ;*
3647                                    ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3648                                    ;*M8956, M8957
```

```
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. READING CAS REG. 000000
 011716                         S
  (1)                           ; ************************************************************************
                                
                                        BGNTST
 011716                                 CLR     R2
 011716  005002                         CALL    CASCOR
 011720  004737  034170                 ENDTST
 011724
                                .SBTTL  TEST 29 - CAS READ TEST - ALL ONES
 011726                         ST
                                ; ************************************************************************
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 29        CAS READ TEST - ALL ONES
 011726                         SD
                                ; ************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*TM78 SIDE WITH A DATA PATTERN OF 177777(8), READING THE PATTERN FROM
                                ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
                                ;*ERRORS ARE LOGGED.
 011726                         SP
                                ; ************************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 177777(8)
                                ;*  CALL SUBROUTINE CASCOR
                                ;*ENDTST
 011726                         SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
```

```
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8956, M8957
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*CAS DATA COMPARE FAIL
                                        ;*CAS REG. 000000
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8956, M8957, MASSBUS
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*PARITY ERR. READING CAS REG. 000000
011726                                  S
 (1)                                    ; ************************************************************************

                                              BGNTST
011726                                        MOV     #177777,R2      ;LOAD THE DATA PATTERN
011726  012702  177777                        CALL    CASCOR
011732  004737  034170                        ENDTST
011736

                                        .SBTTL  TEST 30 - CAS READ TEST - DATA PATTERN 153271
011740                                  ST
 (1)                                    ; ************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*---- -----
                                        ;*TEST 30       CAS READ TEST - DATA PATTERN 153271
011740                                  SD
 (1)                                    ; ************************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
                                        ;*THIS TEST CHECKS THE PROPER OPERATION OF THE ATTENTION BIT SET/CLEAR
                                        ;*OPERATION.
011740                                  SP
 (1)                                    ; ************************************************************************
 (1)                                    ;*PROCEDURE
 (1)                                    ;*---------
                                        ;*BGNTST
                                        ;*  CALL SUBROUTINE CASBOT
                                        ;*  IF ERRCOD=0
                                        ;*  :  THEN-SET A 16 BIT DATA PATTERN TO ALL 1'S
                                        ;*  :       BGNDO
                                        ;*  :       :  CALL SUBROUTINE CASDAT
                                        ;*  :       :  CALL SUBROUTINE CASTMW
                                        ;*  :       :  IF TM78 ATTENTION SUMMARY REG.=DATA PATTERN
                                        ;*  :       :  :  THEN-CONTINUE
                                        ;*  :       :  :  ELSE-ERROR
                                        ;*  :       :  ENDIF
                                        ;*  :       :  LOAD THE ATTENTION SUMMARY REGISTER WITH ALL 1'S
                                        ;*  :       :  IF THE TM78 ATTENTION SUMMARY REGISTER=0
                                        ;*  :       :  :  THEN-CONTINUE
                                        ;*  :       :  :  ELSE-ERROR
                                        ;*  :       :  ENDIF
                                        ;*  :       :  SHIFT THE DATA PATTERN LEFT 1 BIT
                                        ;*  :       :  DO UNTIL THE DATA PATTERN=177400(8)
                                        ;*  :       ENDDO
                                        ;*  :  ELSE-CONTINUE
                                        ;*  ENDIF
```

```
                                ;*ENDTST
                                SD
                                ; ****************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*TM78 SIDE WITH A DATA PATTERN OF 153271(8), READING THE PATTERN FROM
                                ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
                                ;*ERRORS ARE LOGGED.
                                SP
                                ; ****************************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 153271(8)
                                ;*  CALL SUBROUTINE CASCOR
                                ;*ENDTST
                                SE
                                ; ****************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. READING CAS REG. 000000
                                S
                                ; ****************************************************************************

                                        BGNTST
                                        MOV     #153271,R2      ;LOAD THE DATA PATTERN
                                        CALL    CASCOR
                                        ENDTST

                                .SBTTL  TEST 31 - CAS READ TEST - DATA PATTERN 175747
                                ST
```

```
                                ;*********************************************************************
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 31       CAS READ TEST - DATA PATTERN 175747
011752                          SD
                                ;*********************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*TM78 SIDE WITH A DATA PATTERN OF 175747(8), READING THE PATTERN FROM
                                ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
                                ;*ERRORS ARE LOGGED.
011752                          SP
                                ;*********************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 175747(8)
                                ;*  CALL SUBROUTINE CASCOR
                                ;*ENDTST
011752                          SE
                                ;*********************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. READING CAS REG. 000000
011752                          S
                                ;*********************************************************************

011752                          BGNTST
011752  012702  175747          MOV     #175747,R2      ;LOAD THE DATA PATTERN
011756  004737  034170          CALL    CASCOR
011762                          ENDTST
```

```
                                .SBTTL  TEST 32 - CAS READ TEST - DATA PATTERN 062132
011764                          ST
                                ; ************************************************************************
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 32        CAS READ TEST - DATA PATTERN 062132
011764                          SD
                                ; ************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                ;*TM78 SIDE WITH A DATA PATTERN OF 062132(8), READING THE PATTERN FROM
                                ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
                                ;*ERRORS ARE LOGGED.
011764                          SP
                                ; ************************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 062132(8)
                                ;*  CALL SUBROUTINE CASCOR
                                ;*ENDTST
011764                          SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. READING CAS REG. 000000
011764                          S
                                ; ************************************************************************

011764                                  BGNTST
```

```
3870  011764  012702  062132                  MOV     #062132,R2      ;LOAD THE DATA PATTERN
3871  011770  004737  034170                  CALL    CASCOR
3872  011774                                  ENDTST
3873
3874                                  .SBTTL  TEST 33 - CAS READ TEST - DATA PATTERN 042002
3875  011776                          ST
 (1)                                  ; ******************************************************************************
 (1)                                  ;*TEST TITLE
 (1)                                  ;*---- -----
3876                                  ;*TEST 33       CAS READ TEST - DATA PATTERN 042002
3877  011776                          SD
 (1)                                  ; ******************************************************************************
 (1)                                  ;*DESCRIPTION
 (1)                                  ;*-----------
3878                                  ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3879                                  ;*TM78 SIDE WITH A DATA PATTERN OF 042002(8), READING THE PATTERN FROM
3880                                  ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
3881                                  ;*ERRORS ARE LOGGED.
3882  011776                          SP
 (1)                                  ; ******************************************************************************
 (1)                                  ;*PROCEDURE
 (1)                                  ;*---------
3883                                  ;*BGNTST
3884                                  ;*  SET UP THE DATA PATTERN 042002(8)
3885                                  ;*  CALL SUBROUTINE CASCOR
3886                                  ;*ENDTST
3887  011776                          SE
 (1)                                  ; ******************************************************************************
 (1)                                  ;*ERRORS
 (1)                                  ;*------
3888                                  ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3889                                  ;*M8956, M8957, MASSBUS
3890                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3891                                  ;*''NED'' WHEN READING MB REG.
3892                                  ;*
3893                                  ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3894                                  ;*M8957, M8960
3895                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3896                                  ;*''HLDA'' NOT SET  STATUS = 000000
3897                                  ;*
3898                                  ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3899                                  ;*M8957, M8960
3900                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3901                                  ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3902                                  ;*
3903                                  ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3904                                  ;*M8956, M8957
3905                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3906                                  ;*CAS DATA COMPARE FAIL
3907                                  ;*CAS REG. 000000
3908                                  ;*
3909                                  ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3910                                  ;*M8956, M8957, MASSBUS
3911                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3912                                  ;*PARITY ERR. READING CAS REG. 000000
3913  011776                          S
```

```
  (1)                           ; ************************************************************************
 3914
 3915  011776                           BGNTST
 3916  011776  012702  042002          MOV     #042002,R2      ;LOAD THE DATA PATTERN
 3917  012002  004737  034170          CALL    CASCOR
 3918  012006                           ENDTST
 3919
 3920                                .SBTTL  TEST 34 - CAS READ TEST - DATA PATTERN 070066
 3921  012010                        ST
  (1)                           ; ************************************************************************
  (1)                           ;*TEST TITLE
  (1)                           ;*---- -----
 3922                           ;*TEST 34       CAS READ TEST - DATA PATTERN 070066
 3923  012010                        SD
  (1)                           ; ************************************************************************
  (1)                           ;*DESCRIPTION
  (1)                           ;*-----------
 3924                           ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
 3925                           ;*TM78 SIDE WITH A DATA PATTERN OF 070066(8), READING THE PATTERN FROM
 3926                           ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
 3927                           ;*ERRORS ARE LOGGED.
 3928  012010                        SP
  (1)                           ; ************************************************************************
  (1)                           ;*PROCEDURE
  (1)                           ;*---------
 3929                           ;*BGNTST
 3930                           ;*  SET UP THE DATA PATTERN 070066(8)
 3931                           ;*  CALL SUBROUTINE CASCOR
 3932                           ;*ENDTST
 3933  012010                        SE
  (1)                           ; ************************************************************************
  (1)                           ;*ERRORS
  (1)                           ;*------
 3934                           ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 3935                           ;*M8956, M8957, MASSBUS
 3936                           ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 3937                           ;*''NED'' WHEN READING MB REG.
 3938                           ;*
 3939                           ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 3940                           ;*M8957, M8960
 3941                           ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 3942                           ;*''HLDA'' NOT SET  STATUS = 000000
 3943                           ;*
 3944                           ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 3945                           ;*M8957, M8960
 3946                           ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 3947                           ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
 3948                           ;*
 3949                           ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 3950                           ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 3951                           ;*CAS DATA COMPARE FAIL
 3952                           ;*CAS REG. 000000
 3953                           ;*M8956, M8957
 3954                           ;*
 3955                           ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 3956                           ;*M8956, M8957, MASSBUS
```

```
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. READING CAS REG. 000000
3959  012010                    S
 (1)                            ; ***************************************************************************
3960
3961  012010                        BGNTST
3962  012010  012702  070066       MOV     #070066,R2      ;LOAD THE DATA PATTERN
3963  012014  004737  034170       CALL    CASCOR
3964  012020                        ENDTST
3965
3966                            .SBTTL  TEST 35 - CAS READ TEST - DATA PATTERN 102332
3967  012022                    ST
 (1)                            ; ***************************************************************************
 (1)                            ;*TEST TITLE
 (1)                            ;*---- -----
3968                            ;*TEST 35       CAS READ TEST - DATA PATTERN 102332
3969  012022                    SD
 (1)                            ; ***************************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
3970                            ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3971                            ;*TM78 SIDE WITH A DATA PATTERN OF 102332(8), READING THE PATTERN FROM
3972                            ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
3973                            ;*ERRORS ARE LOGGED.
3974  012022                    SP
 (1)                            ; ***************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
3975                            ;*BGNTST
3976                            ;*  SET UP THE DATA PATTERN 102332(8)
3977                            ;*  CALL SUBROUTINE CASCOR
3978                            ;*ENDTST
3979  012022                    SE
 (1)                            ; ***************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
3980                            ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3981                            ;*M8956, M8957, MASSBUS
3982                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3983                            ;*'NED' WHEN READING MB REG.
3984                            ;*
3985                            ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3986                            ;*M8957, M8960
3987                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3988                            ;*'HLDA' NOT SET  STATUS = 000000
3989                            ;*
3990                            ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3991                            ;*M8957, M8960
3992                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3993                            ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3994                            ;*
3995                            ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3996                            ;*M8956, M8957
3997                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3998                            ;*CAS DATA COMPARE FAIL
3999                            ;*CAS REG. 000000
```

```
                                ;*
                                ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. READING CAS REG. 000000
4005  012022                   S
 (1)                            ; ************************************************************************
4006
4007  012022                        BGNTST
4008  012022  012702  102332       MOV     #102332,R2      ;LOAD THE DATA PATTERN
4009  012026  004737  034170       CALL    CASCOR
4010  012032                        ENDTST
4011
4012                            .SBTTL  TEST 36 - CAS READ TEST - FLOAT A 1
4013  012034                    ST
 (1)                            ; ************************************************************************
 (1)                            ;*TEST TITLE
 (1)                            ;*----- -----
4014                            ;*TEST 36       CAS READ TEST - FLOAT A 1
4015  012034                    SD
 (1)                            ; ************************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
4016                            ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
4017                            ;*TM78 SIDE WITH A DATA PATTERN THAT FLOATS A 1 THROUGH A FIELD OF ZEROS,
4018                            ;*READING THE PATTERN FROM THE HOST CPU, AND COMPARING THE WRITTEN WITH
4019                            ;*THE READ FOR EACH SHIFT OF THE PATTERN.  DATA COMPARE ERRORS ARE LOGGED.
4020  012034                    SP
 (1)                            ; ************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
4021                            ;*BGNTST
4022                            ;*  CALL SUBROUTINE CASBOT
4023                            ;*  IF ERRCOD=0
4024                            ;*  :  THEN-CONTINUE
4025                            ;*  :  ELSE-EXIT TEST
4026                            ;*  ENDIF
4027                            ;*  LOADING STARTING DATA PATTERN 000001(8)
4028                            ;*  BGNDO
4029                            ;*  :  CALL SUBROUTINE CASDAT
4030                            ;*  :  CALL SUBROUTINE CASTMW
4031                            ;*  :  CALL SUBROUTINE CASRED
4032                            ;*  :  CALL SUBROUTINE CASCMP
4033                            ;*  :  ROTATE THE DATA PATTERN LEFT
4034                            ;*  :  DO UNTIL THE DATA PATTERN=ZERO
4035                            ;*  ENDDO
4036                            ;*ENDTST
4037  012034                    SE
 (1)                            ; ************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
4038                            ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4039                            ;*M8956, M8957, MASSBUS
4040                            ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4041                            ;*''NED'' WHEN READING MB REG.
4042                            ;*
```

```
                                        ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8957, M8960
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*''HLDA'' NOT SET  STATUS = 000000
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8957, M8960
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8956, M8957
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*CAS DATA COMPARE FAIL
                                        ;*CAS REG. 000000
                                        ;*
                                        ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                        ;*M8956, M8957, MASSBUS
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*PARITY ERR. READING CAS REG. 000000
4063  012034                            S
 (1)                                    ; ************************************************************************
4064
4065  012034                                    BGNTST
4066  012034  004737  034242                   CALL    CASBOT          ;BOOT THE CAS PROGRAM
4067  012040  005705                           TST     ERRCOD
4068  012042  001402                           BEQ     5$
4069  012044                                    EXIT    TST
4070  012050  012702  000001           5$:     MOV     #1,R2           ;LOAD THE DATA PATTERN
4071  012054  010237  004330           1$:     MOV     R2,CASDTA       ;STORE THE DATA PATTERN
4072  012060                                    BGNSEG
4073  012062  004737  014566                   CALL    START           ;START THE TM78
4074  012066  004737  034324                   CALL    CASDAT          ;FILL THE CAS DATA BUFFER
4075  012072  004737  034630                   CALL    CASTMW          ;GO WRITE CAS FROM TM78
4076  012076  004737  034452                   CALL    CASRED          ;GO READ CAS FROM HOST
4077  012102                                    CKLOOP
4078  012104  004737  035020                   CALL    CASCMP          ;COMPARE WRITTEN/READ
4079  012110                                    CKLOOP
4080  012112                                    ENDSEG
4081  012114  013702  004330                   MOV     CASDTA,R2       ;GET THE PATTERN JUST WRITTEN
4082  012120  000241                           CLC                     ;CLEAR THE C BIT
4083  012122  006102                           ROL     R2              ;SHIFT THE PATTERN LEFT
4084  012124  103353                           BCC     1$              ;DO UNTIL THE ONE IS SHIFTED OUT
4085  012126                                    ENDTST
4086
4087                                  .SBTTL  TEST 37 - CAS READ TEST - FLOAT A 0
4088  012130                          ST
 (1)                                    ; ************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*---- -----
4089                                    ;*TEST 37       CAS READ TEST - FLOAT A 0
4090  012130                          SD
 (1)                                    ; ************************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
4091                                    ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
```

```
                                ;*TM78 SIDE WITH A DATA PATTERN THAT FLOATS A 0 THROUGH A FIELD OF ONES,
                                ;*READING THE PATTERN FROM THE HOST CPU, AND COMPARING THE WRITTEN WITH
                                ;*THE READ FOR EACH SHIFT OF THE PATTERN.  DATA COMPARE ERRORS ARE LOGGED.
012130                          SP
 (1)                            ; ****************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNTST
                                ;*  CALL SUBROUTINE CASBOT
                                ;*  IF ERRCOD=0
                                ;*  :  THEN-CONTINUE
                                ;*  :  ELSE-EXIT TEST
                                ;*  ENDIF
                                ;*  LOADING STARTING DATA PATTERN 177776(8)
                                ;*  BGNDO
                                ;*  :  CALL SUBROUTINE CASDAT
                                ;*  :  CALL SUBROUTINE CASTMW
                                ;*  :  CALL SUBROUTINE CASRED
                                ;*  :  CALL SUBROUTINE CASCMP
                                ;*  :  ROTATE THE DATA PATTERN LEFT
                                ;*  :  DO UNTIL THE DATA PATTERN=177777(8)
                                ;*  ENDDO
                                ;*ENDTST
012130                          SE
 (1)                            ; ****************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''NED'' WHEN READING MB REG.
                                ;*
                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*''HLDA'' NOT SET  STATUS = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8957, M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
                                ;*
                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*CAS DATA COMPARE FAIL
                                ;*CAS REG. 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PARITY ERR. READING CAS REG. 000000
012130                          S
 (1)                            ; ****************************************************************************

012130                                BGNTST
```

```
4141  012130  004737  034242                CALL    CASBOT          ;BOOT THE CAS PROGRAM
4142  012134  005705                        TST     ERRCOD
4143  012136  001402                        BEQ     5$
4144  012140                                EXIT    TST
4145  012144  012702  177776        5$:     MOV     #177776,R2      ;LOAD THE DATA PATTERN
4146  012150  010237  004330        1$:     MOV     R2,CASDTA       ;STORE THE DATA PATTERN
4147  012154                                BGNSEG
4148  012156  004737  014566                CALL    START           ;START THE TM78
4149  012162  004737  034324                CALL    CASDAT          ;FILL THE CAS DATA BUFFER
4150  012166  004737  034630                CALL    CASTMW          ;GO WRITE CAS FROM TM78
4151  012172  004737  034452                CALL    CASRED          ;GO READ CAS FROM HOST
4152  012176                                CKLOOP
4153  012200  004737  035020                CALL    CASCMP          ;COMPARE WRITTEN/READ
4154  012204                                CKLOOP
4155  012206                                ENDSEG
4156  012210  013702  004330                MOV     CASDTA,R2       ;GET THE PATTERN JUST WRITTEN
4157  012214  000261                        SEC                     ;SET THE C BIT
4158  012216  006102                        ROL     R2              ;ROTATE THE PATTERN LEFT
4159  012220  103753                        BCS     1$              ;DO UNTIL CARRY IS SET
4160  012222                                ENDTST                  ;
4161
4162                                .SBTTL  TEST 38 - CAS REGISTER 4 TEST
4163  012224                        ST
  (1)                             ; ******************************************************************************
  (1)                             ;*TEST TITLE
  (1)                             ;*---- -----
4164                              ;*TEST 38               CAS REGISTER 4 TEST
4165  012224                        SE
  (1)                             ; ******************************************************************************
  (1)                             ;*ERRORS
  (1)                             ;*------
4166                              ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4167                              ;*M8957, M8960
4168                              ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4169                              ;*''HLDA'' NOT SET  STATUS = 000000
4170                              ;*
4171                              ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4172                              ;*M8957, M8960
4173                              ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4174                              ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
4175                              ;*
4176                              ;*CZTMIA DVC FTL ERR 000020 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4177                              ;*M8956, M8957
4178                              ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4179                              ;*DATA FROM CAS REG 4 NOT AS EXPECTED
4180                              ;*ACT = 000000
4181                              ;*EXP = 000000
4182                              ;*
4183                              ;*CZTMIA DVC FTL ERR 000021 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4184                              ;*M8956, M8957
4185                              ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4186                              ;*ATTEN. REG. = 000000 AFTER WRITTEN CLEAR
4187  012224                        S
  (1)                             ; ******************************************************************************
4188
4189  012224                              BGNTST
```

```
4190  012224  004737  034242          CALL    CASBOT          ;BOOT THE CAS PROGRAM
4191  012230  005705                  TST     ERRCOD
4192  012232  001402                  BEQ     5$
4193  012234                          EXIT    TST
4194  012240  012702  177777    5$:   MOV     #-1,R2          ;LOAD THE DATA PATTERN
4195  012244  010237  004330    3$:   MOV     R2,CASDTA       ;STORE THE DATA PATTERN
4196  012250  004737  034324          CALL    CASDAT          ;FILL THE COMPARE BUFFER
4197  012254  004737  034630          CALL    CASTMW          ;GO WRITE CAS FROM TM78
4198  012260  017702  171762          MOV     @AS,R2          ;READ THE ATTENTION SUMMARY
4199  012264  020237  033642          CMP     R2,MBBUF        ;=EXPECTED?
4200  012270  001404                  BEQ     1$              ;YES-CONTINUE
4201  012272                          ERRDF   20.,CASX,ERM020
4202
4203  012302                    1$:   CKLOOP
4204  012304  012777  177777  171734        MOV     #-1,@AS         ;WRITE ALL 1'S TO ATTENTION
4205  012312  000240                        NOP                     ;WAIT
4206  012314  017702  171726              MOV     @AS,R2          ;GET THE ATTENTION SUMMARY
4207  012320  001404                        BEQ     2$              ;ZERO-CONTINUE
4208                                                                ;ELSE-ERROR
4209  012322                              ERRDF   21.,CASX,ERM021
4210
4211  012332                    2$:   CKLOOP
4212  012334  013702  004330              MOV     CASDTA,R2       ;GET LAST DATA USED
4213  012340  000241                        CLC                     ;CLEAR THE C BIT
4214  012342  006102                        ROL     R2              ;SHIFT IT LEFT
4215  012344  020227  177400              CMP     R2,#177400      ;ALL ATTENTION BITS SET?
4216  012350  001335                        BNE     3$              ;NO-CONTINUE
4217  012352                              ENDTST                  ;YES-END OF TEST
4218
4219                          .SBTTL  TEST 39 - INTERRUPT TEST
4220  012354                  ST
 (1)                          ;*********************************************************************
 (1)                          ;*TEST TITLE
 (1)                          ;*---- -----
4221                          ;*TEST 39       INTERRUPT TEST
4222  012354                  SD
 (1)                          ;*********************************************************************
 (1)                          ;*DESCRIPTION
 (1)                          ;*-----------
4223                          ;*THIS TEST CHECKS THE ABILITY OF THE TM78 TO PROPERLY INTERRUPT THE CPU
4224                          ;*THROUGH THE MASS BUS.
4225  012354                  SP
 (1)                          ;*********************************************************************
 (1)                          ;*PROCEDURE
 (1)                          ;*---------
4226                          ;*BGNTST
4227                          ;*   ISSUE MASS BUS INIT
4228                          ;*   WAIT
4229                          ;*   CALL SUBROUTINE HOLDMP
4230                          ;*   CLEAR THE ATTENTION SUMMARY REGISTER
4231                          ;*   SET UP THE INTERRUPT VECTOR ADDRESS
4232                          ;*   SET THE CPU PRIORITY TO ZERO
4233                          ;*   LOAD 100241(8) IN CAS REGISTER 20(8)
4234                          ;*   LOAD "HOLD" BIT IN CAS REGISTER 21(8)
4235                          ;*   IF INTERRUPT OCCURED
4236                          ;*   :   THEN - CONTINUE
```

```
                        ;*   :  ELSE - ERROE
                        ;*  ENDIF
                        ;*ENDTST
4240  012354            SE
 (1)                    ; ************************************************************************
 (1)                    ;*ERRORS
 (1)                    ;*------
4241                    ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4242                    ;*M8957, M8960
4243                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4244                    ;*''HLDA'' NOT SET  STATUS = 000000
4245                    ;*
4246                    ;*CZTMIA DVC FTL ERR 000022 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4247                    ;*M8957, M8960
4248                    ;*UNIT U  RH: AAAAAA  TM: X  TU: X  PORT: X
4249                    ;*CPU WAS NOT INTERRUPTED BY TM78 SETTING ATTENTION
4250  012354            S
 (1)                    ; ************************************************************************
4251
4252  012354                        BGNTST
4253  012354  005037  004412        CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
4254  012360  005037  004410        CLR     INTFLG          ;CLEAR THE INTERRUPT FLAG
4255  012364  012777  000040  171646  MOV   #MBINIT,@CS2    ;ISSUE MASS BUS INIT
4256  012372                        DELAY   10              ;WAIT
4257  012422  004737  035154        CALL    HOLDMP          ;HOLD THE TM78 MP
4258  012426  012777  000377  171612  MOV   #377,@AS        ;CLEAR THE ATTENTION BITS
4259  012434  012777  000100  171566  MOV   #100,@XFRCMD    ;SET THE INTERRUPT ENABLE BIT
4260  012442  013701  004362        MOV     RHVEC,R1        ;GET THE USER ENTERED VECTOR
4261  012446  062701  000002        ADD     #2,R1           ;POINT TO THE PSW PORTION
4262  012452  005011                CLR     (R1)            ;CLEAR THE NEW PSW
4263  012454                        SETVEC  RHVEC,#INTMB,#PRI07     ;SET UP THE INTERRUPT VECTOR
4264  012502                        SETPRI  #PRI00          ;SET CPU PRIORITY TO 0
4265  012510  012777  100240  171562  MOV   #100240,@AD80  ;SET THE TM READY BIT
4266  012516  012777  000500  171556  MOV   #500,@DS80
4267  012524  000240                NOP
4268  012526  012777  100241  171544  MOV   #100241,@AD80  ;GENERATE AN INTERRUPT
4269  012534  012777  000400  171540  MOV   #HOLD,@DS80
4270  012542  000240                NOP                     ;
4271  012544  000240                NOP                     ;
4272  012546  000240                NOP                     ;
4273  012550  005737  004410        TST     INTFLG          ;DID THE INTERRUPT OCCUR?
4274  012554  001004                BNE     1$              ;YES-CONTINUE
4275  012556                        ERRDF   22.,PROCAS,ERM022  ;NO-ERROR
4276  012566                1$:     SETPRI  #PRI07          ;SET CPU PRIORITY TO 7
4277  012574                        CKLOOP                  ;CHECK LOOP ON ERROR
4278  012576                        CLRVEC  RHVEC           ;CLEAR THE VECTOR
4279  012604                        ENDTST
4280  012606                        BGNSRV  INTMB
4281  012606  005237  004410        INC     INTFLG
4282  012612                        ENDSRV
4283
4284                    .SBTTL  TEST 40 - TM78 MICRO TESTS
4285  012614            ST
 (1)                    ; ************************************************************************
 (1)                    ;*TEST TITLE
 (1)                    ;*---- -----
```

```
4286                                    ;*TEST 40       TM78 MICRO DIAGNOSTICS
4287  012614                            SD
 (1)                                    ; ************************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
4288                                    ;*THIS TEST HAS TWO MODES OF RUNNING THE MICRO DIAGNOSTIC SCRIPT FILE.
4289                                    ;*THE DEFAULT MODE WILL RUN ALL MICRO DIAGNOSTICS FROM TOP TO BOTTOM.
4290                                    ;*THE ALTERNATE MODE ALLOWS FOR MANUAL EXECUTION OF A SINGLE MICRO
4291                                    ;*DIAGNOSTIC, OR OPERATOR ACKNOWLEDGEMENT BEFORE EACH TEST SECTION IS
4292                                    ;*EXECUTED.
4293  012614                            SP
 (1)                                    ; ************************************************************************
 (1)                                    ;*PROCEDURE
 (1)                                    ;*---------
4294                                    ;*BGNTST
4295                                    ;*      IF MANUAL MICRO MODULE SELECTION=0
4296                                    ;*      :  THEN-LOAD POINTER TO MICRODIAGNOSTIC FILE NAME
4297                                    ;*      :       CALL SUBROUTINE MICCTL
4298                                    ;*      :  ELSE-IF MANUAL INTERVENTION FLAG=1
4299                                    ;*      :       :  THEN-PRINT WARNING MESSAGE
4300                                    ;*      :       :  ELSE-ASK USER IF DIRECTORY IS WANTED
4301                                    ;*      :       :       IF RESPONSE=YES
4302                                    ;*      :       :       :  THEN-PRINT DIRECTORY HEADER
4303                                    ;*      :       :       :       INITIALIZE THE SEQUENCE NUBMER TO 1
4304                                    ;*      :       :       :       LOAD POINTER TO FILE NAME
4305                                    ;*      :       :       :       CALL SUBROUTINE DIRLST
4306                                    ;*      :       :       :       IF ERRCOD NOT=0
4307                                    ;*      :       :       :       :  THEN-EXIT TEST
4308                                    ;*      :       :       :       :  ELSE-CONTINUE
4309                                    ;*      :       :       :       ENDIF
4310                                    ;*      :       :       :  ELSE-CONTINUE
4311                                    ;*      :       :       ENDIF
4312                                    ;*      :       :       BGNDO
4313                                    ;*      :       :       :  ASK USER FOR THE NUMBER OF THE DESIRED DIAG.
4314                                    ;*      :       :       :  LOAD POINTER TO FILE NAME
4315                                    ;*      :       :       :  CALL SUBROUTINE DIRSRC
4316                                    ;*      :       :       :  IF ERRCOD NOT=0
4317                                    ;*      :       :       :  :  THEN-EXIT TEST
4318                                    ;*      :       :       :  :  ELSE-CONTINUE
4319                                    ;*      :       :       :  ENDIF
4320                                    ;*      :       :       :  IF SEQNUM=0
4321                                    ;*      :       :       :  :  THEN-CONTINUE
4322                                    ;*      :       :       :  :  ELSE-LOAD ERRCOD WITH 14.
4323                                    ;*      :       :       :  :       CALL SUBROUTINE SYSERR
4324                                    ;*      :       :       :  :       EXIT TEST
4325                                    ;*      :       :       :  ENDIF
4326                                    ;*      :       :       :  CALL SUBROUTINE LOADER
4327                                    ;*      :       :       :  IF ERRCOD NOT=0
4328                                    ;*      :       :       :  :  THEN-EXIT TEST
4329                                    ;*      :       :       :  :  ELSE-CONTINUE
4330                                    ;*      :       :       :  ENDIF
4331                                    ;*      :       :       :  PRINT THE MICRO DIAGNOSTIC HEADER
4332                                    ;*      :       :       :  CLEAR BYPFLG
4333                                    ;*      :       :       :  BGNDO
4334                                    ;*      :       :       :  :  CALL SUBROUTINE CONTRL
4335                                    ;*      :       :       :  :  IF ERRCOD NOT=0
```

```
                        ;*      :       :       :   :  :  THEN-EXIT TEST
                        ;*      :       :       :   :  :  ELSE-CONTINUE
                        ;*      :       :       :   :  ENDIF
                        ;*      :       :       :   :  IF BYPFLG=0
                        ;*      :       :       :   :  :  THEN-ASK USER IF LOOP THIS MODULE
                        ;*      :       :       :   :  :  ELSE-CONTINUE
                        ;*      :       :       :   :  ENDIF
                        ;*      :       :       :   :  IF BYPFLG=0
                        ;*      :       :       :   :  :  THEN-CONTINUE
                        ;*      :       :       :   :  :  ELSE-CALL SUBROUTINE DIAGST
                        ;*      :       :       :   :  :        IF ERRCOD NOT=0
                        ;*      :       :       :   :  :        :  THEN-EXIT TEST
                        ;*      :       :       :   :  :        :  ELSE-CONTINUE
                        ;*      :       :       :   :  :        ENDIF
                        ;*      :       :       :   :  ENDIF
                        ;*      :       :       :   :  DO WHILE BYPFLG NOT=0
                        ;*      :       :       :   ENDDO
                        ;*      :       :       :   DO FOREVER
                        ;*      :       :       ENDDO
                        ;*      :       ENDIF
                        ;*      ENDIF
                        ;*ENDTST
4358  012614            SE
 (1)                    ; ************************************************************************
 (1)                    ;*ERRORS
 (1)                    ;*------
4359                    ;*CZTMIA DVC FTL ERR 000031 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4360                    ;*MODULE UNDER TEST AS PER MICRO DIAGNOSTIC HEADER LINE
4361                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4362                    ;*TM78 MICRO TEST = 000000
4363                    ;*TM78 MICRO PC = 000000
4364                    ;*MB STATUS ERROR - CS2 = 000000
4365                    ;*
4366                    ;*CZTMIA DVC FTL ERR 000032 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4367                    ;*MODULE UNDER TEST AS PER MICRO DIAGNOSTIC HEADER LINE
4368                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4369                    ;*TM78 MICRO TEST = 000000
4370                    ;*TM78 MICRO PC = 000000
4371                    ;*MB DATA COMP. FAIL
4372                    ;*BYTE COUNT = 000000
4373                    ;*ACT = 000000
4374                    ;*EXP = 000000
4375                    ;*
4376                    ;*CZTMIA DVC FTL ERR 000033 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4377                    ;*MODULE UNDER TEST AS PER MICRO DIAGNOSTIC HEADER LINE
4378                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4379                    ;*TM78 MICRO TEST = 000000
4380                    ;*TM78 MICRO PC = 000000
4381                    ;*NO MB STATUS ERROR WHEN EXPECTED
4382  012614            S
 (1)                    ; ************************************************************************
4383
4384  012614                    BGNTST
4385  012614  005037  004412    CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
4386  012620  005737  002332    TST     MANTST          ;MANUAL MICRO MODULE SELECTION?
4387  012624  001007            BNE     1$              ;YES - GO TRY IT
```

```
4388  012626  012737  013662  004400          MOV     #DXTUID,FILNAM  ;LOAD ADDRESS OF MODULE
4389  012634  004737  013402                  CALL    MICCTL          ;CALL THE MICRO DIAGNOSTIC CONTROL MODULE
4390  012640  000137  013146          7$:     JMP     3$              ;END OF THE TEST
4391
4392  012644                          1$:     MANUAL                  ;CAN MANUAL INTERVENTION BE DONE?
4393  012646                                  BCOMPLETE 2$            ;YES - CONTINUE
4394  012650                                  PRINTF  #FATAL
4395  012670  000526                         BR      3$              ;END OF THE TEST
4396  012672                          2$:     GMANIL  DIRQUE,BYPFLG,1,NO
4397  012706  005737  004404                  TST     BYPFLG          ;PRINT THE DIRECTORY
4398  012712  001422                         BEQ     5$              ;NO - GO INPUT DESIRED FILE
4399  012714                                  PRINTF  #DIRHED
4400  012734  012737  000001  004406          MOV     #1,SEQNUM       ;INITIALIZE THE SEQUENCE NUMBER
4401  012742  012737  013662  004400          MOV     #DXTUID,FILNAM  ;LOAD THE FIRST FILE NAME
4402  012750  004737  015552                  CALL    DIRLST          ;GO MAKE A DIRECTORY
4403  012754  005705                         TST     ERRCOD          ;WAS THERE AN ERROR?
4404  012756  001073                         BNE     3$              ;YES - END IT
4405  012760                          5$:     GMANID  SEQ,SEQNUM,0,177777,1,77,NO
4406  013000  012737  013662  004400          MOV     #DXTUID,FILNAM  ;LOAD THE FIRST FILE NAME
4407  013006  004737  015546                  CALL    DIRSRC          ;GO SEARCH FOR THE PROPER SEQUENCE NUMBER
4408  013012  005705                         TST     ERRCOD          ;ERROR?
4409  013014  001054                         BNE     3$              ;YES - END THE ROUTINE
4410  013016  005737  004406                  TST     SEQNUM          ;DID WE FIND THE USER SPECIFIED FILE?
4411  013022  001405                         BEQ     4$              ;YES - GO LOAD IT
4412  013024  012705  000014                 MOV     #14,ERRCOD      ;LOAD THE EOF ERROR
4413  013030  004737  015340                  CALL    SYSERR          ;GO LOG THE ERROR
4414  013034  000444                         BR      3$              ;END THE ROUTINE
4415  013036  004737  013742          4$:     CALL    LOADER          ;GO LOAD THE PROGRAM
4416  013042  005705                         TST     ERRCOD          ;LOAD ERROR?
4417  013044  001040                         BNE     3$              ;END THE ROUTINE
4418  013046                                  PRINTF  #MICRO,#BUFER
4419  013072  005037  004404                  CLR     BYPFLG          ;SET RESPONSE TO - NO
4420  013076  004737  016102          6$:     CALL    CONTRL          ;START THE TEST
4421  013102  005705                         TST     ERRCOD          ;CONTROL ERROR?
4422  013104  001020                         BNE     3$              ;YES - END THE ROUTINE
4423  013106  005737  004404                  TST     BYPFLG          ;IS RESPONSE YES?
4424  013112  001011                         BNE     8$              ;YES - LOOP MICRO MODULE
4425  013114                                  GMANIL  RERET,BYPFLG,1,NO       ;DO IT AGAIN?
4426  013130  005737  004404                  TST     BYPFLG          ;LOOP MICRO MODULE?
4427  013134  001711                         BEQ     5$              ;NO - GO WAIT FOR ANOTHER ONE
4428  013136  004737  014762          8$:     CALL    DIAGST          ;RESTART THE CODE
4429  013142  005705                         TST     ERRCOD          ;RESTART ERROR?
4430  013144  001754                         BEQ     6$              ;NO - GO DO IT AGAIN
4431  013146                          3$:     ENDTST
4432  013150  047514  050117  052040  RERET:  .ASCIZ  /LOOP THIS MICRO MODULE?/
4433                                          .EVEN
4434  013200  051120  047111  020124  DIRQUE: .ASCIZ  /PRINT DIRECTORY OF MICRO MODULES?/
4435                                          .EVEN
4436  013242  047105  042524  020122  SEQ:    .ASCIZ  /ENTER SEQUENCE NUMBER OF MICRO MODULE/
4437                                          .EVEN
4438  013310  047045  040445  040515  FATAL:  .ASCIZ  /%N%AMANUAL SELECTION NOT ALLOWED WITH THE UAM FLAG SET%N/
4439          013402                          .EVEN
4440  013402  004737  021660          MICCTL: CALL    CLOSEX          ;CLOSE THE CHANNEL
4441  013406  004737  013730                  CALL    OPENX           ;OPEN THE CHANNEL
4442  013412  005705                         TST     ERRCOD          ;OPEN CHANNEL ERROR?
4443  013414  001114                         BNE     NOREX           ;YES-EXIT
```

```
4444  013416  004737  013742          CALL    LOADER          ;SKIP OVER THE BCT PROGRAM
4445  013422  004737  013742    3$:   CALL    LOADER          ;NO-LOAD A SEGMENT
4446  013426  005705                  TST     ERRCOD          ;LOAD ERROR?
4447  013430  001106                  BNE     NOREX           ;YES-EXIT
4448  013432  005737  004402          TST     EOF             ;NO-END OF FILE?
4449  013436  001103                  BNE     NOREX           ;EXIT THE MODULE
4450  013440  012702  021666          MOV     #BUFER,R2
4451  013444  122227  000073    6$:   CMPB    (R2)+,#073      ;SEARCH FOR ;
4452  013450  001375                  BNE     6$
4453  013452  122227  000040    1$:   CMPB    (R2)+,#040      ;IS IT A SPACE?
4454  013456  001775                  BEQ     1$              ;YES-IGNORE IT
4455  013460  005302                  DEC     R2              ;NO - ADJUST THE POINTER
4456  013462  122227  000115          CMPB    (R2)+,#115      ;IS IT A M?
4457  013466  001011                  BNE     2$              ;NO-GET OUT
4458  013470  122227  000124          CMPB    (R2)+,#124      ;YES-IS NEXT CHARACTER A T?
4459  013474  001006                  BNE     2$              ;NO-GET OUT
4460  013476  121227  000101          CMPB    (R2),#101       ;IS NEXT CHARACTER AN A?
4461  013502  001003                  BNE     2$              ;NO-GET OUT
4462  013504  005737  002326          TST     MTATST          ;YES-SHOULD MTA TESTS BE SKIPPED?
4463  013510  001344                  BNE     3$              ;YES-SKIP THEM
4464  013512                    2$:   MANUAL                  ;CAN I ENTER DIALOG WITH THE OPERATOR
4465  013514                          BNCOMPLETE      4$      ;NO - JUST RUN THE TESTS
4466  013516  005737  002334          TST     RUNSKP          ;YES - BUT DOES USER WANT RUN/SKIP?
4467  013522  001426                  BEQ     4$              ;NO - JUST RUN
4468  013524                          PRINTF  #MICRO,#BUFER   ;PRINT TEST HEADER
4469  013550  005037  004404          CLR     BYPFLG          ;DEFAULT THE QUESTION RESPONSE TO NO
4470  013554                          GMANIL  SKIP,BYPFLG,1,YES  ;ASK THE QUESTION
4471  013570  005737  004404          TST     BYPFLG          ;SKIP THE MICRO MODULE
4472  013574  001312                  BNE     3$              ;YES - GO GET THE NEXT MODULE
4473  013576  000417                  BR      5$              ;NO-GO START TEST
4474  013600                    4$:   RFLAGS  R2              ;GET USER FLAGS
4475  013604  032702  001000          BIT     #PNT,R2         ;PNT FLAG SET
4476  013610  001412                  BEQ     5$              ;NO-RUN THE TEST
4477  013612                          PRINTF  #MICRO,#BUFER   ;YES-PRINT TEST HEADER
4478  013636  004737  016102    5$:   CALL    CONTRL          ;GO START THE TEST
4479  013642  005705                  TST     ERRCOD
4480  013644  001666                  BEQ     3$
4481  013646  004737  021660    NOREX:CALL    CLOSEX          ;CLOSE THE CHANNEL
4482  013652  000207                  RTS     PC
4483
4484
4485  013654  047045  052045  000 MICRO:  .ASCIZ  /%N%T/
4486          013662                    .EVEN
4487
4488
4489
4490  013662  045513  046524  041501 DXTUID:.ASCIZ  /KKTMAC.PAK/
4491          013676                    .EVEN
4492
4493  013676  054502  040520  051523 SKIP:  .ASCIZ  /BYPASS THIS MICRO MODULE?/
4494                                    .EVEN
```

```
                                        .SBTTL  MODULE 2.1.1 - OPENX
013730                                  SSUB
                                        ;*********************************************************************
                                        ;*SUBROUTINE TITLE
                                        ;*---------- -----
                                        ;*MODULE 2.1.1  OPEN A FILE
013730                                  SP
                                        ;*********************************************************************
                                        ;*PROCEDURE
                                        ;*---------
                                        ;*BGNSUB
                                        ;*  CLEAR THE ERROR CODE
                                        ;*  ISSUE OPEN FILE CALL TO DIAGNOSTIC SUPERVISOR
                                        ;*ENDSUB
013730                                  SIO
                                        ;*********************************************************************
                                        ;*SUBROUTINE INPUT/OUTPUT
                                        ;*---------- ------------
                                        ;*      INPUT:
                                        ;*
                                        ;*      FILNAM  CONTAINING A POINTER TO AN .ASCIZ CHARACTER STRING,
                                        ;*              WITH THE NAME OF THE FILE TO BE OPENED.
                                        ;*
013730                                  S
                                        ;*********************************************************************
013730                                  OPENX:  OPEN    FILNAM          ;OPEN A FILE
013736  005005                                  CLR     ERRCOD          ;CLEAR THE ERROR CODE
013740  000207                                  RTS     PC
                                        .SBTTL  MODULE 2.1.2 - LOADER
013742                                  SSUB
                                        ;*********************************************************************
                                        ;*SUBROUTINE TITLE
                                        ;*---------- -----
                                        ;*MODULE 2.1.2  INPUT/LOAD THE TM78 MICRO-DIAGNOSTIC
013742                                  SP
                                        ;*********************************************************************
                                        ;*PROCEDURE
                                        ;*---------
                                        ;*BGNSUB
                                        ;*     CLEAR THE ERROR CODE
                                        ;*     CLEAR THE EOF FLAG
                                        ;*     CALL SUBROUTINE ''LDMOD''
                                        ;*       IF ERROR CODE=0
                                        ;*       :   THEN-CONTINUE
                                        ;*       :   ELSE-CALL SUBROUTINE ''SYSERR''
                                        ;*       :        EXIT SUBROUTINE
                                        ;*       ENDIF
                                        ;*     SELECT THE TM78 UNIT UNDER TEST
                                        ;*     CALL SUBROUTINE ''STOP''
                                        ;*       IF ERROR CODE=0
                                        ;*       :   THEN-CONTINUE
                                        ;*       :   ELSE-CALL SUBROUTINE ''SYSERR''
                                        ;*       :        EXIT SUBROUTINE
                                        ;*       ENDIF
                                        ;*     CALL SUBROUTINE ''WRITE''
                                        ;*       IF ERROR CODE=0
```

```
                                ;*      :   THEN-CONTINUE
                                ;*      :   ELSE-CALL SUBROUTINE ''SYSERR''
                                ;*      :       EXIT SUBROUTINE
                                ;*        ENDIF
                                ;*      CALL SUBROUTINE ''COMP''
                                ;*        IF ERROR CODE=0
                                ;*      :   THEN-CONTINUE
                                ;*      :   ELSE-CALL SUBROUTINE ''SYSERR''
                                ;*      :       EXIT SUBROUTINE
                                ;*        ENDIF
                                ;*      CALL SUBROUTINE ''START''
                                ;*        IF ERROR CODE=0
                                ;*      :   THEN-CONTINUE
                                ;*      :   ELSE-CALL SUBROUTINE ''SYSERR''
                                ;*      :       EXIT SUBROUTINE
                                ;*        ENDIF
                                ;*      CALL SUBROUTINE ''MESS''
                                ;*        IF ERROR CODE=0
                                ;*      :   THEN-CONTINUE
                                ;*      :   ELSE-CALL SUBROUTINE ''SYSERR''
                                ;*      :       EXIT SUBROUTINE
                                ;*        ENDIF
                                ;*ENDSUB
013742                          SIO
(1)                             ; ************************************************************************
(1)                             ;*SUBROUTINE INPUT/OUTPUT
(1)                             ;*---------- ------------
                                ;*
                                ;*      INPUT:
                                ;*      BINBUF  CONTAINING THE LOAD MODULE OF THE TEST TO BE WRITTEN
                                ;*
                                ;*      OUTPUT:
                                ;*      EOF     END OF FILE FLAG
                                ;*              =0 IF NORMAL EOF NOT DETECTED
                                ;*              >0 IF NORMAL EOF DETECTED
                                ;*      ERRCOD  ERROR CODE-AS FOLLOWS
                                ;*              =0- NO LOAD ERROR OCCURED
                                ;*              >0- LOAD ERROR OCCURED
                                ;*                  ABORT THE TEST
                                ;*
013742                          S
(1)                             ; ************************************************************************

013742  005005                  LOADER: CLR     ERRCOD          ;CLEAR THE ERROR CODE
013744  005037  004402                  CLR     EOF             ;CLEAR END OF FILE FLAG
013750  004737  015002                  CALL    LDMOD           ;BUILD A LOAD MODULE
013754  005705                        TST     ERRCOD          ;BUILD ERROR?
013756  001032                        BNE     ERLOAD          ;YES-GO PRINT ERROR
013760  005737  004402                  TST     EOF             ;END OF FILE?
013764  001031                        BNE     LOADEX          ;YES - EXIT THE MODULE
013766  013777  004352  170244        MOV     MBDRIV,@CS2     ;SET UP TM78 UNIT #
013774  004737  014052                  CALL    STOP            ;STOP THE TM78 MP FOR LOADING
014000  005705                        TST     ERRCOD          ;DID AN TM78 MP STATUS ERROR OCCUR?
014002  001020                        BNE     ERLOAD          ;YES - GO LOG THE ERROR
014004  004737  014212                  CALL    WRITE           ;NO-GO WRITE THE TM78 MP RAM
014010  005705                        TST     ERRCOD          ;DID AN TM78 MP LOAD ERROR OCCUR?
014012  001014                        BNE     ERLOAD          ;YES - GO LOG THE ERROR
```

```
4587  014014  004737  014432                  CALL    COMP            ;NO - GO COMPARE TM78 MP MEMORY WITH
4588                                                                  ;WHAT WAS WRITTEN
4589  014020  005705                          TST     ERRCOD          ;DID A COMPARE ERROR OCCUR?
4590  014022  001010                          BNE     ERLOAD          ;YES - GO LOG THE ERROR
4591  014024  004737  014566                  CALL    START           ;NO - GO START THE TM78 MP MONITOR?
4592  014030  005705                          TST     ERRCOD          ;DID THE MONITOR START?
4593  014032  001004                          BNE     ERLOAD          ;NO-GO LOG A ERROR
4594  014034  004737  015204                  CALL    MESS            ;GO INPUT/BUILD MESSAGE FILE
4595  014040  005705                          TST     ERRCOD          ;MESSAGE FILE ERROR
4596  014042  001402                          BEQ     LOADEX          ;NO-EXIT MODULE
4597  014044  004737  015340          ERLOAD: CALL    SYSERR          ;NO - GO LOG THE ERROR
4598  014050  000207                  LOADEX: RTS     PC              ;RETURN
4599                                  .SBTTL  MODULE 2.1.2.1 - STOP
4600  014052                          SSUB
 (1)                                ;*********************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
4601                                ;*MODULE 2.1.2.1         STOP THE TM78 MICRO PROCESSOR
4602  014052                          SP
 (1)                                ;*********************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
4603                                ;*BGNSUB
4604                                ;*     LOAD A NON-EXISTENT TM78 MICROPROCESSOR MEMORY ADDRESS
4605                                ;*     SET THE HOLD BIT IN CAS REGISTER 21
4606                                ;*     TIMEOUT 100 MICRO SECONDS
4607                                ;*       IF TM78 MICROPROCESSOR STATUS ERROR
4608                                ;*       :   THEN-LOAD ERROR CODE 01
4609                                ;*       :        -EXIT SUBROUTINE
4610                                ;*       :   ELSE-CONTINUE
4611                                ;*       ENDIF
4612                                ;*       IF HOLD ACTIVE SET
4613                                ;*       :   THEN-CONTINUE
4614                                ;*       :        -EXIT SUBROUTINE
4615                                ;*       :   ELSE-LOAD ERROR CODE 02
4616                                ;*       ENDIF
4617                                ;*ENDSUB
4618  014052                          SIO
 (1)                                ;*********************************************************************
 (1)                                ;*SUBROUTINE INPUT/OUTPUT
 (1)                                ;*---------- ------------
4619                                ;*
4620                                ;*       INPUT:
4621                                ;*       ERRCOD  ERROR CODE SET TO 0
4622                                ;*
4623                                ;*       OUTPUT:
4624                                ;*       STAT80  TM78 MP STATUS FOR ERROR CODE 01 AND 02
4625                                ;*       ERRCOD  ERROR CODE -AS FOLLOWS
4626                                ;*                       =00-IF NO ERROR DETECTED
4627                                ;*                       =01-IF AN TM78 MP STATUS ERROR
4628                                ;*                           WAS DETECTED
4629                                ;*                       =02-IF THE TM78 MP WILL NOT STOP
4630                                ;*
4631  014052                          S
 (1)                                ;*********************************************************************
4632  014052  012777  077777  170220  STOP:   MOV     #077777,@AD80   ;LOAD A NON-EXISTENT TM78 MP ADDRESS
```

```
 4633  014060  012777  000400  170214          MOV     #HOLD,@DS80     ;SET THE HOLD BIT
 4634                                          ;
 4635  014066                                  DELAY   1               ;PERFORM A 100 MICRO SECOND TIMEOUT
 4636  014116  017737  170160  004366          MOV     @DS80,STAT80    ;GET THE TM78 MP STATUS
 4637  014124  032737  034000  004366          BIT     #HLDSTA,STAT80  ;IS THERE AN TM78 MP STATUS ERROR?
 4638  014132  001403                          BEQ     STOP1           ;NO- GO CHECK HOLD ACTIVE
 4639  014134  012705  000001                  MOV     #01.,ERRCOD     ;YES-LOAD THE STATUS ERROR CODE
 4640  014140  000423                          BR      STOPEX          ;EXIT THE MODULE
 4641  014142  032737  001000  004366  STOP1:  BIT     #HLDA,STAT80    ;IS THE TM78 MP STOPPED?
 4642  014150  001003                          BNE     STOP2           ;YES -EXIT WITH NO ERROR CODE CLEAR
 4643  014152  012705  000002                  MOV     #02.,ERRCOD     ;NO-LOAD THE TM78 MP WILL NOT STOP ERROR CODE
 4644  014156  000414                          BR      STOPEX          ;EXIT THE MODULE
 4645  014160  013702  004360          STOP2:  MOV     TMPORT,R2       ;GET THE PORT NUMBER
 4646  014164  001402                          BEQ     STOP3           ;
 4647  014166  012702  000200                  MOV     #200,R2         ;LOAD PORT 1 SELECT CODE
 4648  014172  012777  100340  170100  STOP3:  MOV     #MBSEL,@AD80    ;ADDRESS THE MB SELECT BYTE
 4649  014200  062702  000400                  ADD     #HOLD,R2        ;SET HOLD BIT IN DATA
 4650  014204  010277  170072                  MOV     R2,@DS80        ;SELECT DESIRED PORT
 4651  014210  000207                  STOPEX: RTS     PC              ;RETURN TO CALLING MODULE
 4652                                  .SBTTL  MODULE 2.1.2.2 - WRITE
 4653  014212                          SSUB
   (1)                                ;*****************************************************************************
   (1)                                ;*SUBROUTINE TITLE
   (1)                                ;*---------- -----
 4654                                 ;*MODULE 2.1.2.2        WRITE A PROGRAM TO TM78 MP WCS
 4655  014212                          SP
   (1)                                ;*****************************************************************************
   (1)                                ;*PROCEDURE
   (1)                                ;*---------
 4656                                 ;*BGNSUB
 4657                                 ;*    GET THE BYTE COUNT FOR THE RECORD FROM THE BINARY TEST FILE
 4658                                 ;*    BGNDO
 4659                                 ;*    : DO WHILE ERROR CODE=0 AND THE BYTE COUNT FOR THE RECORD NOT=0
 4660                                 ;*    : SET THE CHECKSUM=THE BYTE COUNT
 4661                                 ;*    : GET THE HIGH ORDER BYTE OF THE TM78 MP WCS ADDRESS FROM THE RECORD
 4662                                 ;*    : ADD THE HIGH ORDER BYTE OF THE TM78 MP WCS ADDRESS TO THE CHECKSUM
 4663                                 ;*    : GET THE LOW ORDER BYTE OF THE TM78 MP WCS ADDRESS FROM THE RECORD
 4664                                 ;*    : ADD THE LOW ORDER BYTE OF THE TM78 MP WCS ADDRESS TO THE CHECKSUM
 4665                                 ;*    : ADD THE UNUSED BYTE IN THE RECORD TO THE CHECKSUM
 4666                                 ;*    : BGNDO
 4667                                 ;*    : :    LOAD THE TM78 MP WCS ADDRESS INTO CAS REGISTER 20
 4668                                 ;*    : :    WRITE THE WCS DATA FROM THE RECORD TO CAS REG. 21 WITH THE HOLD BIT
 4669                                 ;*    : :    GET THE TM78 MP STATUS BYTE FROM CAS REGISTER 21
 4670                                 ;*    : :       IF TM78 MP STATUS ERROR
 4671                                 ;*    : :       :   THEN-LOAD ERROR CODE 01
 4672                                 ;*    : :       :   ELSE-CONTINUE
 4673                                 ;*    : :       ENDIF
 4674                                 ;*    : :    ADD THE DATA BYTE TO THE CHECKSUM BYTE
 4675                                 ;*    : :    INCREMENT THE WCS MEMORY ADDRESS
 4676                                 ;*    : :    DECREMENT THE BYTE COUNT
 4677                                 ;*    : :    DO UNTIL BYTE COUNT IS DECREMENTED TO 0
 4678                                 ;*    : ENDDO
 4679                                 ;*    : ADD THE CHECKSUM CALCULATED TO THE CHECKSUM CHARACTER FROM THE RECORD
 4680                                 ;*    :     IF SUM OF CHECKSUM CHARACTERS=0
 4681                                 ;*    :     :   THEN-GET THE BYTE COUNT FROM THE NEXT RECORD
 4682                                 ;*    :     :   ELSE-LOAD ERROR CODE 03
```

```
                                        ;*     :     ENDIF
                                        ;*    ENDDO
                                        ;*ENDSUB
014212                                  SIO
 (1)                                    ; ************************************************************************
 (1)                                    ;*SUBROUTINE INPUT/OUTPUT
 (1)                                    ;*---------- ------------
                                        ;*      INPUT:
                                        ;*      BINBUF  CONTAINING THE LOAD MODULE FOR THE TEST TO BE WRITTEN
                                        ;*      ERRCOD  ERROR CODE SET TO 0
                                        ;*
                                        ;*      OUTPUT:
                                        ;*       ERRCOD ERROR CODE - AS FOLLOWS
                                        ;*                         =00-IF NO ERROR DETECTED
                                        ;*                         =01-IF AN TM78 MP STATUS ERROR
                                        ;*                             WAS DETECTED
                                        ;*                         =03-IF A CHECK SUM ERROR
                                        ;*                             WAS DETECTED
                                        ;*
                                        ;*      STAT80  TM78 MP STATUS FOR ERROR CODE 01
014212                                  S
                                        ; ************************************************************************
014212  012703  021666        WRITE:  MOV     #BUFER,R3       ;GET THE BUFFER ADDRESS
014216  112301                WRIT:   MOVB    (R3)+,R1        ;GET THE BYTE COUNT FOR THIS RECORD
014220  042701  177400                BIC     #177400,R1      ;REMOVE ANY SIGN EXTENSION BITS
014224  005705                WRITE0: TST     ERRCOD          ;IS THE ERROR CODE ZERO?
014226  001002                        BNE     WRITEX          ;NO- EXIT THE MODULE
014230  005701                        TST     R1              ;YES- IS THE BYTE COUNT ZERO?
014232  001001                        BNE     WRITE1          ;NO- CONTINUE TO LOAD
014234  000207                WRITEX: RTS     PC              ;YES- EXIT THE MODULE
                                                              ;
014236  010137  004350        WRITE1: MOV     R1,CHKSUM       ;LOAD THE CHECK SUM WITH THE BYTE COUNT
014242  112302                        MOVB    (R3)+,R2        ;GET THE HO WCS ADDRESS BYTE
014244  042702  177400                BIC     #177400,R2      ;REMOVE ANY SIGN EXTENTION BITS
014250  060237  004350                ADD     R2,CHKSUM       ;ADD HO WCS ADDRESS BYTE TO THE CHKSUM
014254  110237  004377                MOVB    R2,HIAD80       ;STORE IN THE TEMP HO WCS ADDRESS
                                                              ;
014260  112302                        MOVB    (R3)+,R2        ;GET THE LO WCS ADDRESS BYTE
014262  042702  177400                BIC     #177400,R2      ;REMOVE ANY SIGN EXTENTION BITS
014266  060237  004350                ADD     R2,CHKSUM       ;ADD LO WCS ADDRESS BYTE TO THE CHKSUM
014272  110237  004376                MOVB    R2,LOAD80       ;STORE IN THE TEMP LO WCS ADDRESS
014276  112302                        MOVB    (R3)+,R2        ;GET THE ''DUMMY'' BYTE IN THE RECORD
014300  042702  177400                BIC     #177400,R2      ;REMOVE ANY SIGN EXTENTION BITS
014304  060237  004350                ADD     R2,CHKSUM       ;ADD THE ''DUMMY'' BYTE TO THE CHKSUM
                                                              ;
                                                              ;R3 NOW POINTS TO THE FIRST DATA BYTE
014310  013777  004376  167762 WRITE2: MOV     LOAD80,@AD80    ;LOAD THE TM78 MP WCS ADDRESS
014316  111302                        MOVB    (R3),R2         ;LOAD THE TM78 MP WCS DATA BYTE
014320  042702  177400                BIC     #177400,R2      ;REMOVE ANY SIGN EXTENTION BITS
014324  052702  000400                BIS     #HOLD,R2
014330  010277  167746                MOV     R2,@DS80
014334  000240                        NOP
014336  017737  167740  004366        MOV     @DS80,STAT80    ;GET THE TM78 MP STATUS
014344  032737  034000  004366        BIT     #HLDSTA,STAT80  ;IS THERE A STATUS ERROR?
014352  001402                        BEQ     WRITE3          ;NO- CONTINUE
014354  012705  000001                MOV     #01.,ERRCOD     ;YES- LOAD THE STATUS ERROR CODE
```

```
 4735  014360  112302                    WRITE3: MOVB    (R3)+,R2        ;GET THE DATA BYTE
 4736  014362  042702  177400                    BIC     #177400,R2      ;REMOVE ANY SIGN EXTENTION BITS
 4737  014366  060237  004350                    ADD     R2,CHKSUM       ;ADD THE DATA BYTE TO THE CHKSUM
 4738                                                                      ;
 4739  014372  062737  000001  004376            ADD     #1,LOAD80       ;INCREMENT THE TM78 MP WCS ADDRESS
 4740  014400  005301                            DEC     R1              ;DECREMENT THE BYTE COUNT
 4741  014402  001342                            BNE     WRITE2          ;CONTINUE IF NOT ZERO
 4742  014404  112302                            MOVB    (R3)+,R2        ;GET THE CHKSUM BYTE FROM THE INPUT
 4743                                                                      ;RECORD
 4744  014406  042702  177400                    BIC     #177400,R2      ;REMOVE ANY SIGN EXTENTION BITS
 4745  014412  060237  004350                    ADD     R2,CHKSUM       ;ADD THE CHKSUM BYTE FROM THE RECORD
 4746                                                                      ;TO THE CHKSUM CALCULATED
 4747  014416  105737  004350                    TSTB    CHKSUM          ;IS THE CHKSUM RESULT ZERO?
 4748  014422  001675                            BEQ     WRIT            ;YES- GET NEXT BYTE COUNT
 4749  014424  012705  000003                    MOV     #03.,ERRCOD     ;NO- CHECK SUM ERROR
 4750  014430  000675                            BR      WRITE0          ;
 4751                                  .SBTTL  MODULE 2.1.2.3 - COMP
 4752  014432                          SSUB
   (1)                                ; ************************************************************************
   (1)                                ;*SUBROUTINE TITLE
   (1)                                ;*---------- -----
 4753                                 ;*MODULE 2.1.2.3        VERIFY TM78 MP WCS WITH WRITTEN
 4754  014432                          SP
   (1)                                ; ************************************************************************
   (1)                                ;*PROCEDURE
   (1)                                ;*---------
 4755                                 ;*BGNSUB
 4756                                 ;*     GET THE BYTE COUNT FOR THE RECORD FROM THE BINARY TEST FILE
 4757                                 ;*     BGNDO
 4758                                 ;*     : DO WHILE THE ERROR CODE=0 AND THE BYTE COUNT NOT=0
 4759                                 ;*     : GET THE HIGH ORDER BYTE OF THE TM78 MP WCS ADDRESS FROM THE RECORD
 4760                                 ;*     : GET THE LOW ORDER BYTE OF THE TM78 MP WCS ADDRESS FROM THE RECORD
 4761                                 ;*     : SKIP OVER THE UNUSED BYTE IN THE RECORD
 4762                                 ;*     : BGNDO
 4763                                 ;*     : :     LOAD THE TM78 MP WCS ADDRESS INTO CAS REGISTER 20
 4764                                 ;*     : :     READ THE TM78 MP DATA FROM CAS REGISTER 21
 4765                                 ;*     : :         IF TM78 MP STATUS ERROR
 4766                                 ;*     : :         :   THEN-LOAD ERROR CODE 01
 4767                                 ;*     : :         :   ELSE-CONTINUE
 4768                                 ;*     : :         :       IF DATA BYTE EQUAL
 4769                                 ;*     : :         :       :   THEN-INCREMENT THE TM78 MP WCS ADDRESS
 4770                                 ;*     : :         :       :       -DECREMENT THE BYTE COUNT
 4771                                 ;*     : :         :       :   ELSE-STORE THE EXPECTED DATA BYTE
 4772                                 ;*     : :         :       :       -STORE THE ACTUAL DATA BYTE
 4773                                 ;*     : :         :       :       -LOAD ERROR CODE 04
 4774                                 ;*     : :         :       ENDIF
 4775                                 ;*     : :         ENDIF
 4776                                 ;*     : :     DO UNTIL THE BYTE COUNT IS DECREMENTED TO 0 OR ERROR CODE NOT = 0
 4777                                 ;*     : ENDDO
 4778                                 ;*     : IF ERROR CODE = ZERO
 4779                                 ;*     : :   THEN-GET THE BYTE COUNT OF THE NEXT RECORD
 4780                                 ;*     : :   ELSE-CONTINUE
 4781                                 ;*     : ENDIF
 4782                                 ;*     ENDDO
 4783                                 ;*ENDSUB
 4784  014432                          SIO
```

```
 (1)                                ;*********************************************************************
 (1)                                ;*SUBROUTINE INPUT/OUTPUT
 (1)                                ;*---------- ------------
4785                                ;*
4786                                ;*      INPUT:
4787                                ;*      BINBUF  CONTAINING THE LOAD MODULE FOR THE TEST BEING VERIFIED
4788                                ;*      ERRCOD  ERROR CODE SET TO 0
4789                                ;*
4790                                ;*      OUTPUT:
4791                                ;*       ERRCOD ERROR CODE - AS FOLLOWS
4792                                ;*                        =00 - NO ERROR DETECTED
4793                                ;*                        =01 - IF AN TM78 MP STATUS ERROR
4794                                ;*                              WAS DETECTED
4795                                ;*                        =04 - IF A WCS COMPARE ERROR
4796                                ;*                              WAS DETECTED
4797                                ;*
4798                                ;*      STAT80  TM78 MP STATUS FOR ERROR CODE 01 AND FAILING DATA BYTE
4799                                ;*              FOR ERROR CODE 04.
4800                                ;*
4801                                ;*      ADATA   CONTAINS THE ACTUAL DATA BYTE ON COMPARE ERROR
4802                                ;*
4803                                ;*      EDATA   CONTAINS THE EXPECTED DATA BYTE ON COMPARE ERROR
4804                                ;*
4805  014432                        S
 (1)                                ;*********************************************************************
4806  014432  012703  021666        COMP:   MOV     #BUFER,R3       ;GET THE BUFFER ADDRESS
4807  014436  112301                COMP0:  MOVB    (R3)+,R1        ;GET THE BYTE COUNT FOR THE RECORD
4808  014440  042701  177400                BIC     #177400,R1      ;REMOVE ANY SIGN EXTENTION BITS
4809                                                                 ;
4810  014444  005705                        TST     ERRCOD          ;IS THE ERROR CODE ZERO?
4811  014446  001002                        BNE     COMPEX          ;NO -EXIT THE MODULE
4812  014450  005701                        TST     R1              ;YES - IS THE BYTE COUNT ZERO?
4813  014452  001001                        BNE     COMP1           ;NO - CONTINUE WITH COMPARE
4814  014454  000207                COMPEX: RTS     PC              ;YES -EXIT THE MODULE
4815                                                                 ;
4816  014456  112337  004377        COMP1:  MOVB    (R3)+,HIAD80    ;GET THE HO WCS ADDRESS BYTE
4817  014462  112337  004376                MOVB    (R3)+,LOAD80    ;GET THE LO WCS ADDRESS BYTE
4818  014466  105723                        TSTB    (R3)+           ;SKIP OVER THE UNUSED BYTE
4819                                                                 ;
4820  014470  013777  004376  167602 COMP2:  MOV     LOAD80,@AD80    ;LOAD THE TM78 MP WCS ADDRESS
4821  014476  017737  167600  004366        MOV     @DS80,STAT80    ;GET THE TM78 MP DATA/STATUS WORD
4822  014504  032737  034000  004366        BIT     #HLDSTA,STAT80  ;IS THERE A STATUS ERROR?
4823  014512  001403                        BEQ     COMP3           ;NO - CHECK THE DATA
4824  014514  012705  000001                MOV     #01.,ERRCOD     ;YES - LOAD THE ERROR CODE
4825  014520  000755                        BR      COMPEX          ;EXIT THE MODULE
4826                                                                 ;
4827  014522  122337  004366        COMP3:  CMPB    (R3)+,STAT80    ;IS THE DATA VALID?
4828  014526  001410                        BEQ     COMP4           ;YES - PROCEED
4829  014530  114337  004372                MOVB    -(R3),EDATA     ;SAVE THE EXPECTED DATA
4830  014534  113737  004366  004370        MOVB    STAT80,ADATA    ;SAVE THE ACTUAL DATA
4831  014542  012705  000004                MOV     #04.,ERRCOD     ;NO - LOAD THE ERROR CODE
4832  014546  000742                        BR      COMPEX          ;EXIT THE MODULE
4833                                                                 ;
4834  014550  062737  000001  004376 COMP4:  ADD     #1,LOAD80       ;INCREMENT THE TM78 MP WCS ADDRESS
4835  014556  005301                        DEC     R1              ;DECREMENT THE BYTE COUNT
4836  014560  001343                        BNE     COMP2           ;CONTINUE COMPARE IF NOT ZERO
```

```
                        TSTB    (R3)+           ;SKIP OVER THE CHECKSUM BYTE
                        BR      COMP0           ;
                .SBTTL  MODULE 2.1.2.4 - START
                SSUB
                ;*****************************************************************************
                ;*SUBROUTINE TITLE
                ;*---------- -----
                ;*MODULE 2.1.2.4         START TM78 MP DIAGNOSTIC MONITOR
                SP
                ;*****************************************************************************
                ;*PROCEDURE
                ;*---------
                ;*BGNSUB
                ;*      ISSUE MASS BUS INIT
                ;*      WAIT 10 MILLISECONDS
                ;*        IF TM78 MP STATUS ERROR
                ;*        :   THEN-LOAD ERROR CODE 01
                ;*        :        -EXIT SUBROUTINE
                ;*        :   ELSE-
                ;*        :        IF TM READY RESET
                ;*        :        :   THEN-LOAD ERROR CODE 05
                ;*        :        :        -EXIT SUBROUTINE
                ;*        :        :   ELSE-ISSUE FUNCTION CODE 37 TO TM78
                ;*        :        :        -WAIT 10 MILLISECONDS
                ;*        :        :        IF COMMAND GO BIT=0
                ;*        :        :        :   THEN-CONTINUE
                ;*        :        :        :   ELSE-LOAD ERROR CODE 06
                ;*        :        :        :        -EXIT SUBROUTINE
                ;*        :        :        ENDIF
                ;*        :        ENDIF
                ;*      ENDIF
                ;*ENDSUB
                SIO
                ;*****************************************************************************
                ;*SUBROUTINE INPUT/OUTPUT
                ;*---------- ------------
                ;*
                ;*      INPUT:
                ;*       ERRCOD ERROR CODE SET TO 0
                ;*
                ;*      OUTPUT:
                ;*      ERRCOD  ERROR CODE SET AS FOLLOWS
                ;*                      =00 IF NO ERROR DETECTED
                ;*                      =01-IF AN TM78 MP STATUS ERROR
                ;*                          WAS DETECTED
                ;*                      =05-IF TM READY IS NOT ACTIVE
                ;*                          AFTER A 10 MS. TIMEOUT
                ;*                      =06-DIAGNOSTIC MONITOR NOT READY
                ;*                          AFTER ISSUEING
                ;*                          CODE 37 AND A TIMEOUT
                ;*
                ;*      STAT80
                S
                ;*****************************************************************************
014566 052777 000040 167444 START:  BIS     #MBINIT,@CS2    ;START THE TM78
014574                              DELAY   50              ;PERFORM A 5 MILLISECOND TIMEOUT
014624 013777 004352 167406         MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS PORT NUMBER
```

```
4883                                                    ;
4884  014632  017737  167444  004366        MOV     @DS80,STAT80    ;GET THE TM78 MP STATUS
4885  014640  032737  035400  004366        BIT     #CLRSTA,STAT80  ;IS THERE A STATUS ERROR
4886  014646  001403                        BEQ     START1          ;NO - CONTINUE
4887  014650  012705  000001                MOV     #01.,ERRCOD     ;YES - LOAD THE ERROR CODE
4888  014654  000436                        BR      STAREX          ;EXIT THE MODULE
4889  014656  032737  100000  004366  START1: BIT    #TMRDY,STAT80   ;IS TM READY ACTIVE
4890  014664  001003                        BNE     START2          ;YES - GO START THE DIAGNOSTIC MONITER
4891  014666  012705  000005                MOV     #05.,ERRCOD     ;NO - LOAD THE ERROR CODE
4892  014672  000427                        BR      STAREX          ;EXIT THE MODULE
4893  014674  005077  167342        START2: CLR     @XFRINT         ;CLEAR THE DATA TRANSFER INTERRUPT CODE
4894  014700  012777  000037  167322        MOV     #DIGMON,@XFRCMD ;ISSUE CODE 37
4895                                                  ;
4896  014706                                DELAY   100             ;PERFORM A 100 MILLISECOND TIMEOUT
4897                                                  ;
4898  014736  032777  000001  167264        BIT     #1,@XFRCMD      ;TEST FOR CODE ACCEPTED
4899  014744  001402                        BEQ     STAREX          ;YES - EXIT THE MODULE
4900  014746  012705  000006                MOV     #06.,ERRCOD     ;NO - LOAD THE ERROR CODE
4901  014752  012777  000377  167266  STAREX: MOV    #377,@AS        ;CLEAR THE ATTENTION INTERRUPT
4902  014760  000207                        RTS     PC              ;MODULE EXIT
4903
4904  014762  005005                DIAGST: CLR     ERRCOD          ;CLEAR THE ERROR CODE
4905  014764  004737  014566                CALL    START           ;START THE TM78
4906  014770  005705                        TST     ERRCOD          ;ANY START ERRORS
4907  014772  001402                        BEQ     1$              ;NO EXIT
4908  014774  004737  015340                CALL    SYSERR          ;GO LOG THE ERROR
4909  015000  000207                1$:     RTS     PC              ;RETURN TO THE USER
4910                                .SBTTL  MODULE 2.1.2.5 - LDMOD
4911  015002                        SSUB
  (1)                             ; ************************************************************************
  (1)                             ;*SUBROUTINE TITLE
  (1)                             ;*---------- -----
4912                              ;*MODULE 2.1.2.5        PACK TM78 MP LOAD MODULE FROM THE LOAD MEDIA
4913  015002                      SP
  (1)                             ; ************************************************************************
  (1)                             ;*PROCEDURE
  (1)                             ;*---------
4914                              ;*BGNSUB
4915                              ;*  BGNDO
4916                              ;*  :  CALL SUBROUTINE READ
4917                              ;*  :  IF ERROR CODE=0
4918                              ;*  :  :  THEN-CONTINUE
4919                              ;*  :  :  ELSE-IF ERROR CODE=14(8)
4920                              ;*  :  :        :  THEN-CLEAR ERROR CODE
4921                              ;*  :  :        :       INCREMENT THE END OF FILE FLAG
4922                              ;*  :  :        :       EXIT SUBROUTINE
4923                              ;*  :  :        :  ELSE-EXIT SUBROUTINE
4924                              ;*  :  :       ENDIF
4925                              ;*  :  ENDIF
4926                              ;*  :  DO UNTIL CHARACTER READ=:
4927                              ;*  ENDDO
4928                              ;*  CLEAR BUFFER POINTER
4929                              ;*  CLEAR RIGHT/LEFT NIBBLE FLAG
4930                              ;*  BGNDO
4931                              ;*  :  CALL SUBROUTINE READ
4932                              ;*  :  IF ERROR CODE=0
```

```
                        ;*  :  :  THEN-CONTINUE
                        ;*  :  :  ELSE-EXIT SUBROUTINE
                        ;*  :  ENDIF
                        ;*  :  IF CHARACTER=0-9 OR A-F
                        ;*  :  :  THEN-SAVE LEAST SIGNIFICANT 4 BITS
                        ;*  :  :       IF RIGHT/LEFT FLAG=0
                        ;*  :  :       :  THEN-SHIFT THE 4 LS BITS LEFT 4
                        ;*  :  :       :       SET THE RIGHT/LEFT FLAG
                        ;*  :  :       :  ELSE-OR THE 4 BITS WITH 4 PREVIOUS BITS
                        ;*  :  :       :       CLEAR THE RIGHT/LEFT FLAG
                        ;*  :  :       :       SAVE THE COMPLETED BYTE IN THE BUFFER
                        ;*  :  :       :       INCREMENT THE BUFFER POINTER
                        ;*  :  :       ENDIF
                        ;*  :  :  ELSE-CONTINUE
                        ;*  :  ENDIF
                        ;*  :  DO UNTIL CHARACTER=$ OR BUFFER POINTER=MAXIMUM
                        ;*  ENDDO
                        ;*  IF BUFFER POINTER=MAX
                        ;*  :  THEN-LOAD ERROR CODE 17(8)
                        ;*  :  ELSE-CONTINUE
                        ;*  ENDIF
                        ;*ENDSUB
                        SIO
                        ; ************************************************************************
                        ;*SUBROUTINE INPUT/OUTPUT
                        ;*---------- ------------
                        ;*
                        ;*      INPUT:
                        ;*      EOF     END OF FILE FLAG SET TO ZERO
                        ;*
                        ;*      ERRCOD  ERROR CODE SET TO ZERO
                        ;*
                        ;*      OUTPUT:
                        ;*
                        ;*      ERRCOD  ERROR CODE SET AS FOLLOWS:
                        ;*
                        ;*                      =0 - NO  ERROR DETECTED
                        ;*                      =014 - UNEXPECTED EOF
                        ;*                      =015 - DISK ACCESS ERROR
                        ;*                      =017 - BINARY BUFFER FULL
                        ;*
015002                  S
                        ; ************************************************************************
015002 004737 015524    LDMOD:  JSR     PC,READ                 ;READ A CHARACTER
015006 005705                   TST     ERRCOD                  ;READ ERROR?
015010 001407                   BEQ     LDMOD1                  ;YES-EXIT LOOP
015012 022705 000014            CMP     #14,ERRCOD
015016 001010                   BNE     LDMOD2
015020 005005                   CLR     ERRCOD
015022 005237 004402            INC     EOF
015026 000465                   BR      LMODEX
015030 123727 004344 000072 LDMOD1: CMPB CHAR,#':               ;NO-CHARACTER=:?
015036 001361                   BNE     LDMOD                   ;NO-CONTINUE
                                                                ;
015040 005705           LDMOD2: TST     ERRCOD                  ;ERROR?
015042 001057                   BNE     LMODEX                  ;YES-EXIT THE MODULE
                                                                ;
```

```
 4985  015044  005004                 LDMOD3: CLR     R4              ;CLEAR BUFFER POINTER
 4986  015046  005003                         CLR     R3              ;CLEAR NIBBLE FLAG
 4987                                                                 ;
 4988  015050  004737  015524         LDMOD4: JSR     PC,READ         ;READ A CHARACTER
 4989  015054  005705                         TST     ERRCOD          ;READ ERROR?
 4990  015056  001051                         BNE     LMODEX          ;YES-EXIT THE LOOP
 4991  015060  113702  004344                 MOVB    CHAR,R2         ;GET THE CHARACTER
 4992  015064  120227  000060                 CMPB    R2,#'0          ;IS THE CHARACTER <0?
 4993  015070  100433                         BMI     LDMOD8          ;YES - BAD CHARACTER - DO NOT PROCESS
 4994  015072  120227  000072                 CMPB    R2,#':          ;NO - IS THE CHARACTER 0-9?
 4995  015076  100410                         BMI     LDMOD6          ;YES - VALID CHARACTER
 4996  015100  120227  000101                 CMPB    R2,#'A          ;NO - IS THE CHARACTER <A?
 4997  015104  100425                         BMI     LDMOD8          ;YES - BAD CHARACTER - DO NOT PROCESS
 4998  015106  120227  000107                 CMPB    R2,#'G          ;NO - IS THE CHARACTER A-F?
 4999  015112  100022                         BPL     LDMOD8          ;NO - BAD CHARACTER - DO NOT PROCESS
 5000  015114  062702  000011                 ADD     #11,R2          ;ADD THE ALPHA CAHRACTER CONVERSION FACTOR
 5001                                                                 ;
 5002  015120  042702  177760         LDMOD6: BIC     #177760,R2      ;REMOVE JUNK BITS
 5003  015124  005703                         TST     R3              ;TEST THE NIBBLE PACK FLAG
 5004  015126  001007                         BNE     LDMOD7          ;NON-ZERO - PACK THE LOW NIBBLE
 5005  015130  006302                         ASL     R2              ;PACK THE HIGH NIBBLE
 5006  015132  006302                         ASL     R2
 5007  015134  006302                         ASL     R2
 5008  015136  006302                         ASL     R2
 5009  015140  110201                         MOVB    R2,R1           ;STORE THE BYTE FOR NEXT PASS
 5010  015142  005203                         INC     R3              ;SET THE LOW NIBBLE INDICATOR
 5011  015144  000405                         BR      LDMOD8          ;CONTINUE
 5012                                                                 ;
 5013  015146  050201         LDMOD7: BIS     R2,R1           ;FORM THE FINAL BYTE
 5014  015150  110164  021666                 MOVB    R1,BUFER(R4)    ;STORE THE BYTE IN THE LOAD MODULE
 5015  015154  005204                         INC     R4              ;INC. THE LOAD MODULE BYTE POINTER
 5016  015156  005003                         CLR     R3              ;SET THE HIGH NIBBLE INDICATOR
 5017                                                                 ;
 5018  015160  123727  004344  000044 LDMOD8: CMPB    CHAR,#'$        ;CHARACTER=$?
 5019  015166  001405                         BEQ     LMODEX          ;YES-EXIT THE MODULE
 5020  015170  020427  011610                 CMP     R4,#BUFEND-BUFER ;NO-END OF BUFFER?
 5021  015174  001325                         BNE     LDMOD4          ;NO-CONTINUE
 5022  015176  012705  000017                 MOV     #17,ERRCOD      ;YES-QUEUE THE BINARY BUFFER FULL ERROR
 5023  015202  000207         LMODEX: RTS     PC              ;RETURN TO CALLING MODULE
 5024                                                                 ;
 5025                                                                 ;
 5026
 5027                                 .SBTTL  MODULE 2.1.2.6 - MESS
 5028  015204                         SSUB
  (1)                                ; ************************************************************************
  (1)                                ;*SUBROUTINE TITLE
  (1)                                ;*---------- -----
 5029                                ;*MODULE 2.1.2.6         LOAD THE MESSAGE MODULE
 5030  015204                         SP
  (1)                                ; ************************************************************************
  (1)                                ;*PROCEDURE
  (1)                                ;*---------
 5031                                ;*BGNSUB
 5032                                ;*     CLEAR MESSAGE BUFFER POINTER
 5033                                ;*     BGNDO
 5034                                ;*     : CALL SUBROUTINE ''READ''
```

```
5035                                    ;*     :      IF ERROR CODE=ZERO
5036                                    ;*     :      :   THEN-CONTINUE
5037                                    ;*     :      :   ELSE-EXIT SUBROUTINE
5038                                    ;*     :      ENDIF
5039                                    ;*     : DO UNTIL CHARACTER READ=% OR !
5040                                    ;*     ENDDO
5041                                    ;*     STORE THE % OF ! IN THE MESSAGE BUFFER
5042                                    ;*     INCREMENT THE MESSAGE BUFFER POINTER
5043                                    ;*     BGNDO
5044                                    ;*     : CALL SUBROUTINE ''READ''
5045                                    ;*     :      IF ERROR CODE=ZERO
5046                                    ;*     :      :   THEN-CONTINUE
5047                                    ;*     :      :   ELSE-EXIT SUBROUTINE
5048                                    ;*     :      ENDIF
5049                                    ;*     :      IF CHARACTER = TAB
5050                                    ;*     :      :   THEN - REPLACE THE TAB WITH A SPACE
5051                                    ;*     :      :   ELSE - CONTINUE
5052                                    ;*     :      ENDIF
5053                                    ;*     : STORE THE CHARACTER IN THE MESSAGE BUFFER
5054                                    ;*     : INCREMENT THE MESSAGE BUFFER POINTER
5055                                    ;*     :      IF CHARACTER STORED WAS A LINE FEED
5056                                    ;*     :      :   THEN-STORE A ZERO IN THE MESSAGE BUFFER
5057                                    ;*     :      :        -INCREMENT THE MESSAGE BUFFER POINTER
5058                                    ;*     :      :   ELSE-CONTINUE
5059                                    ;*     :      ENDIF
5060                                    ;*     : DO UNTIL BUFFER POINTER=MAX OR CHARACTER=$
5061                                    ;*     ENDDO
5062                                    ;*     IF BUFFER POINTER=MAX
5063                                    ;*     : THEN-LOAD ERROR CODE 16
5064                                    ;*     : ELSE-CONTINUE
5065                                    ;*     ENDIF
5066                                    ;*ENDSUB
5067  015204                            SIO
 (1)                                    ; ************************************************************************
 (1)                                    ;*SUBROUTINE INPUT/OUTPUT
 (1)                                    ;*---------- ------------
5068                                    ;*
5069                                    ;*      INPUT:
5070                                    ;*      ERRCOD  ERROR CODE EQUAL TO ZERO
5071                                    ;*
5072                                    ;*      OUTPUT:
5073                                    ;*      ERRCOD  ERROR CODE AS FOLLOWS:
5074                                    ;*
5075                                    ;*                      =0 - NO ERROR DETECTED
5076                                    ;*                      =14 - UNEXPECTED EOF
5077                                    ;*                      =15 - DISK ACCESS ERROR
5078                                    ;*                      =16 - MESSAGE BUFFER FULL
5079                                    ;*
5080                                    ;*
5081  015204                            S
 (1)                                    ; ************************************************************************
5082
5083  015204  005004                    MESS:   CLR     R4              ;CLEAR THE MESSAGE BUFFER PTR
5084
5085  015206  004737  015524            MESS1:  JSR     PC,READ         ;READ A CHARACTER
5086  015212  005705                            TST     ERRCOD          ;READ ERROR?
```

```
5087  015214  001050                        BNE     MESSEX          ;YES-EXIT THE MODULE
5088  015216  123727  004344  000073        CMPB    CHAR,#';        ;NO-IS IT A ;?
5089  015224  001370                        BNE     MESS1           ;NO-KEEP LOOKING
5090  015226  113764  004344  021666        MOVB    CHAR,BUFER(R4)  ;STORE THE CHARACTER
5091  015234  005204                        INC     R4              ;BUMP THE BUFFER POINTER
5092                                        ;
5093  015236  004737  015524        MESS3:  JSR     PC,READ         ;GET A CHARACTER
5094  015242  005705                        TST     ERRCOD          ;READ ERROR?
5095  015244  001034                        BNE     MESSEX          ;YES-EXIT THE MODULE
5096  015246  123727  004344  000011        CMPB    CHAR,#TAB       ;IS THE CHARACTER A TAB
5097  015254  001003                        BNE     MESS2           ;NO - CONTINUE
5098  015256  112737  000040  004344        MOVB    #SPACE,CHAR     ;YES - REPLACE IT WITH A SPACE
5099  015264  113764  004344  021666  MESS2:  MOVB    CHAR,BUFER(R4)  ;NO-STORE THE CHARACTER
5100  015272  005204                        INC     R4              ;INCREMENT THE BUFFER POINTER
5101  015274  123727  004344  000012        CMPB    CHAR,#LF        ;IS IT A LF?
5102  015302  001004                        BNE     MESS4           ;NO-CONTINUE
5103  015304  112764  000000  021666        MOVB    #0,BUFER(R4)    ;YES-STORE A LINE TERMINATOR
5104  015312  005204                        INC     R4              ;INCREMENT THE BUFFER POINTER
5105  015314  123727  004344  000044  MESS4:  CMPB    CHAR,#'$        ;CHARACTER=$?
5106  015322  001405                        BEQ     MESSEX          ;YES-EXIT
5107  015324  020427  011606                CMP     R4,#BUFEND-BUFER-2  ;NO-END OF BUFFER?
5108  015330  003742                        BLE     MESS3           ;NO-CONTINUE
5109                                                                ;YES-QUEUE THE ERROR
5110  015332  012705  000016                MOV     #16,ERRCOD      ;LOAD-END OF MESSAGE BUFFER AREA ERROR
5111  015336  000207                MESSEX: RTS     PC              ;YES EXIT THE MODULE
5112
5113                                        .SBTTL  MODULE 2.1.2.7 - SYSERR
5114  015340                                SSUB
  (1)                                       ; ************************************************************************
  (1)                                       ;*SUBROUTINE TITLE
  (1)                                       ;*---------- -----
5115                                        ;*MODULE 2.1.2.7         DIAGNOSTIC MONITOR SYSTEM ERROR REPORTING
5116  015340                                SP
  (1)                                       ; ************************************************************************
  (1)                                       ;*PROCEDURE
  (1)                                       ;*---------
5117                                        ;*BGNSUB
5118                                        ;*     GET THE ERROR CODE
5119                                        ;*       IF ERROR CODE NOT LEGAL
5120                                        ;*       :   THEN-PRINT ILLEGAL ERROR CODE MESSAGE
5121                                        ;*       :   ELSE-CONSTRUCT THE ERROR MACRO
5122                                        ;*       :        -PRINT THE ERROR
5123                                        ;*       ENDIF
5124                                        ;*ENDSUB
5125  015340                                SIO
  (1)                                       ; ************************************************************************
  (1)                                       ;*SUBROUTINE INPUT/OUTPUT
  (1)                                       ;*---------- ------------
5126                                        ;*
5127                                        ;*       INPUT:
5128                                        ;*        ERRCOD ERROR CODE FOR THE MESSAGE TO BE PRINTED.
5129                                        ;*
5130  015340                                S
  (1)                                       ; ************************************************************************
5131  015340  010501                SYSERR: MOV     ERRCOD,R1               ;GET THE ERROR CODE
5132  015342  010137  015400                MOV     R1,SYSERM+2             ;PUT THE ERROR NUMBER IN THE MESSAGE
```

```
5133  015346  020127  000022                  CMP     R1,#HEDMPE-HEDJMP/#2    ;VALID MESSAGE NUMBER?
5134  015352  003402                          BLE     1$                      ;YES - CONTINUE
5135  015354  000137  035264            2$:   JMP     SERFAL                  ;NO - ERROR
5136  015360  006301                    1$:   ASL     R1                      ;MULTIPLY BY 2
5137  015362  016137  015410  015402          MOV     HEDJMP(R1),SYSERM+4     ;PUT THE HEADER MESSAGE IN THE ERROR
5138  015370  016137  015456  015404          MOV     MSGJMP(R1),SYSERM+6     ;PUT THE MESSAGE IN THE ERROR
5139  015376                            SYSERM: ERRSF   1.,HEAD1,MSG001
5140  015406  000207                          RTS     PC                      ;RETURN
5141                                                                          ;
5142  015410  000000                    HEDJMP: .WORD   0                       ;DUMMY TABLE ENTRY
5143  015412  035276                            .WORD   HEAD1                   ;ERROR 01 HEADING VECTOR
5144  015414  035276                            .WORD   HEAD1                   ;ERROR 02 HEADING VECTOR
5145  015416  035276                            .WORD   HEAD1                   ;ERROR 03 HEADING VECTOR
5146  015420  035276                            .WORD   HEAD1                   ;ERROR 04 HEADING VECTOR
5147  015422  035276                            .WORD   HEAD1                   ;ERROR 05 HEADING VECTOR
5148  015424  035276                            .WORD   HEAD1                   ;ERROR 06 HEADING VECTOR
5149  015426  035334                            .WORD   HEAD2                   ;ERROR 07 HEADING VECTOR
5150  015430  035334                            .WORD   HEAD2                   ;ERROR 08 HEADING VECTOR
5151  015432  035334                            .WORD   HEAD2                   ;ERROR 09 HEADING VECTOR
5152  015434  035374                            .WORD   HEAD3                   ;ERROR 10 HEADING VECTOR
5153  015436  035374                            .WORD   HEAD3                   ;ERROR 11 HEADING VECTOR
5154  015440  035374                            .WORD   HEAD3                   ;ERROR 12 HEADING VECTOR
5155  015442  035374                            .WORD   HEAD3                   ;ERROR 13 HEADING VECTOR
5156  015444  035374                            .WORD   HEAD3                   ;ERROR 14 HEADING VECTOR
5157  015446  035374                            .WORD   HEAD3                   ;ERROR 15 HEADING VECTOR
5158  015450  035334                            .WORD   HEAD2                   ;ERROR 16 HEADING VECTOR
5159  015452  035334                            .WORD   HEAD2                   ;ERROR 17 HEADING VECTOR
5160  015454  035334                    HEDMPE: .WORD   HEAD2                   ;ERROR 18 HEADING VECTOR
5161
5162  015456  000000                    MSGJMP: .WORD   0                       ;DUMMY TABLE ENTRY
5163  015460  035434                            .WORD   MSG001                  ;ERROR 01 MESSAGE VECTOR
5164  015462  035574                            .WORD   MSG002                  ;ERROR 02 MESSAGE VECTOR
5165  015464  035672                            .WORD   MSG003                  ;ERROR 03 MESSAGE VECTOR
5166  015466  035744                            .WORD   MSG004                  ;ERROR 04 MESSAGE VECTOR
5167  015470  036166                            .WORD   MSG005                  ;ERROR 05 MESSAGE VECTOR
5168  015472  036304                            .WORD   MSG006                  ;ERROR 06 MESSAGE VECTOR
5169  015474  036372                            .WORD   MSG007                  ;ERROR 07 MESSAGE VECTOR
5170  015476  036456                            .WORD   MSG008                  ;ERROR 08 MESSAGE VECTOR
5171  015500  036544                            .WORD   MSG009                  ;ERROR 09 MESSAGE VECTOR
5172  015502  036616                            .WORD   MSG010                  ;ERROR 10 MESSAGE VECTOR
5173  015504  036664                            .WORD   MSG011                  ;ERROR 11 MESSAGE VECTOR
5174  015506  036750                            .WORD   MSG012                  ;ERROR 12 MESSAGE VECTOR
5175  015510  037032                            .WORD   MSG013                  ;ERROR 13 MESSAGE VECTOR
5176  015512  037106                            .WORD   MSG014                  ;ERROR 14 MESSAGE VECTOR
5177  015514  037160                            .WORD   MSG015                  ;ERROR 15 MESSAGE VECTOR
5178  015516  037232                            .WORD   MSG016                  ;ERROR 16 MESSAGE VECTOR
5179  015520  037304                            .WORD   MSG017                  ;ERROR 17 MESSAGE VECTOR
5180  015522  037356                            .WORD   MSG018                  ;ERROR 18 MESSAGE VECTOR
5181
5182
5183                                    .SBTTL  MODULE 2.1.2.5.1 - READ
5184  015524                            SSUB
 (1)                                    ; ************************************************************************************
 (1)                                    ;*SUBROUTINE TITLE
 (1)                                    ;*---------- -----
5185                                    ;*MODULE 2.1.2.5.1       READ A CHARACTER
```

```
5186  015524                        SP
 (1)                                ; ******************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5187                                ;*BGNSUB
5188                                ;*  ISSUE GET BYTE CALL TO THE DIAGNOSTIC SUPERVISOR
5189                                ;*  IF END OF FILE
5190                                ;*  :  THEN - LOAD ERROR CODE 14(8)
5191                                ;*  :  ELSE - CONTINUE
5192                                ;*  ENDIF
5193                                ;*ENDSUB
5194  015524                        SIO
 (1)                                ; ******************************************************************************
 (1)                                ;*SUBROUTINE INPUT/OUTPUT
 (1)                                ;*---------- ------------
5195                                ;*
5196                                ;*      INPUT:
5197                                ;*      ERRCOD  ERROR CODE EQUAL TO ZERO
5198                                ;*
5199                                ;*      OUTPUT:
5200                                ;*
5201                                ;*      CHAR    THE CHARACTER FROM THE DISK
5202                                ;*
5203                                ;*      ERRCOD  SET AS FOLLOWS:
5204                                ;*
5205                                ;*                  =0 - IF NO ERROR DETECTED
5206                                ;*                  =14 - IF NO MORE DATA AVAILABLE END OF FILE
5207                                ;*                    DETECTED
5208                                ;*                  =15 - IF DISK ACCESS ERROR DETECTED
5209                                ;*
5210  015524                        S
 (1)                                ; ******************************************************************************
5211
5212  015524                        READ:   GETBYTE CHAR            ;REQUEST A BYTE FROM THE SUPERVISOR
5213  015532                                BCOMPLETE       1$      ;IF NOT END OF FILE CONTINUE
5214  015534  012705  000014                MOV     #14,ERRCOD      ;IF END OF FILE LOAD THE ERROR CODE
5215  015540  000207                        RTS     PC              ;RETURN TO CALLING MODULE
5216  015542  005005                1$:     CLR     ERRCOD          ;CLEAR THE ERROR CODE
5217  015544  000207                        RTS     PC              ;RETURN TO CALLING MODULE
5218  015546  005003                DIRSRC: CLR     R3              ;SET THE SEARCH FLAG
5219  015550  000402                        BR      DIR1            ;CONTINUE
5220  015552  012703  000001        DIRLST: MOV     #1,R3           ;SET THE DIRECTORY LIST FLAG
5221  015556  005005                DIR1:   CLR     ERRCOD          ;CLEAR THE ERROR CODE
5222  015560  004737  021660                CALL    CLOSEX          ;CLOSE THE FILE
5223  015564  004737  013730                CALL    OPENX           ;OPEN THE DESIRED FILE
5224  015570  005705                        TST     ERRCOD          ;OPEN ERROR?
5225  015572  001100                        BNE     DIREX           ;YES - LOG THE ERROR
5226  015574  004737  015524        6$:     CALL    READ            ;GET A CHARACTER FROM THE OPEN FILE
5227  015600  005705                        TST     ERRCOD          ;READ ERROR?
5228  015602  001065                        BNE     DIRERR          ;YES - LOG THE ERROR
5229  015604  123727  004344  000133        CMPB    CHAR,#'[        ;IS THE CHARACTER A [
5230  015612  001370                        BNE     6$              ;NO - KEEP ON LOOKING
5231  015614  004737  015524        1$:     CALL    READ            ;GET A CHARACTER FROM THE OPEN FILE
5232  015620  005705                        TST     ERRCOD          ;READ ERROR?
5233  015622  001055                        BNE     DIRERR          ;YES - LOG THE ERROR
5234  015624  123727  004344  000133        CMPB    CHAR,#'[        ;IS THE CHARACTER A [
```

```
5235  015632  001370                        BNE     1$              ;NO - KEEP ON LOOKING
5236  015634  005703                        TST     R3              ;SEARCH ?
5237  015636  001004                        BNE     5$              ;NO - DIRECTORY
5238  015640  005337  004406                DEC     SEQNUM          ;DECREMENT THE SEQUENCE NUMBER
5239  015644  001453                        BEQ     DIREX           ;EXIT IF FOUND
5240  015646  000762                        BR      1$              ;CONTINUE IF NOT
5241  015650  005037  015776          5$:   CLR     NAME            ;CLEAR THE PROGRAM NAME
5242  015654  005037  016000                CLR     NAME+2          ;
5243  015660  005037  016002                CLR     NAME+4          ;
5244  015664  005002                        CLR     R2              ;CLEAR THE CHARACTER COUNTER
5245  015666  004737  015524          2$:   CALL    READ            ;READ A CHARACTER FROM THE OPER FILE
5246  015672  123727  004344  000135        CMPB    CHAR,#']                ;IS THE CHARACTER A ]?
5247  015700  001407                        BEQ     4$              ;YES - END OF THE PROGRAM NAME
5248  015702  113762  004344  015776        MOVB    CHAR,NAME(R2)   ;SAVE THE CHARACTER
5249  015710  005202                        INC     R2              ;UPDATE THE CHARACTER COUNT
5250  015712  020227  000006                CMP     R2,#6           ;REACHED CHARACTER MAX?
5251  015716  001363                        BNE     2$              ;NO - CONTINUE
5252  015720                          4$:   PRINTF  #DIRENT,SEQNUM,#NAME
5253  015750  005237  004406                INC     SEQNUM          ;UPDATE THE SEQUENCE NUMBER
5254  015754  000717                        BR      1$              ;
5255  015756  020527  000014          DIRERR: CMP   ERRCOD,#14      ;EOF?
5256  015762  001002                        BNE     3$              ;NO - ERROR
5257  015764  005005                        CLR     ERRCOD          ;EOF IS NOT A ERROR FOR THE ROUTINE
5258  015766  000402                        BR      DIREX           ;CONTINUE
5259  015770  004737  015340          3$:   CALL    SYSERR          ;LOG THE ERROR
5260  015774  000207                  DIREX:  RTS     PC              ;RETURN TO THE USER
5261
5262  015776  000000                  NAME:   .WORD   0               ;PROGRAM NAME
5263  016000  000000                          .WORD   0               ;
5264  016002  000000                          .WORD   0               ;
5265  016004  000000                          .WORD   0               ;
5266
5267  016006  047045  040445  042523  DIRHED: .ASCIZ  /%N%ASEQUENCE NUMBER    NAME%N/
5268                                          .EVEN
5269  016044  040445  020040  020040  DIRENT: .ASCIZ  /%A      %02%A           %T%N/
5270          016102                          .EVEN
5271                                  .SBTTL  MODULE 2.1.3 - CONTRL
5272  016102                          SSUB
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5273                                ;*MODULE 2.1.3 - TM78 TEST CONTROL MODULE
5274  016102                          SP
 (1)                                ; ************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5275                                ;*BGNSUB
5276                                ;*  CLEAR THE ERROR CODE
5277                                ;*  SELECT THE TM78 UNDER TEST
5278                                ;*  CALL SUBROUTINE DIAGO
5279                                ;*  IF ERROR CODE=0
5280                                ;*  :  THEN-CONTINUE
5281                                ;*  :  ELSE-CALL SUBROUTINE SYSERR
5282                                ;*  :       EXIT SUBROUTINE
5283                                ;*  ENDIF
5284                                ;*  BGNDO
```

```
                                ;*  :  CALL SUBROUTINE WAIT
                                ;*  :  IF ERROR CODE=0
                                ;*  :  :  THEN-CONTINUE
                                ;*  :  :  ELSE-CALL SUBROUTINE SYSERR
                                ;*  :  :       EXIT SUBROUTINE
                                ;*  :  ENDIF
                                ;*  :  INPUT CAS REGISTER 3 (MICRO TEST # + ERROR #)
                                ;*  :  IF CAS REGISTER 1=374(8)
                                ;*  :  :  THEN-CALL SUBROUTINE ERR78
                                ;*  :  :  ELSE-CONTINUE
                                ;*  :  ENDIF
                                ;*  :  IF CAS REGISTER 1=376(8)
                                ;*  :  :  THEN-CALL SUBROUTINE UTIL80
                                ;*  :  :  ELSE-CONTINUE
                                ;*  :  ENDIF
                                ;*  :  IF CAS REGISTER 1=375(8)
                                ;*  :  :  THEN-DEPOSIT 377(8) CAS REGISTER 0
                                ;*  :  :       DEPOSIT 33(8) CAS REGISTER 0
                                ;*  :  :  ELSE-CONTINUE
                                ;*  :  ENDIF
                                ;*  :  IF CAS REGISTER 1=373(8)
                                ;*  :  :  THEN-CALL SUBROUTINE QUEUE
                                ;*  :  :  ELSE-CONTINUE
                                ;*  :  ENDIF
                                ;*  :  IF CAS REGISTER 1=377(8)
                                ;*  :  :  THEN-CALL SUBROUTINE QUEUEM
                                ;*  :  :  ELSE-CONTINUE
                                ;*  :  ENDIF
                                ;*  :  DO UNTIL CAS REGISTER 1=372(*)
                                ;*  ENDDO
                                ;*ENDSUB
5316  016102                    SIO
 (1)                            ; ************************************************************************
 (1)                            ;*SUBROUTINE INPUT/OUTPUT
 (1)                            ;*---------- ------------
5317                            ;*       INPUT:
5318                            ;*          NO REQUIRED INPUT
5319                            ;*
5320                            ;*       OUTPUT:
5321                            ;*          ERRCOD ERROR CODE AS FOLLOWS
5322                            ;*                      =0- NO CONTROL ERRORS DETECTED
5323                            ;*                      >0- CONTROL ERROR OCCURED
5324                            ;*                          ABORT THE TEST
5325                            ;*
5326  016102                    S
 (1)                            ; ************************************************************************
5327  016102  005005            CONTRL: CLR     ERRCOD                  ;CLEAR THE ERROR CODE
5328  016104  013777  004352  166126          MOV     MBDRIV,@CS2             ;LOAD THE TM78 UNIT NUMBER
5329  016112  004737  016304                 JSR     PC,DIAGO                ;GO START THE TM78 MP TEST LOADED
5330  016116  005705                         TST     ERRCOD                  ;DIAGNOSTIC START ERROR
5331  016120  001034                         BNE     CTLERR                  ;YES - GO LOG THE ERROR
5332  016122  004737  016424          CONTR1: JSR     PC,WAIT                 ;GO WAIT FOR A TM78 MP-INTERRUPT CODE
5333  016126  005705                         TST     ERRCOD                  ;TEST WAIT FAILURE?
5334  016130  001030                         BNE     CTLERR                  ;YES - GO LOG THE ERROR
5335                                                                          ;
5336  016132  017701  166116                 MOV     @DI1,R1                 ;GET THE DIAG. 1 REGISTER
```

```
5337  016136  110137  004332                MOVB    R1,DIAGTS       ;STORE THE DIAGNOSTIC TEST NUM.
5338  016142  000301                        SWAB    R1              ;SWAP THE BYTES
5339  016144  042701  177700                BIC     #177700,R1      ;LEAVE THE DIAGNOSTIC ERROR NUM.
5340  016150  010137  004334                MOV     R1,DIAGER       ;STORE THE DIAGNOSTIC ERROR NUM.
5341  016154  022737  000374  004364        CMP     #374,DINTCD     ;TM78 MP RUN TIME ERROR?
5342  016162  001003                        BNE     CONTR3          ;NO - CONTINUE
5343  016164  004737  016552                JSR     PC,ERR78        ;YES - GO PROCESS THE ERROR
5344  016170  000754                        BR      CONTR1          ;GO WAIT FOR OTHER EVENTS
5345                                                                ;
5346  016172  022737  000376  004364  CONTR3: CMP    #376,DINTCD     ;TM78 MP RUN TIME UTILITY REQUEST?
5347  016200  001007                        BNE     CONTR4          ;NO - CONTINUE
5348  016202  004737  020604                JSR     PC,UTIL80       ;YES-GO PROCESS THE UTILITY REQ
5349  016206  005705                        TST     ERRCOD          ;UTILITY REQUEST ERROR
5350  016210  001744                        BEQ     CONTR1          ;NO-CONTINUE LOOP
5351  016212  004737  015340        CTLERR: CALL    SYSERR          ;YES-PRINT THE ERROR
5352  016216  000207                        RTS     PC              ;ABORT THE MODULE
5353                                                                ;
5354  016220  022737  000375  004364  CONTR4: CMP    #375,DINTCD     ;TM78 MP LOOP ON ERROR - NO ERROR
5355  016226  001007                        BNE     CONTR5          ;NO - CONTINUE
5356  016230  012777  000377  166010        MOV     #377,@AS        ;CLEAR THE INTERRUPT
5357  016236  012777  000033  165764        MOV     #LOPERR,@XFRCMD ;ISSUE LOOP ON ERROR
5358  016244  000726                        BR      CONTR1          ;YES - BUT NOT IMPLEMENTED
5359  016246  022737  000373  004364  CONTR5: CMP    #373,DINTCD     ;PRINT MESSAGE REQUEST?
5360  016254  001003                        BNE     CONTR6          ;NO - CONTINUE
5361  016256  004737  021534                CALL    QUEUE           ;YES - GO PRINT THE MICRO MESSAGE
5362  016262  000717                        BR      CONTR1          ;CONTINUE TO LOOP
5363  016264  022737  000377  004364  CONTR6: CMP    #377,DINTCD     ;MANUAL INTERVENTION REQUEST?
5364  016272  001003                        BNE     CONTR7          ;NO - CONTINUE
5365  016274  004737  021532                JSR     PC,QUEUEM       ;YES - GO DO PRINT/WAIT SEQUENCE
5366  016300  000710                        BR      CONTR1          ;CONTINUE TO LOOP
5367  016302  000207                CONTR7: RTS     PC              ;ASSUME DONE INTERRUPT - RETURN
5368                                .SBTTL  MODULE 2.1.3.1 - DIAGO
5369  016304                        SSUB
 (1)                                ;*********************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5370                                ;*MODULE        2.1.3.1 START THE TM78 MP TEST
5371  016304                        SP
 (1)                                ;*********************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5372                                ;*BGNSUB
5373                                ;*  CLEAR THE RELIABILITY, SCOPE LOOP & MANUAL FLAG IN CAS REGISTER 11
5374                                ;*  IF USER SPECIFIED RELIABILITY MODE
5375                                ;*  :  THEN-SET THE RELIABILITY FLAG IN CAS REGISTER 11
5376                                ;*  :  ELSE-CONTINUE
5377                                ;*  ENDIF
5378                                ;*  IF MANUAL INTERVENTION ALLOWED
5379                                ;*  :  THEN-SET THE MANUAL INTERVENTION FALG IN CAS REGISTER 11
5380                                ;*  :  ELSE-CONTINUE
5381                                ;*  ENDIF
5382                                ;*  LOAD 377(8) IN CAS REGISTER 4
5383                                ;*  LOAD 35(8) IN CAS REGISTER 0
5384                                ;*  WAIT 10 MILLISECONDS
5385                                ;*  IF CAS REGISTER 0 BITS 5:0=0
5386                                ;*  :  THEN-CONTINUE
```

```
                                ;*  :  ELSE-LOAD ERROR CODE 7(10)
                                ;*  ENDIF
                                ;*ENDSUB
5390  016304                    SIO
 (1)                            ; ************************************************************************
 (1)                            ;*SUBROUTINE INPUT/OUTPUT
 (1)                            ;*---------- ------------
                                ;*
                                ;*      INPUT:
                                ;*        ERRCOD ERROR CODE SET TO 0
                                ;*
                                ;*      OUTPUT:
                                ;*        ERRCOD ERROR CODE SET AS FOLLOWS
                                ;*                    =0-IF NO ERROR DETECTED
                                ;*                    =07-IF A TEST STARTED INDICATION
                                ;*                         IS NOT RECEIVED IN 5MS.
                                ;*
5401  016304                    S
 (1)                            ; ************************************************************************
5402
5403  016304  042777  000340  165750  DIAGO:  BIC     #340,@DI2       ;CLEAR THE REL.,SCOPE LOOP & MANUAL FLAG
5404  016312  005737  002330           TST     RELI78          ;WAS RELIABILITY MODE SET?
5405  016316  001403                   BEQ     2$              ;NO-CONTINUE
5406  016320  052777  000100  165734           BIS     #100,@DI2
5407  016326                    2$:     MANUAL
5408  016330                            BNCOMPLETE 3$
5409  016332  052777  000040  165722           BIS     #40,@DI2        ;SET THE MANUAL FLAG
5410  016340  012777  000377  165700  3$:      MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
5411  016346  112777  000035  165654           MOVB    #TSTART,@XFRCMD ;ISSUE THE TEST START CMD.
5412                                            ;
5413  016354                    1$:     DELAY   100             ;WAIT 10 MILLISECONDS
5414                                            ;
5415  016404  017701  165620           MOV     @XFRCMD,R1              ;GET THE COMMAND REGISTER
5416  016410  042701  177700           BIC     #177700,R1              ;REMOVE JUNK BITS
5417  016414  001402                   BEQ     DIAGEX                  ;YES-RETURN
5418  016416  012705  000007           MOV     #07.,ERRCOD     ;NO - LOAD ERROR CODE
5419  016422  000207          DIAGEX: RTS     PC                      ;RETURN TO CALLING ROUTINE
                                .SBTTL  MODULE 2.1.3.2 - WAIT
5421  016424                    SSUB
 (1)                            ; ************************************************************************
 (1)                            ;*SUBROUTINE TITLE
 (1)                            ;*---------- -----
                                ;*MODULE        2.1.3.2 WAIT/TIMEOUT TM78 MP-HOST COMMUNICATION
5423  016424                    SP
 (1)                            ; ************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNSUB
                                ;*  SET UP THE LOOP COUNTER TO 1200(10)
                                ;*  BGNDO
                                ;*  :  PERFORM A 100 MILLISECOND TIMEOUT
                                ;*  :  IF SCOPE LOOP SPECIFIED
                                ;*  :  :  THEN-CONTINUE
                                ;*  :  :  ELSE-DECREMENT THE LOOP COUNTER
                                ;*  :  ENDIF
                                ;*  :  DO UNTIL INTERRUPT CODE NOT=0 OR LOOP COUNTER=0
```

```
                                ;*  ENDDO
                                ;*  IF LOOP COUNTER=0
                                ;*  :  THEN-LOAD ERROR CODE 10(8)
                                ;*  :       EXIT SUBROUTINE
                                ;*  :  ELSE-CONTINUE
                                ;*  ENDIF
                                ;*  IF INTERRUPT CODE > 371
                                ;*  :  THEN-CONTINUE
                                ;*  :  ELSE-LOAD ERROR CODE 11(8)
                                ;*  ENDIF
                                ;*ENDSUB
016424                          SIO
 (1)                            ; ************************************************************************
 (1)                            ;*SUBROUTINE INPUT/OUTPUT
 (1)                            ;*---------- ------------
                                ;*
                                ;*      INPUT:
                                ;*       ERRCOD ERROR CODE SET TO 0
                                ;*
                                ;*      OUTPUT:
                                ;*       ERRCOD ERROR CODE SET AS FOLLOWS
                                ;*                    =0-IF NO ERROR DETECTED
                                ;*                     =10-IF THE HOST TIMED OUT
                                ;*                         THE TM78 MP-HOST COMMUNICATION.
                                ;*                     =11-IF THE HOST RECEIVED AN
                                ;*                         ILLEGAL REQUEST CODE
                                ;*
016424                          S
 (1)                            ; ************************************************************************
016424  005037  004364        WAIT:   CLR     DINTCD                  ;CLEAR THE INTERRUPT CODE LOC.
                                                                        ;
016430  012701  002260        WAIT0:  MOV     #1200.,R1               ;INITIALIZE R1 TO 1200
016434                        WAIT1:  DELAY   100                     ;PERFORM A 100 SEC. TIMEOUT
016464                                BREAK
016466  033777  004354  165552         BIT     BINUNT,@AS              ;IS THE ATTENTION LINE
                                                                        ;STILL ZERO?
016474  001012                        BNE     WAIT2                   ;NO - GO SAVE THE CODE
016476  005301                        DEC     R1                      ;YES - DECREMENT THE COUNT
016500  001355                        BNE     WAIT1                   ;LOOP UNTIL TIMEOUT
016502                                RFLAGS  R2
016506  032702  040000                BIT     #LOE,R2
016512  001346                        BNE     WAIT0
016514  012705  000010                MOV     #10,ERRCOD              ;LOAD TIMEOUT ERROR CODE
016520  000413                        BR      WAIT3                   ;EXIT THE MODULE
                                                                        ;
016522  117737  165514  004364 WAIT2:  MOVB    @XFRINT,DINTCD          ;STORE THE INTERRUPT CODE
016530  005077  165506                CLR     @XFRINT                 ;CLEAR THE INTERRUPT CODE
016534  123727  004364  000371        CMPB    DINTCD,#371             ;VALID INTERRUPT CODE?
016542  003002                        BGT     WAIT3                   ;YES - RETURN TO CALLING ROUTINE
016544  012705  000011                MOV     #11,ERRCOD              ;NO - LOAD ERROR CODE
016550  000207                WAIT3:  RTS     PC                      ;RETURN
                              .SBTTL  MODULE 2.1.3.3 - ERR78
                              ;
                              ;MODULE 2.1.3.3 PROCESS TM78 MP DETECTED ERRORS
                              ;
                              ;       INPUT:
                              ;       CAS     MASS BUS REGISTERS CONTAINING THE ERROR MESSAGE
```

```
5485                                    ;          INFORMATION FOR PRINTOUT
5486                                    ;   BUFFER CONTAINS THE MESSAGE FILE READ IN FROM THE BULK
5487                                    ;          STORAGE DEVICE
5488                                    ;
5489                                    ;   OUTPUT:
5490                                    ;          ERROR MESSAGE OUTPUT TO THE SYSTEM LOG DEVICE
5491                                    ;
5492
5493  016552  005001                    ERR78:  CLR     R1              ;CLEAR THE MESS. BUFFER PTR.
5494
5495  016554  126127  021666  000041    10$:    CMPB    BUFER(R1),#'!   ;IS THE CHAR. A !?
5496  016562  001402                            BEQ     1$              ;YES-CONTINUE
5497  016564  005201                            INC     R1              ;NO-UPDATE BUFFER POINTER
5498  016566  000772                            BR      10$             ;LOOP
5499  016570  005201                    1$:     INC     R1              ;
5500                                    ;
5501                                    ;HAVE FOUND THE ! THE NEXT N CHARACTERS ARE THE TEST #
5502                                    ;
5503  016572  005003                            CLR     R3              ;CLEAR RESULT LOCATION
5504  016574  116102  021666            2$:     MOVB    BUFER(R1),R2    ;GET A CHAR.
5505  016600  005201                            INC     R1              ;UPDATE THE POINTER
5506  016602  120227  000060                    CMPB    R2,#'0          ;IS THE CHARACTER < ASCII ZERO?
5507  016606  100412                            BMI     3$              ;YES - END OF TEST NUMBER
5508  016610  120227  000070                    CMPB    R2,#'8          ;NO - IS THE CHARACTER < ASCII 8?
5509  016614  100007                            BPL     3$              ;NO - END OF TEST NUMBER
5510  016616  042702  177770                    BIC     #177770,R2      ;NO-GET THE CHAR
5511  016622  006303                            ASL     R3              ;SHIFT
5512  016624  006303                            ASL     R3              ;THE
5513  016626  006303                            ASL     R3              ;RESULT
5514  016630  050203                            BIS     R2,R3           ;UPDATE THE RESULT
5515  016632  000760                            BR      2$              ;CONTINUE UNTIL A NON-OCTAL CHARACTER
5516                                                                    ;
5517  016634  042703  177400            3$:     BIC     #177400,R3      ;LEAVE ONLY 8 BITS
5518  016640  120337  004332                    CMPB    R3,DIAGTS       ;THIS TEST?
5519  016644  001343                            BNE     10$             ;NO - CONTINUE
5520                                                                    ;
5521  016646  116102  021666            6$:     MOVB    BUFER(R1),R2    ;YES-GET NEXT CHAR.
5522  016652  005201                            INC     R1              ;INC THE BUFFER POINTER
5523  016654  120227  000045                    CMPB    R2,#'%          ;IS IT A %?
5524  016660  001372                            BNE     6$              ;NO-CONTINUE
5525  016662  010103                            MOV     R1,R3           ;SAVE THE POINTER
5526  016664  116102  021666            5$:     MOVB    BUFER(R1),R2    ;GET THE NEXT CHARACTER
5527  016670  005201                            INC     R1              ;UPDATE THE CHARACTER POINTER
5528  016672  120227  000046                    CMPB    R2,#'&          ;IS IT A & ?
5529  016676  001372                            BNE     5$              ;NO - CONTINUE TO LOOK
5530  016700  012702  021666                    MOV     #BUFER,R2       ;GET THE BASE BUFFER ADDRESS
5531  016704  060102                            ADD     R1,R2           ;BUILD POINTER TO MODULE CALLOUTS
5532  016706  010237  016736                    MOV     R2,ERR78X+4
5533
5534  016712  105722                    7$:     TSTB    (R2)+           ;LOOK FOR LINE TERMINATOR
5535  016714  001376                            BNE     7$              ;LOOP UNTIL FOUND
5536  016716  005302                            DEC     R2              ;MOVE POINTER BACK TO THE
5537  016720  005302                            DEC     R2              ;CARRIAGE RETURN
5538  016722  005302                            DEC     R2              ;LINE FEED
5539  016724  111237  004414                    MOVB    (R2),SAVE       ;SAVE THE LINE TERMINATOR
5540  016730  105012                            CLRB    (R2)            ;PUT IN A NEW
```

```
5541                                                                    ;LINE TERMINATOR
5542  016732                                ERR78X: ERRDF   0,ERR78X,MPPC ;PRINT THE ERROR
5543  016742  113712  004414                        MOVB    SAVE,(R2)   ;RESTORE THE ORIGINAL LINE TERMINATOR
5544  016746  010301                              MOV     R3,R1       ;RESTORE THE % VECTOR
5545  016750  004737  017234                      CALL    ERR78P      ;PRINT THE % LINE
5546  016754  005003                      MSGPAR: CLR     R3
5547  016756  116102  021666                9$:     MOVB    BUFER(R1),R2 ;GET A CHAR
5548  016762  005201                              INC     R1          ;UPDATE THE POINTER
5549  016764  120227  000076                      CMPB    R2,#'>      ;>?
5550  016770  001372                              BNE     9$          ;NO-LOOP
5551  016772  005203                              INC     R3          ;INC. THE MESSAGE PAIR COUNT
5552  016774  020337  004334                      CMP     R3,DIAGER   ;MSG. PAIR=ERROR #
5553  017000  001407                              BEQ     FOUND       ;YES-EXIT LOOP
5554                                                                  ;
5555  017002  116102  021666                8$:     MOVB    BUFER(R1),R2 ;MESSAGE PAIR
5556  017006  005201                              INC     R1          ;UPDATE BUFFER POINTER
5557  017010  120227  000074                      CMPB    R2,#'<      ;<?
5558  017014  001372                              BNE     8$          ;NO-KEEP ON LOOPING
5559                                                                  ;YES-END OF PAIR
5560  017016  000757                              BR      9$          ;TRY TO MATCH ON NEXT
5561                                                                  ;PAIR
5562
5563  017020  004737  017234                FOUND:  CALL    ERR78P      ;GO PRINT THE LINE
5564
5565  017024  116102  021666                3$:     MOVB    BUFER(R1),R2 ;GET A CHARACTER
5566  017030  005201                              INC     R1          ;UPDATE THE POINTER
5567  017032  120227  000076                      CMPB    R2,#'>      ;>?
5568  017036  001770                              BEQ     FOUND       ;YES-PRINT THE LINE
5569  017040  120227  000074                      CMPB    R2,#'<      ;NO-<?
5570  017044  001367                              BNE     3$          ;NO-KEEP LOOPING
5571  017046  122737  000374  004364              CMPB    #374,DINTCD ;ERROR INTERRUPT
5572  017054  001004                              BNE     SECPAR      ;NO - SKIP EXP/ACT & AUX. PRINT
5573  017056  004737  017450                      CALL    EXACT
5574  017062  004737  017560                      CALL    AUXPNT
5575
5576  017066  004737  017234          SECPAR: CALL    ERR78P          ;PRINT THE LINE
5577                                                                  ;
5578  017072  116102  021666                2$:     MOVB    BUFER(R1),R2 ;GET A CHARACTER
5579  017076  005201                              INC     R1          ;UPDATE THE POINTER
5580  017100  120227  000074                      CMPB    R2,#'<      ;<?
5581  017104  001770                              BEQ     SECPAR      ;YES-GO PRINT IT
5582  017106  120227  000076                      CMPB    R2,#'>      ;NO >?
5583  017112  001410                              BEQ     RESPON      ;YES - EXIT
5584  017114  120227  000043                      CMPB    R2,#'#      ;END OF BUFFER?
5585  017120  001364                              BNE     2$          ;NO - KEEP LOOKING
5586                                                                  ;
5587  017122  122737  000374  004364              CMPB    #374,DINTCD ;ERROR INTERRUPT?
5588  017130  001401                              BEQ     RESPON      ;YES - CONTINUE
5589  017132  000207                              RTS     PC          ;NO - RETURN TO CALLING MODULE
5590  017134  042777  000200  165120  RESPON: BIC     #200,@DI2   ;CLEAR THE SCOPE LOOP FLAG
5591  017142  012777  040000  165060          MOV     #TRE,@XFRCMD ;CLEAR THE MB ERROR
5592  017150  005077  165054                  CLR     @XFRCMD     ;FIX UP THE HARDWARE HACK
5593  017154                                  INLOOP              ;LOOP ON ERROR SPECIFIED?
5594  017156                                  BCOMPLETE       1$  ;YES
5595  017160  012777  000377  165060          MOV     #377,@AS    ;CLEAR THE ATTENTION BIT
5596  017166  012777  000031  165034          MOV     #CONERR,@XFRCMD ;NO - ISSUE CONTINUE ON ERROR COMMAND
```

```
5597  017174  000207                          RTS     PC              ;RETURN
5598                                                                  ;
5599  017176                          1$:     RFLAGS  R2              ;GET THE USER FLAGS
5600  017202  032702  040000                  BIT     #LOE,R2         ;SCOPE LOOP INDICATED?
5601  017206  001403                          BEQ     2$              ;NO-CONTINUE
5602  017210  052777  000200  165044          BIS     #200,@DI2       ;YES-SET THE SCOPE LOOP BIT
5603                                                                  ;
5604  017216  012777  000377  165022  2$:     MOV     #377,@AS        ;CLEAR THE ATTENTION BIT
5605  017224  012777  000033  164776          MOV     #LOPERR,@XFRCMD ;ISSUE LOOP ON ERROR COMMAND
5606  017232  000207                          RTS     PC              ;
5607
5608
5609  017234  012704  021666          ERR78P: MOV     #BUFER,R4       ;CALCULATE STARTING ADDRESS
5610  017240  060104                          ADD     R1,R4           ;OF A CHARACTER STRING
5611  017242  122737  000374  004364          CMPB    #374,DINTCD     ;ERROR INTERRUPT?
5612  017250  001412                          BEQ     1$              ;YES - PRINT THE ERROR LINES WITH DISTINCTION
5613  017252                                  PRINTF  #FMT78P,R4      ;NO - FORCE PRINT THE MESSAGE LINES
5614  017274  000411                          BR      2$
5615  017276                          1$:     PRINTX  #FMT78P,R4      ;PRINT THE LINE
5616  017320  000207                  2$:     RTS     PC              ;RETURN TO USER
5617
5618  017322  052045      000         FMT78P: .ASCIZ  /%T/
5619          017326                          .EVEN
5620  017326                                  BGNMSG  MPPC
5621  017326  004737  046112                  CALL    HEADER
5622  017332                                  PRINTB  #XTNOPC,DIAGER,DIAGTS,@TUSTAT
5623  017366                                  ENDMSG
5624
5625  017370  040445  046524  034067  XTNOPC: .ASCIZ  /%ATM78 MICRO ERROR  %05%A  TST %03%A  PC: %06%N/
5626                                          .EVEN
5627
5628                                  .SBTTL  MODULE 2.1.3.3.1 - EXACT
5629  017450                          SSUB
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5630                                ;*MODULE 2.1.3.3.1 PRINT ACTUAL/EXPECTED DATA
5631  017450                          SP
 (1)                                ; ************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5632                                ;*BGNSUB
5633                                ;*   IF BIT 15 IN CAS REGISTER 3=1
5634                                ;*   :  THEN-PRINT LOW BYTE OF CAS REGISTER 12 AS ACTUAL DATA
5635                                ;*   :  ELSE-CONTINUE
5636                                ;*   ENDIF
5637                                ;*   IF BIT 14 IN CAS REGISTER 3=1
5638                                ;*   :  THEN-PRINT HIGH BYTE OF CAS REGISTER 12 AS EXPECTED DATA
5639                                ;*   :  ELSE-CONTINUE
5640                                ;*   ENDIF
5641                                ;*ENDSUB
5642  017450                          S
 (1)                                ; ************************************************************************
5643
5644  017450  032777  100000  164576  EXACT:  BIT     #100000,@DI1    ;ACTUAL DATA TO PRINT?
5645  017456  001415                          BEQ     1$              ;NO-GO CHECK EXPECTED
```

```
 5646  017460  017704  164600                  MOV     @DI3,R4         ;YES
 5647  017464  042704  177400                  BIC     #177400,R4      ;GET THE ACTUAL DATA BYTE
 5648  017470                                  PRINTX  #FMTACT,R4      ;PRINT IT
 5649
 5650  017512  032777  040000  164534  1$:     BIT     #040000,@DI1    ;EXPECTED DATA TO PRINT?
 5651  017520  001416                          BEQ     2$              ;NO - RETURN
 5652  017522  017704  164536                  MOV     @DI3,R4         ;YES
 5653  017526  000304                          SWAB    R4
 5654  017530  042704  177400                  BIC     #177400,R4      ;GET THE EXPECTED DATA BYTE
 5655  017534                                  PRINTX  #FMTEXP,R4
 5656  017556  000207                  2$:     RTS     PC
 5657
 5658                                  .SBTTL  MODULE 2.1.3.3.2 - AUXPNT
 5659  017560                          SSUB
  (1)                             ;*****************************************************************************
  (1)                             ;*SUBROUTINE TITLE
  (1)                             ;*---------- -----
 5660                             ;*MODULE 2.1.3.3.2 AUXILIARY PRINT REQUESTS
 5661  017560                          SP
  (1)                             ;*****************************************************************************
  (1)                             ;*PROCEDURE
  (1)                             ;*---------
 5662                             ;*BGNSUB
 5663                             ;*   IF CAS REGISTER 11 BIT 15:12=0
 5664                             ;*   :  THEN-CONTINUE
 5665                             ;*   :  ELSE-IF BITS 15:12 RIGHT JUSTIFIED=0 > OR 7
 5666                             ;*   :       :  THEN-CONTINUE
 5667                             ;*   :       :  ELSE-IF BITS 15:12 RIGHT JUSTIFIED=1
 5668                             ;*   :       :       :  THEN-PRINT MESSAGE 1 BELOW
 5669                             ;*   :       :       :  ELSE-CONTINUE
 5670                             ;*   :       :       ENDIF
 5671                             ;*   :       :       IF BITS 15:12 RIGHT JUSTIFIED=2
 5672                             ;*   :       :       :  THEN-PRINT MESSAGE 2 BELOW
 5673                             ;*   :       :       :  ELSE-CONTINUE
 5674                             ;*   :       :       ENDIF
 5675                             ;*   :       :       IF BITS 15:12 RIGHT JUSTIFIED=3
 5676                             ;*   :       :       :  THEN-PRINT MESSAGE 3 BELOW
 5677                             ;*   :       :       :  ELSE-CONTINUE
 5678                             ;*   :       :       ENDIF
 5679                             ;*   :       :       IF BITS 15:12 RIGHT JUSTIFIED=4
 5680                             ;*   :       :       :  THEN-PRINT MESSAGE 4 BELOW
 5681                             ;*   :       :       :  ELSE-CONTINUE
 5682                             ;*   :       :       ENDIF
 5683                             ;*   :       :       IF BITS 15:12 RIGHT JUSTIFIED=5
 5684                             ;*   :       :       :  THEN-PRINT MESSAGE 5 BELOW
 5685                             ;*   :       :       :  ELSE-CONTINUE
 5686                             ;*   :       :       ENDIF
 5687                             ;*   :       :       IF BITS 15:12 RIGHT JUSTIFIED=6
 5688                             ;*   :       :       :  THEN-PRINT MESSAGE 6 BELOW
 5689                             ;*   :       :       :       PRINT MESSAGE 5 BELOW
 5690                             ;*   :       :       :  ELSE-CONTINUE
 5691                             ;*   :       :       ENDIF
 5692                             ;*   :       :       IF BITS 15:12 RIGHT JUSTIFIED=7
 5693                             ;*   :       :       :  THEN-PRINT MESSAGE 7 BELOW
 5694                             ;*   :       :       :  ELSE-CONTINUE
 5695                             ;*   :       :       ENDIF
```

```
                        ;*  :       :       IF BITS 15:12 RIGHT JUSTIFIED=10
                        ;*  :       :       :  THEN-PRINT MESSAGE 1 BELOW
                        ;*  :       :       :       PRINT MESSAGE 2 BELOW
                        ;*  :       :       :       PRINT MESSAGE 5 BELOW
                        ;*  :       :       :  ELSE-CONTINUE
                        ;*  :       :       ENDIF
                        ;*  :     ENDIF
                        ;*  ENDIF
                        ;*ENDSUB
017560                  S
 (1)                    ; ************************************************************************
                        ;*      MESSAGE #                       PRINT LINE
                        ;*      ---------                       ----------
                        ;*
                        ;*          1                   REQUEST HOST CPU TO PRINT:
                        ;*                              'BYTE/SCLK COUNT NUMBER = LLL''
                        ;*                              WHERE: LLL = THE VALUE STORED IN CAS
                        ;*                                     REGISTER 5 (THE BYTE COUNT
                        ;*                                     REGISTER 16 BITS).
                        ;*
                        ;*          2                   REQUEST HOST CPU TO PRINT:
                        ;*                              DATA FORMAT = MM
                        ;*                              SKIP COUNT = NN
                        ;*                              WHERE:  MM = DATA FORMAT FROM CAS REG 2
                        ;*                                      NN = SKIP COUNT FROM CAS REG 2
                        ;*
                        ;*          3                   REQUEST HOST CPU TO PRINT:
                        ;*                              BYTE-SCLK COUNT = LLL
                        ;*                              DATA FORMAT = MM
                        ;*                              SKIP COUNT = NN
                        ;*                              WHERE:  LLL = AS ABOVE
                        ;*                                      MM  = AS ABOVE
                        ;*                                      NN  = AS ABOVE
                        ;*
                        ;*          4                   REQUEST HOST TO PRINT:
                        ;*                              TRANSITION COUNT = LLL
                        ;*                              WHERE:  LLL = COUNT FROM CAS REGISTER 05
                        ;*
                        ;*          5                   REQUEST HOST CPU TO PRINT:
                        ;*                              EXPECTED 18 BITS =      E EEEEEE
                        ;*                              ACTUAL 18 BITS =        A AAAAAA
                        ;*
                        ;*                              WHERE EXPECTED BITS 15-0 ARE IN CAS REG
                        ;*                              14 AND BITS 17-16 ARE IN REG 15...PRINT
                        ;*                              FLAG IS SIGN BIT OF CAS REG 15 LOW BYTE.
                        ;*
                        ;*                              ACTUAL 18 BITS DATA CONTAINED IN REG 16
                        ;*                              (BITS 15-0) AND IN REG 17 (BITS 17-16)..
                        ;*                              PRINT FLAG IS CAS REG 17 LOW BYTE SIGN BIT.
                        ;*
                        ;*          6                   REQUEST THE HOST CPU TO PRINT BOTH ROUTINE
                        ;*                              #1 AND #5 TO REPORT THE BYTE/SCLK COUNT
                        ;*                              AND 18 BITS OF EXPECTED AND/OR ACTUAL
                        ;*                              DATA.
                        ;*
                        ;*          7                   REQUEST HOST CPU TO PRINT:
```

```
                        ;*                              ''SUBGROUP NUMBER = LLL''
                        ;*                              WHERE:  LLL = THE VALUE STORED IN CAS REG 5
                        ;*                                      (THE BYTE COUNT REG 16 BITS).
                        ;*
                        ;*          10                  REQUEST THE HOST TO PRINT ROUTINES #1, #2, & #5
                        S
                        ; ************************************************************************
                        AUXPNT: MOV     @DI2,R4
                                BIT     #170000,R4      ;AUXILIARY PRINT REQ?
                                BEQ     AUXILL          ;NO-GO DO SECOND MSG. PAIR
                                BIC     #007777,R4      ;REMOVE UNWANTED BITS
                                SWAB    R4              ;SWAP BYTES
                                ASR     R4              ;SHIFT RIGHT
                                ASR     R4              ;SHIFT RIGHT
                                ASR     R4              ;SHIFT RIGHT
                                JMP     @AUXTBL(R4)
                        AUXILL: RTS     PC

                        AUXTBL: .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 0 - ILLEGAL
                                .WORD   AUX1            ;AUXILIARY PRINT REQUEST 1
                                .WORD   AUX2            ;AUXILIARY PRINT REQUEST 2
                                .WORD   AUX3            ;AUXILIARY PRINT REQUEST 3
                                .WORD   AUX4            ;AUXILIARY PRINT REQUEST 4
                                .WORD   AUX5            ;AUXILIARY PRINT REQUEST 5
                                .WORD   AUX6            ;AUXILIARY PRINT REQUEST 6
                                .WORD   AUX7            ;AUXILIARY PRINT REQUEST 7
                                .WORD   AUX8            ;AUXILIARY PRINT REQUEST 8
                                .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 9  - ILLEGAL
                                .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 10 - ILLEGAL
                                .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 11 - ILLEGAL
                                .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 12 - ILLEGAL
                                .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 13 - ILLEGAL
                                .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 14 - ILLEGAL
                                .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 15 - ILLEGAL

                        AUX1:   CALL    AUX1X           ;GO PRINT AUXILIARY LINE 1
                                RTS     PC              ;RETURN TO CALLING MODULE
                        AUX2:   CALL    AUX2X           ;GO PRINT AUXILIARY LINE 2
                                RTS     PC              ;RETURN TO CALLING MODULE
                        AUX3:   CALL    AUX1X           ;GO PRINT AUXILIARY LINE 1
                                CALL    AUX2X           ;GO PRINT AUXILIARY LINE 2
                                RTS     PC              ;RETURN TO CALLING MODULE
                        AUX4:   CALL    AUX4X           ;GO PRINT AUXILIARY LINE 4
                                RTS     PC              ;RETURN TO CALLING MODULE
                        AUX5:   CALL    AUX5X           ;GO PRINT AUXILIARY LINE 5
                                RTS     PC              ;RETURN TO CALLING MODULE
                        AUX6:   CALL    AUX1X           ;GO PRINT AUXILIARY LINE 1
                                CALL    AUX5X           ;GO PRINT AUXILIARY LINE 5
                                RTS     PC              ;RETURN TO CALLING MODULE
                        AUX7:   PRINTX  #AUXMS7,@FC
                                RTS     PC
                        AUX8:   CALL    AUX1X           ;GO PRINT AUXILIARY LINE 1
                                CALL    AUX2X           ;GO PRINT AUXILIARY LINE 2
                                CALL    AUX5X           ;GO PRINT AUXILIARY LINE 5
                                RTS     PC              ;RETURN TO CALLING MODULE
```

```
5806
5807
5808  017774  040445  052523  043502  AUXMS7: .ASCIZ  /%ASUBGROUP NUMBER = %06%N/
5809                                          .EVEN
5810
5811                                  ;THIS AUXILIARY PRINT ROUTINE WILL PRINT THE SCLK/BYTE COUNT BASED ON
5812                                  ;THE CONTENTS OF THE CAS REGISTER 5.
5813
5814  020026                          AUX1X:  PRINTX  #AUXMS1,@FC
5815  020052  000207                          RTS     PC
5816  020054  040445  054502  042524  AUXMS1: .ASCIZ  /%ABYTE-SCLK COUNT = %06%N/
5817                                          .EVEN
5818
5819                                  ;THIS AUXILIARY PRINT ROUTINE WILL PRINT THE DATA FORMAT AND SKIP COUNT
5820                                  ;BASED ON THE DATA FORMAT AND SKIP COUNT INFORMATION IN CAS REGISTER 2
5821                                  ;(MASS BUS REGISTER 14).
5822
5823  020106  017702  164132          AUX2X:  MOV     @TC,R2          ;GET THE TAPE CONTROL REGISTER
5824  020112  000302                          SWAB    R2              ;SWAP THE BYTES
5825  020114  042702  177760                  BIC     #177760,R2      ;GET ONLY THE SKIP COUNT
5826  020120  017704  164120                  MOV     @TC,R4          ;GET THE TAPE CONTROL REGISTER
5827  020124  000304                          SWAB    R4              ;SWAP THE BYTES
5828  020126  042704  177617                  BIC     #177617,R4      ;MASK OUT ONLY THE FORMAT BITS
5829  020132  006204                          ASR     R4              ;JUSTIFY RIGHT
5830  020134  006204                          ASR     R4              ;
5831  020136  006204                          ASR     R4              ;
5832  020140  006204                          ASR     R4              ;
5833  020142                                  PRINTX  #AUXMS2,R4      ;GET ONLY THE DATA FORMAT
5834  020164                                  PRINTX  #AUXMO2,R2
5835  020206  000207                          RTS     PC
5836  020210  040445  040504  040524  AUXMS2: .ASCIZ  /%ADATA FORMAT = %06%N/
5837  020236  040445  045523  050111  AUXMO2: .ASCIZ  /%ASKIP COUNT = %06%N/
5838          020264                          .EVEN
5839
5840                                  ;THIS AUXILIARY PRINT ROUTINE WILL PRINT THE TRANSIITION COUNT BASED
5841                                  ;ON THE CONTENTS OF CAS REGISTER 5.
5842  020264                          AUX4X:  PRINTX  #AUXMS4,@FC
5843  020310  000207                          RTS     PC
5844
5845  020312  040445  051124  047101  AUXMS4: .ASCIZ  /%ATRANSITION COUNT = %06%N/
5846          020346                          .EVEN
5847
5848                                  ;THIS AUXILIARY PRINT ROUTINE WILL PRINT EXPECTED DATA AND/OR ACTUAL
5849                                  ;DATA IN 18 BIT FORMAT (6 OCTAL CHARACTERS).  THE ACTUAL DATA (BITS
5850                                  ;15:0) IS CONTAINED IN CAS REGISTER 16 AND (BITS 17:16) IN CAS REGISTER
5851                                  ;17.  THE EXPECTED DATA (BITS 15:0) IS CONTAINED IN CAS REGISTER 14 AND
5852                                  ;(BITS 17:16) IN CAS REGISTER 15.  ASSOCIATED WITH BOTH THE ACTUAL AND
5853                                  ;EXPECTED DATA IS A PRINT FLAG INDICATING IF THE INFORMATION IS TO BE
5854                                  ;PRINTED.  THE ACTUAL DATA PRINT FLAG IS BIT 7 OF CAS REGISTER 17, AND
5855                                  ;THE PRINT FLAG FOR THE EXPECTED DATA IS BIT 7 OF CAS REGISTER 15.
5856  020346  032777  000200  163716  AUX5X:  BIT     #200,@MO1       ;EXPECTED DATA TO PRINT?
5857  020354  001415                          BEQ     1$              ;NO-GO CHECK FOR ACTUAL
5858  020356  005003                          CLR     R3              ;YES-LOAD THE DISPLACEMENT VALUE
5859  020360  004737  020456                  CALL    AUX18           ;GET THE DATA
5860  020364                                  PRINTX  #AUXMS5,R2,R4   ;
5861  020410  032777  000200  163660  1$:     BIT     #200,@MO3       ;ACTUAL DATA TO PRINT?
```

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5862  020416  001416                        BEQ     2$                  ;NO-RETURN TO USER
5863  020420  012703  000002                MOV     #2,R3               ;YES-LOAD THE DISPLACEMENT VALUE
5864  020424  004737  020456                CALL    AUX18               ;GET THE DATA
5865  020430                                PRINTX  #AUXM05,R2,R4
5866  020454  000207              2$:       RTS     PC                  ;RETURN
5867
5868  020456  017302  004272      AUX18:    MOV     @M01(R3),R2         ;GET BIT 17:16
5869  020462  042702  177774                BIC     #177774,R2          ;REMOVE UNWANTED BITS
5870  020466  006302                        ASL     R2                  ;JUSTIFY THE CHARACTER
5871  020470  017304  004270                MOV     @M00(R3),R4         ;GET THE MISSING BIT
5872  020474  042704  077777                BIC     #077777,R4          ;JUSTIFY THE BIT
5873  020500  000241                        CLC
5874  020502  006304                        ASL     R4
5875  020504  006304                        ASL     R4
5876  020506  050402                        BIS     R4,R2               ;COMPLETE THE PARTIAL CHARACTER
5877  020510  017304  004270                MOV     @M00(R3),R4         ;GET THE OTHER 5 CHARACTERS
5878  020514  000207                        RTS     PC                  ;RETURN
5879
5880  020516  040445  054105  027124  AUXMS5: .ASCIZ  /%AEXT. EXPECTED = %01%05%N/
5881          020552                        .EVEN
5882  020552  040445  054105  027124  AUXM05. .ASCIZ  /%AEXT. ACTUAL = %01%05%N/
5883          020604                        .EVEN
5884                                .SBTTL  MODULE 2.1.3.4 - UTIL80
5885  020604                        SSUB
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5886                                ;*MODULE         2.1.3.4 PROCESS TM78 MP UTILITY REQUEST
5887  020604                        SP
 (1)                                ; ************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5888                                ;*BGNSUB
5889                                ;*   IF CAS REGISTER 11 BITS 3:0=0 OR 4 OR > 7
5890                                ;*   :  THEN-LOAD ERRCOD WITH 16(10)
5891                                ;*   :       EXIT SUBROUTINE
5892                                ;*   :  ELSE-IF REGISTER 11 BITS 3:0=1 OR 2
5893                                ;*   :       :  THEN-CALL SUBROUTINE CALBYT
5894                                ;*   :       :       IF ERRCOD=0
5895                                ;*   :       :       :  THEN-CALL SUBROUTINE PATGEN
5896                                ;*   :       :       :       IF ERRCOD=0
5897                                ;*   :       :       :       :  THEN-LOAD 377(8) CAS REGISTER 4
5898                                ;*   :       :       :       :       SET UP THE WRITE BUFFER ADDRESS
5899                                ;*   :       :       :       :       LOAD 65(8) CAS REGISTER 0
5900                                ;*   :       :       :       :  ELSE-EXIT SUBROUTINE
5901                                ;*   :       :       :       ENDIF
5902                                ;*   :       :       :  ELSE-EXIT SUBROUTINE
5903                                ;*   :       :       ENDIF
5904                                ;*   :       :  ELSE-CONTINUE
5905                                ;*   :       ENDIF
5906                                ;*   :       IF CAS REGISTER 11 BITS 3:0=3
5907                                ;*   :       :  THEN-CALL SUBROUTINE CALBYT
5908                                ;*   :       :       IF ERRCOD=0
5909                                ;*   :       :       :  THEN-CALL SUBROUTINE PATGEN
5910                                ;*   :       :       :       IF ERRCOD=0
5911                                ;*   :       :       :       :  THEN-LOAD 377(8) TO CAS REGISTER 4
```

```
5912                    ;*  :       :       :       :       LOAD THE READ BUFFER ADDRESS
5913                    ;*  :       :       :       :       LOAD 71(8) TO CAS REGISTER 0
5914                    ;*  :       :       :       :  ELSE-EXIT SUBROUTINE
5915                    ;*  :       :       :       ENDIF
5916                    ;*  :       :       :  ELSE-EXIT SUBROUTINE
5917                    ;*  :       :       ENDIF
5918                    ;*  :       :  ELSE-CONTINUE
5919                    ;*  :       ENDIF
5920                    ;*  :       IF  CAS REGISTER 11 BITS 3:0=5
5921                    ;*  :       :  THEN-IF MASSBUS STATUS BIT ''TRE''=1
5922                    ;*  :       :       :  THEN-STATUS ERROR 31 (ON DATA TRANSFER)
5923                    ;*  :       :       :  ELSE-CONTINUE
5924                    ;*  :       :       ENDIF
5925                    ;*  :       :       IF  CAS REGISTER 11 BIT 4=1
5926                    ;*  :       :       :  THEN-COMPARE THE DATA
5927                    ;*  :       :       :       IF  DATA COMPARE ERROR
5928                    ;*  :       :       :       :  THEN-ERROR 32
5929                    ;*  :       :       :       :  ELSE-CONTINUE
5930                    ;*  :       :       :       ENDIF
5931                    ;*  :       :       :  ELSE-CONTINUE
5932                    ;*  :       :       ENDIF
5933                    ;*  :       :       CLEAR BIT 7 IN CAS REGISTER 11
5934                    ;*  :       :       IF  ERROR AND LOOP ON ERROR SPECIFIED
5935                    ;*  :       :       :  THEN-IF SCOPE LOOP SPECIFIED
5936                    ;*  :       :       :       :  THEN-SET BIT 7 IN CAS REGISTER 11
5937                    ;*  :       :       :       :  ELSE-CONTINUE
5938                    ;*  :       :       :       ENDIF
5939                    ;*  :       :       :       LOAD 377(8) IN CAS REGISTER 4
5940                    ;*  :       :       :       LOAD 33(8) IN CAS REGISTER 0
5941                    ;*  :       :       :  ELSE-LOAD 377(8) IN CAS REGISTER 4
5942                    ;*  :       :       :       LOAD 31(8) IN CAS REGISTER 0
5943                    ;*  :       :       ENDIF
5944                    ;*  :       :  ELSE-CONTINUE
5945                    ;*  :       ENDIF
5946                    ;*  :       IF  CAS REGISTER 11 BITS 3:0=6
5947                    ;*  :       :  THEN-IF MASSBUS STATUS BIT ''TRE''=1
5948                    ;*  :       :       :  THEN-STATUS ERROR 33 (ON DATA TRANSFER)
5949                    ;*  :       :       :  ELSE-CONTINUE
5950                    ;*  :       :       ENDIF
5951                    ;*  :       :       IF  CAS REGISTER 11 BIT 4=1
5952                    ;*  :       :       :  THEN-COMPARE THE DATA
5953                    ;*  :       :       :       IF  DATA COMPARE ERROR
5954                    ;*  :       :       :       :  THEN-ERROR 32
5955                    ;*  :       :       :       :  ELSE-CONTINUE
5956                    ;*  :       :       :       ENDIF
5957                    ;*  :       :       :  ELSE-CONTINUE
5958                    ;*  :       :       ENDIF
5959                    ;*  :       :       CLEAR BIT 7 IN CAS REGISTER 11
5960                    ;*  :       :       IF  ERROR AND LOOP ON ERROR SPECIFIED
5961                    ;*  :       :       :  THEN-IF SCOPE LOOP SPECIFIED
5962                    ;*  :       :       :       :  THEN-SET BIT 7 IN CAS REGISTER 11
5963                    ;*  :       :       :       :  ELSE-CONTINUE
5964                    ;*  :       :       :       ENDIF
5965                    ;*  :       :       :       LOAD 377(8) IN CAS REGISTER 4
5966                    ;*  :       :       :       LOAD 33(8) IN CAS REGISTER 0
5967                    ;*  :       :       :  ELSE-LOAD 377(8) IN CAS REGISTER 4
```

```
5968                                    ;*  :       :       :       LOAD 31(8) IN CAS REGISTER 0
5969                                    ;*  :       :       :   ENDIF
5970                                    ;*  :       :       : ELSE-CONTINUE
5971                                    ;*  :       :       ENDIF
5972                                    ;*  :       :       IF CAS REGISTER 11 BITS 3:0=7
5973                                    ;*  :       :       : THEN-LOAD THE BIT UNIT NUMBER IN CAS REGISTER 12
5974                                    ;*  :       :       :       LOAD 377(8) TO CAS REGISTER 4
5975                                    ;*  :       :       :       LOAD 31(8) TO CAS REGISTER 0
5976                                    ;*  :       :       : ELSE-CONTINUE
5977                                    ;*  :       :       ENDIF
5978                                    ;*  ENDIF
5979                                    ;*ENDSUB
5980  020604                            S
 (1)                                    ; ***************************************************************************
5981  020604  017701  163452            UTIL80: MOV     @DI2,R1         ;GET THE UTILITY REQ #
5982  020610  042701  177760                    BIC     #177760,R1      ;MASK OUT DESIRED BITS
5983  020614  006301                            ASL     R1              ;MULTIPLY BY 2
5984  020616  000171  020622                    JMP     @UTILTB(R1)     ;JUMP TO REQUIRED REQUEST
5985
5986  020622  020772                    UTILTB: .WORD   UTLILL          ;REQUEST CODE 0 INVALID
5987  020624  020662                            .WORD   WGCRPE          ;REQUEST CODE 1 WRITE PE
5988  020626  020662                            .WORD   WGCRPE          ;REQUEST CODE 2 WRITE GCR
5989  020630  020726                            .WORD   RFWD            ;REQUEST CODE 3 READ FORWARD
5990  020632  020772                            .WORD   UTLILL          ;REQUEST CODE 4 INVALID
5991  020634  021000                            .WORD   STNER           ;REQUEST CODE 5 STATUS CHECK-NO ERR
5992  020636  021066                            .WORD   STER            ;REQUEST CODE 6 STATUS CHECK-ERROR
5993  020640  021110                            .WORD   UNITS           ;REQUEST CODE 7 UNITS UNDER TEST
5994  020642  020772                            .WORD   UTLILL          ;REQUEST CODE 8 INVALID
5995  020644  020772                            .WORD   UTLILL          ;REQUEST CODE 9 INVALID
5996  020646  020772                            .WORD   UTLILL          ;REQUEST CODE A INVALID
5997  020650  020772                            .WORD   UTLILL          ;REQUEST CODE B INVALID
5998  020652  020772                            .WORD   UTLILL          ;REQUEST CODE C INVALID
5999  020654  020772                            .WORD   UTLILL          ;REQUEST CODE D INVALID
6000  020656  020772                            .WORD   UTLILL          ;REQUEST CODE E INVALID
6001  020660  020772                            .WORD   UTLILL          ;REQUEST CODE F INVALID
6002
6003                                    ;
6004                                    ;WRITE GCR/PE UTILITY REQUEST
6005                                    ;
6006  020662  004737  021142            WGCRPE: CALL    CALBYT          ;CALCULATE BYTE COUNT
6007  020666  005705                            TST     ERRCOD          ;TEST ERROR CODE
6008  020670  001015                            BNE     WGCRX           ;EXIT IF SET
6009  020672  004737  021312                    CALL    PATGEN          ;GENERATE THE DATA PATTERN
6010  020676  005705                            TST     ERRCOD          ;TEST ERROR CODE
6011  020700  001011                            BNE     WGCRX           ;EXIT IF SET
6012  020702  012777  000377  163336            MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
6013  020710  012777  033642  163316            MOV     #WRTBUF,@BA     ;LOAD THE BUFFER ADDRESS FOR WRITE
6014  020716  012777  000065  163304            MOV     #65,@XFRCMD     ;ISSUE WRITE GCR-NOT 18 BIT COMPAT.
6015  020724  000207                    WGCRX:  RTS     PC
6016
6017                                    ;
6018                                    ;READ FORWARD UTILITY REQUEST
6019                                    ;
6020  020726  004737  021142            RFWD:   CALL    CALBYT          ;CALCULATE THE BYTE COUNT
6021  020732  005705                            TST     ERRCOD          ;TEST ERROR CODE
6022  020734  001015                            BNE     RFWDX           ;EXIT IF SET
```

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6023  020736  004737  021312                  CALL    PATGEN          ;GENERATE THE DATA PATTERN
6024  020742  005705                          TST     ERRCOD          ;TEST ERROR CODE
6025  020744  001011                          BNE     RFWDX           ;EXIT IF SET
6026  020746  012777  033476  163260          MOV     #REDBUF,@BA     ;LOAD THE BUFFER ADDRESS FOR READ
6027  020754  012777  000377  163264          MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
6028  020762  012777  000071  163240          MOV     #71,@XFRCMD     ;ISSUE READ FORWARD
6029  020770  000207                  RFWDX:  RTS     PC              ;
6030
6031                                  ;
6032                                  ;ILLEGAL UTILITY REQUEST CODE ERROR TRAP
6033                                  ;
6034  020772  012705  000020          UTLILL: MOV     #16.,ERRCOD     ;LOAD THE ILLEGAL HOST REQUEST ERROR CODE
6035  020776  000207                          RTS     PC
6036
6037  021000  032777  040000  163222  STNER:  BIT     #040000,@XFRCMD ;TEST THE MASS BUS STATUS
6038  021006  001404                          BEQ     STNER1          ;CONTINUE IF NONE
6039  021010                                  ERRDF   #31.,,ERM031    ;ELSE - ERROR
6040
6041  021020  032777  000020  163234  STNER1: BIT     #000020,@D12    ;SHOULD DATA BE COMPARED?
6042  021026  001415                          BEQ     2$              ;NO-EXIT
6043  021030  005002                          CLR     R2              ;CLEAR THE BUFFER POINTER
6044  021032  126262  033476  033642  3$:     CMPB    REDBUF(R2),WRTBUF(R2)
6045  021040  001404                          BEQ     1$
6046  021042                                  ERRDF   #32.,,ERM032    ;ELSE - DATA COMPARE FAILURE
6047  021052  005202                  1$:     INC     R2              ;UPDATE THE POINTER
6048  021054  020237  004336                  CMP     R2,BYTCNT       ;DONE?
6049  021060  001364                          BNE     3$              ;NO - CONTINUE
6050  021062  000137  017134          2$:     JMP     RESPON          ;GO SPECIFIFY CONTINUE/LOOP ON ERROR
6051
6052  021066  032777  040000  163134  STER:   BIT     #040000,@XFRCMD
6053  021074  001351                          BNE     STNER1
6054  021076                                  ERRDF   #33.,,ERM033
6055
6056  021106  000744                          BR      STNER1
6057
6058                                  ;
6059                                  ;UNIT NUMBERS UTILITY REQUEST
6060                                  ;
6061  021110  013701  004354          UNITS:  MOV     BINUNT,R1       ;GET THE UNITS WORD
6062  021114  042701  177760                  BIC     #177760,R1      ;REMOVE UNUSED BITS
6063  021120  010177  163140                  MOV     R1,@D13         ;STORE IN CAS REGISTER 12 LOW
6064  021124  012777  000377  163114          MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
6065  021132  012777  000031  163070          MOV     #31,@XFRCMD     ;ISSUE DIAGNOSTIC CONTINUE COMMAND
6066  021140  000207                          RTS     PC              ;RETURN
6067                                  .SBTTL  MODULE 2.1.3.4.1 - CALBYT
6068  021142                          SSUB
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
6069                                ;*MODULE        2.1.4.1 - CALCULATE BYTE COUNT
6070  021142                          SD
 (1)                                ; ************************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
6071                                ;*THIS ROUTINE WILL CALCUALTE THE BYTE COUNT FOR A GIVEN TM78 DATA
6072                                ;*TRANSFER REQUEST.  THIS BYTE COUNT IS BASED ON THE "SCLOCK" COUNT
```

```
6073                                    ;*RETURNED IN CAS REGISTER 5, MASS BUS REGISTER 6, AND THE DATA FORMAT
6074                                    ;*IN CAS REGISTER 2, MASS BUS REGISTER 14.
6075  021142                            S
 (1)                                    ; ************************************************************************
6076
6077  021142  017701  163070   CALBYT: MOV     @FC,R1          ;GET THE NUMBER OF ''SCLK''S
6078  021146  010102                   MOV     R1,R2           ;COPY TO R2
6079  021150  006302                   ASL     R2              ;MULTIPLY BY 2
6080  021152  010237  004336           MOV     R2,BYTCNT       ;SAVE FOR LATER USE
6081  021156  010102                   MOV     R1,R2           ;COPY TO R2
6082  021160  005402                   NEG     R2              ;TAKE TWOS COMPLEMENT
6083  021162  010277  163044           MOV     R2,@WC          ;SET UP THE WORD COUNT
6084  021166  017702  163052           MOV     @TC,R2          ;GET THE DATA FORMAT
6085  021172  042702  107777           BIC     #107777,R2      ;REMOVE JUNK BITS
6086  021176  000302                   SWAB    R2              ;SWAP THE BYTES
6087  021200  006202                   ASR     R2
6088  021202  006202                   ASR     R2
6089  021204  006202                   ASR     R2              ;R2=DATA FORMAT CODE X 2
6090  021206  000172  021212           JMP     @CALTBL(R2)
6091  021212  021232           CALTBL: .WORD   CALX2           ;11 NORMAL FORMAT
6092  021214  021232                   .WORD   CALX2           ;15 NORMAL FORMAT
6093  021216  021242                   .WORD   CALX4           ;10 COMPAT. FORMAT
6094  021220  021246                   .WORD   CALX5           ;10 DUMP FORMAT
6095  021222  021264                   .WORD   CALX9           ;10 HIGH DENSITY FORMAT
6096  021224  021234                   .WORD   CALX1           ;IMAGE FORMAT
6097  021226  021304                   .WORD   CALILL          ;ILLEGAL
6098  021230  021304                   .WORD   CALILL          ;ILLEGAL
6099
6100  021232  006301           CALX2:  ASL     R1              ;MULTIPLY ''SCLK'' COUNT BY 2
6101  021234  010177  162776   CALX1:  MOV     R1,@FC          ;SET UP THE FRAMC COUNT
6102  021240  000207                   RTS     PC
6103  021242  006301           CALX4:  ASL     R1              ;MULTIPLY ''SCLK'' COUNT BY 2
6104  021244  000772                   BR      CALX2           ;GO MULTIPLY AGAIN
6105  021246  010102           CALX5:  MOV     R1,R2           ;COPY THE ''SCLK'' COUNT
6106  021250  006301                   ASL     R1              ;MULTIPLY BY 2
6107  021252  006202                   ASR     R2              ;DIVIDE BY 2
6108  021254  060201                   ADD     R2,R1           ;MULTIPLY BY 5
6109  021256  010177  162754           MOV     R1,@FC          ;STORE IN THE FRAME COUNT
6110  021262  000207                   RTS     PC              ;RETURN
6111  021264  010102           CALX9:  MOV     R1,R2           ;COPY THE ''SCLK'' COUNT
6112  021266  006301                   ASL     R1              ;MULTIPLY BY 2
6113  021270  006202                   ASR     R2              ;DIVIDE COPY BY 2
6114  021272  006202                   ASR     R2              ;DIVIDE COPY BY 4
6115  021274  060201                   ADD     R2,R1           ;MULTIPLY BY 2.25
6116  021276  010177  162734           MOV     R1,@FC
6117  021302  000207                   RTS     PC
6118
6119  021304  012705  000021   CALILL: MOV     #21,ERRCOD      ;LOAD THE ILLEGAL
6120  021310  000207                   RTS     PC              ;RETURN TO CALLING MODULE
6121
6122
6123                                    .SBTTL  MODULE 2.1.3.4.2 - PATGEN
6124  021312                            SSUB
 (1)                                    ; ************************************************************************
 (1)                                    ;*SUBROUTINE TITLE
 (1)                                    ;*---------- -----
```

```
                                ;*MODULE        2.1.3.4.2 - GENERATE THE DATA PATTERN
                                $D
                                ; ************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS ROUTINE IS CALLED TO GENERATE THE PROPER DATA PATTERN FOR THE
                                ;*REQUESTED TRANSFER ON A WRITE OR FOR COMPARE BUFFER GENERATION
                                ;*ON A READ.
                                $
                                ; ************************************************************************
021312  017701  162744        PATGEN: MOV     @DI2,R1         ;GET MASS BUS REGISTER
021316  000301                        SWAB    R1              ;SWAP THE HIGH-LOW BYTE
021320  042701  177776                BIC     #177776,R1      ;REMOVE JUNK BITS
021324  006301                        ASL     R1              ;MULTIPLY BY 2
021326  005002                        CLR     R2              ;CLEAR THE BYTE COUNTER
021330  000171  021334                JMP     @PATTBL(R1)

021334  021340                PATTBL: .WORD   PATILL          ;PATTERN 0 - UNDEFINED
021336  021364                        .WORD   MPDPAR          ;PATTERN 1 - MASS BUS PARITY

021340  012705  000022        PATILL: MOV     #22,ERRCOD      ;LOAD ILLEGAL DATA PATTERN ERROR CODE
021344  000207                        RTS     PC

021346  010162  033642        FILLX:  MOV     R1,WRTBUF(R2)   ;STORE THE DATA IN THE BUFFER
021352  005202                        INC     R2              ;INC THE COUNT
021354  005202                        INC     R2              ;INC THE COUNT
021356  020237  004336                CMP     R2,BYTCNT       ;DONE?
021362  000207                        RTS     PC              ;YES-RETURN


                                ;
                                ;WORST CASE MASSBUS DATA PATTERN
                                ;

021364  012701  000001        MPDPAR: MOV     #1,R1           ;LOAD STARTING DATA PATTERN
021370  004737  021346        2$:     CALL    FILLX           ;WRITE TO THE BUFFER
021374  002055                        BGE     4$              ;DONE?
021376  006301                        ASL     R1              ;GENERATE NEXT PATTERN
021400  103373                        BCC     2$              ;
021402  005001                        CLR     R1              ;LOAD DATA OF ZEROS
021404  004737  021346                CALL    FILLX           ;WRITE TO THE BUFFER
021410  002047                        BGE     4$              ;DONE?
021412  004737  021346                CALL    FILLX           ;WRITE TO THE BUFFER
021416  002044                        BGE     4$              ;DONE?
                                        ;
021420  012701  177777                MOV     #-1,R1          ;LOAD ALL ONES DATA
021424  004737  021346                CALL    FILLX           ;WRITE THE BUFFER
021430  002037                        BGE     4$              ;DONE?
021432  004737  021346                CALL    FILLX           ;WRITE THE BUFFER
021436  002034                        BGE     4$              ;DONE?
                                        ;
021440  012701  077777                MOV     #77777,R1       ;LOAD STARTING DATA PATTERN
021444  004737  021346        3$:     CALL    FILLX           ;WRITE THE BUFFER
021450  002027                        BGE     4$              ;DONE?
021452  006201                        ASR     R1              ;GENERATE NEXT PATTERN
```

```
6177  021454  052701  100000          BIS     #100000,R1      ;
6178  021460  103771                  BCS     3$              ;
6179
6180  021462  012701  177777          MOV     #177777,R1      ;LOAD ALL ONES DATA
6181  021466  004737  021346          CALL    FILLX           ;WRITE TO BUFFER
6182  021472  002016                  BGE     4$              ;DONE?
6183
6184  021474  005001                  CLR     R1              ;LOAD ALL ZEROS DATA
6185  021476  004737  021346          CALL    FILLX           ;WRITE TO BUFFER
6186  021502  002012                  BGE     4$              ;DONE?
6187
6188  021504  012701  052525          MOV     #052525,R1      ;LOAD ALTERNATE ONES DATA
6189  021510  004737  021346          CALL    FILLX           ;WRITE TO BUFFER
6190  021514  002005                  BGE     4$              ;DONE?
6191
6192  021516  012701  125252          MOV     #125252,R1      ;WRITE COMP. ALTER. ONES DATA
6193  021522  004737  021346          CALL    FILLX           ;WRITE TO BUFFER
6194  021526  003716                  BLE     MPDPAR          ;DONE?-NO CONTINUE
6195
6196  021530  000207              4$: RTS     PC              ;RETURN
6197                          .SBTTL  MODULE 2.1.3.5 - QUEUEM
6198  021532                  SSUB
 (1)                        ;*********************************************************************
 (1)                        ;*SUBROUTINE TITLE
 (1)                        ;*--------- -----
6199                        ;*MODULE 2.1.3.5 - QUEUE A PRINT LINE/MANUAL INTERVENTION
6200  021532                SP
 (1)                        ;*********************************************************************
 (1)                        ;*PROCEDURE
 (1)                        ;*---------
6201                        ;*BGNSUB
6202                        ;*  PRINT DEVICE HEADER
6203                        ;*  CALL SUBROUTINE MSGPAR
6204                        ;*  IF DATA TRANSFER INTERRUPT CODE=373(8)
6205                        ;*  :  THEN-CONTINUE
6206                        ;*  :  ELSE-PRINT ''TYPE CARRIAGE RETURN TO CONTINUE''
6207                        ;*  :       WAIT FOR CARRIAGE RETURN
6208                        ;*  ENDIF
6209                        ;*  LOAD 377(8) IN CAS REGISTER 4
6210                        ;*  LOAD 31(8) IN CAS REGISTER 1
6211                        ;*ENDSUB
6212  021532                S
 (1)                        ;*********************************************************************
6213  021532  000240        QUEUEM: NOP                     ;MANUAL INTERVENTION ENTRY
6214  021534  004737  046112  QUEUE:  CALL    HEADER
6215  021540  005001                  CLR     R1              ;CLEAR THE BUFFER POINTER
6216  021542  004737  016754          CALL    MSGPAR          ;GO PRINT THE MESSAGE
6217  021546  122737  000373  004364  CMPB    #373,DINTCD     ;PRINT ONLY REQUEST?
6218  021554  001411                  BEQ     1$              ;YES - DONE
6219  021556  012737  000001  004420  MOV     #1,DUMFLG       ;
6220  021564                          GMANIL  MANMSG,DUMFLG,1,YES
6221  021600  012777  000377  162440  1$:     MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
6222  021606  012777  000031  162414          MOV     #CONERR,@XFRCMD ;ISSUE CODE 31
6223  021614  000207                  RTS     PC              ;RETURN TO THE CALLING MODULE
6224
6225  021616  054524  042520  041440  MANMSG: .ASCIZ  /TYPE CARRIAGE RETURN TO CONTINUE/
```

```
                        .EVEN
                .SBTTL  MODULE 2.1.4 - CLOSEX
                SSUB
                ;*************************************************************************
                ;*SUBROUTINE TITLE
                ;*---------- -----
                ;*MODULE 2.1.4 - CLOSEX
                SP
                ;*************************************************************************
                ;*PROCEDURE
                ;*---------
                ;*BGNSUB
                ;*  ISSUE CLOSE FILE CALL TO SUPERVISOR
                ;*ENDSUB
                SIO
                ;*************************************************************************
                ;*SUBROUTINE INPUT/OUTPUT
                ;*---------- ------------
                ;*      INPUT:  NONE
                ;*
                ;*      OUTPUT: NONE
                ;*
                ;*
                S
                ;*************************************************************************
021660          CLOSEX: CLOSE                   ;CLOSE FILE
021662  005005          CLR     ERRCOD          ;CLEAR THE ERROR CODE
021664  000207          RTS     PC


                .SBTTL  BUFFERS

                S
                ;*************************************************************************
                ;*MICRO-DIAGNOSTIC/ERROR MESSAGE BUFFER
021666  011610  BUFER:  .BLKB   5000.           ;5.0K BUFFER
033476          BUFEND:

                S
                ;*************************************************************************
                ;*READ DATA BUFFER
033476          MBREAD:                         ;MASS BUS DATA READ
033476  000144  REDBUF: .BLKB   100.            ;READ DATA TRANSFER BUFFER
                                                ;

                S
                ;*************************************************************************
                ;*WRITE DATA BUFFER
033642          MBBUF:                          ;MASS BUS DATA WRITTEN
033642  000144  WRTBUF: .BLKB   100.            ;WRITE DATA TRANSFER BUFFER
```

```
6262
6263  034006  010237  004330          CASCOW: MOV     R2,CASDTA
6264  034012  004737  034242                  CALL    CASBOT          ;BOOT UP THE CAS PROGRAM
6265  034016  005705                          TST     ERRCOD
6266  034020  001062                          BNE     5$
6267  034022                                  BGNSEG
6268  034024  004737  014566                  CALL    START           ;START THE TM78
6269  034030  004737  034324                  CALL    CASDAT          ;FILL THE CAS DATA BUFFER
6270  034034  004737  035154                  CALL    HOLDMP
6271  034040  012777  041420  150232          MOV     #CASCMD,@AD80   ;ADDRESS COMMAND BYTE
6272  034046  012777  000400  150226          MOV     #HOLD,@DS80     ;ISSUE THE READ CAS FROM TM78MP COMMAND
6273  034054  004737  014566                  CALL    START
6274  034060  004737  034350                  CALL    CASWRT          ;GO WRITE CAS FROM HOST
6275  034064                                  CKLOOP
6276  034066  012777  000035  150134          MOV     #TSTART,@XFRCMD
6277  034074                                  DELAY   100             ;PERFORM A 10MS. TIMEOUT
6278  034124  122777  000372  150076          CMPB    #372,@XFRCMD    ;DONE
6279  034132  001406                          BEQ     3$              ;YES-CONTINUE
6280  034134                                  ERRDF   8.,PROCAS,ERM008  ;NO-PRINT THE ERROR
6281  034144                                  CKLOOP
6282  034146  000406                          BR      6$              ;EXIT THE MODULE
6283  034150                          3$:     CKLOOP
6284  034152  004737  034560                  CALL    CASTMR          ;GO READ CAS FROM TM78
6285  034156  004737  035020                  CALL    CASCMP          ;GO COMPARE DATA
6286  034162                                  CKLOOP
6287  034164                          6$:     ENDSEG
6288  034166  000207                  5$:     RTS     PC              ;RETURN
6289  034170  010237  004330          CASCOR: MOV     R2,CASDTA
6290  034174  004737  034242                  CALL    CASBOT          ;BOOT THE CAS PROGRAM
6291  034200  005705                          TST     ERRCOD
6292  034202  001016                          BNE     5$
6293  034204                                  BGNSEG
6294  034206  004737  014566                  CALL    START           ;START THE TM78
6295  034212  004737  034324                  CALL    CASDAT          ;FILL THE CAS DATA BUFFER
6296  034216  004737  034630                  CALL    CASTMW          ;GO WRITE CAS FROM TM78
6297  034222  004737  034452                  CALL    CASRED          ;GO READ CAS FROM HOST
6298  034226                                  CKLOOP
6299  034230  004737  035020                  CALL    CASCMP          ;GO COMPARE DATA
6300  034234                                  CKLOOP
6301  034236                                  ENDSEG
6302  034240  000207                  5$:     RTS     PC              ;RETURN
6303                                  ;
6304                                  ;CASBOT         CAS BOOT SUBROUTINE
6305                                  ;
6306  034242  005737  004412          CASBOT: TST     CASLD           ;IS THE CAS PROGRAM ALREADY LOADED?
6307  034246  001402                          BEQ     3$              ;NO - LOAD IT
6308  034250  005005                          CLR     ERRCOD          ;YES - DON'T LOAD IT BUT CLEAR THE ERRCOD
6309  034252  000422                          BR      2$              ;GET OUT
6310  034254  012737  013662  004400  3$:     MOV     #DXTUID,FILNAM  ;LOAD THE FILE NAME
6311  034262  004737  021660                  CALL    CLOSEX          ;CLOSE THE CHANNEL
6312  034266  004737  013730                  CALL    OPENX           ;OPEN THE CHANNEL
6313  034272  005705                          TST     ERRCOD          ;OPEN CHANNEL ERROR
6314  034274  001007                          BNE     1$              ;YES - RETURN TO USER
6315  034276  004737  013742                  CALL    LOADER          ;NO-LOAD THE TM78
6316  034302  005705                          TST     ERRCOD          ;LOAD ERROR?
6317  034304  001003                          BNE     1$              ;YES - EXIT
```

```
6318  034306  012737  000001  004412          MOV     #1,CASLD        ;SET THE CAS PROGRAM LOADED FLAG
6319  034314  004737  021660          1$:     CALL    CLOSEX          ;CLOSE THE CHANNEL
6320  034320  000207                  2$:     RTS     PC
6321
6322
6323                                  .SBTTL  SUBROUTINE FILL CAS DATA BUFFER - CASDAT
6324                                  ;
6325                                  ;CASDAT         FILL CAS DATA BUFFER ROUTINE
6326                                  ;
6327                                  ;       INPUT:
6328                                  ;       CASDTA  DATA WORD TO BE WRITTEN IN THE BUFFER
6329                                  ;
6330                                  ;       OUTPUT:
6331                                  ;       MBBUF   FILLED WITH DESIRED DATA BYTE
6332                                  ;
6333                                  ;       REGISTER USED
6334  034322  000001                  R1
6335  034324  005001          CASDAT: CLR     R1              ;CLEAR THE COUNTER
6336  034326  013761  004330  033642  1$:     MOV     CASDTA,MBBUF(R1)  ;STORE DATA IN THE BUFFER
6337  034334  005201                  INC     R1              ;BUMP THE COUNTER
6338  034336  005201                  INC     R1              ;BUMP THE COUNTER
6339  034340  020127  000036          CMP     R1,#30.         ;DONE?
6340  034344  001370                  BNE     1$              ;NO-CONTINUE
6341  034346  000207                  RTS     PC              ;YES-RETURN
6342
6343                                  .SBTTL  SUBROUTINE CAS WRITE FROM HOST - CASWRT
6344                                  ;
6345                                  ;CASWRT CAS WRITE SUBROUTINE-FROM HOST
6346                                  ;
6347                                  ;       INPUT:
6348                                  ;       MBBUF   CONTAINING THE DATA TO BE
6349                                  ;               WRITTEN TO THE CAS
6350                                  ;
6351                                  ;       OUTPUT:
6352                                  ;       NONE
6353                                  ;
6354                                  ;       REGISTERS USED:
6355                                  ;       R1
6356                                  ;       R2
6357                                  ;       R3
6358                                  ;
6359  034350                  CASWRT: BGNSEG
6360  034352  013777  004352  147660          MOV     MBDRIV,@CS2     ;LOAD THE UNIT NUMBER
6361  034360  005001                  CLR     R1              ;CLEAR MB REGISTER TABLE COUNT
6362  034362  005002                  CLR     R2              ;CLEAR DATA BUFFER POINTER
6363  034364  116103  035112          1$:     MOVB    MBTBL(R1),R3    ;GET MASS BUS REGISTER #
6364  034370  016273  033642  004230          MOV     MBBUF(R2),@XFRCMD(R3) ;LOAD THE MASS BUS
6365  034376  005201                  INC     R1              ;INCREMENT THE CAS REGISTER NUMBER
6366  034400  004737  035132          CALL    NONEX           ;CHECK FOR NONEXISTENT DRIVE
6367  034404  032777  004000  147670  BIT     #CPE,@DS80      ;PARITY ERROR?
6368  034412  001407                  BEQ     2$              ;NO-EXIT
6369  034414                          ERRDF   30.,RHCAS,ERM030  ;YES-ERROR
6370  034424  052777  040400  147650  BIS     #040400,@DS80   ;DO TM CLR AND KEEP HOLD SET
6371  034432                  2$:     CKLOOP
6372  034434  005202                  INC     R2              ;INCREMENT THE BUFFER POINTER
6373  034436  005202                  INC     R2              ;
```

```
6374  034440  020127  000017            CMP     R1,#15.         ;FINISHED?
6375  034444  001347                    BNE     1$              ;NO=CONTINUE
6376  034446                    3$:     ENDSEG
6377  034450  000207                    RTS     PC              ;YES-RETURN
6378                            .SBTTL  SUBROUTINE CAS READ FROM HOST - CASRED
6379
6380                            ;
6381                            ;CASRED CAS READ SUBROUTINE-FROM HOST
6382                            ;
6383                            ;       INPUT:
6384                            ;       NONE
6385                            ;
6386                            ;       OUTPUT:
6387                            ;       MBREAD  THE DATA READ FROM
6388                            ;               CAS VIA THE MASS BUS.
6389                            ;
6390                            ;       REGISTERS USED
6391                            ;       R1
6392                            ;       R2
6393                            ;       R3
6394  034452                    CASRED: BGNSEG
6395  034454  013777  004352  147556      MOV     MBDRIV,@CS2     ;LOAD THE UNIT NUMBER
6396  034462  005001                      CLR     R1              ;CLEAR MASS BUS REGISTER TABLE COUNT
6397  034464  005002                      CLR     R2              ;CLEAR DATA BUFFER POINTER
6398  034466  116103  035112      1$:     MOVB    MBTBL(R1),R3    ;GET MASS BUS REGISTER NUMBER
6399  034472  017362  004230  033476      MOV     @XFRCMD(R3),MBREAD(R2)  ;GET THE CAS DATA
6400  034500  005201                      INC     R1              ;INCREMENT THE REGISTER NUMBER
6401  034502  004737  035132              CALL    NONEX           ;CHECK FOR NON-EXISTENT DRIVE
6402  034506  032777  020000  147514      BIT     #MCPE,@XFRCMD   ;PARITY ERROR?
6403  034514  001411                      BEQ     2$              ;NO-EXIT
6404  034516                              ERRDF   29.,RHCAS,ERM029  ;YES-ERROR
6405  034526  052777  040000  147474      BIS     #TRE,@XFRCMD    ;RH CLR TO CLR MCPE
6406  034534  005077  147470              CLR     @XFRCMD
6407  034540                    2$:     CKLOOP
6408  034542  005202                      INC     R2              ;INCREMENT THE BUFFER POINTER
6409  034544  005202                      INC     R2              ;
6410  034546  020127  000017              CMP     R1,#15.         ;FINISHED?
6411  034552  001345                      BNE     1$              ;NO-CONTINUE
6412  034554                    3$:     ENDSEG
6413  034556  000207                      RTS     PC              ;YES-RETURN
6414
6415                            .SBTTL  SUBROUTINE CAS READ FROM TM78 MICROPROCESSOR - CASTMR
6416  034560                    CASTMR: BGNSEG
6417  034562  004737  035154              CALL    HOLDMP          ;HALT THE TM78 MP
6418  034566  005001                      CLR     R1              ;CLEAR THE READ DATA BYTE COUNT
6419  034570  012702  042000              MOV     #CASBUF,R2      ;LOAD THE TM78 MP DATA BUFFER ADDRESS
6420  034574  010277  147500      4$:     MOV     R2,@AD80        ;ADDRESS THE TM78 MP DATA BUFFER
6421  034600  000240                      NOP
6422  034602  017703  147474              MOV     @DS80,R3        ;GET THE DATA BYTE
6423  034606  110361  033476              MOVB    R3,MBREAD(R1)   ;STORE THE DATA
6424  034612  005202                      INC     R2              ;INCREMENT TM78 MP ADDRESS
6425  034614  005201                      INC     R1              ;INCREMENT BYTE POINTER
6426  034616  020127  000036              CMP     R1,#30.         ;DONE?
6427  034622  001364                      BNE     4$              ;NO-CONTINUE
6428  034624                    6$:     ENDSEG
6429  034626  000207                      RTS     PC              ;YES-RETURN
```

```
                                        .SBTTL  SUBROUTINE CAS WRITE FROM TM78 MICROPROCESSOR - CASTMW
                                CASTMW: BGNSEG
                                        CALL    HOLDMP
                                        MOV     #CASCMD,@AD80   ;ADDRESS COMMAND BYTE
                                        MOV     #HOLD+1,@DS80   ;WRITE THE WRITE CAS FROM TM78MP COMMAND
                                        NOP
                                        MOV     #CASDAL,@AD80   ;ADDRESS CAS WRITE DATA LOW BYTE
                                        MOVB    MBBUF,R1        ;GET THE CAS LOW BYTE DATA
                                        BIC     #177400,R1      ;REMOVE ANY SIGN EXTENTION BITS
                                        ADD     #HOLD,R1        ;ADD IN THE HOLD BIT
                                        MOV     R1,@DS80        ;WRITE THE LOW BYTE TO TM78
                                        MOV     #CASDAH,@AD80   ;ADDRESS CAS WRITE DATA HIGH BYTE
                                        MOVB    MBBUF+1,R1      ;GET THE CAS HIGH BYTE DATA
                                        BIC     #177400,R1      ;REMOVE ANY SIGN EXTENTION BITS
                                        ADD     #HOLD,R1        ;ADD IN THE HOLD BIT
                                        MOV     R1,@DS80        ;WRITE HIGH BYTE TO TM78
                                        CALL    START
                                        MOV     #TSTART,@XFRCMD
                                        DELAY   100             ;PERFORM A 100 MS. TIMEOUT
                                        CMPB    #372,@XFRCMD    ;DONE?
                                        BEQ     3$              ;YES-CONTINUE
                                        ERRDF   8.,PROCAS,ERM008  ;NO-ERROR
                                3$:     CKLOOP
                                        ENDSEG
                                        RTS     PC
                                        .SBTTL  SUBROUTINE CAS DATA COMPARE - CASCMP
                                CASCMP: BGNSEG
                                        CLR     R1              ;YES-COMPARE THE DATA
                                7$:     CMP     MBBUF(R1),MBREAD(R1)  ;
                                        BEQ     5$              ;
                                        MOV     R1,R5           ;COPY INDEX
                                        INC     R5              ;ADJUST R5
                                        INC     R5              ;ADJUST R5
                                        ASR     R5              ;DIVIDE BY 2
                                        CMP     R5,#1           ;CAS REG 1
                                        BEQ     5$              ;YES - IGNORE THE ERROR
                                        CMP     R5,#4           ;CAS REG 4
                                        BEQ     5$              ;YES - IGNORE THE ERROR
                                        ERRDF   9.,CASX,ERM009
                                        INLOOP                  ;ARE WE LOOPING ON AN ERROR?
                                        BCOMPLETE 2$            ;YES - GET OUT OF THE COMPARE BUSINESS
                                5$:     INC     R1              ;INCREMENT THE BUFFER POINTER
                                        INC     R1              ;
                                        CMP     R1,#30.         ;DONE
                                        BNE     7$              ;NO-CONTINUE
                                2$:     ENDSEG
                                        RTS     PC
                                        .SBTTL  TABLE MASS BUS VS. CAS REGISTER
                                MBTBL:  .BYTE   12              ;CAS REGISTER 1
                                        .BYTE   14              ;CAS REGISTER 2
                                        .BYTE   24              ;CAS REGISTER 3
                                        .BYTE   16              ;CAS REGISTER 4
                                        .BYTE   6               ;CAS REGISTER 5
                                        .BYTE   26              ;CAS REGISTER 6
                                        .BYTE   20              ;CAS REGISTER 7
                                        .BYTE   30              ;CAS REGISTER 10
```

```
                                        .BYTE   32              ;CAS REGISTER 11
                                        .BYTE   34              ;CAS REGISTER 12
                                        .BYTE   36              ;CAS REGISTER 13
                                        .BYTE   40              ;CAS REGISTER 14
                                        .BYTE   42              ;CAS REGISTER 15
                                        .BYTE   44              ;CAS REGISTER 16
                                        .BYTE   46              ;CAS REGISTER 17
                                        .EVEN

                                .SBTTL  NON EXISTENT DRIVE CHECK SUBROUTINE
                                ;
                                ;NON EXISTENT DRIVE (NED) SUBROUTINE
                                ;
                                ;       INPUT:
                                ;       NONE
                                ;
                                ;       OUTPUT:
                                ;       CKLOOP ERROR CONTROL
                                ;       ERROR3 PRINTED ON CONSOLE IF 'NED' IS ACTIVE
                                ;
035132  032777  010000  147100  NONEX:  BIT     #NED,@CS2       ;'NED' SET?
035140  001404                        BEQ     MBREGX          ;NO-EXIT
035142                                ERRDF   3,RHCAS,ERM003  ;YES-PRINT 'NED' ERROR
035152  000207                MBREGX: RTS     PC              ;EXIT THE SUBROUTINE
                                .SBTTL  HOLD TM78 MICRO PROCESSOR SUBROUTINE
                                ;
                                ;HOLDMP SUBROUTINE
                                ;
                                ;       INPUT:  NONE
                                ;
                                ;       OUTPUT:
                                ;
                                ;       ERR7    IF HOLD ACTIVE (HLDA) NOT SET
                                ;
035154                          HOLDMP: BGNSEG
035156  013777  004352  147054        MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
035164  005077  147040                CLR     @XFRCMD         ;CLEAR CAS REGISTER 0
035170  052777  000400  147104        BIS     #HOLD,@DS80     ;STOP THE TM78MP
035176  000240                        NOP
035200  000240                        NOP
035202  000240                        NOP
035204  017701  147072                MOV     @DS80,R1        ;GET THE TM78MP STATUS
035210  032701  001000                BIT     #HLDA,R1        ;IS 'HLDA' SET?
035214  001004                        BNE     1$              ;YES-CONTINUE
035216                                ERRDF   7.,PROCAS,ERM007  ;NO-
035226                          1$:   CKLOOP
035230  013701  004360                MOV     TMPORT,R1       ;GET THE PORT NUMBER
035234  001402                        BEQ     2$              ;
035236  012701  000200                MOV     #200,R1         ;LOAD PORT 1 SELECT CODE
035242  012777  100340  147030  2$:   MOV     #MBSEL,@AD80    ;ADDRESS THE MB SELECT BYTE
035250  062701  000400                ADD     #HOLD,R1        ;SET HOLD BIT IN DATA
035254  010177  147022                MOV     R1,@DS80        ;SELECT DESIRED PORT
035260                                ENDSEG
035262  000207                        RTS     PC              ;RETURN TO CALLING ROUTINE
```

```
                                        .SBTTL  GLOBAL TEXT SECTION
                                        ;++
                                        ; THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
                                        ; MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
                                        ; MORE THAN ONE TEST.
                                        ;--
                                        ;
                                        ; FORMAT STATEMENTS USED IN PRINT CALLS
                                        ;
035264                                  SERFAL: ERRSF   19.,HEAD2,MSG019
035274  000207                                  RTS     PC
035276  046524  034067  046040          HEAD1:  .ASCIZ  /TM78 LOAD ERROR-TEST ABORTED/
        035334                                  .EVEN
035334  046524  034067  041440          HEAD2:  .ASCIZ  /TM78 CONTROL ERROR-TEST ABORTED/
                                                .EVEN
035374  044506  042514  051440          HEAD3:  .ASCIZ  /FILE SERVICE ERROR-TEST ABORTED/
                                                .EVEN
                                        ;*
                                        ;*SYSTEM ERROR MESSAGES
                                        ;*
035434                                  S
 (1)                                    ; ******************************************************************************
                                        ;*TM78CLT SYS FTL ERR 000001 TST 000  SUB 000  PC: 000000
                                        ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                        ;*TM78 STATUS ERROR
                                        ;*TM78 LOAD ERROR-TEST ABORTED
                                        ;*MB. REG. 52 (CAS 21) = 000000

035434                                          BGNMSG  MSG001
035434  004737  046112                          CALL    HEADER
035440                                          PRINTB  #FMT001
035460                                          PRINTB  #FMTSTA,STAT80
035504                                          ENDMSG
035506  040445  046524  034067  FMT001: .ASCIZ  /%ATM78 STATUS ERROR%N/
                                                .EVEN
035534  040445  041115  020056  FMTSTA: .ASCIZ  /%AMB. REG. 52 (CAS 21) = %O6%N/
        035574                                  .EVEN

035574                                  S
 (1)                                    ; ******************************************************************************
                                        ;*TM78CLT SYS FTL ERR 000002  TST 000  SUB 000  PC: 000000
                                        ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                        ;*''HLDA'' NOT SET
                                        ;*TM78 LOAD ERROR-TEST ABORTED
                                        ;*STATUS = 000000

035574                                          BGNMSG  MSG002
035574  004737  046112                          CALL    HEADER
035600                                          PRINTB  #FMT002
035620                                          PRINTB  #FMTSTA,STAT80
035644                                          ENDMSG

035646  040445  044042  042114  FMT002: .ASCIZ  /%A''HLDA'' NOT SET%N/
        035672                                  .EVEN

035672                                  S
```

```
  (1)                                   ; ********************************************************************************
 6605                                   ;*TM78CLT SYS FTL ERR 000003  TST 000  SUB 000  PC: 000000
 6606                                   ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6607                                   ;*TM78 LOAD ERROR-TEST ABORTED
 6608                                   ;*WMC CKSUM ERROR
 6609
 6610  035672                                   BGNMSG  MSG003
 6611  035672  004737  046112                   CALL    HEADER
 6612  035676                                   PRINTB  #FMT003
 6613  035716                                   ENDMSG
 6614
 6615  035720  040445  041527  020123  FMT003: .ASCIZ  /%AWCS CKSUM ERROR%N/
 6616                                           .EVEN
 6617
 6618  035744                           S
  (1)                                   ; ********************************************************************************
 6619                                   ;*TM78CLT SYS FTL ERR 000004  TST 000  SUB 000  PC: 000000
 6620                                   ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6621                                   ;*TM78 LOAD ERROR-TEST ABORTED
 6622                                   ;*WCS VERIFY ERROR
 6623                                   ;*ADD = 000000
 6624                                   ;*ACT = 000000
 6625                                   ;*EXP = 000000
 6626
 6627  035744                                   BGNMSG  MSG004
 6628  035744  004737  046112                   CALL    HEADER
 6629  035750                                   PRINTB  #FMT004
 6630  035770                                   PRINTB  #FMTWAD,LOAD80
 6631  036014                                   PRINTB  #FMTACT,ADATA
 6632  036040                                   PRINTB  #FMTEXP,EDATA
 6633  036064                                   ENDMSG
 6634
 6635  036066  040445  041527  020123  FMT004: .ASCIZ  /%AWCS VERIFY ERROR%N/
 6636          036114                           .EVEN
 6637  036114  040445  042101  020104  FMTWAD: .ASCIZ  /%AADD = %O6%N/
 6638                                           .EVEN
 6639  036132  040445  041501  020124  FMTACT: .ASCIZ  /%AACT = %O6%N/
 6640                                           .EVEN
 6641  036150  040445  054105  020120  FMTEXP: .ASCIZ  /%AEXP = %O6%N/
 6642                                           .EVEN
 6643
 6644  036166                           S
  (1)                                   ; ********************************************************************************
 6645                                   ;*TM78CLT SYS FTL ERR 000005  TST 000  SUB 000  PC: 000000
 6646                                   ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6647                                   ;*TM78 LOAD ERROR-TEST ABORTED
 6648                                   ;*''TMRDY'' RESET AFTER CLEAR CMD.
 6649                                   ;*STATUS = 000000
 6650
 6651  036166                                   BGNMSG  MSG005
 6652  036166  004737  046112                   CALL    HEADER
 6653  036172                                   PRINTB  #FMT005
 6654  036212                                   PRINTB  #FMTSTA,STAT80
 6655  036236                                   ENDMSG
 6656
 6657  036240  040445  052042  051115  FMT005: .ASCIZ  /%A''TMRDY'' RESET AFTER CLEAR CMD.%N/
```

```
 6658          036304                          .EVEN
 6659
 6660  036304                                  S
  (1)                                          ; ************************************************************************
 6661                                          ;*TM78CLT SYS FTL ERR 000006  TST 000  SUB 000  PC: 000000
 6662                                          ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6663                                          ;*TM78 LOAD ERROR-TEST ABORTED
 6664                                          ;*TM78 MONITOR DID NOT START
 6665
 6666  036304                                          BGNMSG  MSG006
 6667  036304  004737  046112                         CALL    HEADER
 6668  036310                                          PRINTB  #FMT006
 6669  036330                                          ENDMSG
 6670
 6671  036332  040445  046524  034067          FMT006: .ASCIZ  /%ATM78 MONITOR DID NOT START%N/
 6672          036372                                  .EVEN
 6673
 6674  036372                                  S
  (1)                                          ; ************************************************************************
 6675                                          ;*TM78CLT SYS FTL ERR 000007  TST 000  SUB 000  PC: 000000
 6676                                          ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6677                                          ;*TM78 CONTROL ERROR-TEST ABORTED
 6678                                          ;*MICRO TEST DID NOT START
 6679
 6680  036372                                          BGNMSG  MSG007
 6681  036372  004737  046112                         CALL    HEADER
 6682  036376                                          PRINTB  #FMT007
 6683  036416                                          ENDMSG
 6684
 6685  036420  040445  044515  051103          FMT007: .ASCIZ  /%AMICRO TEST DID NOT START%N/
 6686          036456                                  .EVEN
 6687
 6688  036456                                  S
  (1)                                          ; ************************************************************************
 6689                                          ;*TM78CLT SYS FTL ERR 000008  TST 000  SUB 000  PC: 000000
 6690                                          ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6691                                          ;*TM78 CONTROL ERROR-TEST ABORTED
 6692                                          ;*TM78 COMMUNICATION TIMEOUT
 6693
 6694  036456                                          BGNMSG  MSG008
 6695  036456  004737  046112                         CALL    HEADER
 6696  036462                                          PRINTB  #FMT008
 6697  036502                                          ENDMSG
 6698
 6699  036504  040445  046524  034067          FMT008: .ASCIZ  /%ATM78 COMMUNICATION TIMEOUT%N/
 6700          036544                                  .EVEN
 6701
 6702  036544                                  S
  (1)                                          ; ************************************************************************
 6703                                          ;*TM78CLT SYS FTL ERR 000009  TST 000  SUB 000  PC: 000000
 6704                                          ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6705                                          ;*TM78 CONTROL ERROR-TEST ABORTED
 6706                                          ;*ILL. REQ. CODE
 6707
 6708  036544                                          BGNMSG  MSG009
 6709  036544  004737  046112                         CALL    HEADER
```

```
                                        PRINTB  #FMT009
                                        ENDMSG

036572  040445  046111  027114  FMT009: .ASCIZ  /%AILL. REQ. CODE%N/
        036616                          .EVEN

036616                          S
 (1)                            ; ************************************************************************
                                ;*TM78CLT SYS FTL ERR 000010  TST 000  SUB 000  PC: 000000
                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                ;*FIELD SERVICE ERROR-TEST ABORTED
                                ;*OPEN FAILED

036616                                  BGNMSG  MSG010
036616  004737  046112                  CALL    HEADER
036622                                  PRINTB  #FMT010
036642                                  ENDMSG
036644  040445  050117  047105  FMT010: .ASCIZ  /%AOPEN FAILED%N/
                                        .EVEN

036664                          S
 (1)                            ; ************************************************************************
                                ;*TM78CLT SYS FTL ERR 000011  TST 000  SUB 000  PC: 000000
                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                ;*FIELD SERVICE ERROR-TEST ABORTED
                                ;*FILE NOT FOUND ''FILNAM.EXT''

036664                                  BGNMSG  MSG011
036664  004737  046112                  CALL    HEADER
036670                                  PRINTB  #FMT011,FILNAM
036714                                  ENDMSG
036716  040445  044506  042514  FMT011: .ASCIZ  /%AFILE NOT FOUND ''%T%A''%N/
                                        .EVEN

036750                          S
 (1)                            ; ************************************************************************
                                ;*TM78CLT SYS FTL ERR 000012  TST 000  SUB 000  PC: 000000
                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                ;*FIELD SERVICE ERROR-TEST ABORTED
                                ;*EOF READING ''FILNAM.EXT''

036750                                  BGNMSG  MSG012
036750  004737  046112                  CALL    HEADER
036754                                  PRINTB  #FMT012,FILNAM
037000                                  ENDMSG
037002  040445  047505  020106  FMT012: .ASCIZ  /%AEOF READING ''%T%A''%N/
        037032                          .EVEN

037032                          S
 (1)                            ; ************************************************************************
                                ;*TM78CLT SYS FTL ERR 000013  TST 000  SUB 000  PC: 000000
                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                ;*FIELD SERVICE ERROR-TEST ABORTED
                                ;*LOAD DEVICE ERROR

037032                                  BGNMSG  MSG013
```

```
 6762  037032  004737  046112                    CALL    HEADER
 6763  037036                                    PRINTB  #FMT013
 6764  037056                                    ENDMSG
 6765  037060  040445  047514  042101  FMT013:  .ASCIZ  /%ALOAD DEVICE ERROR%N/
 6766                                            .EVEN
 6767
 6768  037106                          S
  (1)                                ;*********************************************************************
 6769                                ;*TM78CLT SYS FTL ERR 000014  TST 000  SUB 000  PC: 000000
 6770                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6771                                ;*FIELD SERVICE ERROR-TEST ABORTED
 6772                                ;*MSG. BUF. FULL
 6773
 6774  037106                                    BGNMSG  MSG014
 6775  037106  004737  046112                    CALL    HEADER
 6776  037112                                    PRINTB  #FMT014
 6777  037132                                    ENDMSG
 6778  037134  040445  051515  027107  FMT014:  .ASCIZ  /%AMSG. BUF. FULL%N/
 6779          037160                            .EVEN
 6780
 6781  037160                          S
  (1)                                ;*********************************************************************
 6782                                ;*TM78CLT SYS FTL ERR 000015  TST 000  SUB 000  PC: 000000
 6783                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6784                                ;*FIELD SERVICE ERROR-TEST ABORTED
 6785                                ;*BIN. BUF. FULL
 6786
 6787  037160                                    BGNMSG  MSG015
 6788  037160  004737  046112                    CALL    HEADER
 6789  037164                                    PRINTB  #FMT015
 6790  037204                                    ENDMSG
 6791  037206  040445  044502  027116  FMT015:  .ASCIZ  /%ABIN. BUF. FULL%N/
 6792          037232                            .EVEN
 6793
 6794  037232                          S
  (1)                                ;*********************************************************************
 6795                                ;*TM78CLT SYS FTL ERR 000016  TST 000  SUB 000  PC: 000000
 6796                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6797                                ;*TM78 CONTROL ERROR-TEST ABORTED
 6798                                ;*ILL. UTIL. REQ.
 6799
 6800  037232                                    BGNMSG  MSG016
 6801  037232  004737  046112                    CALL    HEADER
 6802  037236                                    PRINTB  #FMT016
 6803  037256                                    ENDMSG
 6804  037260  040445  046111  027114  FMT016:  .ASCIZ  /%AILL. UTIL. REQ.%N/
 6805                                            .EVEN
 6806
 6807  037304                          S
  (1)                                ;*********************************************************************
 6808                                ;*TM78CLT SYS FTL ERR 000017  TST 000  SUB 000  PC: 000000
 6809                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6810                                ;*TM78 CONTROL ERROR-TEST ABORTED
 6811                                ;*ILL. DATA FMT.
 6812
 6813  037304                                    BGNMSG  MSG017
```

```
 6814  037304  004737  046112                    CALL    HEADER
 6815  037310                                    PRINTB  #FMT017
 6816  037330                                    ENDMSG
 6817  037332  040445  046111  027114  FMT017:   .ASCIZ  /%AILL. DATA FMT.%N/
 6818          037356                            .EVEN
 6819
 6820  037356                          S
  (1)                                ; ************************************************************************
 6821                                ;*TM78CLT SYS FTL ERR 000018  TST 000  SUB 000  PC: 000000
 6822                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6823                                ;*TM78 CONTROL ERROR-TEST ABORTED
 6824                                ;*ILL. DATA PAT.
 6825
 6826  037356                                    BGNMSG  MSG018
 6827  037356  004737  046112                    CALL    HEADER
 6828  037362                                    PRINTB  #FMT018
 6829  037402                                    ENDMSG
 6830  037404  040445  046111  027114  FMT018:    .ASCIZ /%AILL. DATA PAT.%N/
 6831          037430                            .EVEN
 6832
 6833  037430                          S
  (1)                                ; ************************************************************************
 6834                                ;*TM78CLT SYS FTL ERR 000019  TST 000  SUB 000  PC: 000000
 6835                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6836                                ;*ILL. ERR CODE.
 6837  037430                          S
  (1)                                ; ************************************************************************
 6838  037430                                    BGNMSG  MSG019
 6839  037430  004737  046112                    CALL    HEADER
 6840  037434                                    PRINTB  #FMT019
 6841  037454                                    ENDMSG
 6842
 6843
 6844  037456  040445  046111  027114  FMT019:  .ASCIZ  /%AILL. ERR CODE.%N/
 6845          037502                            .EVEN
```

```
                                        .SBTTL  ERROR MESSAGE AREA

                                        ;*
                                        ;*ERROR MESSAGES
                                        ;*

037502                                  BGNMSG  ERM001
037502  004737  046112                  CALL    HEADER
037506                                  PRINTB  #FMM001,R1,@XFRCMD(R1)
037534                                  ENDMSG
037536  040445  041115  051040  FMM001: .ASCIZ  /%AMB REG. %06%A = %06%A AFTER MB CLEAR%N/
        037610                          .EVEN

037610                                  BGNMSG  ERM002
037610  004737  046112                  CALL    HEADER
037614                                  PRINTB  #FMM002,R1
037636                                  ENDMSG
037640  040445  047042  042105  FMM002: .ASCIZ  /%A'NFD'' WHEN READING MB REG. %06%N/
        037704                          .EVEN

037704                                  BGNMSG  ERM003
037704  004737  046112                  CALL    HEADER
037710                                  PRINTB  #FMM003
037730                                  ENDMSG
037732  040445  047042  042105  FMM003: .ASCIZ  /%A'NED'' WHEN READING MB REG.%N/
        037772                          .EVEN

037772                                  BGNMSG  ERM004
037772  004737  046112                  CALL    HEADER
037776                                  PRINTB  #FMM004
040016                                  ENDMSG
040020  040445  052042  051115  FMM004: .ASCIZ  /%A''TMRDY'' NOT SET%N/
                                        .EVEN

040044                                  BGNMSG  ERM005
040044  004737  046112                  CALL    HEADER
040050                                  PRINTB  #FMM005,R1,R2
040074                                  ENDMSG
040076  040445  047516  026516  FMM005: .ASCII  /%ANON-EXISTENT REG. %02%A = %06%A SHOULD /
040147    102   020105  042532          .ASCIZ  /BE ZERO%N/
        040162                          .EVEN

040162                                  BGNMSG  ERM006
040162  004737  046112                  CALI    HEADER
040166                                  PRINTB  #FMM006,R1
040210                                  ENDMSG
040212  040445  046524  034067  FMM006: .ASCIZ  /%ATM78 ''ILR'' NOT SET AFTER REG. %02%A READ%N/
        040270                          .EVEN

040270                                  BGNMSG  ERM007
040270  004737  046112                  CALL    HEADER
040274                                  PRINTB  #FMT002
040314                                  PRINTB  #FMTSTA,R1
040336                                  ENDMSG
```

```
6902
6903  040340                                    BGNMSG  ERM008
6904  040340  004737  046112                    CALL    HEADER
6905  040344                                    PRINTB  #FMM008
6906  040364                                    ENDMSG
6907  040366  040445  044515  051103  FMM008:  .ASCIZ  /%AMICRO DIAGNOSTIC RESPONSE TIMEOUT%N/
6908                                            .EVEN
6909
6910  040434                                    BGNMSG  ERM009
6911  040434  004737  046112                    CALL    HEADER
6912  040440                                    PRINTB  #FMM009
6913  040460                                    PRINTB  #FNN009,R5
6914  040502                                    PRINTB  #FMTACT,MBREAD(R1)
6915  040526                                    PRINTB  #FMTEXP,MBBUF(R1)
6916  040552                                    ENDMSG
6917  040554  040445  040503  020123  FMM009:  .ASCIZ  /%ACAS DATA COMPARE FAIL%N/
6918  040606  040445  040503  020123  FNN009:  .ASCIZ  /%ACAS REG. %06%N/
6919          040630                            .EVEN
6920
6921  040630                                    BGNMSG  ERM010
6922  040630  004737  046112                    CALL    HEADER
6923  040634                                    PRINTB  #FMM010
6924  040654                                    ENDMSG
6925  040656  040445  046524  034067  FMM010:  .ASCIZ  /%ATM78 DATA BUS CHANGING WHEN 'HLDA' SET%N/
6926          040732                            .EVEN
6927
6928  040732                                    BGNMSG  ERM011
6929  040732  004737  046112                    CALL    HEADER
6930  040736                                    PRINTB  #FMM011
6931  040756                                    ENDMSG
6932  040760  040445  046524  034067  FMM011:  .ASCIZ  /%ATM78 ADDR BUS CHANGING WHEN 'HLDA' SET%N/
6933          041034                            .EVEN
6934
6935  041034                                    BGNMSG  ERM012
6936  041034  004737  046112                    CALL    HEADER
6937  041040                                    PRINTB  #FMM012
6938  041060                                    ENDMSG
6939  041062  040445  044042  046117  FMM012:  .ASCIZ  /%A'HOLD' DID NOT RESET%N/
6940          041114                            .EVEN
6941
6942  041114                                    BGNMSG  ERM013
6943  041114  004737  046112                    CALL    HEADER
6944  041120                                    PRINTB  #FMM013
6945  041140                                    ENDMSG
6946  041142  040445  044042  042114  FMM013:  .ASCIZ  /%A'HLDA' DID NOT RESET%N/
6947          041174                            .EVEN
6948
6949  041174                                    BGNMSG  ERM014
6950  041174  004737  046112                    CALL    HEADER
6951  041200                                    PRINTB  #FMM014
6952  041220                                    ENDMSG
6953  041222  040445  044042  042114  FMM014:  .ASCIZ  /%A'HLDA' RESETS WHEN 'HOLD' + 'CLEAR' SET%N/
6954                                            .EVEN
6955
6956  041276                                    BGNMSG  ERM015
6957  041276  004737  046112                    CALL    HEADER
```

```
 6958  041302                                        PRINTB  #FMM015
 6959  041322                                        ENDMSG
 6960  041324  040445  052042  051115  FMM015:     .ASCIZ  /%A''TMRDY'' DID NOT RESET%N/
 6961                                                .EVEN
 6962
 6963  041356                                        BGNMSG  ERM016
 6964  041356  004737  046112                        CALL    HEADER
 6965  041362                                        PRINTB  #FMM016
 6966  041402                                        PRINTB  #FMTACT,R2
 6967  041424                                        PRINTB  #FMTEXP,R1
 6968  041446                                        ENDMSG
 6969
 6970  041450  040445  042522  027107  FMM016:     .ASCIZ  /%AREG. 20 COMPARE FAIL%N/
 6971          041502                                .EVEN
 6972
 6973  041502                                        BGNMSG  ERM017
 6974  041502  004737  046112                        CALL    HEADER
 6975  041506                                        PRINTB  #FMM017,R3
 6976  041530                                        ENDMSG
 6977  041532  040445  047520  052122  FMM017:     .ASCIZ  /%APORT %O1%A SELECT BIT NOT SET%N/
 6978                                                .EVEN
 6979
 6980  041574                                        BGNMSG  ERM018
 6981  041574  004737  046112                        CALL    HEADER
 6982  041600                                        PRINTB  #FMM018
 6983  041620                                        ENDMSG
 6984  041622  040445  047516  041440  FMM018:     .ASCIZ  /%ANO CONTENTION ERROR OCCURRED%N/
 6985          041664                                .EVEN
 6986
 6987  041664                                        BGNMSG  ERM019
 6988  041664  004737  046112                        CALL    HEADER
 6989  041670                                        PRINTB  #FMM019
 6990  041710                                        ENDMSG
 6991  041712  040445  044442  051114  FMM019:     .ASCIZ  /%A''ILR'' NOT CLEAR WHEN WRITTEN CLEAR%N/
 6992          041762                                .EVEN
 6993
 6994  041762                                        BGNMSG  ERM020
 6995  041762  004737  046112                        CALL    HEADER
 6996  041766                                        PRINTB  #FMM020
 6997  042006                                        PRINTB  #FMTACT,@AS
 6998  042032                                        PRINTB  #FMTEXP,MBBUF
 6999  042056                                        ENDMSG
 7000  042060  040445  040504  040524  FMM020:     .ASCIZ  /%ADATA FROM CAS REG. 4 NOT AS EXPECTED%N/
 7001          042132                                .EVEN
 7002
 7003  042132                                        BGNMSG  ERM021
 7004  042132  004737  046112                        CALL    HEADER
 7005  042136                                        PRINTB  #FMM021,R2
 7006  042160                                        ENDMSG
 7007  042162  040445  052101  042524  FMM021:     .ASCIZ  /%AATTEN. REG. = %O6%AAFTER WRITTEN CLEAR%N/
 7008          042236                                .EVEN
 7009  042236                                        BGNMSG  ERM022
 7010  042236  004737  046112                        CALL    HEADER
 7011  042242                                        PRINTB  #FMM022
 7012  042262                                        ENDMSG
 7013  042264  040445  050103  020125  FMM022:     .ASCIZ  /%ACPU WAS NOT INTERRUPTED BY TM78 SETTING ATTENTION%N/
```

```
7014                                                    .EVEN
7015
7016  042352                                            BGNMSG  ERM023
7017  042352  004737  046112                            CALL    HEADER
7018  042356                                            PRINTB  #FMM023
7019  042376                                            ENDMSG
7020  042400  040445  046524  034067  FMM023:           .ASCIZ  /%ATM78 ''CPE'' NOT SET WHEN ''PAT'' IS SET%N/
7021          042452                                    .EVEN
7022
7023  042452                                            BGNMSG  ERM024
7024  042452  004737  046112                            CALL    HEADER
7025  042456                                            PRINTB  #FMM024
7026  042476                                            ENDMSG
7027  042500  040445  046524  034067  FMM024:           .ASCIZ  /%ATM78 ''CPE'' NOT RESET WHEN ''PAT'' IS CLEAR%N/
7028          042556                                    .EVEN
7029
7030  042556                                            BGNMSG  ERM025
7031  042556  004737  046112                            CALL    HEADER
7032  042562                                            PRINTB  #FMM025
7033  042602                                            ENDMSG
7034  042604  040445  046524  034067  FMM025:           .ASCIZ  /%ATM78 ''CPE'' SET WHEN ''PAT'' CLEAR%N/
7035                                                    .EVEN
7036
7037  042650                                            BGNMSG  ERM026
7038  042650  004737  046112                            CALL    HEADER
7039  042654                                            PRINTB  #FMM026
7040  042674                                            ENDMSG
7041  042676  040445  050115  021040  FMM026:           .ASCIZ  /%AMP ''MCPE'' NOT SET%N/
7042                                                    .EVEN
7043
7044  042724                                            BGNMSG  ERM027
7045  042724  004737  046112                            CALL    HEADER
7046  042730                                            PRINTB  #FMM027
7047  042750                                            ENDMSG
7048  042752  040445  041115  021040  FMM027:           .ASCIZ  /%AMB ''MCPE'' SET%N/
7049                                                    .EVEN
7050
7051  042774                                            BGNMSG  ERM028
7052  042774  004737  046112                            CALL    HEADER
7053  043000                                            PRINTB  #FMM028
7054  043020                                            PRINTB  #FMTWAD,R3
7055  043042                                            PRINTB  #FMTACT,R4
7056  043064                                            PRINTB  #FMTEXP,R2
7057  043106                                            ENDMSG
7058  043110  040445  046524  034067  FMM028:           .ASCIZ  /%ATM78 MEMORY FAILURE%N/
7059                                                    .EVEN
7060
7061  043140                                            BGNMSG  ERM029
7062  043140  004737  046112                            CALL    HEADER
7063  043144                                            PRINTB  #FMM029,R1
7064  043166                                            ENDMSG
7065  043170  040445  040520  044522  FMM029:           .ASCIZ  /%APARITY ERR. READING CAS REG. %06%N/
7066          043236                                    .EVEN
7067
7068  043236                                            BGNMSG  ERM030
7069  043236  004737  046112                            CALL    HEADER
```

```
7070  043242                                        PRINTB  #FMM030,R1
7071  043264                                        ENDMSG
7072  043266  040445  040520  044522  FMM030:     .ASCIZ  /%APARITY ERR. WRITING CAS REG. %06%N/
7073          043334                                .EVEN
7074
7075  043334                                        BGNMSG  ERM031
7076  043334  004737  046112                        CALL    HEADER
7077  043340                                        PRINTB  #TNOPC,DIAGTS
7078  043364                                        PRINTB  #FMMPPC,@TUSTAT
7079  043410                                        PRINTB  #FMM031,@CS2
7080  043434                                        ENDMSG
7081  043436  040445  046524  034067  FMMPPC:     .ASCIZ  /%ATM78 MICRO PC = %06%N/
7082                                                .EVEN
7083  043466  040445  046524  034067  TNOPC:      .ASCIZ  /%ATM78 MICRO TEST = %06%N/
7084                                                .EVEN
7085  043520  040445  041115  051440  FMM031:     .ASCIZ  /%AMB STATUS ERROR - CS2 = %06%N/
7086                                                .EVEN
7087
7088  043560                                        BGNMSG  ERM032
7089  043560  004737  046112                        CALL    HEADER
7090  043564                                        PRINTB  #TNOPC,DIAGTS
7091  043610                                        PRINTB  #FMMPPC,@TUSTAT
7092  043634                                        PRINTB  #FMM032
7093  043654                                        PRINTB  #FNN032,R2
7094  043676                                        PRINTB  #FMTACT,<B,REDBUF(R2)>
7095  043724                                        PRINTB  #FMTEXP,<B,WRTBUF(R2)>
7096  043752                                        ENDMSG
7097  043754  040445  041115  042040  FMM032:     .ASCIZ  /%AMB DATA COMP. FAIL%N/
7098          044004                                .EVEN
7099  044004  040445  054502  042524  FNN032:     .ASCIZ  /%ABYTE COUNT = %06%N/
7100          044032                                .EVEN
7101
7102  044032                                        BGNMSG  ERM033
7103  044032  004737  046112                        CALL    HEADER
7104  044036                                        PRINTB  #TNOPC,DIAGTS
7105  044062                                        PRINTB  #FMMPPC,@TUSTAT
7106  044106                                        PRINTB  #FMM033
7107  044126                                        ENDMSG
7108  044130  040445  047516  046440  FMM033:     .ASCIZ  /%ANO MB STATUS ERROR WHEN EXPECTED%N/
7109          044176                                .EVEN
7110  044176                                        BGNMSG  ERM034
7111  044176  004737  046112                        CALL    HEADER
7112  044202                                        PRINTB  #FMM034,R3
7113  044224                                        ENDMSG
7114
7115  044226  040445  046524  034067  FMM034:     .ASCIZ  /%ATM78 ROM INFORMATION PARITY ERROR %N%AADR %06%N/
7116                                                .EVEN
7117
7118  044310                                        BGNMSG  ERM035
7119  044310  004737  046112                        CALL    HEADER
7120  044314                                        PRINTB  #FMM035
7121  044334                                        PRINTB  #FMMA35,R3,(R5),2(R5)
7122  044364                                        ENDMSG
7123  044366  040445  046524  034067  FMM035:     .ASCIZ  /%ATM78 ROM ID# WRONG (CAN NOT LOOP ON THIS ERROR) %N/
7124  044453     045  040501  051104  FMMA35:     .ASCIZ  /%AADR %06%N%AIDEN %01%N%AVER # %03%N/
7125                                                .EVEN
```

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7126
7127  044520                                        BGNMSG  ERM036
7128  044520  004737  046112                        CALL    HEADER
7129  044524                                        PRINTB  #FMM036
7130  044544                                        PRINTB  #FMMA35, R3,(R5),2(R5)
7131  044574                                        ENDMSG
7132  044576  040445  047522  020115  FMM036:      .ASCIZ  /%AROM PARITY ERROR NOT SET AND SHOULD BE %N/
7133                                                .EVEN
7134
7135  044652                                        BGNMSG  ERM037
7136  044652  004737  046112                        CALL    HEADER
7137  044656                                        PRINTB  #FMM037
7138  044676                                        PRINTB  #FMMA35,R3,(R5),2(R5)
7139  044726                                        ENDMSG
7140
7141  044730  040445  047522  020115  FMM037:      .ASCIZ  /%AROM PARITY ERROR %N/
7142                                                .EVEN
7143  044756                                        BGNMSG  ERM040
7144  044756                                        PRINTB  #FMM040
7145  044776                                        ENDMSG
7146
7147  045000  040445  047516  023440  FMM040:      .ASCIZ  /%ANO 'DLT' AFTER READ FROM EMPTY SILO%N/
7148                                                .EVEN
7149
7150  045050                                        BGNMSG  ERM041
7151  045050                                        PRINTB  #FMM041
7152  045070                                        ENDMSG
7153
7154  045072  040445  047516  023440  FMM041:      .ASCIZ  /%ANO 'SC' AFTER READ FROM EMPTY SILO%N/
7155          045142                                .EVEN
7156
7157  045142                                        BGNMSG  ERM042
7158  045142                                        PRINTB  #FMM042
7159  045162                                        ENDMSG
7160
7161  045164  040445  047516  023440  FMM042:      .ASCIZ  /%ANO 'TRE' AFTER READ FROM EMPTY SILO%N/
7162                                                .EVEN
7163
7164  045234                                        BGNMSG  ERM043
7165  045234                                        PRINTB  #FMM043
7166  045254                                        ENDMSG
7167
7168  045256  040445  044447  023522  FMM043:      .ASCIZ  /%A'IR' NOT SET AFTER RH CLEAR%N/
7169                                                .EVEN
7170
7171  045316                                        BGNMSG  ERM044
7172  045316                                        PRINTB  #FMM044
7173  045336                                        ENDMSG
7174
7175  045340  040445  047447  023522  FMM044:      .ASCIZ  /%A'OR' SET AFTER RH CLEAR%N/
7176                                                .EVEN
7177
7178  045374                                        BGNMSG  ERM045
7179  045374                                        PRINTB  #FMM045
7180  045414                                        ENDMSG
7181
```

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7182  045416  040445  047447  023522  FMM045: .ASCIZ  /%A'OR' SET AFTER 1 SILO LOAD%N/
7183          045456                          .EVEN
7184
7185  045456                                  BGNMSG  ERM046
7186  045456                                  PRINTB  #FMM046
7187  045476                                  ENDMSG
7188
7189  045500  040445  047447  023522  FMM046: .ASCIZ  /%A'OR' RESET AFTER SECOND SILO LOAD%N/
7190                                          .EVEN
7191
7192  045546                                  BGNMSG  ERM047
7193  045546                                  PRINTB  #FMM047
7194  045566                                  ENDMSG
7195
7196  045570  040445  044447  023522  FMM047: .ASCIZ  /%A'IR' NOT RESET BY SILO FULL%N/
7197                                          .EVEN
7198
7199  045630                                  BGNMSG  ERM048
7200  045630                                  PRINTB  #FMM048
7201  045650                                  ENDMSG
7202
7203  045652  040445  047447  023522  FMM048: .ASCIZ  /%A'OR' NOT SET AFTER SILO FULL%N/
7204          045714                          .EVEN
7205
7206  045714                                  BGNMSG  ERM049
7207  045714                                  PRINTB  #FMM049
7208  045734                                  PRINTB  #FMTACT,R2
7209  045756                                  PRINTB  #FMTEXP,R1
7210  046000                                  ENDMSG
7211
7212  046002  040445  040502  020104  FMM049: .ASCIZ  /%ABAD SILO READ%N/
7213                                          .EVEN
7214
7215  046024                                  BGNMSG  ERM050
7216  046024                                  PRINTB  #FMM050
7217  046044                                  ENDMSG
7218
7219  046046  040445  042047  052114  FMM050: .ASCIZ  /%A'DLT' NOT SET BY SILO OVERFLOW%N/
7220          046112                          .EVEN
7221  046112                          HEADER: PRINTB  #FHEAD,XFRCMD,MBDRIV,TMUNIT,TMPORT
7222  046152  000207                          RTS     PC
7223
7224  046154  040445  044122  020072  FHEAD:  .ASCIZ  /%ARH: %06%A TM: %01%A TU: %01%A PORT: %01%N/
7225                                          .EVEN
7226  046230  034115  032471  026066  RHCAS:  .ASCIZ  /M8956, M8957, MASSBUS/
7227  046256  034115  032471  026066  CASX:   .ASCIZ  /M8956, M8957, M8960, M8958, M8953/
7228  046320  034115  032471  026067  PROCAS: .ASCIZ  /M8957, M8960/
7229  046335     115  034470  030066  PRO:    .ASCIZ  /M8960, M8958, M8953/
7230  046361     115  034470  034465  WMC:    .ASCIZ  /M8959/
7231  046367     122  030510  020061  RH11:   .ASCIZ  /RH11 FAILURE/
7232                                          .EVEN
7233                                          .LIST   BEX
7234  046404                                  LASTAD
 (3)  046410                          L$LAST::
```

```
ADATA   004370          1359#  4830*  6631
ADR   = 000020 G        1230#
AD80    004300          1330#  1958*  1961   1967   1988*  2048*  2049   2125*  2133*  2188*  2197*  2282*  2570*
                        2604*  2617*  2682*  2693*  2763*  2775*  2849*  2858*  2982*  3055*  3064   3508*  3595*
                        4265*  4268*  4632*  4648*  4725*  4820*  6271*  6420*  6433*  6436*  6441*  6541*
AS      004246          1056   1069*  1317#  4198   4204*  4206   4258*  4901*  5356*  5410*  5462   5595*  5604*
                        6012*  6027*  6064*  6221*  6997
ASSEMB= 000010           551
AUXILL  017612          5760   5767#  5769   5778   5779   5780   5781   5782   5783   5784
AUXMO2  020236          5834   5837#
AUXMO5  020552          5865   5882#
AUXMS1  020054          5814   5816#
AUXMS2  020210          5833   5836#
AUXMS4  020312          5842   5845#
AUXMS5  020516          5860   5880#
AUXMS7  017774          5800   5808#
AUXPNT  017560          5574*  5758#
AUXTBL  017614          5766   5769#
AUX1    017654          5770   5786#
AUX1X   020026          5786*  5790*  5797*  5802*  5814#
AUX18   020456          5859*  5864*  5868#
AUX2    017662          5771   5788#
AUX2X   020106          5788*  5791*  5803*  5823#
AUX3    017670          5772   5790#
AUX4    017702          5773   5793#
AUX4X   020264          5793*  5842#
AUX5    017710          5774   5795#
AUX5X   020346          5795*  5798*  5804*  5856#
AUX6    017716          5775   5797#
AUX7    017730          5776   5800#
AUX8    017756          5777   5802#
AU.DRP  003406          1075   1086#
AU.RH   003256          1035   1080#
AU.TM   003316          1046   1082#
AU.TO   003210          1062   1078#
AU.TU   003352          1067   1072   1084#
BA      004234          1312#  6013*  6026*
BINUNT  004354           995*  1069   1353#  5462   6061
BIT0  = 000001 G        1230#
BIT00 = 000001 G        1230#
BIT01 = 000002 G        1230#
BIT02 = 000004 G        1230#
BIT03 = 000010 G        1230#
BIT04 = 000020 G        1230#
BIT05 = 000040 G        1230#
BIT06 = 000100 G        1230#
BIT07 = 000200 G        1230#
BIT08 = 000400 G        1230#
BIT09 = 001000 G        1230#
BIT1  = 000002 G        1230#
BIT10 = 002000 G        1230#
BIT11 = 004000 G        1230#
BIT12 = 010000 G        1230#
BIT13 = 020000 G        1230#
BIT14 = 040000 G        1230#
BIT15 = 100000 G        1230#
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```
BIT2   = 000004 G          1230#
BIT3   = 000010 G          1230#
BIT4   = 000020 G          1230#
BIT5   = 000040 G          1230#
BIT6   = 000100 G          1230#
BIT7   = 000200 G          1230#
BIT8   = 000400 G          1230#
BIT9   = 001000 G          1230#
BOE    = 000400 G          1230#
BUFEND  033476             5020    5107    6251#
BUFER   021666             4418    4450    4468    4477    4701    4806    5014*   5020    5090*   5099*   5103*   5107    5495
                           5504    5521    5526    5530    5547    5555    5565    5578    5609    6250#
BYPFLG  004404             1366#   4396    4397    4419*   4423    4425    4426    4469*   4470    4471
BYTCNT  004336             1346#   6048    6080*   6147
CALBYT  021142             6006*   6020*   6077#
CALILL  021304             6097    6098    6119#
CALTBL  021212             6090    6091#
CALX1   021234             6096    6101#
CALX2   021232             6091    6092    6100#   6104
CALX4   021242             6093    6103#
CALX5   021246             6094    6105#
CALX9   021264             6095    6111#
CASBOT  034242             2977*   3049*   3498*   3585*   4066*   4141*   4190*   6264*   6290*   6306#
CASBUF= 042000             1287#   6419
CASCMD= 041420             1286#   2982    3055    3508    3595    6271    6433
CASCMP  035020             2942*   3522*   3609*   4078*   4153*   6285*   6299*   6456#
CASCOR  034170             3661*   3707*   3779*   3825*   3871*   3917*   3963*   4009*   6289#
CASCOW  034006             3119*   3164*   3210*   3256*   3302*   3349*   3395*   3441*   6263#
CASDAH= 042041             1289#   6441
CASDAL= 042040             1288#   6436
CASDAT  034324             3506*   3593*   4074*   4149*   4196*   6269*   6295*   6335#
CASDTA  004330             1343#   3503*   3525    3590*   3612    4071*   4081    4146*   4156    4195*   4212    6263*   6289*
                           6336
CASLD   004412             1000*   1369#   1571*   1738*   1834*   1955*   2043*   2123*   2186*   2280*   2368*   2445*   2558*
                           2679*   2760*   2844*   2930*   4253*   4385*   6306    6318*
CASRED  034452             2941*   4076*   4151*   6297*   6394#
CASTMR  034560             3521*   3608*   6284*   6416#
CASTMW  034630             4075*   4150*   4197*   6296*   6431#
CASWRT  034350             2940*   3511*   3598*   6274*   6359#
CASX    046256             1863    2052    2131    2287    3071    4201    4209    6468    7227#
CHAR    004344             1349#   4979    4991    5018    5088    5090    5096    5098*   5099    5101    5105    5212*   5229
                           5234    5246    5248
CHKSUM  004350             1351#   4710*   4713*   4718*   4722*   4737*   4745*   4747
CKSUM   004340             1347#
CLOSEX  021660             2999*   4440*   4481*   5222*   6241#   6311*   6319*
CLRSTA= 035400             1270#   4885
COMP    014432             4587*   4806#
COMPEX  014456             4811    4814#   4825    4832
COMP0   014436             4807#   4838
COMP1   014456             4813    4816#
COMP2   014470             4820#   4836
COMP3   014522             4823    4827#
COMP4   014550             4828    4834#
CONERR= 000031             1255#   5596    6222
CONTRL  016102             4420*   4478*   5327#
CONTR1  016122             5332#   5344    5350    5358    5362    5366
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CONTR3  016172          5342    5346#
CONTR4  016220          5347    5354#
CONTR5  016246          5355    5359#
CONTR6  016264          5360    5363#
CONTR7  016302          5364    5367#
COUNT   004346          1350#   3054*   3068*
CPE   = 004000          1260#   2375    2385    2392    6367
CR    = 000015          1291#
CS2     004240          1040    1117*   1314#   1578*   1579*   1591*   1592*   1597    1613*   1614    1618    1623    1628
                        1637*   1643    1647    1666*   1671    1682*   1684*   1687    1691*   1739*   1746    1749*   1751*
                        1835*   1840    1843*   1845*   1856*   1858*   2290*   2293*   2372*   2380*   2382*   2455*   2457*
                        2994*   4255*   4580*   4880*   4882*   5328*   6360*   6395*   6512    6527*   7079
CTLERR  016212          5331    5334    5351#
C$AU  = 000052           551#   1166
C$AUTO= 000061           551#   1076
C$BRK = 000022           551#   1059    2991    5461
C$BSEG= 000004           551#   1577    1589    1611    1635    1664    1744    1838    1956    1975    2047    2569    2603
                        2616    2692    2774    2857    3504    3591    4072    4147    6267    6293    6359    6394    6416
                        6431    6456    6526
C$BSUB= 000002           551#   1576    1680
C$CEFG= 000045           551#
C$CLCK= 000062           551#
C$CLEA= 000012           551#   1128
C$CLOS= 000035           551#   6241
C$CLP1= 000006           551#   1587    1600    1604    1608    1617    1621    1626    1632    1646    1650    1661    1675
                        1690    1696    1752    1846    1850    1855    1864    1963    1969    1973    1978    1982    1986
                        1991    1997    2002    2056    2132    2141    2146    2206    2289    2298    2302    2307    2379
                        2389    2395    2454    2466    2578    2610    2623    2705    2788    2870    2998    3073    3512
                        3518    3520    3523    3599    3605    3607    3610    4077    4079    4152    4154    4203    4211
                        4277    6275    6281    6283    6286    6298    6300    6371    6407    6452    6537
C$CVEC= 000036           551#    999    1032    4278
C$DCLN= 000044           551#
C$DODU= 000051           551#   1074
C$DRPT= 000024           551#
C$DU  = 000053           551#   1146
C$EDIT= 000003           551#    878
C$ERDF= 000055           551#   1586    1599    1603    1607    1616    1620    1625    1630    1645    1649    1659    1673
                        1689    1695    1748    1842    1849    1854    1863    1972    1985    1995    2000    2052    2131
                        2139    2144    2204    2287    2297    2301    2305    2377    2387    2394    2452    2464    2574
                        2594    2608    2621    2701    2784    2864    2997    3071    3517    3604    4201    4209    4275
                        5542    6039    6046    6054    6280    6369    6404    6451    6468    6514    6536
C$ERHR= 000056           551#
C$ERRO= 000060           551#
C$ERSF= 000054           551#   5139    6560
C$ERSO= 000057           551#
C$ESCA= 000010           551#
C$ESEG= 000005           551#   1588    1609    1633    1662    1676    1753    1865    1974    1987    2059    2579    2611
                        2624    2706    2789    2874    3524    3611    4080    4155    6287    6301    6376    6412    6428
                        6453    6475    6544
C$ESUB= 000003           551#   1678    1697
C$ETST= 000001           551#   1698    1765    1869    2003    2060    2147    2207    2308    2396    2467    2629    2710
                        2793    2878    2943    3001    3074    3120    3165    3211    3257    3303    3350    3396    3442
                        3529    3616    3662    3708    3780    3826    3872    3918    3964    4010    4085    4160    4217
                        4279    4431
C$EXIT= 000032           551#   1002    1119    2980    2987    3052    3060    3501    3588    4069    4144    4193
C$GETB= 000026           551#   5212
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C$GETW= 000027          551#
C$GMAN= 000043          551#  4396  4405  4425  4470  6220
C$GPHR= 000042          551#   975
C$GPLO= 000030          551#
C$GPRI= 000040          551#
C$INIT= 000011          551#  1004
C$INLP= 000020          551#  5593  6469
C$MANI= 000050          551#  4392  4464  5407
C$MEM = 000031          551#
C$MSG = 000023          551#  5623  6582  6599  6613  6633  6655  6669  6683  6697  6711  6725  6738
                       6751   6764  6777  6790  6803  6816  6829  6841  6857  6864  6871  6878  6885
                       6893   6901  6906  6916  6924  6931  6938  6945  6952  6959  6968  6976  6983
                       6990   6999  7006  7012  7019  7026  7033  7040  7047  7057  7064  7071  7080
                       7096   7107  7113  7122  7131  7139  7145  7152  7159  7166  7173  7180  7187
                       7194   7201  7210  7217
C$OPEN= 000034           551#  4510
C$PNTB= 000014           551#  5622  6580  6581  6597  6598  6612  6629  6630  6631  6632  6653  6654
                       6668   6682  6696  6710  6724  6737  6750  6763  6776  6789  6802  6815  6828
                       6840   6856  6863  6870  6877  6884  6892  6899  6900  6905  6912  6913  6914
                       6915   6923  6930  6937  6944  6951  6958  6965  6966  6967  6975  6982  6989
                       6996   6997  6998  7005  7011  7018  7025  7032  7039  7046  7053  7054  7055
                       7056   7063  7070  7077  7078  7079  7090  7091  7092  7093  7094  7095  7104
                       7105   7106  7112  7120  7121  7129  7130  7137  7138  7144  7151  7158  7165
                       7172   7179  7186  7193  7200  7207  7208  7209  7216  7221
C$PNTF= 000017           551#  1035  1046  1062  1067  1072  1075  4394  4399  4418  4468  4477  5252
                       5613
C$PNTS= 000016           551#
C$PNTX= 000015           551#  5615  5648  5655  5800  5814  5833  5834  5842  5860  5865
C$QIO = 000377           551#
C$RDBU= 000007           551#
C$REFG= 000047           551#   966   968
C$RESE= 000033           551#  1001
C$REVI= 000003           551#   878
C$RFLA= 000021           551#  4474  5467  5599
C$RPT = 000025           551#   956
C$SEFG= 000046           551#
C$SPRI= 000041           551#   965  4264  4276
C$SVEC= 000037           551#  1029  4263
C$TPRI= 000013           551#
DB      004252          1319#  1596  1622*  1627*  1639*  1652  1668*
DFPTBL  002310 G         908#
DIAGER  004334          1345#  5340*  5552  5622
DIAGEX  016422          5417   5419#
DIAGMC= 000000           551
DIAGO   016304          5329   5403#
DIAGST  014762          2984*  3057*  4428*  4904#
DIAGTS  004332          1344#  5337*  5518  5622  7077  7090  7104
DIGMON= 000037          1253#  4894
DINTCD  004364          1357#  5341  5346  5354  5359  5363  5457*  5473*  5475  5571  5587  5611  6217
DIRENT  016044          5252   5269#
DIRERR  015756          5228   5233  5255#
DIREX   015774          5225   5239  5258  5260#
DIRHED  016006          4399   5267#
DIRLST  015552          4402*  5220#
DIRQUE  013200          4396   4434#
DIRSRC  015546          4407*  5218#
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DI1     004254          1320# 2373* 2390* 2448  2460  5336  5644  5650
DI2     004262          1323# 5403* 5406* 5409* 5590* 5602* 5758  5981  6041  6131
DI3     004264          1324# 5646  5652  6063*
DROPIT  003154          1036  1047  1063  1074#
DS80    004302          1331# 1851  1859* 1860  1976  1980  1989* 1992  2126* 2128  2134* 2136  2195*
                        2198  2283* 2284  2294  2374  2383* 2384  2391  2447* 2458* 2571  2572  2575*
                        2605  2606  2609* 2618  2619  2622* 2686* 2696  2703* 2768* 2779  2786* 2852*
                        2860  2867* 2983* 3056* 3509* 3596* 4266* 4269* 4633* 4636  4650* 4729* 4731
                        4821  4884  6272* 6367  6370* 6422  6434* 6440* 6445* 6529* 6533  6543*
DT      004256          1321#
DUMFLG  004420          1372# 6219* 6220
DXTUID  013662          4388  4401  4406  4490# 6310
EDATA   004372          1360# 4829* 6632
EF.CON= 000036  G        966  1230#
EF.NEW= 000035  G        968  1230#
EF.PWR= 000034  G       1230#
EF.RES= 000037  G       1230#
EF.STA= 000040  G       1230#
EOF     C04402          1365# 4448  4574* 4578  4977*
ERLOAD  014044          4577  4583  4586  4590  4593  4597#
ERM001  037502  G       1586  1689  1695  6854#
ERM002  037610  G       1748  1842  6861#
ERM003  037704  G       6514  6868#
ERM004  037772  G       2131  2287  6875#
ERM005  040044  G       1849  6882#
ERM006  040162  G       1854  6890#
ERM007  040270  G       6536  6897#
ERM008  040340  G       2997  3517  3604  6280  6451  6903#
ERM009  040434  G       6468  6910#
ERM010  040630  G       1985  6921#
ERM011  040732  G       1972  6928#
ERM012  041034  G       1995  2297  6935#
ERM013  041114  G       2000  2301  6942#
ERM014  041174  G       2139  6949#
ERM015  041276  G       2144  2305  6956#
ERM016  041356  G       2052  6963#
ERM017  041502  G       2204  6973#
ERM018  041574  G       3071  6980#
ERM019  041664  G       1863  6987#
ERM020  041762  G       4201  6994#
ERM021  042132  G       4209  7003#
ERM022  042236  G       4275  7009#
ERM023  042352  G       2377  7016#
ERM024  042452  G       2387  7023#
ERM025  042556  G       2394  7030#
ERM026  042650  G       2452  7037#
ERM027  042724  G       2464  7044#
ERM028  042774  G       2701  2784  2864  7051#
ERM029  043140  G       6404  7061#
ERM030  043236  G       6369  7068#
ERM031  043334  G       6039  7075#
ERM032  043560  G       6046  7088#
ERM033  044032  G       6054  7102#
ERM034  044176  G       2574  7110#
ERM035  044310  G       2594  7118#
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ERM036  044520 G          2608    7127#
ERM037  044652 G          2621    7135#
ERM040  044756 G          1599    7143#
ERM041  045050 G          1603    7150#
ERM042  045142 G          1607    7157#
ERM043  045234 G          1616    7164#
ERM044  045316 G          1620    7171#
ERM045  045374 G          1625    7178#
ERM046  045456 G          1630    7185#
ERM047  045546 G          1645    7192#
ERM048  045630 G          1649    7199#
ERM049  045714 G          1659    7206#
ERM050  046024 G          1673    7215#
ERRLP   004226            1250#   2562*   2576*   2580
ERR78   016552            5343    5493#
ERR78P  017234            5545*   5563*   5576*   5609#
ERR78X  016732            5532*   5542#
EVL    = 000004 G         1230#
EVPAR  = 002000            1261#   2447
EXACT   017450            5573*   5644#
EXAUTO  003206            1071    1076#
E$END  = 002100             551#
E$LOAD= 000035              551#    878
FATAL   013310            4394    4438#
FC      004236            1313#   5800    5814    5842    6077    6101*   6109*   6116*
FHEAD   046154            7221    7224#
FILERR  004342            1348#
FILLX   021346            6144#   6157*   6162*   6164*   6168*   6170*   6174*   6181*   6185*   6189*   6193*
FILNAM  004400            1364#   4388*   4401*   4406*   4510    6310*   6737    6750
FMMA35  044453            7121    7124#   7130    7138
FMMPPC  043436            7078    7081#   7091    7105
FMM001  037536            6856    6858#
FMM002  037640            6863    6865#
FMM003  037732            6870    6872#
FMM004  040020            6877    6879#
FMM005  040076            6884    6886#
FMM006  040212            6892    6894#
FMM008  040366            6905    6907#
FMM009  040554            6912    6917#
FMM010  040656            6923    6925#
FMM011  040760            6930    6932#
FMM012  041062            6937    6939#
FMM013  041142            6944    6946#
FMM014  041222            6951    6953#
FMM015  041324            6958    6960#
FMM016  041450            6965    6970#
FMM017  041532            6975    6977#
FMM018  041622            6982    6984#
FMM019  041712            6989    6991#
FMM020  042060            6996    7000#
FMM021  042162            7005    7007#
FMM022  042264            7011    7013#
FMM023  042400            7018    7020#
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FMM025  042604            7032    7034#
FMM026  042676            7039    7041#
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FMM031  043520          7079    7085#
FMM032  043754          7092    7097#
FMM033  044130          7106    7108#
FMM034  044226          7112    7115#
FMM035  044366          7120    7123#
FMM036  044576          7129    7132#
FMM037  044730          7137    7141#
FMM040  045000          7144    7147#
FMM041  045072          7151    7154#
FMM042  045164          7158    7161#
FMM043  045256          7165    7168#
FMM044  045340          7172    7175#
FMM045  045416          7179    7182#
FMM046  045500          7186    7189#
FMM047  045570          7193    7196#
FMM048  045652          7200    7203#
FMM049  046002          7207    7212#
FMM050  046046          7216    7219#
FMTACT  036132          5648    6631    6639#   6914    6966    6997    7055    7094    7208
FMTEXP  036150          5655    6632    6641#   6915    6967    6998    7056    7095    7209
FMTSTA  035534          6581    6585#   6598    6654    6900
FMTWAD  036114          6630    6637#   7054
FMT001  035506          6580    6583#
FMT002  035646          6597    6601#   6899
FMT003  035720          6612    6615#
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FMT005  036240          6653    6657#
FMT006  036332          6668    6671#
FMT007  036420          6682    6685#
FMT008  036504          6696    6699#
FMT009  036572          6710    6713#
FMT010  036644          6724    6726#
FMT011  036716          6737    6739#
FMT012  037002          6750    6752#
FMT013  037060          6763    6765#
FMT014  037134          6776    6778#
FMT015  037206          6789    6791#
FMT016  037260          6802    6804#
FMT017  037332          6815    6817#
FMT018  037404          6828    6830#
FMT019  037456          6840    6844#
FMT78P  017322          5613    5615    5618#
FNN009  040606          6913    6918#
FNN032  044004          7093    7099#
FOUND   017020          5553    5563#   5568
F$AU    =  000015        551#   1153    1166
F$AUTO=  000020          551#   1026    1076
F$BGN   =  000040          551#    939     947     964    1002    1006    1026    1095    1110    1119    1133    1139    1153
                          1159    1175    1207    1570    1576    1577    1589    1611    1635    1664    1678    1680    1697
                          1698    1737    1744    1765    1833    1838    1869    1954    1956    1975    2003    2042    2047
                          2060    2122    2147    2185    2207    2279    2308    2367    2396    2444    2467    2557    2569
                          2603    2616    2629    2678    2692    2710    2759    2774    2793    2843    2857    2878    2929
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                    2943   2976   2980   2987   3001   3048   3052   3060   3074   3117   3120   3162   3165
                    3208   3211   3254   3257   3300   3303   3347   3350   3393   3396   3439   3442   3497
                    3501   3504   3529   3584   3588   3591   3616   3659   3662   3705   3708   3777   3780
                    3923   3826   3869   3872   3915   3918   3961   3964   4007   4010   4065   4069   4072
                    4085   4140   4144   4147   4160   4189   4193   4217   4252   4279   4280   4384   4431
                    5620   6267   6293   6359   6394   6416   6431   6456   6526   6578   6595   6610   6627
                    6651   6666   6680   6694   6708   6722   6735   6748   6761   6774   6787   6800   6813
                    6826   6838   6854   6861   6868   6875   6882   6890   6897   6903   6910   6921   6928
                    6935   6942   6949   6956   6963   6973   6980   6987   6994   7003   7009   7016   7023
                    7030   7037   7044   7051   7061   7068   7075   7088   7102   7110   7118   7127   7135
                    7143   7150   7157   7164   7171   7178   7185   7192   7199   7206   7215
F$CLEA= 000007        551#   1110   1128
F$DU  = 000016        551#   1133   1146
F$END = 000041        551#    947    956   1002   1004   1076   1099   1119   1128   1139   1146   1159   1166
                    1182   1224   1570   1576   1588   1609   1633   1662   1676   1678   1680   1697   1698
                    1737   1753   1765   1833   1865   1869   1954   1974   1987   2003   2042   2059   2060
                    2122   2147   2185   2207   2279   2308   2367   2396   2444   2467   2557   2579   2611
                    2624   2629   2678   2706   2710   2759   2789   2793   2843   2874   2878   2929   2943
                    2976   2980   2987   3001   3048   3052   3060   3074   3117   3120   3162   3165   3208
                    3211   3254   3257   3300   3303   3347   3350   3393   3396   3439   3442   3497   3501
                    3524   3529   3584   3588   3611   3616   3659   3662   3705   3708   3777   3780   3823
                    3826   3869   3872   3915   3918   3961   3964   4007   4010   4065   4069   4080   4085
                    4140   4144   4155   4160   4189   4193   4217   4252   4279   4282   4384   4431   5623
                    6287   6301   6376   6412   6428   6453   6475   6544   6582   6599   6613   6633   6655
                    6669   6683   6697   6711   6725   6738   6751   6764   6777   6790   6803   6816   6829
                    6841   6857   6864   6871   6878   6885   6893   6901   6906   6916   6924   6931   6938
                    6945   6952   6959   6968   6976   6983   6990   6999   7006   7012   7019   7026   7033
                    7040   7047   7057   7064   7071   7080   7096   7107   7113   7122   7131   7139   7145
                    7152   7159   7166   7173   7180   7187   7194   7201   7210   7217
F$HARD= 000004        551#   1175   1182
F$HW  = 000013        551#    908    915
F$INIT= 000006        551#    964   1004
F$JMP = 000050        551#    947   1002   1119   1139   1159   2980   2987   3052   3060   3501   3588   4069
                    4144   4193
F$MOD = 000000        551#
F$MSG = 000011        551#   5620   5623   6578   6582   6595   6599   6610   6613   6627   6633   6651   6655
                    6666   6669   6680   6683   6694   6697   6708   6711   6722   6725   6735   6738   6748
                    6751   6761   6764   6774   6777   6787   6790   6800   6803   6813   6816   6826   6829
                    6838   6841   6854   6857   6861   6864   6868   6871   6875   6878   6882   6885   6890
                    6893   6897   6901   6903   6906   6910   6916   6921   6924   6928   6931   6935   6938
                    6942   6945   6949   6952   6956   6959   6963   6968   6973   6976   6980   6983   6987
                    6990   6994   6999   7003   7006   7009   7012   7016   7019   7023   7026   7030   7033
                    7037   7040   7044   7047   7051   7057   7061   7064   7068   7071   7075   7080   7088
                    7096   7102   7107   7110   7113   7118   7122   7127   7131   7135   7139   7143   7145
                    7150   7152   7157   7159   7164   7166   7171   7173   7178   7180   7185   7187   7192
                    7194   7199   7201   7206   7210   7215   7217
F$PROT= 000021        551#   1006   1010
F$PWR = 000017        551#
F$RPT = 000012        551#    939    956
F$SEG = 000003        551#   1577   1588   1589   1609   1611   1633   1635   1662   1664   1676   1744   1753
                    1838   1865   1956   1974   1975   1987   2047   2059   2569   2579   2603   2611   2616
                    2624   2692   2706   2774   2789   2857   2874   3504   3524   3591   3611   4072   4080
                    4147   4155   6267   6287   6293   6301   6359   6376   6394   6412   6416   6428   6431
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F$SOFT= 000005         551#   1207   1224
F$SRV = 000010         551#   1095   1099   4280   4282
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F$SW  = 000014          551#   921   932
F$TEST= 000001          551#  1570  1698  1737  1765  1833  1869  1954  2003  2042  2060  2122  2147
                       2185  2207  2279  2308  2367  2396  2444  2467  2557  2629  2678  2710  2759
                       2793  2843  2878  2929  2943  2976  3001  3048  3074  3117  3120  3162  3165
                       3208  3211  3254  3257  3300  3303  3347  3350  3393  3396  3439  3442  3497
                       3529  3584  3616  3659  3662  3705  3708  3777  3780  3823  3826  3869  3872
                       3915  3918  3961  3964  4007  4010  4065  4085  4140  4160  4189  4217  4252
                       4279  4384  4431
G$CNTO= 000200          551#
G$DELM= 000372          551#  1058  1118  1581  1593  1686  1750  1844  1857  1965  1979  2135  2381
                       2456  2990  3514  3601  4256  4635  4881  4896  5413  5460  6277  6448
G$DISP= 000003          551#
C$EXCP= 000400          551#
G$HILI= 000002          551#
G$LOLI= 000001          551#
G$NO  = 000000          551#  4396  4405  4425
G$OFFS= 000400          551#  1176  1177  1178  1179  1180  1181  1214  1215  1216  1217  4396  4405
                       4425  4470  6220
G$OFSI= C00376          551#  1176  1177  1178  1179  1180  1181  1214  1215  1216  1217  4396  4405
                       4425  4470  6220
G$PRMA= 000001          551#  1176
G$PRMD= 000002          551#  1178  1179  1180  1181  4405
G$PRML= 000000          551#  1177  1214  1215  1216  1217  4396  4425  4470  6220
G$RADA= 000140          551#
G$RADB= 000000          551#
G$RADD= 000040          551#
G$RADL= 000120          551#  1177  1214  1215  1216  1217  4396  4425  4470  6220
G$RADO= 000020          551#  1176  1178  1179  1180  1181  4405
G$XFER= 000004          551#
G$YES = 000010          551#  1176  1177  1178  1179  1180  1181  1214  1215  1216  1217  4470  6220
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HEADER  046112         5621*  6214*  6579*  6596*  6611*  6628*  6652*  6667*  6681*  6695*  6709*  6723*  6736*
                       6749*  6762*  6775*  6788*  6801*  6814*  6827*  6839*  6855*  6862*  6869*  6876*  6883*
                       6891*  6898*  6904*  6911*  6922*  6929*  6936*  6943*  6950*  6957*  6964*  6974*  6981*
                       6988*  6995*  7004*  7010*  7017*  7024*  7031*  7038*  7045*  7052*  7062*  7069*  7076*
                       7089*  7103*  7111*  7119*  7128*  7136*  7221#
HEAD1   035276         5139   5143   5144   5145   5146   5147   5148  6562#
HEAD2   035334         5149   5150   5151   5158   5159   5160   6560  6564#
HEAD3   035374         5152   5153   5154   5155   5156   5157  6566#
HEDJMP  015410         5133   5137  5142#
HEDMPE  015454         5133  5160#
HELP  = 000000          538#   545   568   869   882   896   926   941   949  1111  1121  1134  1140
                       1154  1160  1208  1218  1295  1374  6495  6552
HIAD80  004377         1363#  4714*  4816*
HLDA  = 001000         1265#  1998  2137  2299  4641  6534
HLDSTA= 034000         1271#  4637  4732  4822
HOE   = 100000 G       1230#
HOLD  = 000400         1264#  1859  1993  2126  2134  2194  2283  2295  2383  2447  2458  2685  2702
                       2767  2785  2851  2866  2983  3056  3509  3596  4269  4633  4649  4728  6272
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HOLDMP  035154         1957*  2044*  2124*  2187*  2281*  2369*  2446*  2559*  2680*  2761*  2845*  2931*  2981*
                       3053*  3507*  3594*  4257*  6270*  6417*  6432*  6526#
IBE   = 010000 G       1230#
IDU   = 000040 G       1230#
IER   = 020000 G       1230#
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ILR    = 010000          1262#  1852   1861
INTFLG  004410           1368#  4254*  4273   4281*
INTMB   012606 G         4263   4280#
INTO    002442            981#   985
ISR    = 000100 G        1230#
IXE    = 004000 G        1230#
I$AU   = 000041           551#  1153#  1166#
I$AUTO= 000041            551#  1026#  1076#
I$CLN  = 000041           551#  1110#  1119   1128#
I$DU   = 000041           551#  1133#  1146#
I$HRD  = 000041          1175#  1182#
I$INIT= 000041            551#   964#  1002   1004#
I$MOD  = 000041           551#
I$MSG  = 000041           551#  5620#  5623#  6578#  6582#  6595#  6599#  6610#  6613#  6627#  6633#  6651#  6655#
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                         7037#  7040#  7044#  7047#  7051#  7057#  7061#  7064#  7068#  7071#  7075#  7080#  7088#
                         7096#  7102#  7107#  7110#  7113#  7118#  7122#  7127#  7131#  7135#  7139#  7143#  7145#
                         7150#  7152#  7157#  7159#  7164#  7166#  7171#  7173#  7178#  7180#  7185#  7187#  7192#
                         7194#  7199#  7201#  7206#  7210#  7215#  7217#
I$PROT= 000040           551#  1006#
I$PTAB= 000041           551#
I$PWR  = 000041          551#
I$RPT  = 000041           551#   939#   956#
I$SEG  = 000041           551#  1570   1576   1577#  1588#  1589#  1609#  1611#  1633#  1635#  1662#  1664#  1676#
                         1680   1737   1744#  1753#  1833   1838#  1865#  1954   1956#  1974#  1975#  1987#  2042
                         2047#  2059#  2122   2185   2279   2367   2444   2557   2569#  2579#  2603#  2611#  2616#
                         2624#  2678   2692#  2706#  2759   2774#  2789#  2843   2857#  2874#  2929   2976   3048
                         3117   3162   3208   3254   3300   3347   3393   3439   3497   3504#  3524#  3584   3591#
                         3611#  3659   3705   3777   3823   3869   3915   3961   4007   4065   4072#  4080#  4140
                         4147#  4155#  4189   4252   4384   6267#  6287#  6293#  6301#  6359#  6376#  6394#  6412#
                         6416#  6428#  6431#  6453#  6456#  6475#  6526#  6544#
I$SETU= 000041            551#
I$SFT  = 000041          1207#  1224#
I$SRV  = 000041           551#  1095#  1099#  4280#  4282#
I$SUB  = 000041           551#  1570   1576#  1678#  1680#  1697#  1737   1833   1954   2042   2122   2185   2279
                         2367   2444   2557   2678   2759   2843   2929   2976   3048   3117   3162   3208   3254
                         3300   3347   3393   3439   3497   3584   3659   3705   3777   3823   3869   3915   3961
                         4007   4065   4140   4189   4252   4384
I$TST  = 000041           551#  1570#  1576   1680   1698#  1737#  1765#  1833#  1869#  1954#  2003#  2042#  2060#
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                         2710#  2759#  2793#  2843#  2878#  2929#  2943#  2976#  2980   2987   3001#  3048#  3052
                         3060   3074#  3117#  3120#  3162#  3165#  3208#  3211#  3254#  3257#  3300#  3303#  3347#
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                         3705#  3708#  3777#  3780#  3823#  3826#  3869#  3872#  3915#  3918#  3961#  3964#  4007#
                         4010#  4065#  4069   4085#  4140#  4144   4160#  4189#  4193   4217#  4252#  4279#  4384#
                         4431#
J$JMP  = 000167           551#   947   1139   1159
LDMOD   015002           4575*  4971#  4980
LDMOD1  015030           4973   4979#
LDMOD2  015040           4975   4982#
LDMOD3  015044           4985#
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LDMOD4  015050           4988#   5021
LDMOD6  015120           4995    5002#
LDMOD7  015146           5004    5013#
LDMOD8  015160           4993    4997    4999    5011    5018#
LF    = 000012           1292#   5101
LMODEX  015202           4978    4983    4990    5019    5023#
LOADER  013742           4415*   4444*   4445*   4573#   6315*
LOADEX  014050           4579    4596    4598#
LOAD80  004376           1362#   4719*   4725    4739*   4817*   4820    4834*   6630
LOE   = 040000 G         1230#   5468    5600
LOPERR= 000033           1256#   5357    5605
LOT   = 000010 G         1230#
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L$APT   002036 G          878#
L$AU    003532 G          878    1153#
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L$AUTO  002566 G          878    1026#
L$CCP   002106 G          878#
L$CLEA  003460 G          878    1110#
L$CO    002032 G          878#
L$DEPO  002011 G          878#
L$DESC  002130 G          878     880#
L$DESP  002076 G          878#
L$DEVP  002060 G          878#
L$DISP  002166 G          878     894#
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                         2456    2990    3514    3601    4256    4635    4881    4896    5413    5460    6277    6448
L$DTP   002040 G          878#
L$DTYP  002034 G          878#
L$DU    003524 G          878    1133#
L$DUT   002072 G          878#
L$DVTY  002122 G          878     879#
L$EF    002052 G          878#
L$ENVI  002044 G          878#
L$ETP   002102 G          878#
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L$EXP4  002064 G          878#
L$EXP5  002066 G          878#
L$HARD  003542 G          878    1175#
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L$ICP   002104 G          878#
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L$LAST  046410 G          878    7234#
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L$MREV  002050 G          878#
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L$REV   002010 G          878#
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L$STA   002030 G          878#
L$SW    002326 G          878     921#
L$TEST  002114 G          878#
L$TIML  002014 G          878#
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L10001  002336            921     932#
L10002  002342            947     956#
L10003  002556           1002    1004#
L10005  003206           1076#
L10006  003456           1099#
L10007  003522           1119    1128#
L10010  003530           1139    1146#
L10011  003536           1159    1166#
L10012  003630           1175    1182#
L10013  004216           1207    1224#
L10014  005414           1698#
L10015  005256           1678#
L10016  005412           1697#
L10017  005600           1765#
L10020  006074           1869#
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L10022  006464           2060#
L10023  006650           2147#
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L10025  007136           2308#
L10026  007342           2396#
L10027  007516           2467#
L10030  010116           2629#
L10031  010256           2710#
L10032  010422           2793#
L10033  010602           2878#
L10034  010656           2943#
L10035  011034           2980    2987    3001#
L10036  011166           3052    3060    3074#
L10037  011176           3120#
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L10041  011222           3211#
L10042  011234           3257#
L10043  011246           3303#
L10044  011260           3350#
L10045  011272           3396#
L10046  011304           3442#
L10047  011510           3501    3529#
L10050  011714           3588    3616#
L10051  011724           3662#
L10052  011736           3708#
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L10131	041322	6959#	
L10132	041446	6968#	
L10133	041530	6976#	
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L10151  043434          7080#
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L10154  044224          7113#
L10155  044364          7122#
L10156  044574          7131#
L10157  044726          7139#
L10160  044776          7145#
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L10162  045162          7159#
L10163  045254          7166#
L10164  045336          7173#
L10165  045414          7180#
L10166  045476          7187#
L10167  045566          7194#
L10170  045650          7201#
L10171  046000          7210#
L10172  046044          7217#
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MANTST  002332           924#   4386
MBBUF   033642          2934*   4199    6260#   6336*   6364    6437    6442    6458    6915    6998
MBDRIV  004352           987*   1041    1046    1352#   1579    1592    1682    1691    1739    1751    1835    1845    1858
                        2293    2370    2382    2457    2994    4580    4882    5328    6360    6395    6527    7221
MBINIT= 000040          1117    1275#   1749    1843    1856    2290    2380    2455    4255    4880
MBREAD  033476          6255#   6399*   6423*   6458    6914
MBREGX  035152          6513    6515#
MBSEL = 100340          1279#   2188    2197    4648    6541
MBTBL   035112          6363    6398    6478#
MCPE  = 020000          1263#   2450    2462    6402
MESS    015204          4594*   5083#
MESSEX  015336          5087    5095    5106    5111#
MESS1   015206          5085#   5089
MESS2   015264          5097    5099#
MESS3   015236          5093#   5108
MESS4   015314          5102    5105#
MICCTL  013402          4389*   4440#
MICRO   013654          4418    4468    4477    4485#
MOINT   004266          1051*   1064    1325#
MO0     004270          1054*   1326#   5871    5877
MO1     004272          1327#   5856    5868
MO2     004274          1328#
MO3     004276          1329#   5861
MPDPAR  021364          6139    6156#   6194
MPPC    017326  G       5542    5620#
MSGJMP  015456          5138    5162#
MSGPAR  016754          5546#   6216*
MSG001  035434  G       5139    5163    6578#
MSG002  035574  G       5164    6595#
MSG003  035672  G       5165    6610#
MSG004  035744  G       5166    6627#
MSG005  036166  G       5167    6651#
MSG006  036304  G       5168    6666#
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MSG008  036456  G       5170    6694#
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MSG011  036664 G        5173    6735#
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MSG014  037106 G        5176    6774#
MSG015  037160 G        5177    6787#
MSG016  037232 G        5178    6800#
MSG017  037304 G        5179    6813#
MSG018  037356 G        5180    6826#
MSG019  037430 G        6560    6838#
MSG1    003630          1176    1183#
MSG10   004143          1177    1194#
MSG2    003643          1179    1184#
MSG3    003652          1180    1185#
MSG4    003661          1181    1186#
MSG5    003675          1187#   1214
MSG6    003750          1188#   1215
MSG7    004012          1178    1189#
MSG8    004034          1190#   1216
MSG9    004076          1191#   1217
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NON56   004306          1333#
NON60   004310          1334#
NON62   004312          1335#
NON64   004314          1336#
NON66   004316          1337#
NON70   004320          1338#
NON72   004322           984    1339#
NOREX   013646          4443    4447    4449    4481#
NXMFLG  003450          1028*   1033    1091#   1097*
NXMLOC= 000004          1021#   1029    1032
NXMTRP  003452 G        1029    1095#
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O$BGNS= 000001           551#    867#    878
O$DU  = 000001           551#    867#    878
O$ERRT= 000000           551#    878
O$GNSW= 000001           551#    867#    878
O$POIN= 000001           551#    867#    878
O$SETU= 000000           551#    878     7234
PAT   = 000020          1274#   2371
PATGEN  021312          6009*   6023*   6131#
PATILL  021340          6138    6141#
PATTBL  021334          6136    6138#
PC80    004374          1361#
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PRES  = 040000          1024#   1070
PRI   = 002000 G        1230#
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PRI07 = 000340 G         965   1029   1230#  4263   4276
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QUEUE   021534          5361*  6214#
QUEUEM  021532          5365   6213#
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READ    015524          4971   4988   5085   5093   5212#  5226*  5231*  5245*
REDBUF  033476          6026   6044   6256#  7094
REL178  002330           923#  5404
RERET   013150          4425   4432#
RESPON  017134          5583   5588   5590#  6050
RFWD    020726          5989   6020#
RFWDX   C20770          6022   6025   6029#
RHCAS   046230          1586   1689   1695   1748   1842   1849   1854   2377   2387   2394   2452   2464   6369
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RHVEC   004362           997*   999   1356#  4260   4263   4278
RH11    046367          1599   1603   1607   1616   1620   1625   1630   1645   1649   1659   1673   7231#
ROMIDT  004216          1245#  2567   2589
RUNSKP  002334           925#  4466
SAVE    004414          1370#  5539*  5543
SECPAR  017066          5572   5576#  5581
SENSDN= 000001          1023#  1065
SENSGO= 000011          1022#  1054
SEQ     013242          4405   4436#
SEQNUM  004406          1367#  4400*  4405   4410   5238*  5252   5253*
SERFAL  035264          5135   6560#
SFPTBL  002326 G         921#
SKIP    013676          4470   4493#
SN      004260          1322#
SPACE = 000040          1294#  5098
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START2  014674          4890   4893#
STAT80  004366          1358#  4636*  4637   4641   4731*  4732   4821*  4822   4827   4830   4884*  4885   4889
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STER    021066          5992   6052#
STMRDY= 000100          1283#  2126   2283
STNER   021000          5991   6037#
STNER1  021020          6038   6041#  6053   6056
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STOP1   014142          4638   4641#
STOP2   014160          4642   4645#
STOP3   014172          4646   4648#
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	7157	7164	7171	7178	7185	7192	7199	7206	7215	7234#			
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	968	969	975	976	999	1001	1002	1004	1029	1032	1035	1046	1058
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	1216	1217	1224	1576	1577	1581	1586	1587	1588	1589	1593	1599	1600
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	1676	1678	1680	1686	1689	1690	1695	1696	1697	1698	1744	1748	1750
	1752	1753	1765	1838	1842	1844	1846	1849	1850	1854	1855	1857	1863
	1864	1865	1869	1956	1963	1965	1969	1972	1973	1974	1975	1978	1979
	1982	1985	1986	1987	1991	1995	1997	2000	2002	2003	2047	2052	2056
	2059	2060	2131	2132	2135	2139	2141	2144	2146	2147	2204	2206	2207
	2287	2289	2297	2298	2301	2302	2305	2307	2308	2377	2379	2381	2387
	2389	2394	2395	2396	2452	2454	2456	2464	2466	2467	2569	2574	2578
	2579	2594	2603	2608	2610	2611	2616	2621	2623	2624	2629	2692	2701
	2705	2706	2710	2774	2784	2788	2789	2793	2857	2864	2870	2874	2878
	2943	2980	2987	2990	2991	2997	2998	3001	3052	3060	3071	3073	3074
	3120	3165	3211	3257	3303	3350	3396	3442	3501	3504	3512	3514	3517
	3518	3520	3523	3524	3529	3588	3591	3599	3601	3604	3605	3607	3610
	3611	3616	3662	3708	3780	3826	3872	3918	3964	4010	4069	4072	4077
	4079	4080	4085	4144	4147	4152	4154	4155	4160	4193	4201	4203	4209
	4211	4217	4256	4263	4264	4275	4276	4277	4278	4279	4282	4392	4393
	4394	4396	4399	4405	4418	4425	4431	4464	4465	4468	4470	4474	4477
	4510	4635	4881	4896	5139	5212	5213	5252	5407	5408	5413	5460	5461
	5467	5542	5593	5594	5599	5613	5615	5622	5623	5648	5655	5800	5814
	5833	5834	5842	5860	5865	6039	6046	6054	6220	6241	6267	6275	6277
	6280	6281	6283	6286	6287	6293	6298	6300	6301	6359	6369	6371	6376
	6394	6404	6407	6412	6416	6428	6431	6448	6451	6452	6453	6456	6468
	6469	6470	6475	6514	6526	6536	6537	6544	6560	6580	6581	6582	6597
	6598	6599	6612	6613	6629	6630	6631	6632	6633	6653	6654	6655	6668
	6669	6682	6683	6696	6697	6710	6711	6724	6725	6737	6738	6750	6751
	6763	6764	6776	6777	6789	6790	6802	6803	6815	6816	6828	6829	6840
	6841	6856	6857	6863	6864	6870	6871	6877	6878	6884	6885	6892	6893
	6899	6900	6901	6905	6906	6912	6913	6914	6915	6916	6923	6924	6930
	6931	6937	6938	6944	6945	6951	6952	6958	6959	6965	6966	6967	6968
	6975	6976	6982	6983	6989	6990	6996	6997	6998	6999	7005	7006	7011
	7012	7018	7019	7025	7026	7032	7033	7039	7040	7046	7047	7053	7054
	7055	7056	7057	7063	7064	7070	7071	7077	7078	7079	7080	7090	7091
	7092	7093	7094	7095	7096	7104	7105	7106	7107	7112	7113	7120	7121
	7122	7129	7130	7131	7137	7138	7139	7144	7145	7151	7152	7158	7159
	7165	7166	7172	7173	7179	7180	7186	7187	7193	7194	7200	7201	7207
	7208	7209	7210	7216	7217	7221	7234						
SVCSUB= 177777	551#	559#	1576	1680									
SVCTAG= 177777	551#	561#	915	932	956	1004	1076	1099	1128	1146	1166	1182	1224
	1588	1609	1633	1662	1676	1678	1697	1698	1753	1765	1865	1869	1974
	1987	2003	2059	2060	2147	2207	2308	2396	2467	2579	2611	2624	2629
	2706	2710	2789	2793	2874	2878	2943	3001	3074	3120	3165	3211	3257
	3303	3350	3396	3442	3524	3529	3611	3616	3662	3708	3780	3826	3872
	3918	3964	4010	4080	4085	4155	4160	4217	4279	4282	4396	4405	4425
	4431	4470	5623	6220	6287	6301	6376	6412	6428	6453	6475	6544	6582
	6599	6613	6633	6655	6669	6683	6697	6711	6725	6738	6751	6764	6777
	6790	6803	6816	6829	6841	6857	6864	6871	6878	6885	6893	6901	6906

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                    6916    6924    6931    6938    6945    6952    6959    6968    6976    6983    6990    6999    7006
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                    7122    7131    7139    7145    7152    7159    7166    7173    7180    7187    7194    7201    7210
                    7217
SVCTST= 177777       551#    558#   1570    1737    1833    1954    2042    2122    2185    2279    2367    2444    2557
                    2678    2759    2843    2929    2976    3048    3117    3162    3208    3254    3300    3347    3393
                    3439    3497    3584    3659    3705    3777    3823    3869    3915    3961    4007    4065    4140
                    4189    4252    4384
SYSERM  015376      5132*   5137*   5138*   5139#
SYSERR  015340      4413*   4597*   4908*   5131#   5259*   5351*
S$LSYM= 010000       551#    915#    932#    956#   1004#   1076#   1099#   1128#   1146#   1166#   1182#   1224#   1577#
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                    2710#   2774#   2793#   2857#   2878#   2943#   3001#   3074#   3120#   3165#   3211#   3257#   3303#
                    3350#   3396#   3442#   3504#   3529#   3591#   3616#   3662#   3708#   3780#   3826#   3872#   3918#
                    3964#   4010#   4072#   4085#   4147#   4160#   4217#   4279#   4282#   4396#   4405#   4425#   4431#
                    4470#   5623#   6220#   6267#   6293#   6359#   6394#   6416#   6431#   6456#   6526#   6582#   6599#
                    6613#   6633#   6655#   6669#   6683#   6697#   6711#   6725#   6738#   6751#   6764#   6777#   6790#
                    6803#   6816#   6829#   6841#   6857#   6864#   6871#   6878#   6885#   6893#   6901#   6906#   6916#
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                    7019#   7026#   7033#   7040#   7047#   7057#   7064#   7071#   7080#   7096#   7107#   7113#   7122#
                    7131#   7139#   7145#   7152#   7159#   7166#   7173#   7180#   7187#   7194#   7201#   7210#   7217#
TAB    = 000011     1293#   5096
TC       004244     1316#   5823    5826    6084
TMCLR  = 040000     1266#   2134
TMPORT   004360      996*   1355#   2190    4645    6538    7221
TMRDST= 100240      1280#   2125    2282
TMRDY  = 100000     1267#   2129    2142    2285    2303    4889
TMUNIT   004356      990*   1052    1067    1072    1354#   7221
TNOPC    043466     7077    7083#   7090    7104
TRE    = 040000     1042    1276#   5591    6405
TSTART= 000035      1254#   2988    3061    3513    3600    5411    6276    6447
TUSTAT   004250     1068    1318#   5622    7078    7091    7105
T$ARGC= 000005       878#   1035#   1046#   1062#   1067#   1072#   1075#   4394#   4399#   4418#   4468#   4477#   5252#
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                    6710#   6724#   6737#   6750#   6763#   6776#   6789#   6802#   6815#   6828#   6840#   6856#   6863#
                    6870#   6877#   6884#   6892#   6899#   6900#   6905#   6912#   6913#   6914#   6915#   6923#   6930#
                    6937#   6944#   6951#   6958#   6965#   6966#   6967#   6975#   6982#   6989#   6996#   6997#   6998#
                    7005#   7011#   7018#   7025#   7032#   7039#   7046#   7053#   7054#   7055#   7056#   7063#   7070#
                    7077#   7078#   7079#   7090#   7091#   7092#   7093#   7094#   7095#   7104#   7105#   7106#   7112#
                    7120#   7121#   7129#   7130#   7137#   7138#   7144#   7151#   7158#   7165#   7172#   7179#   7186#
                    7193#   7200#   7207#   7208#   7209#   7216#   7221#
T$CODE= 000130       1176#   1177#   1178#   1179#   1180#   1181#   1214#   1215#   1216#   1217#   4396#   4405#   4425#
                    4470#   6220#
T$ERRN= 000023        551#   1586#   1599#   1603#   1607#   1616#   1620#   1625#   1630#   1645#   1649#   1659#   1673#
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                    2594#   2608#   2621#   2701#   2784#   2864#   2997#   3071#   3517#   3604#   4201#   4209#   4275#
                    5139#   5542#   6039#   6046#   6054#   6280#   6369#   6404#   6451#   6468#   6514#   6536#   6560#
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T$GMAN= 000000       551#   4405#
T$HILI= 000077      1176#   1178#   1179#   1180#   1181#   4405#
T$LAST= 000001       551#   7234#
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T$LSYM= 010000

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1697 1698 1765 1869 2003 2060 2147 2207 2308 2396 2467 2629 2710
2793 2878 2943 3001 3074 3120 3165 3211 3257 3303 3350 3396 3442
3529 3616 3662 3708 3780 3826 3872 3918 3964 4010 4085 4160 4217
4279 4282 4431 5623 6582 6599 6613 6633 6655 6669 6683 6697 6711
6725 6738 6751 6764 6777 6790 6803 6816 6829 6841 6857 6864 6871
6878 6885 6893 6901 6906 6916 6924 6931 6938 6945 6952 6959 6968
6976 6983 6990 6999 7006 7012 7019 7026 7033 7040 7047 7057 7064
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7180 7187 7194 7201 7210 7217

T$LTNO= 000050
T$NEST= 177777

551# 908# 915# 921# 932# 939# 956# 964# 1004# 1006# 1010# 1026# 1076#
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1697# 1698# 1737# 1744# 1753# 1765# 1833# 1838# 1865# 1869# 1954# 1956# 1974#
1975# 1987# 2003# 2042# 2047# 2059# 2060# 2122# 2147# 2185# 2207# 2279# 2308#
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7110# 7113# 7118# 7122# 7127# 7131# 7135# 7139# 7143# 7145# 7150# 7152# 7157#
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7206# 7210# 7215# 7217#

T$NSO = 000011

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1737# 1765 1833# 1869 1954# 2003 2042# 2060 2122# 2147 2185# 2207 2279#
2308 2367# 2396 2444# 2467 2557# 2629 2678# 2710 2759# 2793 2843# 2878
2929# 2943 2976# 3001 3048# 3074 3117# 3120 3162# 3165 3208# 3211 3254#
3257 3300# 3303 3347# 3350 3393# 3396 3439# 3442 3497# 3529 3584# 3616
3659# 3662 3705# 3708 3777# 3780 3823# 3826 3869# 3872 3915# 3918 3961#
3964 4007# 4010 4065# 4085 4140# 4160 4189# 4217 4252# 4279 4280# 4282
4384# 4431 5620# 5623 6267# 6287 6293# 6301 6359# 6376 6394# 6412 6416#
6428 6431# 6453 6456# 6475 6526# 6544 6578# 6582 6595# 6599 6610# 6613
6627# 6633 6651# 6655 6666# 6669 6680# 6683 6694# 6697 6708# 6711 6722#
6725 6735# 6738 6748# 6751 6761# 6764 6774# 6777 6787# 6790 6800# 6803
6813# 6816 6826# 6829 6838# 6841 6854# 6857 6861# 6864 6868# 6871 6875#
6878 6882# 6885 6890# 6893 6897# 6901 6903# 6906 6910# 6916 6921# 6924
6928# 6931 6935# 6938 6942# 6945 6949# 6952 6956# 6959 6963# 6968 6973#
6976 6980# 6983 6987# 6990 6994# 6999 7003# 7006 7009# 7012 7016# 7019
7023# 7026 7030# 7033 7037# 7040 7044# 7047 7051# 7057 7061# 7064 7068#
7071 7075# 7080 7088# 7096 7102# 7107 7110# 7113 7118# 7122 7127# 7131
7135# 7139 7143# 7145 7150# 7152 7157# 7159 7164# 7166 7171# 7173 7178#
7180 7185# 7187 7192# 7194 7199# 7201 7206# 7210 7215# 7217

T$NS1 = 000003
1576# 1678 1680# 1697 1744# 1753 1838# 1865 1956# 1974 1975# 1987 2047#
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3504# 3524 3591# 3611 4072# 4080 4147# 4155

T$NS2 = 000003
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T$PTNU= 000000
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T$SAVL= 177777
551#

T$SEGL= 177777
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T$SEK0= 010010
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1865 1956# 1974 1975# 1987 2047# 2059 2569# 2579 2603# 2611 2616# 2624
2692# 2706 2774# 2789 2857# 2874 3504# 3524 3591# 3611 4072# 4080 4147#
4155 6267# 6287 6293# 6301 6359# 6376 6394# 6412 6416# 6428 6431# 6453
6456# 6475 6526# 6544

T$SUBN= 000000
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T$TAGL= 177777
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4189# 4252# 4280# 4384# 5620# 6578# 6595# 6610# 6627# 6651# 6666# 6680# 6694#
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5623# 6220# 6287# 6301# 6376# 6412# 6428# 6453# 6475# 6544# 6582# 6599# 6613#
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T$TEST= 000050
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T$TSTM= 177777
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1616 1617 1620 1621 1625 1626 1630 1632 1633 1635 1645 1646 1649
1650 1659 1661 1662 1664 1673 1675 1676 1678 1680 1689 1690 1695
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1854 1855 1863 1864 1865 1869 1956 1963 1969 1972 1973 1974 1975

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                    1978  1982  1985  1986  1987  1991  1995  1997  2000  2002  2003  2047  2052
                    2056  2059  2060  2131  2132  2139  2141  2144  2146  2147  2204  2206  2207
                    2287  2289  2297  2298  2301  2302  2305  2307  2308  2377  2379  2387  2389
                    2394  2395  2396  2452  2454  2464  2466  2467  2569  2574  2578  2579  2594
                    2603  2608  2610  2611  2616  2621  2623  2624  2629  2692  2701  2705  2706
                    2710  2774  2784  2788  2789  2793  2857  2864  2870  2874  2878  2943  2980
                    2987  2991  2997  2998  3001  3052  3060  3071  3073  3074  3120  3165  3211
                    3257  3303  3350  3396  3442  3501  3504  3512  3517  3518  3520  3523  3524
                    3529  3588  3591  3599  3604  3605  3607  3610  3611  3616  3662  3708  3780
                    3826  3872  3918  3964  4010  4069  4072  4077  4079  4080  4085  4144  4147
                    4152  4154  4155  4160  4193  4201  4203  4209  4211  4217  4263  4264  4275
                    4276  4277  4278  4279  4392  4394  4396  4399  4405  4418  4425  4431  4464
                    4468  4470  4474  4477  4510  5139  5212  5252  5407  5461  5467  5542  5593
                    5599  5613  5615  5622  5623  5648  5655  5800  5814  5833  5834  5842  5860
                    5865  6039  6046  6054  6220  6241  6267  6275  6280  6281  6283  6286  6287
                    6293  6298  6300  6301  6359  6369  6371  6376  6394  6404  6407  6412  6416
                    6428  6431  6451  6452  6453  6456  6468  6469  6475  6514  6526  6536  6537
                    6544  6560  6580  6581  6582  6597  6598  6599  6612  6613  6629  6630  6631
                    6632  6633  6653  6654  6655  6668  6669  6682  6683  6696  6697  6710  6711
                    6724  6725  6737  6738  6750  6751  6763  6764  6776  6777  6789  6790  6802
                    6803  6815  6816  6828  6829  6840  6841  6856  6857  6863  6864  6870  6871
                    6877  6878  6884  6885  6892  6893  6899  6900  6901  6905  6906  6912  6913
                    6914  6915  6916  6923  6924  6930  6931  6937  6938  6944  6945  6951  6952
                    6958  6959  6965  6966  6967  6968  6975  6976  6982  6983  6989  6990  6996
                    6997  6998  6999  7005  7006  7011  7012  7018  7019  7025  7026  7032  7033
                    7039  7040  7046  7047  7053  7054  7055  7056  7057  7063  7064  7070  7071
                    7077  7078  7079  7080  7090  7091  7092  7093  7094  7095  7096  7104  7105
                    7106  7107  7112  7113  7120  7121  7122  7129  7130  7131  7137  7138  7139
                    7144  7145  7151  7152  7158  7159  7165  7166  7172  7173  7179  7180  7186
                    7187  7193  7194  7200  7201  7207  7208  7209  7210  7216  7217  7221
T$TSTS= 000001        551#  1570#  1737#  1833#  1954#  2042#  2122#  2185#  2279#  2367#  2444#  2557#  2678#
                    2759#  2843#  2929#  2976#  3048#  3117#  3162#  3208#  3254#  3300#  3347#  3393#  3439#
                    3497#  3584#  3659#  3705#  3777#  3823#  3869#  3915#  3961#  4007#  4065#  4140#  4189#
                    4252#  4384#
T$$AU  = 010011     1153#  1159  1166
T$$AUT= 010005      1026#  1076
T$$CLE= 010007      1110#  1119  1128
T$$DU  = 010010     1133#  1139  1146
T$$HAR= 010012      1175#  1182
T$$HW  = 010000      908#   915
T$$INI= 010003       964#  1002  1004
T$$MSG= 010172      5620#  5623  6578#  6582  6595#  6599  6610#  6613  6627#  6633  6651#  6655  6666#
                    6669  6680#  6683  6694#  6697  6708#  6711  6722#  6725  6735#  6738  6748#  6751
                    6761#  6764  6774#  6777  6787#  6790  6800#  6803  6813#  6816  6826#  6829  6838#
                    6841  6854#  6857  6861#  6864  6868#  6871  6875#  6878  6882#  6885  6890#  6893
                    6897#  6901  6903#  6906  6910#  6916  6921#  6924  6928#  6931  6935#  6938  6942#
                    6945  6949#  6952  6956#  6959  6963#  6968  6973#  6976  6980#  6983  6987#  6990
                    6994#  6999  7003#  7006  7009#  7012  7016#  7019  7023#  7026  7030#  7033  7037#
                    7040  7044#  7047  7051#  7057  7061#  7064  7068#  7071  7075#  7080  7088#  7096
                    7102#  7107  7110#  7113  7118#  7122  7127#  7131  7135#  7139  7143#  7145  7150#
                    7152  7157#  7159  7164#  7166  7171#  7173  7178#  7180  7185#  7187  7192#  7194
                    7199#  7201  7206#  7210  7215#  7217
T$$PRO= 010004      1006#
T$$RPT= 010002       939#   947   956
T$$SEG= 010010      1577#  1588#  1589#  1609#  1611#  1633#  1635#  1662#  1664#  1676#  1744#  1753#  1838#
                    1865#  1956#  1974#  1975#  1987#  2047#  2059#  2569#  2579#  2603#  2611#  2616#  2624#
```

```
                    2692#  2706#  2774#  2789#  2857#  2874#  3504#  3524#  3591#  3611#  4072#  4080#  4147#
                    4155#  6267#  6287#  6293#  6301#  6359#  6376#  6394#  6412#  6416#  6428#  6431#  6453#
                    6456#  6475#  6526#  6544#
T$$SOF= 010013      1207#  1224
T$$SRV= 010065      1095#  1099   4280#  4282
T$$SUB= 010016      1576#  1678   1680#  1697
T$$SW = 010001       921#   932
T$$TES= 010066      1570#  1698   1737#  1765   1833#  1869   1954#  2003   2042#  2060   2122#  2147   2185#
                    2207   2279#  2308   2367#  2396   2444#  2467   2557#  2629   2678#  2710   2759#  2793
                    2843#  2878   2929#  2943   2976#  2980   2987   3001   3048#  3052   3060   3074   3117#
                    3120   3162#  3165   3208#  3211   3254#  3257   3300#  3303   3347#  3350   3393#  3396
                    3439#  3442   3497#  3501   3529   3584#  3588   3616   3659#  3662   3705#  3708   3777#
                    3780   3823#  3826   3869#  3872   3915#  3918   3961#  3964   4007#  4010   4065#  4069
                    4085   4140#  4144   4160   4189#  4193   4217   4252#  4279   4384#  4431
T1      004422 G     894   1570#
T1.1    004440      1576#
T1.2    005260      1680#
T10     007344 G     894   2444#
T11     007520 G     894   2557#
T12     010120 G     894   2678#
T13     010260 G     894   2759#
T14     010424 G     894   2843#
T15     010604 G     894   2929#
T16     010660 G     894   2976#
T17     011036 G     894   3048#
T18     011170 G     894   3117#
T19     011200 G     894   3162#
T2      005416 G     894   1737#
T20     011212 G     894   3208#
T21     011224 G     894   3254#
T22     011236 G     894   3300#
T23     011250 G     894   3347#
T24     011262 G     894   3393#
T25     011274 G     894   3439#
T26     011306 G     894   3497#
T27     011512 G     894   3584#
T28     011716 G     894   3659#
T29     011726 G     894   3705#
T3      005602 G     894   1833#
T30     011740 G     894   3777#
T31     011752 G     894   3823#
T32     011764 G     894   3869#
T33     011776 G     894   3915#
T34     012010 G     894   3961#
T35     012022 G     894   4007#
T36     012034 G     894   4065#
T37     012130 G     894   4140#
T38     012224 G     894   4189#
T39     012354 G     894   4252#
T4      006076 G     894   1954#
T40     012614 G     894   4384#
T5      006402 G     894   2042#
T6      006466 G     894   2122#
T7      006652 G     894   2185#
T8      006762 G     894   2279#
T9      007140 G     894   2367#
```

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UAM    = 000200 G  1230#
UNINUM   004326     970*   971    974*   975   1074   1075   1342#
UNITS    021110    5993  6061#
UTILTB   020622    5984  5986#
UTIL80   020604    5348  5981#
UTLILL   020772    5986  5990   5994   5995   5996   5997   5998   5999   6000   6001   6034#
WAIT     016424    5332  5457#
WAITO    016430    5459# 5469
WAIT1    016434    5460# 5466
WAIT2    016522    5464  5473#
WAIT3    016550    5471  5476   5478#
WC       004232    1311# 6083*
WGCRPE   020662    5987  5988   6006#
WGCRX    020724    6008  6011   6015#
WMC      046361    7230#
WRIT     014216    4702# 4748
WRITE    014212    4584* 4701#
WRITEX   014234    4705  4708#
WRITEO   014224    4704# 4750
WRITE1   014236    4707  4710#
WRITE2   014310    4725# 4741
WRITE3   014360    4733  4735#
WRTBUF   033642    6013  6044   6144*  6261#  7095
XFRCMD   004230     979  1030   1310#  1582*  1583*  1584   1594*  1595*  1601   1605   1683*  1693   1740*
                   1745  1836*  1839   2449   2461   2988*  2995   3061*  3062   3066   3513*  3515   3600*
                   3602  4259*  4894*  4898   5357*  5411*  5415   5591*  5592*  5596*  5605*  6014*  6028*
                   6037  6052   6065*  6222*  6276*  6278   6364*  6399   6402   6405*  6406*  6447*  6449
                   6528* 6856   7221
XFRINT   004242    1315# 4893*  5473   5474*
XTNOPC   017370    5622  5625#
X$ALWA=  000000     551#
X$FALS=  000040     551#
X$OFFS=  000400     551#
X$TRUE=  000020     551#
.      = 046410     549#   879#   880#   947   1002   1058   1118   1119   1139   1159   1195#  1581   1593
                   1686  1750   1844   1857   1965   1979   2135   2381   2456   2980   2987   2990   3052
                   3060  3501   3514   3588   3601   4069   4144   4193   4256   4439#  4486#  4491#  4635
                   4881  4896   5270#  5413   5460   5619#  5838#  5846#  5881#  5883#  6226#  6250#  6256#
                   6261# 6277   6448   6493#  6563#  6586#  6602#  6636#  6658#  6672#  6686#  6700#  6714#
                   6753# 6779#  6792#  6818#  6831#  6845#  6859#  6866#  6873#  6888#  6895#  6919#  6926#
                   6933# 6940#  6947#  6971#  6985#  6992#  7001#  7008#  7021#  7028#  7066#  7073#  7098#
                   7100# 7109#  7155#  7183#  7204#  7220#
```

```
BCOMPL   967   969  4393  5213  5594  6470
BGNAU   1153
BGNAUT  1026
BGNCLN  1110
BGNDU   1133
BGNHRD  1175
BGNHW    908
BGNINI   964
BGNMSG  5620  6578  6595  6610  6627  6651  6666  6680  6694  6708  6722  6735  6748  6761  6774
        6787  6800  6813  6826  6838  6854  6861  6868  6875  6882  6890  6897  6903  6910  6921
        6928  6935  6942  6949  6956  6963  6973  6980  6987  6994  7003  7009  7016  7023  7030
        7037  7044  7051  7061  7068  7075  7088  7102  7110  7118  7127  7135  7143  7150  7157
        7164  7171  7178  7185  7192  7199  7206  7215
BGNPRO  1006
BGNRPT   939
BGNSEG  1577  1589  1611  1635  1664  1744  1838  1956  1975  2047  2569  2603  2616  2692  2774
        2857  3504  3591  4072  4147  6267  6293  6359  6394  6416  6431  6456  6526
BGNSFT  1207
BGNSRV  1095  4280
BGNSUB  1576  1680
BGNSW    921
BGNTST  1570  1737  1833  1954  2042  2122  2185  2279  2367  2444  2557  2678  2759  2843  2929
        2976  3048  3117  3162  3208  3254  3300  3347  3393  3439  3497  3584  3659  3705  3777
        3823  3869  3915  3961  4007  4065  4140  4189  4252  4384
BNCOMP   976  4465  5408
BREAK   1059  2991  5461
BRESET  1001
CKLOOP  1587  1600  1604  1608  1617  1621  1626  1632  1646  1650  1661  1675  1690  1696  1752
        1846  1850  1855  1864  1963  1969  1973  1978  1982  1986  1991  1997  2002  2056  2132
        2141  2146  2206  2289  2298  2302  2307  2379  2389  2395  2454  2466  2578  2610  2623
        2705  2788  2870  2998  3073  3512  3518  3520  3523  3599  3605  3607  3610  4077  4079
        4152  4154  4203  4211  4277  6275  6281  6283  6286  6298  6300  6371  6407  6452  6537
CLOSE   6241
CLRVEC   999  1032  4278
DELAY   1058  1118  1581  1593  1686  1750  1844  1857  1965  1979  2135  2381  2456  2990  3514
        3601  4256  4635  4881  4896  5413  5460  6277  6448
DESCRI   880
DEVTYP   879
DISPAT   894
DODU    1074
ENDAU   1166
ENDAUT  1076
ENDCLN  1128
ENDDU   1146
ENDHRD  1182
ENDHW    915
ENDINI  1004
ENDMSG  5623  6582  6599  6613  6633  6655  6669  6683  6697  6711  6725  6738  6751  6764  6777
        6790  6803  6816  6829  6841  6857  6864  6871  6878  6885  6893  6901  6906  6916  6924
        6931  6938  6945  6952  6959  6968  6976  6983  6990  6999  7006  7012  7019  7026  7033
        7040  7047  7057  7064  7071  7080  7096  7107  7113  7122  7131  7139  7145  7152  7159
        7166  7173  7180  7187  7194  7201  7210  7217
ENDPRO  1010
ENDRPT   956
ENDSEG  1588  1609  1633  1662  1676  1753  1865  1974  1987  2059  2579  2611  2624  2706  2789
        2874  3524  3611  4080  4155  6287  6301  6376  6412  6428  6453  6475  6544
```

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ENDSFT  1224
ENDSRV  1099  4282
ENDSUB  1678  1697
ENDSW    932
ENDTST  1698  1765  1869  2003  2060  2147  2207  2308  2396  2467  2629  2710  2793  2878  2943
        3001  3074  3120  3165  3211  3257  3303  3350  3396  3442  3529  3616  3662  3708  3780
        3826  3872  3918  3964  4010  4085  4160  4217  4279  4431
EQUALS  1230
ERRDF   1586  1599  1603  1607  1616  1620  1625  1630  1645  1649  1659  1673  1689  1695  1748
        1842  1849  1854  1863  1972  1985  1995  2000  2052  2131  2139  2144  2204  2287  2297
        2301  2305  2377  2387  2394  2452  2464  2574  2594  2608  2621  2701  2784  2864  2997
        3071  3517  3604  4201  4209  4275  5542  6039  6046  6054  6280  6369  6404  6451  6468
        6514  6536
ERRSF   5139  6560
EXIT     947  1002  1119  1139  1159  2980  2987  3052  3060  3501  3588  4069  4144  4193
GETBYT  5212
GMANID  4405
GMANIL  4396  4425  4470  6220
GPHARD   975
GPRMA   1176
GPRMD   1178  1179  1180  1181  4405#
GPRML   1177  1214  1215  1216  1217  4396#  4425#  4470#  6220#
HEADER   878
INLOOP  5593  6469
LASTAD  7234
MANUAL  4392  4464  5407
M$BYTE   878#
M$CHEC   947#  1002#  1119#  1139#  1159#  2980#  2987#  3052#  3060#  3501#  3588#  4069#  4144#  4193#
M$CNTO  1176#  1177#  1178#  1179#  1180#  1181#  1214#  1215#  1216#  1217#  4396#  4405#  4425#  4470#  6220#
M$COUN  1035#  1046#  1062#  1067#  1072#  1075#  4394#  4399#  4418#  4468#  4477#  5252#  5613#  5615#  5622#
        5648#  5655#  5800#  5814#  5833#  5834#  5842#  5860#  5865#  6580#  6581#  6597#  6598#  6612#  6629#
        6630#  6631#  6632#  6653#  6654#  6668#  6682#  6696#  6710#  6724#  6737#  6750#  6763#  6776#  6789#
        6802#  6815#  6828#  6840#  6856#  6863#  6870#  6877#  6884#  6892#  6899#  6900#  6905#  6912#  6913#
        6914#  6915#  6923#  6930#  6937#  6944#  6951#  6958#  6965#  6966#  6967#  6975#  6982#  6989#  6996#
        6997#  6998#  7005#  7011#  7018#  7025#  7032#  7039#  7046#  7053#  7054#  7055#  7056#  7063#  7070#
        7077#  7078#  7079#  7090#  7091#  7092#  7093#  7094#  7095#  7104#  7105#  7106#  7112#  7120#  7121#
        7129#  7130#  7137#  7138#  7144#  7151#  7158#  7165#  7172#  7179#  7186#  7193#  7200#  7207#  7208#
        7209#  7216#  7221#
M$DATA   878#   879#   880#
M$DECR   915#   932#   956#  1004#  1010#  1076#  1099#  1128#  1146#  1166#  1182#  1224#  1588#  1609#  1633#
        1662#  1676#  1678#  1697#  1698#  1753#  1765#  1865#  1869#  1974#  1987#  2003#  2059#  2060#  2147#
        2207#  2308#  2396#  2467#  2579#  2611#  2624#  2629#  2706#  2710#  2789#  2793#  2874#  2878#  2943#
        3001#  3074#  3120#  3165#  3211#  3257#  3303#  3350#  3396#  3442#  3524#  3529#  3611#  3616#  3662#
        3708#  3780#  3826#  3872#  3918#  3964#  4010#  4080#  4085#  4155#  4160#  4217#  4279#  4282#  4431#
        5623#  6287#  6301#  6376#  6412#  6428#  6453#  6475#  6544#  6582#  6599#  6613#  6633#  6655#  6669#
        6683#  6697#  6711#  6725#  6738#  6751#  6764#  6777#  6790#  6803#  6816#  6829#  6841#  6857#  6864#
        6871#  6878#  6885#  6893#  6901#  6906#  6916#  6924#  6931#  6938#  6945#  6952#  6959#  6968#  6976#
        6983#  6990#  6999#  7006#  7012#  7019#  7026#  7033#  7040#  7047#  7057#  7064#  7071#  7080#  7096#
        7107#  7113#  7122#  7131#  7139#  7145#  7152#  7159#  7166#  7173#  7180#  7187#  7194#  7201#  7210#
        7217#
M$DEFA  1176#  1177#  1178#  1179#  1180#  1181#  1214#  1215#  1216#  1217#  4396#  4405#  4425#  4470#  6220#
M$ENDE   915#   932#   956#  1004#  1076#  1099#  1128#  1146#  1166#  1182#  1224#  1588#  1609#  1633#  1662#
        1676#  1678#  1697#  1698#  1753#  1765#  1865#  1869#  1974#  1987#  2003#  2059#  2060#  2147#  2207#
        2308#  2396#  2467#  2579#  2611#  2624#  2629#  2706#  2710#  2789#  2793#  2874#  2878#  2943#  3001#
        3074#  3120#  3165#  3211#  3257#  3303#  3350#  3396#  3442#  3524#  3529#  3611#  3616#  3662#  3708#
        3780#  3826#  3872#  3918#  3964#  4010#  4080#  4085#  4155#  4160#  4217#  4279#  4282#  4431#  5623#
```

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            6697#  6711#  6725#  6738#  6751#  6764#  6777#  6790#  6803#  6816#  6829#  6841#  6857#  6864#  6871#
            6878#  6885#  6893#  6901#  6906#  6916#  6924#  6931#  6938#  6945#  6952#  6959#  6968#  6976#  6983#
            6990#  6999#  7006#  7012#  7019#  7026#  7033#  7040#  7047#  7057#  7064#  7071#  7080#  7096#  7107#
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	6582#	6597#	6598#	6599#	6612#	6613#	6629#	6630#	6631#	6632#	6633#	6653#	6654#	6655#	6668#
	6669#	6682#	6683#	6696#	6697#	6710#	6711#	6724#	6725#	6737#	6738#	6750#	6751#	6763#	6764#
	6776#	6777#	6789#	6790#	6802#	6803#	6815#	6816#	6828#	6829#	6840#	6841#	6856#	6857#	6863#
	6864#	6870#	6871#	6877#	6878#	6884#	6885#	6892#	6893#	6899#	6900#	6901#	6905#	6906#	6912#
	6913#	6914#	6915#	6916#	6923#	6924#	6930#	6931#	6937#	6938#	6944#	6945#	6951#	6952#	6958#
	6959#	6965#	6966#	6967#	6968#	6975#	6976#	6982#	6983#	6989#	6990#	6996#	6997#	6998#	6999#
	7005#	7006#	7011#	7012#	7018#	7019#	7025#	7026#	7032#	7033#	7039#	7040#	7046#	7047#	7053#
	7054#	7055#	7056#	7057#	7063#	7064#	7070#	7071#	7077#	7078#	7079#	7080#	7090#	7091#	7092#
	7093#	7094#	7095#	7096#	7104#	7105#	7106#	7107#	7112#	7113#	7120#	7121#	7122#	7129#	7130#
	7131#	7137#	7138#	7139#	7144#	7145#	7151#	7152#	7158#	7159#	7165#	7166#	7172#	7173#	7179#
	7180#	7186#	7187#	7193#	7194#	7200#	7201#	7207#	7208#	7209#	7210#	7216#	7217#	7221#	
M$WORD	878#	894#	947#	1002#	1119#	1139#	1159#	1176#	1177#	1178#	1179#	1180#	1181#	1214#	1215#
	1216#	1217#	1586#	1599#	1603#	1607#	1616#	1620#	1625#	1630#	1645#	1649#	1659#	1673#	1689#
	1695#	1748#	1842#	1849#	1854#	1863#	1972#	1985#	1995#	2000#	2052#	2131#	2139#	2144#	2204#
	2287#	2297#	2301#	2305#	2377#	2387#	2394#	2452#	2464#	2574#	2594#	2608#	2621#	2701#	2784#
	2864#	2980#	2987#	2997#	3052#	3060#	3071#	3501#	3517#	3588#	3604#	4069#	4144#	4193#	4201#
	4209#	4275#	4396#	4405#	4425#	4470#	5139#	5542#	6039#	6046#	6054#	6220#	6280#	6369#	6404#
	6451#	6468#	6514#	6536#	6560#	7234									
OPEN	4510														
POINTE	867														
PRINTB	5622	6580	6581	6597	6598	6612	6629	6630	6631	6632	6653	6654	6668	6682	6696
	6710	6724	6737	6750	6763	6776	6789	6802	6815	6828	6840	6856	6863	6870	6877
	6884	6892	6899	6900	6905	6912	6913	6914	6915	6923	6930	6937	6944	6951	6958
	6965	6966	6967	6975	6982	6989	6996	6997	6998	7005	7011	7018	7025	7032	7039
	7046	7053	7054	7055	7056	7063	7070	7077	7078	7079	7090	7091	7092	7093	7094
	7095	7104	7105	7106	7112	7120	7121	7129	7130	7137	7138	7144	7151	7158	7165
	7172	7179	7186	7193	7200	7207	7208	7209	7216	7221					
PRINTF	1035	1046	1062	1067	1072	1075	4394	4399	4418	4468	4477	5252	5613		
PRINTX	5615	5648	5655	5800	5814	5833	5834	5842	5860	5865					
READEF	966	968													
RFLAGS	4474	5467	5599												
S	857#	1568	1736	1832	1952	2041	2120	2183	2277	2365	2442	2556	2676	2757	2841
	2928	2974	3046	3115	3160	3206	3252	3298	3344	3391	3437	3495	3582	3657	3703
	3775	3821	3867	3913	3959	4005	4063	4138	4187	4250	4382	4509	4571	4631	4700
	4805	4879	4970	5081	5130	5210	5326	5401	5456	5642	5705	5756	5980	6075	6130
	6212	6240	6248	6253	6258	6571	6588	6604	6618	6644	6660	6674	6688	6702	6716
	6729	6742	6755	6768	6781	6794	6807	6820	6833	6837					
SD	816#	1383	1703	1769	1873	2008	2064	2152	2212	2312	2401	2472	2636	2717	2798

```
        2882    2947    3007    3079    3124    3170    3216    3262    3308    3355    3401    3447    3534    3621    3667
        3713    3739    3785    3831    3877    3923    3969    4015    4090    4222    4287    6070    6126
SE       827#   1517    1731    1812    1921    2029    2099    2173    2251    2344    2427    2526    2663    2744    2828
        2902    2969    3036    3089    3134    3180    3226    3272    3318    3365    3411    3469    3556    3631    3677
        3749    3795    3841    3887    3933    3979    4037    4112    4165    4240    4358
SETPRI   965    4264    4276
SETVEC  1029    4263
SIO      847#   4503    4558    4618    4686    4784    4863    4955    5067    5125    5194    5316    5390    5444    6234
SP       837#   1394    1710    1776    1888    2014    2076    2155    2224    2321    2408    2479    2640    2721    2801
        2886    2952    3012    3084    3129    3175    3221    3267    3313    3360    3406    3452    3539    3626    3672
        3716    3744    3790    3836    3882    3928    3974    4020    4095    4225    4293    4498    4516    4602    4655
        4754    4842    4913    5030    5116    5186    5274    5371    5423    5631    5661    5887    6200    6230
SSUB     806#   4496    4514    4600    4653    4752    4840    4911    5028    5114    5184    5272    5369    5421    5629
        5659    5885    6068    6124    6198    6228
ST       796#   1381    1701    1767    1871    2006    2062    2150    2210    2310    2399    2470    2634    2715    2796
        2880    2945    3005    3077    3122    3168    3214    3260    3306    3353    3399    3445    3532    3619    3665
        3711    3783    3829    3875    3921    3967    4013    4088    4163    4220    4285
SVC      550#    551
XFER     947#   1002#   1119#   1139#   1159#   2980#   2987#   3052#   3060#   3501#   3588#   4069#   4144#   4193#

. ABS.  046410      000

 ERRORS DETECTED:  0

 CZTMIC,CZTMIC/CRF/EQ:ONEFILE=SVC33/ML,ZTMIC1.P11,ZTMIC2.P11,ZTMIC5.P11,ZTMIC4.P11,ZTMIC6.P11,ZTMIC3.P11,ZTMIC7.P11
 RUN-TIME: 59 64 6 SECONDS
 RUN-TIME RATIO: 290/130=2.2
 CORE USED:  23K  (46 PAGES)
```