TM78,TU78 TM78 CTRL/LGC TST
CZTMIBO
AH-E643B-MC
FICHE 1 OF 1
FEB 1981

MADE IN USA

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.NLIST TOC

.REM \
                    IDENTIFICATION
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PRODUCT CODE:           AC-E642B-MC

PRODUCT NAME:           CZTMIB0 TM78 CTRL/LGC TST

MAINTAINER:             DIAGNOSTIC ENGINEERING

DATE:                   OCTOBER 1,1980

AUTHOR:                 G. COOKE
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                        .SBTTL  HISTORY
                        .REM \
                                                HISTORY
                                                -------


                        JUNE 1,1980             INITIAL RELEASE         CZTMIA
                        OCTOBER 1,1980          SECOND RELEASE          CZTMIB

                                                CHANGES TO CZTMIA
                                                ------- -- ------

                        1.CHANGED MODULE CALLOUT AFTER FAULT INSERTION INFORMATION
                          WAS AVAILABLE.

                        2.EXACT ROUTINE PRINTS 2 SETS OF ACTUAL AND EXPECTED MESSAGES

                        3.CALX9 WAS MULTIPLYING BY WRONG NUMBER

                        4.TEST 17 WAS NOT READING ALL CAS

                        5.CHANGE DXTUID FROM KKTMAA TO KKTMAB SO WE USE NEW MICRO
                          DIAGNOSTIC PAK FILE

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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	MAINT	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

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

                  *  = DIAGNOSTIC USE ONLY
                  ** = SEE PDP-11 PERIPHERALS HANDBOOK
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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	4000	PE	1600 BPI MODE SET	CAS
20	2000	BOT	TU78 AT BEGINNING OF TAPE	CAS
20	1000	EOT	TU78 AT END-OF-TAPE	CAS
20	400	FPT	FILE PROTECTED	CAS
20	200	AVAIL	AVAILABLE TO MASSBUS	CAS
20	100	SHR	SHARED	CAS
20	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 MANLAL FOR BIT DESCRIPTIONS


                        \
                        .NLIST  CND


                        .SBTTL  PROGRAM HEADER

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

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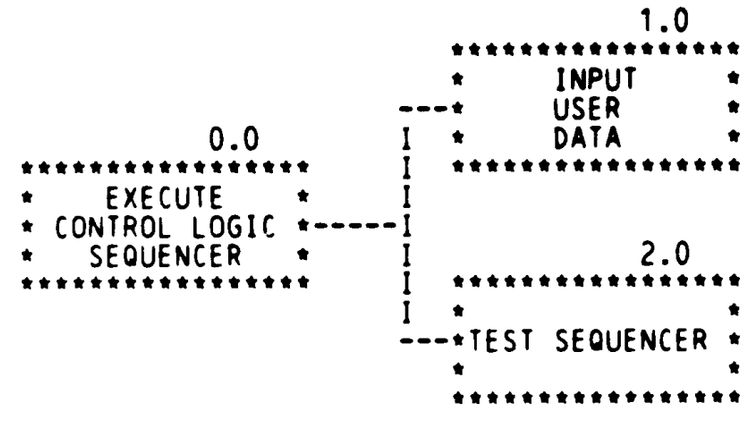
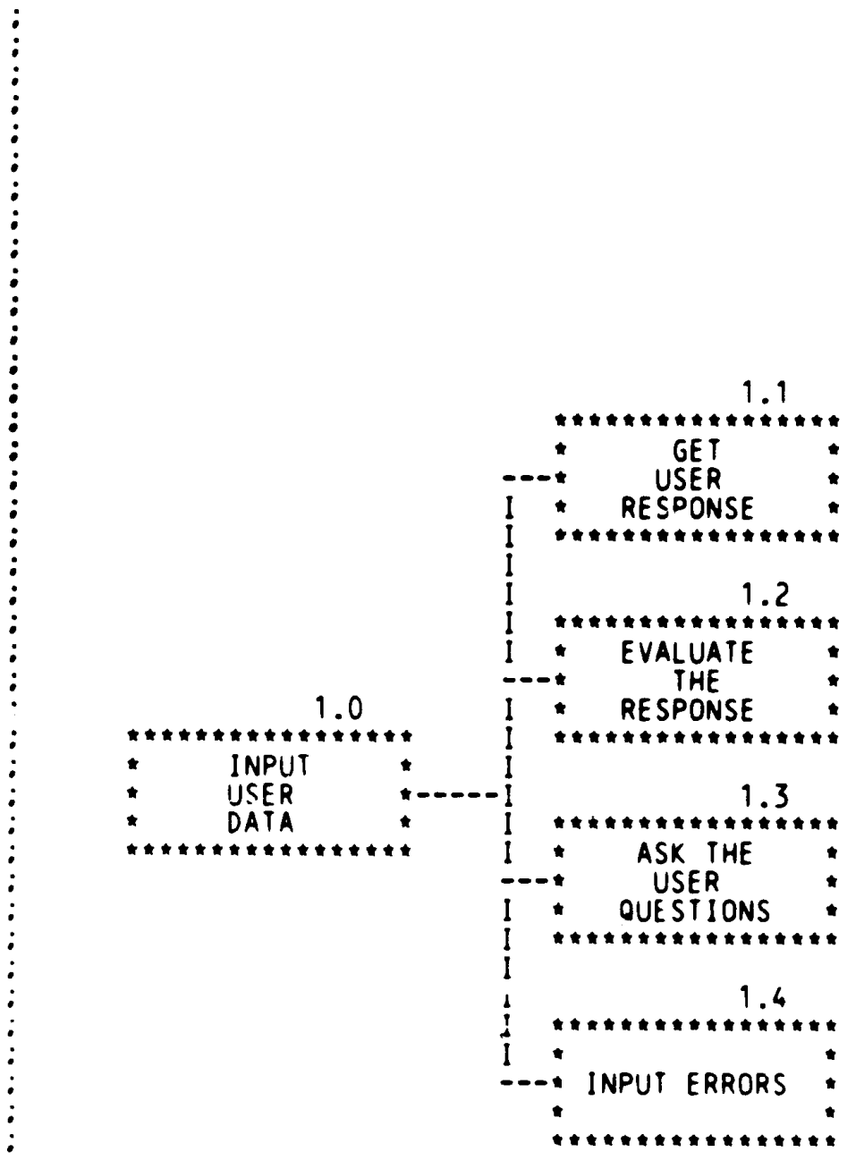
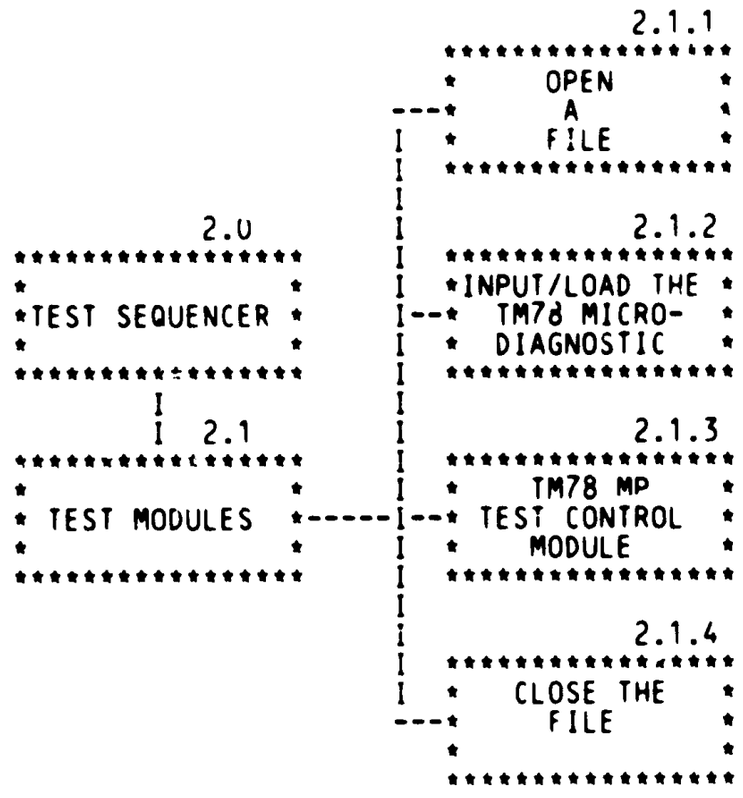
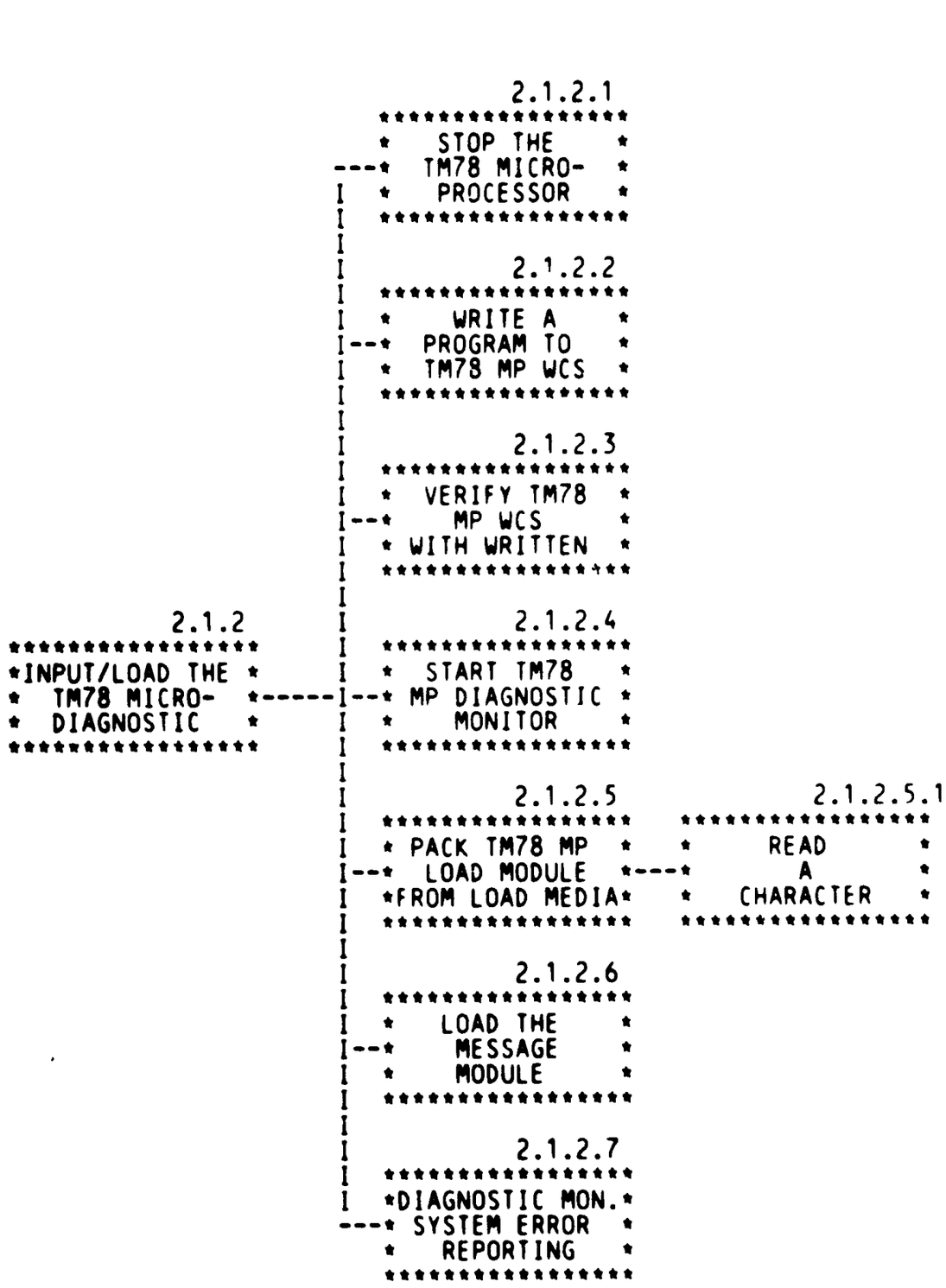
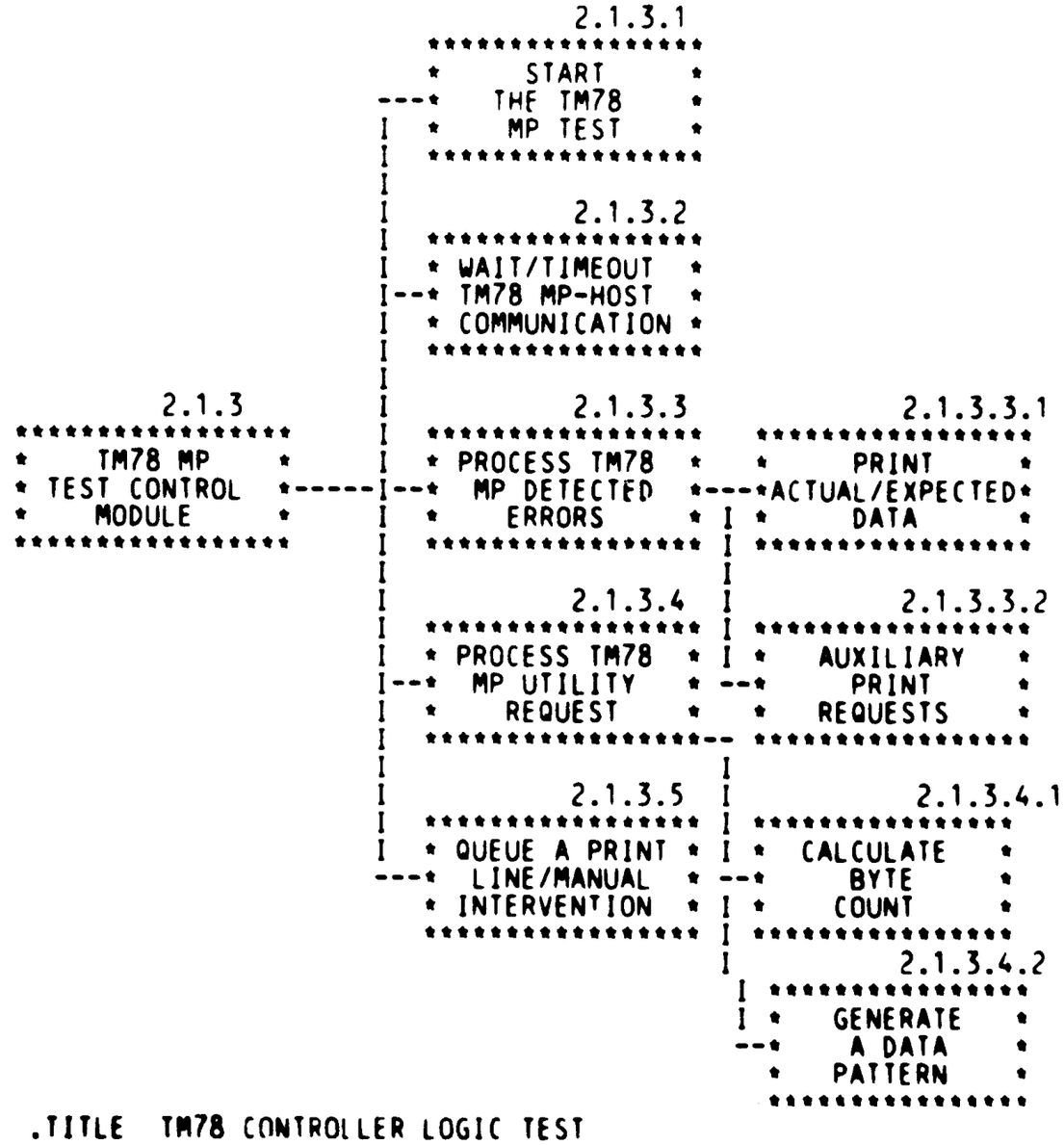



1.1
GET USER RESPONSE
1.2
EVALUATE THE RESPONSE
1.0
INPUT USER DATA
1.3
ASK THE USER QUESTIONS
1.4
INPUT ERRORS


2.1.1
OPEN
A
FILE
2.0
TEST SEQUENCER
2.1.2
INPUT/LOAD THE
TM78 MICRO-
DIAGNOSTIC
2.1
TEST MODULES
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
VERIFY TM78 MP WCS WITH WRITTEN
2.1.2.4
START TM78 MP DIAGNOSTIC MONITOR
2.1.2.5
PACK TM78 MP LOAD MODULE FROM LOAD MEDIA
2.1.2.5.1
READ A CHARACTER
2.1.2.6
LOAD THE MESSAGE MODULE
2.1.2.7
DIAGNOSTIC MON. SYSTEM ERROR REPORTING




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

```

002000                                  POINTER BGNSW,BGNSFT,BGNAU,BGNDU


                                        .NLIST  BEX
002000                                  HEADER  CZTMIB,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 VAJLE
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
                                ; PARAMFTERS 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  #PRIO7
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,#PRIO7  ;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
```

```
1058  003114  053777  004354  001124          BIS     BINUNT,@AS              ;RELEASE ATTENTION
1059  003122  032703  040000                  BIT     #PRES,R3                ;DRIVE PRESENT ?
1060  003126  001027                          BNE     EXAUTO                  ;YES , EXIT AUTODROP CODE
1061  003130                                  PRINTF  #AU.TU,TMUNIT           ;WRONG TU78 #
1062
1063  003154                          DROPIT: DODU    UNINUM                  ;DROP UNIT UNINUM
1064  003162                                  PRINTF  #AU.DRP,UNINUM          ;DROP UNIT MESSAGE
1065  003206                          EXAUTO: ENDAUTO                         ;END OF AUTO DROP CODE
1066
1067  003210  047045  040445  052101  AU.TO:   .ASCIZ/%N%AATTENTION TIME OUT FOR TM78 # %02/
1068                                          .EVEN
1069  003256  047045  040445  047516  AU.RH:   .ASCIZ/%N%ANON EXISTENT RH ADDRESS %06/
1070                                          .EVEN
1071  003316  047045  040445  047516  AU.TM:   .ASCIZ/%N%ANON EXISTENT TM78 # %02/
1072                                          .EVEN
1073  003352  047045  040445  047516  AU.TU:   .ASCIZ/%N%ANON EXISTENT TU78 # %02/
1074                                          .EVEN
1075  003406  047045  040445  051104  AU.DRP:  .ASCIZ/%N%ADROPPING LOGICAL UNIT # %02%N/
1076                                          .EVEN
1077
1078                                  ;  NXM FLAG FOR AUTO DROP CODE
1079
1080  003450  000000                  NXMFLG: .WORD 0                         ;NXM FLAG
1081
1082                                  ·  NON EXISTENT DEVICE TRAP DURING AUTO DROP CODE
1083
1084  003452                                  BGNSRV  NXMTRP
1085
1086  003452  005237  003450                  INC     NXMFLG
1087
1088  003456                                  ENDSRV
1089
1090
1091
1092                                  .SBTTL  CLEANUP CODING SECTION
1093
1094                                  ;++
1095                                  ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
1096                                  ; AT THE END OF EACH PASS.
1097                                  ;--
1098
1099  003460                                  BGNCLN
1106  003460  012777  000040  000552          MOV     #MBINIT,@CS2    ;ISSUE A MASSBUS INIT.
1107  003466                                  DELAY   100             ;WAIT FOR IT TO FINISH
1108  003516                                  EXIT    CLN
1109
1116
1117  003522                                  ENDCLN
1118                                  ;++
1119                                  ; THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
1120                                  ; TO NO LONGER BE TESTED.
1121                                  ;--
1122  003524                                  BGNDU
1128  003524                                  EXIT    DU
1135  003530                                  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
```

```
1214                                    ;++
1215                                    ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
1216                                    ; ARE USED IN MORE THAN ONE TEST.
1217                                    ;--
1218
1219  004216                                    EQUALS
 (1)                                    ;
 (1)                                    ; BIT DIFINITIONS
 (1)                                    ;
 (1)            100000                  BIT15== 100000
 (1)            040000                  BIT14== 40000
 (1)            020000                  BIT13== 20000
 (1)            010000                  BIT12== 10000
 (1)            004000                  BIT11== 4000
 (1)            002000                  BIT10== 2000
 (1)            001000                  BIT09== 1000
 (1)            000400                  BIT08== 400
 (1)            000200                  BIT07== 200
 (1)            000100                  BIT06== 100
 (1)            000040                  BIT05== 40
 (1)            000020                  BIT04== 20
 (1)            000010                  BIT03== 10
 (1)            000004                  BIT02== 4
 (1)            000002                  BIT01== 2
 (1)            000001                  BIT00== 1
 (1)                                    ;
 (1)            001000                  BIT9==  BIT09
 (1)            000400                  BIT8==  BIT08
 (1)            000200                  BIT7==  BIT07
 (1)            000100                  BIT6==  BIT06
 (1)            000040                  BIT5==  BIT05
 (1)            000020                  BIT4==  BIT04
 (1)            000010                  BIT3==  BIT03
 (1)            000004                  BIT2==  BIT02
 (1)            000002                  BIT1==  BIT01
 (1)            000001                  BIT0==  BIT00
 (1)                                    ;
 (1)                                    ; EVENT FLAG DEFINITIONS
 (1)                                    ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
 (1)                                    ;
 (1)            000040                  EF.START==      32.             ; START COMMAND WAS ISSUED
 (1)            000037                  EF.RESTART==    31.             ; RESTART COMMAND WAS ISSUED
 (1)            000036                  EF.CONTINUE==   30.             ; CONTINUE COMMAND WAS ISSUED
 (1)            000035                  EF.NEW==        29.             ; A NEW PASS HAS BEEN STARTED
 (1)            000034                  EF.PWR==        28.             ; A POWER-FAIL/POWER-UP OCCURRED
 (1)                                    ;
 (1)                                    ;
 (1)                                    ; PRIORITY LEVEL DEFINITIONS
 (1)                                    ;
 (1)            000340                  PRI07== 340
 (1)            000300                  PRI06== 300
 (1)            000240                  PRI05== 240
 (1)            000200                  PRI04== 200
 (1)            000140                  PRI03== 140
 (1)            000100                  PRI02== 100
 (1)            000040                  PRI01== 40
```

```
   (1)          000000                  PRIOO== 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
  1220
  1221                                          .DSABL  REG
  1222                                  ;
  1223                                  ;REGISTER DEFINITIONS
  1224          000000                  R0=%0                           ;REGISTER 0 DEFINITION
  1225          000001                  R1=%1                           ;REGISTER 1 DEFINITION
  1226          000002                  R2=%2                           ;REGISTER 2 DEFINITION
  1227          000003                  R3=%3                           ;REGISTER 3 DEFINITION
  1228          000004                  R4=%4                           ;REGISTER 4 DEFINITION
  1229          000005                  R5=%5                           ;REGISTER 5 DEFINITION
  1230          000005                  ERRCOD=%5                       ;ERROR CODE
  1231          000006                  SP=%6                           ;STACK POINTER
  1232          000007                  PC=%7                           ;PROGRAM COUNTER
  1233
  1234  004216  000000                  ROMIDT: .WORD   0               ;ROM IDENTIFICATION INFORMATION STORAGE
  1235  004220  000000                          .WORD   0
  1236  004222  000000                          .WORD   0
  1237  004224  000000                          .WORD   0
  1238
  1239  004226  000000                  ERRLP:  .WORD   0               ;ROM ERROR LOOP FLAG
  1240
  1241                                  ;MASS BUS COMMAND BYTES
  1242          000037                  DIGMON=000037           ;BEGIN DIAGNOSTIC MONITOR
  1243          000035                  TSTART=000035           ;BEGIN TM78 MP TEST
  1244          000031                  CONERR=000031           ;CONTINUE ON ERROR
  1245          000033                  LOPERR=000033           ;LOOP ON ERROR
  1246
  1247                                  ;TM78 REGISTER 21 COMMAND/STATUS BITS
  1248          010000                  NED=010000              ;NON EXISTENT DRIVE
  1249          004000                  CPE=004000              ;CONTROL BUS PARITY ERROR
  1250          002000                  EVPAR=002000            ;FORCE PARITY ERROR FROM TM78
  1251          010000                  ILR=010000              ;ILLEGAL REGISTER STATUS BIT
  1252          020000                  MCPE=020000             ;CONTROL BUS PARITY ERROR
  1253          000400                  HOLD=000400             ;HOLD COMMAND BIT
  1254          001000                  HLDA=001000             ;HOLD STATUS BIT
  1255          040000                  TMCLR=040000            ;TM CLEAR COMMAND BIT
  1256          100000                  TMRDY=100000            ;TM READY STATUS BIT
  1257
```

```
                                ;TM78 STATUS MASKS
            035400              CLRSTA=035400           ;STATUS ERROR ON CLEAR COMMAND
            034000              HLDSTA=034000           ;STATUS ERROR ON HOLD COMMAND

                                ;MASS BUS COMMAND/STATUS BITS
            000020              PAT=000020              ;RH PARITY TEST BIT
            000040              MBINIT=000040           ;MASS BUS INITIALIZE
            040000              TRE=040000              ;TRANSFER ERROR

                                ;TM78 INTERNAL ADDRESSES
            100340              MBSEL=100340            ;TM78 PORT SELECT ADDRESS
            100240              TMRDST=100240           ;ADDRESS OF TM READY CONTROL WORD

                                ;TM78 INTERNAL COMMAND BITS
            000100              STMRDY=000100           ;SET TM READY

                                ;CAS.A78 MEMORY ADDRESS EQUATES
            041420              CASCMD=041420           ;CAS READ/WRITE COMMAND ADDRESS X'4300'
            042000              CASBUF=042000           ;CAS READ BUFFER ADDRESS X'4210'
            042040              CASDAL=042040           ;CAS WRITE DATA BYTE LOW X'4320'
            042041              CASDAH=042041           ;CAS WRITE DATA BYTE HIGH X'4321'

            000015              CR=000015               ;CARRIAGE RETURN
            000012              LF=000012               ;LINE FEED
            000011              TAB=000011              ;TAB CHARACTER
            000040              SPACE=000040            ;SPACE CHARACTER
                                .SBTTL  GLOBAL DATA SECTION

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

                                ;
004230  000000                  XFRCMD: 0               ;MASS BUS/TM78 DATA TRANSFER WORD
004232  000000                  WC:     0               ;MASS BUS WORD COUNT
004234  000000                  BA:     0               ;TRANSFER MEMORY ADDRESS
004236  000000                  FC:     0               ;FRAME COUNT
004240  000000                  CS2:    0               ;MASS BUS CONTROL/STATUS WORD
004242  000000                  XFRINT: 0               ;DATA TRANSFER INTERRUPT CODE
004244  000000                  TC:     0               ;TAPE CONTROL
004246  000000                  AS:     0               ;ATTENTION SUMMARY
004250  000000                  TUSTAT: 0               ;TAPE STATUS
004252  000000                  DB:     0               ;DATA BUFFER
004254  000000                  DI1:    0               ;DIAGNOSTIC REGISTER 1
004256  000000                  DT:     0               ;DRIVE TYPE
004260  000000                  SN:     0               ;SERIAL NUMBER
004262  000000                  DI2:    0               ;DIAGNOSTIC REGISTER 2
004264  000000                  DI3:    0               ;DIAGNOSTIC REGISTER 3
004266  000000                  MOINT:  0               ;MOTION INTERRUPT CODE
004270  000000                  MO0:    0               ;MOTION COMMAND FOR TU0
004272  000000                  MO1:    0               ;MOTION COMMAND FOR TU1
004274  000000                  MO2:    0               ;MOTION COMMAND FOR TU2
004276  000000                  MO3:    0               ;MOTION COMMAND FOR TU3
004300  000000                  AD80:   0               ;TM78 MP ADDRESS WORD
004302  000000                  DS80:   0               ;TM78 MP DATA/STATUS
```

```
1321  004304  000000          NON54:  0                       ;NON EXISTENT REG. 1
1322  004306  000000          NON56:  0                       ;NON EXISTENT REG. 2
1323  004310  000000          NON60:  0                       ;NON EXISTENT REG. 3
1324  004312  000000          NON62:  0                       ;NON EXISTENT REG. 4
1325  004314  000000          NON64:  0                       ;NON EXISTENT REG. 5
1326  004316  000000          NON66:  0                       ;NON EXISTENT REG. 6
1327  004320  000000          NON70:  0                       ;NON EXISTENT REG. 7
1328  004322  000000          NON72:  0                       ;NON EXISTENT REG. 10
1329                                  ;
1330  004324  000000          HARDPT: .WORD   0               ;RUN TIME P TABLE POINTER
1331  004326  000000          UNINUM: .WORD   0               ;UNIT UNDER TEST-CURRENTLY
1332  004330  000000          CASDTA: .WORD   0               ;DIAGNOSTIC TEST NUMBER
1333  004332  000000          DIAGTS: .WORD   0               ;DIAGNOSTIC TEST NUMBER
1334  004334  000000          DIAGER: .WORD   0               ;DIAGNOSTIC ERROR NUMBER
1335  004336  000000          BYTCNT: .WORD   0               ;BYTE COUNT
1336  004340  000000          CKSUM   .WORD   0               ;FILE SERVICES CHECKSUM LOCATION
1337  004342  000000          FILERR: .WORD   0               ;FILE HANDLING ERROR
1338  004344  000000          CHAR:   .WORD   0               ;DATA CHARACTER FROM DISK
1339  004346  000000          COUNT:  .WORD   0               ;ITERATION COUNTER
1340  004350  000000          CHKSUM: .WORD   0               ;CHECK SUM WORK REGISTER
1341  004352  000000          MBDRIV: .WORD   0               ;MASS BUS DRIVE NUMBER
1342  004354  000000          BINUNT: .WORD   0               ;TM78 BINARY UNIT NUMBER
1343  004356  000000          TMUNIT: .WORD   0               ;TM78 UNIT UNDER TEST
1344  004360  000000          TMPORT: .WORD   0               ;TM78 PORT NUMBER
1345  004362  000000          RHVEC:  .WORD   0               ;RH VECTOR ADDRESS
1346  004364  000000          DINTCD: .WORD   0               ;TM78 MP DIAGNOSTIC MONITOR INTERRUPT CODE
1347  004366  000000          STAT80: .WORD   0               ;TM78 MP STATUS WORD (MASS BUS REG. 52)
1348  004370  000000          ADATA:  .WORD   0               ;ACTUAL DATA
1349  004372  000000          EDATA:  .WORD   0               ;EXPECTED DATA
1350  004374  000000          PC80:   .WORD   0               ;TM78 MP PROGRAM COUNTER
1351  004376     000          LOAD80: .BYTE   0               ;LOW ORDER WCS ADDRESS
1352  004377     000          HIAD80: .BYTE   0               ;HIGH ORDER WCS ADDRESS
1353  004400  000000          FILNAM: .WORD   0               ;FILE NAME TO BE LOADED
1354  004402  000000          EOF:    .WORD   0               ;END OF FILE FLAG
1355  004404  000000          BYPFLG: .WORD   0               ;BYPASS MICRO MODULE FLAG
1356  004406  000000          SEQNUM: .WORD   0               ;SEQUENCE NUMBER MANUAL MICRO MODULE SELECTION
1357  004410  000000          INTFLG: .WORD   0               ;INTERRUPT FLAG
1358  004412  000000          CASLD:  .WORD   0               ;CAS PROGRAM LOADED FLAG
1359  004414  000000          SAVE:   .WORD   0               ;LINE TERMINATOR BUFFER WORD
1360  004416  000000          RHTYP:  .WORD   0               ;RH TYPE (RH70=1, RH11=0)
1361  004420  000000          DUMFLG: .WORD   0               ;DUMMY FLAG FOR SUPERVISOR COMPATABILITY
1362                                  .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
```

```
1416                    ;*  :  :  :  ELSE-ERROR
1417                    ;*  :  :  ENDIF
1418                    ;*  :  ENDSEG EMPTY SILO READ
1419                    ;*  :  BGNSEG IR/OR CHECK
1420                    ;*  :  :  INIT RH
1421                    ;*  :  :  IF 'IR' SET
1422                    ;*  :  :  :  THEN-CONTINUE
1423                    ;*  :  :  :  ELSE-ERROR
1424                    ;*  :  :  ENDIF
1425                    ;*  :  :  IF 'OR' CLEAR
1426                    ;*  :  :  :  THEN-CONTINUE
1427                    ;*  :  :  :  ELSE-ERROR
1428                    ;*  :  :  ENDIF
1429                    ;*  :  :  LOAD SILO WITH 0
1430                    ;*  :  :  IF 'OR' CLEAR
1431                    ;*  :  :  :  THEN-CONTINUE
1432                    ;*  :  :  :  ELSE-ERROR
1433                    ;*  :  :  ENDIF
1434                    ;*  :  :  LOAD SILO WITH -1
1435                    ;*  :  :  IF 'OR' SET
1436                    ;*  :  :  :  THEN-CONTINUE
1437                    ;*  :  :  :  ELSE-ERROR
1438                    ;*  :  :  ENDIF
1439                    ;*  :  ENDSEG IR/OR CHECK
1440                    ;*  :  BGNSEG-SILO DATA TEST
1441                    ;*  :  :  INIT RH
1442                    ;*  :  :  LOAD SILO WITH DATA
1443                    ;*  :  :  DO FOR DATA=0 TO DATA=102
1444                    ;*  :  :  :  LOAD DATA INTO SILO
1445                    ;*  :  :  :  INCREMENT DATA
1446                    ;*  :  :  ENDDO FOR
1447                    ;*  :  :  IF 'IR' RESET
1448                    ;*  :  .  :  THEN-CONTINUE
1449                    ;*  :  :  :  ELSE-ERROR
1450                    ;*  :  :  ENDIF
1451                    ;*  :  :  READ DATA FROM SILO
1452                    ;*  :  :  DO FOR DATA=0 TO DATA-102
1453                    ;*  :  :  :  READ DATA
1454                    ;*  :  :  :  COMPARE TO EXPECTED
1455                    ;*  :  :  :  IF MISCOMPARE
1456                    ;*  :  :  :  :  THEN-ERROR
1457                    ;*  :  :  :  ENDIF
1458                    ;*  :  :  ENDDO FOR
1459                    ;*  :  ENDSEG-SILO DATA TEST
1460                    ;*  :  BGNSEG-SILO OVERFLOW
1461                    ;*  :  :  INIT RH
1462                    ;*  :  :  LOAD SILO FULL PLUS 1 WORD
1463                    ;*  :  :  DO FOR DATA=0 TO DATA=103
1464                    ;*  :  :  :  LOAD DATA INTO SILO
1465                    ;*  :  :  ENDDO FOR
1466                    ;*  :  :  IF 'DLT' SET
1467                    ;*  :  :  :  THEN-CONTINUE
1468                    ;*  :  :  :  ELSE-ERROR
1469                    ;*  :  :  ENDIF
1470                    ;*  :  ENDSEG-SILO OVERFLOW
1471                    ;*  :  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
 (1)                            ; ************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
                                ;*CZTMIA DVC FTL ERR 000001 ON  JNIT 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)                            ; ************************************************************************
                                
004422                                  BGNTST
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,ERMC01  ;YES-PRINT MASS BUS ERROR
004544                          2$:     CKLOOP
004546                                  ENDSEG                  ;CS1 BITS
004550                                  BGNSEG                  ;EMPTY SILO READ
```

```
1580  004552  012777  000040  177460          MOV     #40,@CS2        ;INIT RH11
1581  004560  013777  004352  177452          MOV     MBDRIV,@CS2     ;SELECT THE TM78 NUMBER
1582  004566                                  DELAY   2.              ;WAIT .2 MS.
1583  004616  012777  040000  177404          MOV     #40000,@XFRCMD  ;CLEAR TRE
1584  004624  005077  177400                  CLR     @XFRCMD         ;CLEAR CS1
1585  004630  017701  177416                  MOV     @DB,R1          ;READ DATA BUFFER
1586  004634  005777  177400                  TST     @CS2            ;SEE IF 'DLT' SET
1587  004640  100404                          BMI     3$              ;IF SO BR
1588  004642                                  ERRDF   40.,RH11,ERM040 ;NO 'DLT' ON READ FROM EMPTY SILO
1589  004652                          3$:     CKLOOP
1590  004654  005777  177350                  TST     @XFRCMD         ;SEE IF 'SC' IS SET
1591  004660  100404                          BMI     4$              ;IF SO BR
1592  004662                                  ERRDF   41.,RH11,ERM041 ;NO 'SC' ON READ FROM EMPTY SILO
1593  004672                          4$:     CKLOOP
1594  004674  032777  040000  177326          BIT     #40000,@XFRCMD  ;SEE IF 'TRE' IS SET
1595  004702  001004                          BNE     5$              ;IF SO BR
1596  004704                                  ERRDF   42.,RH11,ERM042 ;NO 'TRE' ON READ FROM EMPTY SILO
1597  004714                          5$:     CKLOOP
1598  004716                                  ENDSEG                  ;EMPTY SILO READ
1599
1600  004720                                  BGNSEG                  ;IR/OR CHECK
1601
1602  004722  012777  000040  177310          MOV     #40,@CS2        ;INIT THE RH11
1603  004730  032777  000100  177302          BIT     #100,@CS2       ;SEE IF 'IR' IS SET
1604  004736  001004                          BNE     6$              ;IF SO BR
1605  004740                                  ERRDF   43.,RH11,ERM043 ;NO 'IR' AFTER INIT
1606  004750                          6$:     CKLOOP
1607  004752  032777  000200  177260          BIT     #200,@CS2       ;SEE IF 'OR' IS RESET
1608  004760  001404                          BEQ     7$              ;IF SO BR
1609  004762                                  ERRDF   44.,RH11,ERM044 ;'OR' SET AFTER INIT
1610  004772                          7$:     CKLOOP
1611  004774  012777  000000  177250          MOV     #0,@DB          ;LOAD 0 INTO SILO
1612  005002  032777  000200  177230          BIT     #200,@CS2       ;SEE THAT 'OR' RESET
1613  005010  001404                          BEQ     8$              ;IF IT DOES BR
1614  005012                                  ERRDF   45.,RH11,ERM045 ;'OR' SET AFTER 1 SILO LOAD
1615  005022                          8$:     CKLOOP
1616  005024  012777  177777  177220          MOV     #-1,@DB         ;LOAD SILO WITH -1
1617  005032  032777  000200  177200          BIT     #200,@CS2       ;SEE IF 'OR' IS SET
1618  005040  001004                          BNE     9$              ;IF SO BR
1619  005042                                  ERRDF   46.,RH11,ERM046 ;'OR' RESET AFTER 2 SILO LOADS
1620
1621  005052                          9$:     CKLOOP
1622  005054                                  ENDSEG
1623
1624  005056                                  BGNSEG                  ;SILO DATA TEST
1625
1626  005060  012777  000040  177152          MOV     #40,@CS2        ;INIT THE RH11
1627  005066  005001                          CLR     R1              ;PRESET DATA
1628  005070  010177  177156          10$:    MOV     R1,@DB          ;LOAD SILO
1629  005074  005201                          INC     R1              ;BUMP DATA
1630  005076  022701  000102                  CMP     #102,R1         ;SEE IF DONE
1631  005102  001372                          BNE     10$             ;IF NOT BR
1632  005104  032777  000100  177126          BIT     #100,@CS2       ;SEE IF 'IR' IS RESET
1633  005112  001404                          BEQ     11$             ;IF SO BR
1634  005114                                  ERRDF   47.,RH11,ERM047 ;'IR' NOT RESET BY SILO FULL
1635  005124                          11$:    CKLOOP
```

```
1636  005126  032777  000200  177104          BIT     #200,@CS2       ;SEE IF 'OR' IS SET
1637  005134  001004                          BNE     12$             ;IF SO BR
1638  005136                                  ERRDF   48.,RH11,ERM048 ;'OR' NOT SET AFTER FILLING SILO
1639  005146                          12$:    CKLOOP
1640  005150  005001                          CLR     R1              ;PRESET DATA
1641  005152  017702  177074          13$:    MOV     @DB,R2          ;READ SILO
1642  005156  020102                          CMP     R1,R2           ;SEE IF EXPT=RCVD
1643  005160  001005                          BNE     14$             ;
1644  005162  005201                          INC     R1              ;BUMP DATA
1645  005164  022701  000102                  CMP     #102,R1         ;SEE IF DONE
1646  005170  001370                          BNE     13$             ;IF NOT BR
1647  005172  000404                          BR      15$             ;CONTINUE TESTING
1648  005174                          14$:    ERRDF   49.,RH11,ERM049 ;SILO DATA COMPARE ERROR
1649
1650  005204                          15$:    CKLOOP
1651  005206                                  ENDSEG                  ;SILO DATA TEST
1652
1653  005210                                  BGNSEG                  ;SILO OVERFLOW
1654
1655  005212  012777  000040  177020          MOV     #40,@CS2        ;INIT THE RH11
1656  005220  012701  000103                  MOV     #103,R1         ;SET SIZE OF SILO+1
1657  005224  010177  177022          16$:    MOV     R1,@DB          ;LOAD DILO
1658  005230  005301                          DEC     R1              ;SEE IF DONE
1659  005232  001374                          BNE     16$             ;IF NOT BR
1660  005234  005777  177000                  TST     @CS2            ;SEE IF DLT SET
1661  005240  100404                          BMI     17$             ;CONTINUE TESTING
1662  005242                                  ERRDF   50.,RH11,ERM050 ;'DLT' NOT SET BY SILO OVERFLOW
1663
1664  005252                          17$:    CKLOOP
1665  005254                                  ENDSEG                  ;SILO OVERFLOW
1666
1667  005256                                  ENDSUB                  ;RH11 TESTS
1668
1669  005260                                  BGNSUB                  ;MASSBUS READY TEST
1670
1671  005262  013777  004352  176750  RDYTST: MOV     MBDRIV,@CS2     ;SELECT THE TM78 NUMBER
1672  005270  005077  176734                  CLR     @XFRCMD         ;CLEAR CAS REGISTER 0
1673  005274  052777  177770  176736          BIS     #177770,@CS2    ;SET ALL OTHER BITS
1674  005302  012701  000010                  MOV     #10,R1          ;LOAD THE MASS BUS REGISTER NUMBER
1675  005306                                  DELAY   3.              ;WAIT .3 MS.
1676  005336  032777  177670  176674          BIT     #177670,@CS2    ;ANY ERRORS?
1677  005344  001404                          BEQ     18$             ;NO-CONTINUE
1678  005346                                  ERRDF   1.,RHCAS,ERM001 ;YES-PRINT MASS BUS ERROR
1679  005356                          18$:    CKLOOP
1680  005360  013777  004352  176652          MOV     MBDRIV,@CS2
1681  005366  005001                          CLR     R1              ;LOAD THE MASS BUS REGISTER NUMBER
1682  005370  032777  173577  176632          BIT     #173577,@XFRCMD ;ANY ERRORS?
1683  005376  001404                          BEQ     19$             ;NO-CONTINUE
1684  005400                                  ERRDF   1.,RHCAS,ERM001 ;YES
1685  005410                          19$:    CKLOOP
1686  005412                                  ENDSUB
1687  005414                                  ENDTST
1688
1689                                  .SBTTL  TEST 02 - TM78 HANDSHAKE TEST
1690  005416                                  ST
 (1)                                      ; ******************************************************************************
```

```
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 2                TM78 HANDSHAKE TEST
005416                          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.
005416                          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
005416                          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
005416                          S
                                ; ************************************************************************
005416                                  BGNTST
005416  005037  004412                  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
005422  013777  004352  176610          MOV     MBDRIV,@CS2     ;LOAD TM78 UNIT NUMBER
005430  005077  176574                  CLR     @XFRCMD         ;CLEAR CAS REGISTER 0
005434  005001                          CLR     R1              ;CLEAR MASS BUS REGISTER PTR.
005436  020127  000054          1$:     CMP     R1,#54          ;FINISHED?
005442  001456                          BEQ     3$              ;YES-EXIT
005444                                  BGNSEG
005446  017102  004230                  MOV     @XFRCMD(R1),R2  ;READ MB
```

```
      005452  032777  010000  176560            BIT     #NED,@CS2           ;NON-EXISTENT DRIVE SET
      005460  001426                            BEQ     4$
      005462                                    ERRDF   2.,RHCAS,ERM002
      005472  012777  000040  176540            MOV     #MBINIT,@CS2        ;CLEAR THE NED ERROR
      005500                                    DELAY   5                   ;WAIT 1 MS.
      005530  013777  004352  176502            MOV     MBDRIV,@CS2
      005536                            4$:     CKLOOP
      005540                                    ENDSEG
      005542  005201                    2$:     INC     R1                  ;INCREMENT THE REGISTER NUMBER
      005544  005201                            INC     R1                  ;INCREMENT THE REGISTER NUMBER
      005546  020127  000002                    CMP     R1,#2               ;REGISTER NUMBER=2?
      005552  001773                            BEQ     2$                  ;YES-DON'T TEST
      005554  020127  000004                    CMP     R1,#4               ;REGISTER NUMBER=4?
      005560  001770                            BEQ     2$                  ;YES-DON'T TEST
      005562  020127  000010                    CMP     R1,#10              ;REGISTER NUMBER=10?
      005566  001765                            BEQ     2$                  ;YES-DON'T TEST
      005570  020127  000022                    CMP     R1,#22              ;REGISTER=22?
      005574  001762                            BEQ     2$                  ;YES-DON'T TEST
      005576  000717                            BR      1$                  ;CONTINUE
      005600                            3$:     ENDTST                      ;END OF TEST
                                        .SBTTL  TEST 03 - NON-EXISTENT REGISTER TEST
      005602                            ST
 (1)                                    ; ******************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*----- -----
                                        ;*TEST 3                  NON-EXISTENT REGISTER TEST
      005602                            SD
 (1)                                    ; ******************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
                                        ;*THIS TEST READS THE NON-EXISTENT MB REGISTERS (54, 56,
                                        ;*60, 62, 64, 66, 70 AND 72(8) AND EXPECTS THE READ DATA
                                        ;*TO BE ZERO, AND THE ILLEGAL REGISTER ''ILR'' BIT IN MB
                                        ;*REGISTER 52(8) CAS REGISTER 21(8) TO BE SET.  THEN A MASS
                                        ;*BUS INIT IS ISSUED AND A 100 MICROSECOND TIME PREFORMED.
                                        ;*THE ''ILR'' BIT IS AGAIN TESTED BUT SHOULD NOW BE RESET.
      005602                            SP
 (1)                                    ; ******************************************************************
 (1)                                    ;*PROCEDURE
 (1)                                    ;*---------
                                        ;*BGNTST
                                        ;*  SELECT THE TM78 UNDER TEST
                                        ;*  CLEAR MASSBUS REGISTER 0 (CS1)
                                        ;*  SET THE LOOP COUNTER TO 54(8)
                                        ;*  BGNDO
                                        ;*  :  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
                                        ;*  :  IF THE DATA READ FROM THE MASSBUS REGISTER=0
                                        ;*  :  :  THEN-ERROR 5
                                        ;*  :  :  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
005602                          SE
 (1)                            ; ************************************************************************
 (1)                            ;*ERRORS
 (1)                            ;*------
                                ;*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
                                ;*
                                ;*CZTMIA DVC FTL ERR 000005 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*NON-EXISTENT REG. 00 = 000000 SHOULD BE ZERO
                                ;*
                                ;*CZTMIA DVC FTL ERR 000006 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8956, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*TM78 "ILR" NOT SET AFTER REG. 00 READ
                                ;*
                                ;*CZTMIA DVC FTL ERR 000019 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8956, M8957, MASSBUS
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*"ILR" NOT CLEAR WHEN WRITTEN CLEAR
005602                          S
 (1)                            ; ************************************************************************
005602                                  BGNTST
005602  005037  004412                   CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
005606  013777  004352  176424           MOV     MBDRIV,@CS2     ;LOAD TM78 UNIT NUMBER
005614  005077  176410                   CLR     @XFRCMD         ;CLEAR CAS REGISTER 0
005620  012701  000054                   MOV     #54,R1          ;SET UP THE REGISTER POINTER
005624                          3$:     BGNSEG
005626  017102  004230                   MOV     @XFRCMD(R1),R2  ;READ NON EXISTENT MB REGISTER
005632  032777  010000  176400           BIT     #NED,@CS2
005640  001426                           BEQ     5$
005642                                   ERRDF   2.,RHCAS,ERM002
005652  012777  000040  176360           MOV     #MBINIT,@CS2    ;CLEAR THE NED ERROR
005660                                   DELAY   5               ;WAIT 1 MS.
```

```
1834  005710  013777  004352  176322          MOV     MBDRIV,@CS2
1835  005716                          5$:     CKLOOP
1836  005720  005702                          TST     R2                  ;DATA=ZERO?
1837  005722  001404                          BEQ     1$                  ;YES-CONTINUE
1838  005724                                  ERRDF   5,RHCAS,ERM005      ;NO-ERROR
1839  005734                          1$:     CKLOOP
1840  005736  017702  176340                  MOV     @DS80,R2            ;READ MB REGISTER 52
1841  005742  032702  010000                  BIT     #ILR,R2             ;"ILR" SET?
1842  005746  001004                          BNE     2$                  ;YES-CONTINUE
1843  005750                                  ERRDF   6,RHCAS,ERM006      ;NO-ERROR
1844  005760                          2$:     CKLOOP
1845  005762  052777  000040  176250          BIS     #MBINIT,@CS2        ;CLEAR "ILR"
1846  005770                                  DELAY   5                   ;WAIT 1 MS.
1847  006020  013777  004352  176212          MOV     MBDRIV,@CS2         ;LOAD THE MASS BUSS DRIVE NUMBER
1848  006026  012777  000400  176246          MOV     #HOLD,@DS80         ;HOLD THE TM78 MP
1849  006034  017702  176242                  MOV     @DS80,R2            ;GET THE TM78 MP STATUS
1850  006040  032702  010000                  BIT     #ILR,R2             ;"ILR" CLEAR?
1851  006044  001404                          BEQ     4$                  ;YES-CONTINUE
1852  006046                                  ERRDF   19.,CASX,ERM019     ;NO-ERROR
1853  006056                          4$:     CKLOOP
1854  006060                                  ENDSEG
1855  006062  062701  000002                  ADD     #2,R1               ;INC ILR REGISTER NUMBER
1856  006066  020127  000074                  CMP     R1,#74              ;DONE
1857  006072  001254                          BNE     3$                  ;NO
1858  006074                                  ENDTST                      ;YES
1859                                  .SBTTL  TEST 04 - HOLD TOGGLE TEST
1860  006076                          ST
 (1)                                ;*********************************************************************
 (1)                                ;*TEST TITLE
 (1)                                ;*----- -----
1861                                ;*TEST 4                 HOLD TOGGLE TEST
1862  006076                        SD
 (1)                                ;*********************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
1863                                ;*THIS TEST SETS THE TM78MP "HOLD" BIT IN MB REGISTER 52(8),
1864                                ;*AND TESTS FOR "HLDA".
1865                                ;*THEN MB REGISTER 50(8) IS READ AND THE ADDRESS BITS SAVED,
1866                                ;*A TIME DELAY IS PERFORMED THE REGISTER IS REREAD AND
1867                                ;*COMPARED TO THE INITIAL ADDRESS READ. - THESE ADDRESSES
1868                                ;*SHOULD BE EQUAL.
1869                                ;*
1870                                ;*THEN MB REGISTER 52(8) IS READ
1871                                ;*AND THE DATA BITS SAVED, A TIME DELAY IS PERFORMED AND
1872                                ;*THE REGISTER 52(8) DATA BITS ARE COMPARED WITH THE PREVIOUS
1873                                ;*READING - THESE VALUES SHOULD BE EQUAL.
1874                                ;*
1875                                ;*THEN "HOLD" IS SET TO ZERO AND THE PROGRAM VERIFIES THAT
1876                                ;*"HOLD" AND "HLDA" EQUAL ZERO.
1877  006076                        SP
 (1)                                ;*********************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
1878                                ;*BGNTST
1879                                ;*  CALL SUBROUTINE HOLDMP
1880                                ;*  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
006076                  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 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
                                        ;*
 006076                                 S
                                        ; *******************************************************************

 006076                                         BGNTST
 006076  005037  004412                         CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
 006102                                         BGNSEG                  ;
 006104  004737  033414                         CALL    HOLDMP          ;HOLD THE TM78 MP-WAIT FOR HLDA
 006110  012777  000000  176162                 MOV     #0,@AD80        ;LOAD THE TM78 ADDRESS BUS REGISTER WITH ZERO
 006116  000240                                 NOP                     ;WAIT
 006120  000240                                 NOP                     ;WAIT
 006122  017702  176152                         MOV     @AD80,R2        ;READ TM78 MP ADDRESS BUS
 006126  004737  033372                         CALL    NONEX           ;CHECK FOR NONEX
 006132                                         CKLOOP
                                                                        ;
 006134                                         DELAY   1.              ;WAIT 100 MICRO SECONDS
                                                                        ;
 006164  017703  176110                         MOV     @AD80,R3        ;READ TM78 MP ADDRESS BUS AGAIN
 006170  004737  033372                         CALL    NONEX           ;CHECK FOR NONEX
 006174                                         CKLOOP
 006176  020203                                 CMP     R2,R3           ;COMPARE BOTH ADDRESSES
 006200  001404                                 BEQ     2$              ;CONTINUE IF EQUAL
 006202                                         ERRDF   11.,PROCAS,ERM011
 006212                                 2$:     CKLOOP
 006214                                         ENDSEG
 006216                                         BGNSEG
 006220  017702  176056                         MOV     @DS80,R2        ;READ TM78 MP DATA BUS
 006224  004737  033372                         CALL    NONEX           ;CHECK FOR NONEX
 006230                                         CKLOOP
 006232                                         DELAY   1.              ;WAIT 100 MICRO SECONDS
 006262  017703  176014                         MOV     @DS80,R3        ;READ TM78 MP DATA BUS AGAIN
 006266  004737  033372                         CALL    NONEX           ;CHECK FOR NONEX
 006272                                         CKLOOP
 006274  120203                                 CMPB    R2,R3           ;COMPARE BOTH BUS ADDRESSES
 006276  001404                                 BEQ     1$
 006300                                         ERRDF   10.,PROCAS,ERM010  ;ERROR
 006310                                 1$:     CKLOOP
 006312                                         ENDSEG                  ;
 006314  012777  177777  175756                 MOV     #-1,@AD80       ;LOAD A NONEXISTENT ADDRESS
 006322  005077  175754                         CLR     @DS80           ;DROP HOLD
 006326  004737  033372                         CALL    NONEX           ;
 006332                                         CKLOOP
 006334  017702  175742                         MOV     @DS80,R2        ;READ THE STATUS
 006340  032702  000400                         BIT     #HOLD,R2        ;HOLD=0?
 006344  001404                                 BEQ     3$              ;YES CONTINUE
 006346                                         ERRDF   12.,PROCAS,ERM012  ;NO

 006356                                 3$:     CKLOOP
 006360  032702  001000                         BIT     #HLDA,R2        ;HLDA=0?
 006364  001404                                 BEQ     4$              ;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
```

```
2032  006402  005037  004412                  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
2033  006406  004737  033414                  CALL    HOLDMP          ;HOLD TM78 MP-WAIT FOR HLDA
2034  006412  005003                          CLR     R3
2035  006414  005001                          CLR     R1              ;CLEAR THE ADDRESS
2036  006416                                  BGNSEG
2037  006420  010177  175654          1$:     MOV     R1,@AD80        ;MOVE TO ADDRESS REG IN TM78
2038  006424  017702  175650                  MOV     @AD80,R2        ;READ THE ADDRESS FROM REG IN TM78
2039  006430  020102                          CMP     R1,R2           ;=?
2040  006432  001406                          BEQ     2$              ;YES-CONTINUE
2041  006434                                  ERRDF   16.,CASX,ERM016  ;NO-ERROR
2042  006444  012703  000001                  MOV     #1,R3
2043  006450  005703                  2$:     TST     R3
2044  006452  001401                          BEQ     3$
2045  006454                                  CKLOOP
2046  006456  005201                  3$:     INC     R1              ;INCREMENT THE ADDRESS
2047  006460  001357                          BNE     1$              ;CONTINUE UNTIL DONE
2048  006462                                  ENDSEG
2049  006464                                  ENDTST
2050                                  .SBTTL  TEST 06 - CLEAR FROM HOLD TEST
2051  006466                                  ST
  (1)                                   ;*********************************************************************
  (1)                                   ;*TEST TITLE
  (1)                                   ;*----- -----
2052                                    ;*TEST 6                 CLEAR FROM HOLD TEST
2053  006466                            SD
  (1)                                   ;*********************************************************************
  (1)                                   ;*DESCRIPTION
  (1)                                   ;*-----------
2054                                    ;*THIS TEST SETS THE TM78MP "HOLD" BIT IN MB REGISTER 52(8),
2055                                    ;*CAS REGISTER 21 AND TESTS FOR "HLDA".  THEN THE PDP11
2056                                    ;*PROCESSOR ATTEMPTS TO SET "TMRDY", AND CHECKS THAT
2057                                    ;*IT SETS.
2058                                    ;*
2059                                    ;*THEN MB REGISTER 52(8), CAS REGISTER 21 IS WRITTEN WITH
2060                                    ;*THE "CLEAR" AND "HOLD" BITS SET, AND THE FOLLOWING CON-
2061                                    ;*DITIONS ARE TESTED.
2062                                    ;*
2063                                    ;*      ."HLDA" IS STILL SET
2064                                    ;*      ."TMRDY" IS RESET
2065  006466                            SP
  (1)                                   ;*********************************************************************
  (1)                                   ;*PROCEDURE
  (1)                                   ;*---------
2066                                    ;*BGNTST
2067                                    ;*  CALL SUBROUTINE HOLDMP
2068                                    ;*  LOAD THE TM78 INTERNAL ADDRESS FOR TM READY BIT 100240(8) TO TM78
2069                                    ;*      CAS REGISTER 20(8)
2070                                    ;*  LOAD THE "HOLD" BIT+200(8) TO CAS REGISTER 21(8)
2071                                    ;*  READ CAS REGISTER 21(8)
2072                                    ;*  IF STATUS BIT "TMRDY"=0
2073                                    ;*  :  THEN-ERROR 4
2074                                    ;*  :  ELSE-CONTINUE
2075                                    ;*  ENDIF
2076                                    ;*  LOAD -1 TO CAS REGISTER 20(8)
2077                                    ;*  LOAD THE "HOLD" AND "CLR" BITS IN CAS REGISTER 21(8)
2078                                    ;*  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
 (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 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
 (1)                    ; ***************************************************************************

                                BGNTST
006466  005037  004412          CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
006472  004737  033414          CALL    HOLDMP          ;HOLD THE TM78 MP-WAIT FOR HLDA
006476  012777  100240  175574  MOV     #TMRDST,@AD80   ;LOAD ADDRESS OF TM-READY
006504  012777  000500  175570  MOV     #HOLD+#STMRDY,@DS80  ;SET TM READY
006512  000240                  NOP                     ;
006514  017702  175562          MOV     @DS80,R2        ;GET THE STATUS
006520  032702  100000          BIT     #TMRDY,R2       ;TM READY SET?
006524  001004                  BNE     1$              ;YES-CONTINUE
006526                          ERRDF   04.,CASX,ERM004  ;NO ERROR
006536                  1$:     CKLOOP
006540  012777  077777  175532  MOV     #077777,@AD80   ;LOAD A NON EXISTENT ADDRESS
006546  012777  040400  175526  MOV     #TMCLR+#HOLD,@DS80  ;SET HOLD AND CLEAR
006554                          DELAY   1.              ;WAIT 100 MICRO SECONDS
006604  017702  175472          MOV     @DS80,R2        ;GET TM78 MP STATUS
006610  032702  001000          BIT     #HLDA,R2        ;HLDA SET?
006614  001004                  BNE     2$              ;YES-CONTINUE
006616                          ERRDF   14.,PRO,ERM014  ;NO-ERROR

006626                  2$:     CKLOOP
```

```
006630  032702  100000                  BIT     #TMRDY,R2          ;TM READY SET?
006634  001404                          BEQ     3$                 ;NO-CONTINUE
006636                                  ERRDF   15.,PROCAS,ERM015  ;YES-ERROR

006646                          3$:     CKLOOP
006650                                  ENDTST

                                .SBTTL  TEST 07 - PORT SELECT TEST
006652                          ST
                                ; ****************************************************************
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 7                    PORT SELECT TEST
006652                          SD
                                ; ****************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST CHECKS THE ABILITY OF THE PORT SELECT LOGIC IN THE TM78 TO
                                ;*SELECT TO THE USER SPECIFIED MASS BUS PORT.
006652                          SP
                                ; ****************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*   CALL SUBROUTINE HOLDMP
                                ;*   LOAD THE INTERNAL ADDRESS OF THE PORT SELECT BYTE 100340(8) TO CAS
                                ;*        REGISTER 20(8)
                                ;*   GET THE USER SPECIFIED MASS BUS PORT # (0 OR 1)
                                ;*   IF USER SPECIFIED PORT=0
                                ;*   :  THEN-LOAD THE ''HOLD'' BIT TO CAS REGISTER 21(8)
                                ;*   :  ELSE-LOAD THE ''HOLD'' BIT+200(8) TO CAS REGISTER 21(8)
                                ;*   ENDIF
                                ;*   LOAD THE INTERNAL ADDRESS OF THE PORT SELECT BYTE 100340(8) TO CAS
                                ;*        REGISTER 20(8)
                                ;*   READ CAS REGISTER 21(8)
                                ;*   IF THE VALUE READ=THE VALUE WRITTEN
                                ;*   :  THEN-CONTINUE
                                ;*   :  ELSE-ERROR 17
                                ;*   ENDIF
                                ;*ENDTST
006652                          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 000017 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*M8960
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*PORT X SELECT BIT NOT SET
006652                          S
                                ; ****************************************************************
```

```
 2174  006652                                          BGNTST
 2175  006652  005037  004412                        CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
 2176  006656  004737  033414                        CALL    HOLDMP          ;HOLD TM78MP-WAIT FOR HLDA
 2177  006662  012777  100340  175410                MOV     #MBSEL,@AD80    ;ADDRESS THE PORT SELECT BYTE
 2178  006670  005003                                CLR     R3              ;CLEAR THE EXPECTED DATA BYTE
 2179  006672  013701  004360                        MOV     TMPORT,R1       ;GET THE PORT SELECTED
 2180  006676  001403                                BEQ     1$              ;BRANCH IF PORT 0
 2181  006700  012701  000200                        MOV     #200,R1         ;ELSE-LOAD PORT 1 SELECT BIT
 2182  006704  005203                                INC     R3              ;UPDATE THE EXPECTED DATA BYTE
 2183  006706  062701  000400          1$:           ADD     #HOLD,R1        ;ADD IN HOLD BIT
 2184  006712  010177  175364                        MOV     R1,@DS80        ;LOAD PORT SELECT BYTE
 2185  006716  000240                                NOP
 2186  006720  012777  100340  175352                MOV     #MBSEL,@AD80
 2187  006726  017702  175350                        MOV     @DS80,R2
 2188  006732  042701  177400                        BIC     #177400,R1      ;REMOVE HOLD BIT FROM PORT BYTE
 2189  006736  042702  177577                        BIC     #177577,R2      ;REMOVE BITS FROM ACTUAL
 2190  006742  020102                                CMP     R1,R2           ;PROPER PORT SELECTED
 2191  006744  001404                                BEQ     2$              ;YES-EXIT TEST
 2192                                                                          ;NO-ERROR
 2193  006746                                        ERRDF   17.,PRO,ERM017
 2194
 2195  006756                          2$:           CKLOOP
 2196  006760                                        ENDTST
 2197
 2198                                  .SBTTL  TEST 08 - MASS BUS INIT FROM HOLD TEST
 2199  006762                          ST
  (1)                                 ;*********************************************************************
  (1)                                 ;*TEST TITLE
  (1)                                 ;*---- -----
 2200                                 ;*TEST 8                 MASS BUS INIT FROM HOLD TEST
 2201  006762                          SD
  (1)                                 ;*********************************************************************
  (1)                                 ;*DESCRIPTION
  (1)                                 ;*-----------
 2202                                 ;*THIS TEST SETS THE TM78MP ''HOLD'' BIT IN MB REGISTER 52(8),
 2203                                 ;*CAS REGISTER 21 AND TESTS FOR ''HLDA''.  THEN THE PDP11
 2204                                 ;*PROCESSOR ATTEMPTS TO SET ''TMRDY'', AND CHECKS THAT IT
 2205                                 ;*SETS.
 2206                                 ;*
 2207                                 ;*MB CLEAR IS THEN ISSUED, AND THE FOLLOWING CONDITIONS
 2208                                 ;*ARE TESTED:
 2209                                 ;*
 2210                                 ;*      .''HOLD'' IS RESET
 2211                                 ;*      .''HLDA'' IS RESET
 2212                                 ;*      .''TMRDY'' IS RESET
 2213  006762                          SP
  (1)                                 ;*********************************************************************
  (1)                                 ;*PROCEDURE
  (1)                                 ;*---------
 2214                                 ;*BGNTST
 2215                                 ;*  CALL SUBROUTINE HOLDMP
 2216                                 ;*  LOAD THE TM78 INTERNAL ADDRESS FOR TM READY 100240(8) TO CAS
 2217                                 ;*      REGISTER 20(8)
 2218                                 ;*  LOAD THE ''HOLD'' BIT+100(8) TO CAS REGISTER 21(8)
 2219                                 ;*  CLEAR CAS REGISTER 20(8)
 2220                                 ;*  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
006762                          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)                            ; ************************************************************************

006762                                  BGNTST
006762  005037  004412                  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
006766  004737  033414                  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
```

```
                                        MOV     @DS80,R2        ;GET THE STATUS
                                        BIT     #TMRDY,R2       ;TM READY SET?
                                        BNE     1$              ;YES-CONTINUE
                                        ERRDF   4.,CASX,ERM004  ;NO-ERROR

                                1$:     CKLOOP
                                        BIS     #MBINIT,@CS2    ;ISSUE MASS BUS INIT
                                        NOP
                                        NOP
                                        MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
                                        MOV     @DS80,R2        ;READ THE STATUS
                                        BIT     #HOLD,R2        ;HOLD SET?
                                        BEQ     2$              ;NO-CONTINUE
                                        ERRDF   12.,PROCAS,ERM012  ;YES-ERROR
                                2$:     CKLOOP
                                        BIT     #HLDA,R2        ;HLDA SET?
                                        BEQ     3$              ;NO-CONTINUE
                                        ERRDF   13.,PROCAS,ERM013  ;YES-ERROR
                                3$:     CKLOOP
                                        BIT     #TMRDY,R2       ;TM READY SET?
                                        BEQ     4$              ;NO-CONTINUE
                                        ERRDF   15.,PROCAS,ERM015  ;YES-ERROR

                                4$:     CKLOOP
                                        ENDTST
                                .SBTTL  TEST 09 - TM78 CONTROL BUS PARITY ERROR DETECT TEST
                                ST
                                ; ************************************************************************
                                ;*TEST TITLE
                                ;*---- -----
                                ;*TEST 9                 TM78 CONTROL BUS PARITY ERROR DETECT TEST
                                SD
                                ; ************************************************************************
                                ;*DESCRIPTION
                                ;*-----------
                                ;*THIS TEST SETS THE "PAT" BIT IN MB CONTROLLER AND THEN
                                ;*WRITES CAS REGISTER 3 (MB REGISTER 24) WITH THE TM78 MP
                                ;*IN "HOLD".  CAS REGISTER 21 (MB REGISTER 52) IS READ AND
                                ;*THE "CPE" BIT IS EXPECTED.  THEN THE "PAT" BIT IN THE MB
                                ;*CONTROLLER IS RESET, THE "CPE" BIT IN CAS REGISTER 21
                                ;*(MB REGISTER 52) IS RESET, AND CAS REGISTER 3 (MB REGISTER 24)
                                ;*IS AGAIN WRITTEN. THE "CPE" BIT IS THEN TESTED FOR THE
                                ;*RESET CONDITION.
                                SP
                                ; ************************************************************************
                                ;*PROCEDURE
                                ;*---------
                                ;*BGNTST
                                ;*  CALL SUBROUTINE HOLDMP
                                ;*  SET THE "PAT" BIT IN MB REGISTER 10(8)
                                ;*  CLEAR CAS REGISTER 3
                                ;*  IF THE "CPE" STATUS BIT IN CAS REGISTER 21(8)=1
                                ;*  :  THEN-CONTINUE
                                ;*  :  ELSE-ERROR 23
                                ;*  ENDIF
                                ;*  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                  
007140  005037  004412          CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
007144  004737  033414          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
```

```
 2372  007260  012777  000400  175014          MOV     #HOLD,@DS80     ;CLEAR "CPE" IN THE TM78
 2373  007266  017701  175010                  MOV     @DS80,R1        ;DID IT CLEAR?
 2374  007272  032701  004000                  BIT     #CPE,R1
 2375  007276  001404                          BEQ     2$              ;YES-CONTINUE
 2376  007300                                  ERRDF   24.,RHCAS,ERM024  ;NO-ERROR
 2377
 2378  007310                          2$:     CKLOOP
 2379  007312  005077  174736                  CLR     @DI1            ;WRITE AGAIN
 2380  007316  017701  174760                  MOV     @DS80,R1        ;"CPE" SET?
 2381  007322  032701  004000                  BIT     #CPE,R1         ;
 2382  007326  001404                          BEQ     3$              ;NO-EXIT TEST
 2383  007330                                  ERRDF   25.,RHCAS,ERM025  ;YES-ERROR
 2384  007340                          3$:     CKLOOP
 2385  007342                                  ENDTST                  ;END OF TEST
 2386
 2387                                  .SBTTL  TEST 10 - TM78 CONTROL BUS PARITY ERROR FORCE TEST
 2388  007344                          ST
  (1)                                 ; ******************************************************************
  (1)                                 ;*TEST TITLE
  (1)                                 ;*---- -----
 2389                                 ;*TEST 10       TM78 CONTROL BUS PARITY ERROR FORCE TEST
 2390  007344                          SD
  (1)                                 ; ******************************************************************
  (1)                                 ;*DESCRIPTION
  (1)                                 ;*-----------
 2391                                 ;*THIS TEST "HOLDS" THE TM78 MICRO PROCESSOR AND SETS THE EVEN
 2392                                 ;*PARITY "EVPAR" BIT IN CAS REGISTER 21 (MB REGISTER 52).
 2393                                 ;*THEN CAS REGISTER 3 (MB REGISTER 24) IS READ AND THE MB
 2394                                 ;*STATUS BIT "MCPE" IS EXPECTED.  THEN A MB INIT IS ISSUED
 2395                                 ;*AND THE TM78 MP AGAIN HELD.  CAS REGISTER 3 (MB REGISTER 24)
 2396                                 ;*IS THEN READ AGAIN, AND NO ERROR IS EXPECTED.
 2397  007344                          SP
  (1)                                 ; ******************************************************************
  (1)                                 ;*PROCEDURE
  (1)                                 ;*---------
 2398                                 ;*BGNTST
 2399                                 ;*  CALL SUBROUTINE HOLDMP
 2400                                 ;*  LOAD THE "HOLD" BIT AND "EVPAR" BIT IN CAS REGISTER 21(8)
 2401                                 ;*  READ CAS REGISTER 3
 2402                                 ;*  IF THE "MCPE" STATUS BIT IN MB REGISTER 0=1
 2403                                 ;*  :  THEN-CONTINUE
 2404                                 ;*  :  ELSE-ERROR 26
 2405                                 ;*  ENDIF
 2406                                 ;*  LOAD THE "CLEAR" BIT IN MB REGISTER 10(8)
 2407                                 ;*  DELAY
 2408                                 ;*  SELECT THE TM78 UNDER TEST
 2409                                 ;*  LOAD THE "HOLD" BIT IN CAS REGISTER 21(8) CLEAR "EVPAR"
 2410                                 ;*  READ CAS REGISTER 3
 2411                                 ;*  IF THE "MCPE" BIT IN MB REGISTER 0=0
 2412                                 ;*  :  THEN-CONTINUE
 2413                                 ;*  :  ELSE-ERROR 27
 2414                                 ;*  ENDIF
 2415                                 ;*ENDTST
 2416  007344                          SE
  (1)                                 ; ******************************************************************
  (1)                                 ;*ERRORS
```

```
 (1)                                    ;*------
2417                                    ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
2418                                    ;*M8957, M8960
2419                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
2420                                    ;*"HLDA" NOT SET  STATUS = 000000
2421                                    ;*
2422                                    ;*CZTMIA DVC FTL ERR 000026 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
2423                                    ;*M8956, M8957, MASSBUS
2424                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
2425                                    ;*MP "MCPE" NOT SET
2426                                    ;*
2427                                    ;*CZTMIA DVC FTL ERR 000027 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
2428                                    ;*M8956, M8957, MASSBUS
2429                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
2430                                    ;*MB "MCPE" SET
2431  007344                            S
 (1)                                    ; ************************************************************************
2432
2433  007344                                BGNTST
2434  007344  005037  004412                CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
2435  007350  004737  033414                CALL    HOLDMP          ;HOLD TM78 MP-WAIT FOR HLDA
2436  007354  012777  002400  174720        MOV     #HOLD+#EVPAR,@DS80  ;SET THE EVEN PARITY BIT
2437  007362  017701  174666                MOV     @DI1,R1         ;READ A CAS REGISTER
2438  007366  017701  174636                MOV     @XFRCMD,R1      ;GET MASS BUS REGISTER 0
2439  007372  032701  020000                BIT     #MCPE,R1        ;MASS BUS PARITY ERROR
2440  007376  001004                        BNE     1$              ;YES-CONTINUE
2441  007400                                ERRDF   26.,RHCAS,ERM026  ;NO-ERROR
2442
2443  007410                            1$: CKLOOP
2444  007412  052777  000040  174620        BIS     #MBINIT,@CS2    ;ISSUE MB INIT
2445  007420                                DELAY   5               ;WAIT 1 MS.
2446  007450  013777  004352  174562        MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
2447  007456  012777  000400  174616        MOV     #HOLD,@DS80     ;HOLD THE TM78 MP
2448  007464  000240                        NOP
2449  007466  017701  174562                MOV     @DI1,R1         ;READ A CAS REGISTER
2450  007472  017701  174532                MOV     @XFRCMD,R1      ;GET THE MASS BUS REG. 0
2451  007476  032701  020000                BIT     #MCPE,R1        ;MASS BUS PARITY ERROR?
2452  007502  001404                        BEQ     2$              ;NO-EXIT
2453  007504                                ERRDF   27.,RHCAS,ERM027  ;YES-ERROR
2454
2455  007514                            2$: CKLOOP
2456  007516                                ENDTST                  ;END OF TEST
2457                                    .SBTTL  TEST 11 - TM78 ROM MEMORY TEST
2458
2459  007520                            ST
 (1)                                    ; ************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*---- -----
2460                                    ;*  TEST 11 TM78 ROM MEMORY TEST
2461  007520                            SD
 (1)                                    ; ************************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
2462                                    ;*  THIS TEST CHECKS PARITY IN ROM FROM 00000 (8) TO 37777 (8)
2463                                    ;*  BY READING FROM THE LAST 4 LOCATIONS IN EACH ROM CHIP.  THESE
2464                                    ;*  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
                        ; ****************************************************************************
                        ;*ERRORS
```

```
  (1)                                   ;*------
 2516                                   ;*  TM78CLT DVC FTL ERR 000034 ON UNIT NN TST NNN SUB 000 PL:  XXXXXX
 2517                                   ;*  M8960
 2518                                   ;*  RH: AAAAAA TM: X TU: X PORT: X
 2519                                   ;*  TM78 ROM PARITY FAILURE
 2520                                   ;*  ADD = 000000
 2521                                   ;*
 2522                                   ;*  TM78CLT DVC FTL ERR 000035 ON UNIT NN TST NNN SUB 000 PL: XXXXXX
 2523                                   ;*  M8960
 2524                                   ;*  RH: AAAAAA  TM: X  TU: X  PORT: X
 2525                                   ;*  TM78 ROM IDENTIFICATION WRONG, CAN'T LOOP ON THIS ERROR
 2526                                   ;*  ADD = 000000
 2527                                   ;*  IDEN = 000
 2528                                   ;*  VER = 000
 2529                                   ;*
 2530                                   ;*  TM78CLT DVC FTL ERROR 000036 ON UNIT NN TST NNN SUB 000 PL: XXXXXX
 2531                                   ;   M8960
 2532                                   ;*  RH: AAAAAA  TM: X  TU: X  PORT: X
 2533                                   ;*  ROM PARITY ERROR NOT SET AND SHOULD BE
 2534                                   ;*  ADD = 000000
 2535                                   ;*  IDEN = 000
 2536                                   ;*  VER = 000
 2537                                   ;*
 2538                                   ;*  TM78CLT DVC FTL ERR 000037 ON UNIT NN TST NNN SUB 000 PL: XXXXXX
 2539                                   ;*  M8960
 2540                                   ;*  RH: AAAAAA  TM: X  TU: X  PORT: X
 2541                                   ;*  ROM PARITY ERROR
 2542                                   ;*  ADD = 000000
 2543                                   ;*  IDEN = 000
 2544                                   ;*  VER = 000
 2545  007520                           S
  (1)                                   ; ************************************************************************
 2546  007520                                   BGNTST                          ;CLEAR ERROR LOOP FLAG
 2547  007520  005037  004412                   CLR     CASLD                   ;CLEAR THE CAS PROGRAM LOADED FLAG
 2548  007524  004737  033414                   CALL    HOLDMP                  ;HOLD THE TM78 - WAIT FOR HLDA
 2549  007530  012703  037777                   MOV     #37777,R3               ;GET LAST ADDRESS
 2550  007534  012702  000010                   MOV     #10,R2                  ;GET ROM ID #
 2551  007540  005037  004226           1$:     CLR     ERRLP
 2552  007544  012704  004000                   MOV     #4000,R4                ;INITIALIZE COUNTER
 2553  007550  005302                           DEC     R2                      ;DECREMENT ROM ID #
 2554  007552  002002                           BGE     2$                      ;BRANCH IF NOT DONE
 2555  007554  000137  010116                   JMP     10$                     ;DONE
 2556  007560  012705  004216           2$:     MOV     #ROMIDT,R5              ;R5 CONTAINS ROM STORAGE INFORMATION ADDRESS
 2557  007564  012701  000004                   MOV     #4,R1                   ;SET UP COUNTER
 2558  007570                           3$:     BGNSEG
 2559  007572  010377  174502                   MOV     R3,@AD80                ;LOAD STARTING ADDRESS
 2560  007576  017725  174500                   MOV     @DS80,(R5)+             ;STORE ROM INFORMATION
 2561  007602  032777  020000  174472           BIT     #20000,@DS80            ;SEE IF PARITY ERROR
 2562  007610  001414                           BEQ     4$                      ;BRANCH IF NO ERROR
 2563  007612                                   ERRDF   34.,PRO,ERM034
 2564  007622  052777  040400  174452           BIS     #40400,@DS80            ;CLEAR PARITY ERROR
 2565  007630  012737  000001  004226           MOV     #1,ERRLP                ;SET ERROR FLAG
 2566  007636  162705  000002                   SUB     #2,R5                   ;RESTORE ERROR INFORMATION
 2567  007642                           4$:     CKLOOP
 2568  007644                                   ENDSEG
 2569  007646  005737  004226                   TST     ERRLP                   ;SEE IF ERROR
```

```
2570  007652  001404                          BEQ     11$             ;ERROR, GO GET ANOTHER ROM
2571  007654  062701  003774                  ADD     #3774,R1
2572  007660  160103                          SUB     R1,R3
2573  007662  000726                          BR      1$
2574  007664  005304                  11$:    DEC     R4              ;DECREMENT # OF ADDRESSES LEFT TO TEST
2575  007666  005303                          DEC     R3              ;DECREMENT ADDRESS
2576  007670  005301                          DEC     R1              ;DECREMENT ROM INFORMATION COUNTER
2577  007672  001336                          BNE     3$              ;BRANCH IF NOT DONE
2578  007674  012705  004216                  MOV     #ROMIDT,R5      ;GET ROM ID #
2579  007700  042715  177400                  BIC     #177400,(R5)    ;CLEAR OFF GARBAGE BITS
2580  007704  020215                          CMP     R2,(R5)         ;SEE IF ROM HAS CORRECT ID #
2581  007706  001411                          BEQ     5$              ;BRANCH IF YES
2582  007710  062703  000004                  ADD     #4,R3           ;GET ID ADDRESS
2583  007714                                  ERRDF   35.,PRO,ERM035
2584  007724  162703  004000                  SUB     #4000,R3        ;GET ADDRESS OF NEXT ROM
2585  007730  000703                          BR      1$              ;GO GET ANOTHER ROM
2586  007732  042765  177400  000004  5$:     BIC     #177400,4(R5)   ;MASK OFF HIGH BITS
2587  007740  042765  177400  000006          BIC     #177400,6(R5)   ;MASK OFF HIGH BITS
2588  007746  000365  000004                  SWAB    4(R5)           ;COMBINED HIGH & LOW BYTES TO MAKE ADDRESS
2589  007752  056565  000006  000004          BIS     6(R5),4(R5)     ;
2590  007760  020365  000004          6$:     CMP     R3,4(R5)        ;SEE IF LAST USED ADDRESS IN ROM
2591  007764  001426                          BEQ     8$              ;BRANCH IF YES
2592  007766                                  BGNSEG
2593  007770  010377  174304                  MOV     R3,@AD80        ;LOAD ADDRESS
2594  007774  017701  174302                  MOV     @DS80,R1        ;DUMMY READ
2595  010000  032777  020000  174274          BIT     #20000,@DS80    ;SEE IF PARITY ERROR SET
2596  010006  001004                          BNE     7$              ;BRANCH IF YES (NO ERROR)
2597  010010                                  ERRDF   36.,PRO,ERM036
2598  010020  052777  040400  174254  7$:     BIS     #40400,@DS80    ;RESET PARITY ERROR BIT
2599  010026                                  CKLOOP
2600  010030                                  ENDSEG
2601  010032  005303                          DEC     R3              ;GET NEXT ADDRESS
2602  010034  005304                          DEC     R4              ;DECREMENT COUNTER
2603  010036  001640                          BEQ     1$              ;BRANCH IF DONE WITH ROM
2604  010040  000747                          BR      6$              ;CONTINUE LOOP
2605  010042                          8$:     BGNSEG
2606  010044  010377  174230                  MOV     R3,@AD80        ;LOAD ADDRESS
2607  010050  017701  174226                  MOV     @DS80,R1        ;DUMMY READ
2608  010054  032777  020000  174220          BIT     #20000,@DS80    ;SEE IF PARITY ERROR
2609  010062  001407                          BEQ     9$              ;BRANCH IF NO PARITY ERROR
2610  010064                                  ERRDF   37.,PRO,ERM037
2611  010074  052777  040400  174200          BIS     #40400,@DS80    ;RESET PARITY ERROR
2612  010102                          9$:     CKLOOP
2613  010104                                  ENDSEG
2614  010106  005303                          DEC     R3              ;GET NEXT ADDRESS
2615  010110  005304                          DEC     R4              ;AM I DONE YET
2616  010112  001612                          BEQ     1$              ;YES?
2617  010114  000752                          BR      8$              ;GO GET MORE
2618  010116                          10$:    ENDTST
2619
2620
2621                                  .SBTTL  TEST 12 - TM78 MEMORY TEST - LOW ADDRESS LINES
2622
2623  010120                                  ST
 (1)                                      ;*****************************************************************************
 (1)                                      ;*TEST TITLE
```

```
  (1)                                   ;*----- -----
 2624                                   ;*TEST 12       TM78 MEMORY TEST - LOW ADDRESS BITS AS DATA
 2625  010120                          SD
  (1)                                   ; ****************************************************************************
  (1)                                   ;*DESCRIPTION
  (1)                                   ;*-----------
 2626                                   ;*THIS TEST CHECKS THE TM78 RAM FROM LOCATION 40000(8) TO 50000(8) BY
 2627                                   ;*WRITING THE LEAST SIGNIFICANT 8 BITS OF THE ADDRESS INTO THE BYTE AT
 2628                                   ;*THAT ADDRESS.
 2629  010120                          SP
  (1)                                   ; ****************************************************************************
  (1)                                   ;*PROCEDURE
  (1)                                   ;*---------
 2630                                   ;*BGNTST
 2631                                   ;*  CALL SUBROUTINE HOLDMP
 2632                                   ;*  INITIALIZE THE ADDRESS TO 40000(8)
 2633                                   ;*  BGNDO
 2634                                   ;*  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
 2635                                   ;*  :  LOAD THE LEAST SIGNIFICANT 8 BITS OF THE ADDRESS AND THE HOLD BIT
 2636                                   ;*  :       IN CAS REGISTER 21(8)
 2637                                   ;*  :  INCREMENT THE ADDRESS BY 1
 2638                                   ;*  :  DO UNTIL THE ADDRESS=50000(8)
 2639                                   ;*  ENDDO
 2640                                   ;*  INITIALIZE THE ADDRESS TO 40000(8)
 2641                                   ;*  BGNDO
 2642                                   ;*  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
 2643                                   ;*  :  INPUT CAS REGISTER 21(8) LOW 8 BITS
 2644                                   ;*  :  IF LOW 8 BITS OF CAS REGISTER 21(8)=LOW 8 BITS OF ADDRESS
 2645                                   ;*  :  :  THEN-CONTINUE
 2646                                   ;*  :  :  ELSE-ERROR 28
 2647                                   ;*  :  ENDIF
 2648                                   ;*  :  INCREMENT THE ADDRESS BY 1
 2649                                   ;*  :  DO UNTIL THE ADDRESS=50000(8)
 2650                                   ;*  ENDDO
 2651                                   ;*ENDTST
 2652  010120                          SE
  (1)                                   ; ****************************************************************************
  (1)                                   ;*ERRORS
  (1)                                   ;*------
 2653                                   ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 2654                                   ;*M8957, M8960
 2655                                   ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 2656                                   ;*''HLDA'' NOT SET  STATUS = 000000
 2657                                   ;*
 2658                                   ;*CZTMIA DVC FTL ERR 000028 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 2659                                   ;*M8960
 2660                                   ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 2661                                   ;*TM78 MEMORY FAILURE
 2662                                   ;*ADD = 000000
 2663                                   ;*ACT = 000000
 2664                                   ;*EXP = 000000
 2665  010120                          S
  (1)                                   ; ****************************************************************************
 2666
 2667  010120                                  BGNTST
 2668  010120  005037  004412                 CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
```

```
2669  010124  004737  033414          CALL    HOLDMP          ;HOLD THE TM78MP-WAIT FOR HLDA
2670  010130  012703  040000          MOV     #040000,R3      ;LOAD STARTING MEMORY ADDRESS
2671  010134  010377  174140    1$:   MOV     R3,@AD80        ;ADDRESS THE TM78
2672  010140  010302                  MOV     R3,R2           ;COPY THE ADDRESS
2673  010142  042702  177400          BIC     #177400,R2      ;AND OFF LO BYTE
2674  010146  052702  000400          BIS     #HOLD,R2        ;ADD IN THE HOLD BIT
2675  010152  010277  174124          MOV     R2,@DS80        ;WRITE IT TO THE TM78MP
2676  010156  005203                  INC     R3              ;INCREMENT THE MEMORY ADDRESS
2677  010160  022703  050000          CMP     #050000,R3      ;COMPARE TO FINAL ADDRESS
2678  010164  001363                  BNE     1$              ;CONTINUE UNTIL DONE
2679
2680  010166  012703  040000          MOV     #040000,R3      ;LOAD THE STARTING MEMORY ADDRESS
2681  010172                    3$:   BGNSEG
2682  010174  010377  174100          MOV     R3,@AD80        ;ADDRESS TM78 RAM
2683  010200  010302                  MOV     R3,R2           ;COPY ADDRESS TO R2
2684  010202  042702  177400          BIC     #177400,R2      ;REMOVE LO BYTE
2685  010206  017704  174070          MOV     @DS80,R4        ;GET CONTENTS OF TM78 RAM
2686  010212  042704  177400          BIC     #177400,R4      ;REMOVE DATA BYTE
2687  010216  020204                  CMP     R2,R4           ;EXPECTED=ACTUAL?
2688  010220  001410                  BEQ     2$              ;YES-CONTINUE
2689                                                          ;NO-PRINT ERROR
2690  010222                          ERRDF   28.,PRO,ERM028
2691  010232  052702  000400          BIS     #HOLD,R2        ;REWRITE THE FAILING LOCATION
2692  010236  010277  174040          MOV     R2,@DS80
2693
2694  010242                    2$:   CKLOOP
2695  010244                          ENDSEG
2696  010246  005203                  INC     R3              ;INCREMENT THE TM78 ADDRESS
2697  010250  022703  050000          CMP     #050000,R3      ;DONE?
2698  010254  001346                  BNE     3$              ;NO-KEEP ON TRUKIN'
2699  010256                          ENDTST                  ;YES-HANG IT UP
2700
2701
2702                                .SBTTL  TEST 13 - TM78 MEMORY TEST - HIGH ADDRESS LINES
2703
2704  010260                    ST
 (1)                              ;*********************************************************************
 (1)                              ;*TEST TITLE
 (1)                              ;*---- -----
2705                              ;TEST 13        TM78 MEMORY TEST - HIGH ADDRESS BITS AS DATA
2706  010260                    SD
 (1)                              ;*********************************************************************
 (1)                              ;*DESCRIPTION
 (1)                              ;*-----------
2707                              ;*THIS TEST CHECKS THE TM78 RAM FROM LOCATION 40000(8) TO 50000(8) BY
2708                              ;*WRITING THE MOST SIGNIFICANT 8 BITS OF THE ADDRESS INTO THE BYTE AT
2709                              ;*THAT ADDRESS.
2710  010260                    SP
 (1)                              ;*********************************************************************
 (1)                              ;*PROCEDURE
 (1)                              ;*---------
2711                              ;*BGNTST
2712                              ;*  CALL SUBROUTINE HOLDMP
2713                              ;*  INITIALIZE THE ADDRESS TO 40000(8)
2714                              ;*  BGNDO
2715                              ;*  :  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 FAIL ER
                                ;*ADD = 000000
                                ;*ACT = 000000
                                ;*EXP = 000000
010260                          S
 (1)                            ; ****************************************************************************

010260                                  BGNTST
010260  005037  004412                  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
010264  004737  033414                  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
```

```
2768  010352  017704  173724                  MOV     @DS80,R4        ;GET CONTENTS OF TM78 RAM
2769  010356  042704  177400                  BIC     #177400,R4      ;REMOVE DATA BYTE
2770  010362  020204                          CMP     R2,R4           ;EXPECTED=ACTUAL?
2771  010364  001410                          BEQ     2$              ;YES-CONTINUE
2772                                                                  ;NO-PRINT ERROR
2773  010366                                  ERRDF   28.,PRO,ERM028
2774  010376  052702  000400                  BIS     #HOLD,R2        ;REWRITE FAILING LOCATION
2775  010402  010277  173674                  MOV     R2,@DS80
2776
2777  010406                          2$:     CKLOOP
2778  010410                                  ENDSEG
2779  010412  005203                          INC     R3              ;INCREMENT THE TM78 ADDRESS
2780  010414  022703  050000                  CMP     #050000,R3      ;DONE?
2781  010420  001345                          BNE     3$              ;NO-KEEP ON TRUKIN'
2782  010422                                  ENDTST                  ;YES-HANG IT UP
2783
2784                                  .SBTTL  TEST 14 - TM78 MEMORY TEST - DATA RELIABILITY
2785  010424                          ST
 (1)                                ; ******************************************************************************
 (1)                                ;*TEST TITLE
 (1)                                ;*---- -----
2786                                ;*TEST 14       TM78 MEMORY TEST - DATA RELIABILITY
2787  010424                          SD
 (1)                                ; ******************************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
2788                                ;*THIS TEST CHECKS THE TM78 RAM FROM LOCATION 40000(8) TO 50000(8) BY
2789                                ;*WRITING DATA OF 000-377(8) TO EACH RAM LOCATION AND CHECKING THE DATA.
2790  010424                          SP
 (1)                                ; ******************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
2791                                ;*BGNTST
2792                                ;*  CALL SUBROUTINE HOLDMP
2793                                ;*  CLEAR THE DATA PATTERN
2794                                ;*  BGNDO
2795                                ;*  :  INITIALIZE THE ADDRESS TO 40000(8)
2796                                ;*  :  BGNDO
2797                                ;*  :  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
2798                                ;*  :  :  LOAD THE DATA PATTERN + THE HOLD BIT IN CAS REGISTER 21(8)
2799                                ;*  :  :  INCREMENT THE ADDRESS BY 1
2800                                ;*  :  :  DO UNTIL THE ADDRESS=50000(8)
2801                                ;*  :  ENDDO
2802                                ;*  :  INITIALIZE THE ADDRESS TO 40000(8)
2803                                ;*  :  BGNDO
2804                                ;*  :  :  LOAD THE ADDRESS IN CAS REGISTER 20(8)
2805                                ;*  :  :  INPUT CAS REGISTER 21(8) LOW 8 BITS
2806                                ;*  :  :  IF LOW 8 BITS OF CAS REGISTER 21(8)=
2807                                ;*  :  :  :  THEN-CONTINUE
2808                                ;*  :  :  :  ELSE-ERROR 28
2809                                ;*  :  :  ENDIF
2810                                ;*  :  :  INCREMENT THE ADDRESS BY 1
2811                                ;*  :  :  DO UNTIL THE ADDRESS=50000(8)
2812                                ;*  :  ENDDO
2813                                ;*  :  INCREMENT THE DATA PATTERN BY 1
2814                                ;*  :  DO UNTIL THE DATA PATTERN=0
```

```
                                        ;*  ENDDO
                                        ;*ENDTST
010424                                  SE
 (1)                                    ; ************************************************************************
 (1)                                    ;*ERRORS
 (1)                                    ;*------
                                        ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000   .: 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
010424                                  S
 (1)                                    ; ************************************************************************

010424                                          BGNTST
010424  005037  004412                          CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
010430  004737  033414                          CALL    HOLDMP          ;HOLD THE TM78MP-WAIT FOR HLDA
010434  005002                                  CLR     R2              ;SET UP STARTING DATA PATTERN
010436  005001                                  CLR     R1              ;CLEAR THE ERROR OCCURED FLAG
010440  012703  040000          4$:     MOV     #040000,R3      ;LOAD STARTING MEMORY ADDRESS
010444  010377  173630          1$:     MOV     R3,@AD80        ;ADDRESS THE TM78
010450  042702  177400                  BIC     #177400,R2      ;REMOVE JUNK BITS
010454  052702  000400                  BIS     #HOLD,R2        ;ADD IN THE HOLD BIT
010460  010277  173616                  MOV     R2,@DS80        ;WRITE IT TO THE TM78MP
010464  005203                          INC     R3              ;INCREMENT THE MEMORY ADDRESS
010466  022703  050000                  CMP     #050000,R3      ;COMPARE TO FINAL ADDRESS
010472  001364                          BNE     1$              ;CONTINUE UNTIL DONE
010474  012703  040000                  MOV     #040000,R3      ;LOAD THE STARTING MEMORY ADDRESS
010500                                  BGNSEG
010502  010377  173572          3$:     MOV     R3,@AD80        ;ADDRESS TM78 RAM
010506  042702  177400                  BIC     #177400,R2      ;REMOVE JUNK BITS
010512  017704  173564                  MOV     @DS80,R4        ;GET CONTENTS OF TM78 RAM
010516  042704  177400                  BIC     #177400,R4      ;REMOVE DATA BYTE
010522  020204                          CMP     R2,R4           ;EXPECTED=ACTUAL?
010524  001412                          BEQ     2$              ;YES-CONTINUE
010526                                  ERRDF   28.,PRO,ERM028  ;NO - PRINT ERROR
010536  012701  000001                  MOV     #1,R1           ;SET THE ERROR OCCURED FLAG
010542  052702  000400                  BIS     #HOLD,R2        ;REWRITE THE FAILING LOCATION
010546  010277  173530                  MOV     R2,@DS80
010552  005701          2$:     TST     R1              ;HAVE ANY ERRORS OCCURED?
010554  001401                          BEQ     5$              ;NO - SKIP THE CKLOOP TO SAVE TIME
010556                                  CKLOOP
010560  005203          5$:     INC     R3              ;INCREMENT THE TM78 ADDRESS
010562  022703  050000                  CMP     #050000,R3      ;DONE?
010566  001345                          BNE     3$              ;NO-KEEP ON TRUKIN'
010570                                  ENDSEG
010572  005202                          INC     R2              ;YES-INCREMENT THE DATA BYTE
010574  020227  000400                  CMP     R2,#400         ;ALL PATTERNS RUN?
010600  001317                          BNE     4$              ;NO-KEEP ON TRUKIN'
```

```
                        ENDTST                  ;YES-HANG IT UP
                .SBTTL  TEST 15 - CAS WRITE/READ TEST - ADDRESS TO ADDRESS
010604          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 M8 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
010604                                  $
 (1)                                    ; ************************************************************************
010604                                          BGNTST
010604  005037  004412                          CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
010610  004737  033414                          CALL    HOLDMP          ;STOP THE 8085
010614  012702  000002                          MOV     #2,R2           ;INITIALIZE THE DATA BYTE
010620  005001                                  CLR     R1              ;CLEAR THE BUFFER POINTER
010622  010261  032102                  1$:     MOV     R2,MBBUF(R1)    ;WRITE DATA TO THE BUFFER
010626  005201                                  INC     R1              ;ADD #2 TO THE BUFFER POINTER
010630  005201                                  INC     R1
010632  005202                                  INC     R2              ;ADD #1 TO THE DATA BYTE
010634  020127  000036                          CMP     R1,#30.         ;END OF BUFFER?
010640  001370                                  BNE     1$              ;NO-CONTINUE
010642  004737  032610                          CALL    CASWRT          ;GO WRITE CAS FROM HOST
010646  004737  032712                          CALL    CASRED          ;GO READ CAS FROM HOST
010652  004737  033260                          CALL    CASCMP          ;GO COMPARE DATA
010656                                          ENDTST
                                        .SBTTL  TEST 16 - TM78 BASIC CONFIDENCE TEST
010660                                  ST
 (1)                                    ; ************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*----- -----
                                        ;*TEST 16       TM78 BASIC CONFIDENCE TEST
010660                                  SD
 (1)                                    ; ************************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
                                        ;*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-DIAGNUSTIC RAM THE ADDRESSING CAPABILITY
                                        ;*OF THE 8085.
010660                                  SP
 (1)                                    ; ************************************************************************
 (1)                                    ;*PROCEDURE
 (1)                                    ;*---------
                                        ;*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
```

```
2957                                    ;*ENDTST
2958  010660                            SE
 (1)                                    ; ****************************************************************************
 (1)                                    ;*ERRORS
 (1)                                    ;*------
2959                                    ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
2960                                    ;*M8957, M8960
2961                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
2962                                    ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
2963  010660                            S
 (1)                                    ; ****************************************************************************
2964
2965  010660                                    BGNTST
2966  010660  004737  032502                   CALL    CASBOT
2967  010664  005705                           TST     ERRCOD
2968  010666  001402                           BEQ     2$
2969  010670                                    EXIT    TST
2970  010674  004737  033414           2$:     CALL    HOLDMP          ;STOP THE TM78
2971  010700  012777  041420  173372           MOV     #CASCMD,@AD80   ;ADDRESS THE COMMAND LOCATION
2972  010706  012777  000403  173366           MOV     #HOLD+3,@DS80   ;STORE THE MEMORY TEST COMMAND
2973  010714  004737  014762                   CALL    DIAGST          ;START THE DIAGNOSTIC MONITOR
2974  010720  005705                           TST     ERRCOD          ;ERROR?
2975  010722  001402                           BEQ     5$              ;NO - CONTINUE
2976  010724                                    EXIT    TST             ;YES - EXIT THE TEST
2977  010730  012777  000035  173272   5$:     MOV     #TSTART,@XFRCMD ;ISSUE CODE 35
2978  010736  012702  000214                   MOV     #140.,R2        ;TIMES TO DELAY TO EQUAL 35 SEC .
2979  010742                           6$:     DELAY   250             ;DELAY 25 MS.
2980  010772                                   BREAK                   ;
2981  010774  005302                           DEC     R2              ;DECREMENT LOOP COUNT
2982  010776  001361                           BNE     6$              ;DO IT AGAIN
2983  011000  013777  004352  173232           MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
2984  011006  122777  000372  173214           CMPB    #372,@XFRCMD    ;DID PROC TEST FINISH.
2985  011014  001404                           BEQ     1$              ;YES-DONE
2986  011016                                   ERRDF   8.,PROCAS,ERM008
2987  011026                           1$:     CKLOOP
2988  011030  004737  021660                   CALL    CLOSEX          ;CLOSE THE CHANNEL
2989
2990  011034                                    ENDTST
2991
2992
2993                                    .SBTTL  TEST 17 - CAS CONTENTION INTERRUPT TEST
2994  011036                            ST
 (1)                                    ; ****************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*---- -----
2995                                    ;*TEST 17       CAS CONTENTION INTERRUPT TEST
2996  011036                            SD
 (1)                                    ; ****************************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
2997                                    ;*THIS TEST CHECKS THE OPERATION OF THE CAS CONTENTION (BETWEEN THE
2998                                    ;*HOST AND THE 8085.) ERROR LOGIC.  TO TEST THE PROPER OPERATION OF
2999                                    ;*THE LOGIC A PROGRAM MUST BE LOADED AND EXECUTED IN THE TM78 THAT
3000                                    ;*ACCESSES CAS WHILE THE HOST ACCESSES CAS.
3001  011036                            SP
 (1)                                    ; ****************************************************************************
```

```
 (1)                                    ;*PROCEDURE
 (1)                                    ;*---------
3002                                    ;*BGNTST
3003                                    ;*  CALL SUBROUTINE CASBOT (LOAD THE CAS PROGRAM)
3004                                    ;*  IF A BOOT ERROR
3005                                    ;*  :  THEN-EXIT TEST
3006                                    ;*  :  ELSE-CONTINUE
3007                                    ;*  ENDIF
3008                                    ;*  CALL SUBROUTINE HOLDMP
3009                                    ;*
3010                                    ;*  LOAD THE ADDRESS OF THE CAS CONTROL BYTE 41420 TO CAS REGISTER 20(8)
3011                                    ;*  LOAD THE "HOLD" BIT+002 TO CAS REGISTER 21(8)
3012                                    ;*  CALL SUBROUTINE CONT
3013                                    ;*  LOAD THE DIAGNOSTIC START/RESTART COMMAND 35(8) TO MB REGISTER 0
3014                                    ;*  SET UP A TIMEOUT COUNT
3015                                    ;*  BGNDO
3016                                    ;*  :  READ ALL THE MB REGISTERS 000-052(8)
3017                                    ;*  :  DECREMENT THE TIMEOUT COUNT
3018                                    ;*  :  DO UNTIL TIMEOUT COUNT=0 OR MB REGISTER 0=372(8)
3019                                    ;*  ENDDO
3020                                    ;*  IF TIMEOUT COUNT=0
3021                                    ;*  :  THEN-ERROR 18
3022                                    ;*  :  ELSE-CONTINUE
3023                                    ;*  ENDIF
3024                                    ;*ENDTST
3025  011036                            SE
 (1)                                    ; ***************************************************************************
 (1)                                    ;*ERRORS
 (1)                                    ;*------
3026                                    ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3027                                    ;*M8957, M8960
3028                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3029                                    ;*"HLDA" NOT SET  STATUS = 000000
3030                                    ;*
3031                                    ;*CZTMIA DVC FTL ERR 000018 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3032                                    ;*M8956, M8957
3033                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3034                                    ;*NO CONTENTION ERROR OCCURRED
3035  011036                            S
 (1)                                    ; ***************************************************************************
3036
3037  011036                                    BGNTST
3038  011036  004737  032502                    CALL    CASBOT          ;BOOT UP THE CAS PROGRAM
3039  011042  005705                            TST     ERRCOD
3040  011044  001402                            BEQ     5$
3041  011046                                    EXIT    TST
3042  011052  004737  033414           5$:     CALL    HOLDMP
3043  011056  012737  000777  004346            MOV     #777,COUNT      ;LOAD TIMEOUT COUNT
3044  011064  012777  041420  173206            MOV     #CASCMD,@AD80   ;ADDRESS THE COMMAND BYTE
3045  011072  012777  000402  173202            MOV     #HOLD+2,@DS80   ;WRITE THE CONTENTION TEST COMMAND
3046  011100  004737  014762                    CALL    DIAGST
3047  011104  005705                            TST     ERRCOD          ;ERROR?
3048  011106  001402                            BEQ     4$              ;NO - CONTINUE
3049  011110                                    EXIT    TST             ;YES - EXIT THE TEST
3050  011114  012777  000035  173106   4$:     MOV     #TSTART,@XFRCMD ;
3051  011122  013701  004230           2$:     MOV     XFRCMD,R1       ;LOAD STARTING CAS ADDRESS
```

```
                                                1$:     MOV     (R1)+,R0        ;READ MASS BUS REGISTER
                                                        CMP     AD80,R1
                                                        BNE     1$
                                                        CMPB    #372,@XFRCMD    ;DID A CONTENTION INTERRUPT OCCUR?
                                                        BEQ     6$              ;YES-CONTENTION ERROR OCCURRED
                                                        DEC     COUNT           ;NO-TRY AGAIN?
                                                        BNE     2$              ;YES-CONTINUE
                                                                                ;NO-ERROR
                                                        ERRDF   18.,CASX,ERM018

                                                6$:     CKLOOP
                                                        ENDTST

                                                .SBTTL  TEST 18 - CAS WRITE TEST - ALL ZEROS
                                                ST
                                                ; ************************************************************************
                                                ;*TEST TITLE
                                                ;*---- -----
                                                ;*TEST 18        CAS WRITE TEST - ALL ZEROS
                                                SD
                                                ; ************************************************************************
                                                ;*DESCRIPTION
                                                ;*-----------
                                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                                ;*HOST CPU WITH A DATA PATTERN OF 000000(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 000000(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
011170                          S
 (1)                            ; ****************************************************************************

                                        BGNTST
011170                                  CLR     R2
011170  005002                          CALL    CASCOW
011172  004737  032246                  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
      011200                       S
(1)                                ; ***********************************************************************

      011200                               BGNTST
      011200  012702  177777               MOV     #177777,R2      ;LOAD ALL ONES DATA PATTERN
      011204  004737  032246               CALL    CASCOW          ;
      011210                               ENDTST

                                   .SBTTL  TEST 20 - CAS WRITE TEST - DATA PATTERN 153271
      011212                       ST
(1)                                ; ***********************************************************************
(1)                                ;*TEST TITLE
(1)                                ;*---- -----
                                   ;*TEST 20       CAS WRITE TEST - DATA PATTERN 153271
      011212                       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 153271(8), READING THE PATTERN FROM
                                   ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
                                   ;*ARE LOGGED.
      011212                       SP
(1)                                ; ***********************************************************************
(1)                                ;*PROCEDURE
(1)                                ;*---------
                                   ;*BGNTST
                                   ;*  SET UP THE DATA PATTERN 153271(8)
                                   ;*  CALL SUBROUTINE CASCOW
                                   ;*ENDTST
      011212                       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
011212                          S
 (1)                            ; **********************************************************************

                                        BGNTST
011212                          
012702  153271                          MOV     #153271,R2      ;LOAD ALTERNATE ZEROS AND ONES
004737  032246                          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
 (1)                                    ; ******************************************************************************

                                                BGNTST
011224                                          
011224  012702  175747                          MOV     #175747,R2      ;LOAD ALTERNATE ZEROS AND ONES
011230  004737  032246                          CALL    CASCOW
011234                                          ENDTST

                                        .SBTTL  TEST 22 - CAS WRITE TEST - DATA PATTERN 062232
011236                                  ST
 (1)                                    ; ******************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*---- -----
                                        ;*TEST 22       CAS WRITE TEST - DATA PATTERN 062232
011236                                  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 062132(8), READING THE PATTERN FROM
                                        ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
                                        ;*ARE LOGGED.
011236                                  SP
 (1)                                    ; ******************************************************************************
 (1)                                    ;*PROCEDURE
 (1)                                    ;*---------
                                        ;*BGNTST
                                        ;*  SET UP THE DATA PATTERN 062132(8)
                                        ;*  CALL SUBROUTINE CASCOW
                                        ;*ENDTST
011236                                  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
011236                          S
 (1)                            ; ************************************************************************

                                        BGNTST
011236                          
011236  012702  062132                  MOV     #062132,R2      ;LOAD ALTERNATE ZEROS AND ONES
011242  004737  032246                  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  012702  042002                  MOV     #042002,R2      ;LOAD ALTERNATE ZEROS AND ONES
011254  004737  032246                  CALL    CASCOW
011260                                  ENDTST

                                .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)                                ;*------
3355                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3356                                ;*M8956, M8957, MASSBUS
3357                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3358                                ;*"NED" WHEN READING MB REG.
3359                                ;*
3360                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3361                                ;*M8957, M8960
3362                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3363                                ;*"HLDA" NOT SET  STATUS = 000000
3364                                ;*
3365                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3366                                ;*M8957, M8960
3367                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3368                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3369                                ;*
3370                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3371                                ;*M8956, M8957
3372                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3373                                ;*CAS DATA COMPARE FAIL
3374                                ;*CAS REG. 000000
3375                                ;*
3376                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3377                                ;*M8956, M8957, MASSBUS
3378                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3379                                ;*PARITY ERR. WRITING CAS REG. 000000
3380  011262                        S
 (1)                                ; ************************************************************************
3381
3382  011262                            BGNTST
3383  011262  012702  070066           MOV     #070066,R2      ;LOAD ALTERNATE ZEROS AND ONES
3384  011266  004737  032246           CALL    CASCOW
3385  011272                            ENDTST
3386
3387                                .SBTTL  TEST 25 - CAS WRITE TEST - DATA PATTERN 102332
3388  011274                        ST
 (1)                                ; ************************************************************************
 (1)                                ;*TEST TITLE
 (1)                                ;*---- -----
3389                                ;*TEST 25       CAS WRITE TEST - DATA PATTERN 102332
3390  011274                        SD
 (1)                                ; ************************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
3391                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3392                                ;*HOST CPU WITH A DATA PATTERN OF 102332(8), READING THE PATTERN FROM
3393                                ;*THE TM78, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE ERRORS
3394                                ;*ARE LOGGED.
3395  011274                        SP
 (1)                                ; ************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
3396                                ;*BGNTST
3397                                ;*  SET UP THE DATA PATTERN 102332(8)
3398                                ;*  CALL SUBROUTINE CASCOW
3399                                ;*ENDTST
```

```
  3400  011274                        SE
   (1)                                ; ************************************************************************
   (1)                                ;*ERRORS
   (1)                                ;*------
  3401                                ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
  3402                                ;*M8956, M8957, MASSBUS
  3403                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
  3404                                ;*"NED" WHEN READING MB REG.
  3405                                ;*
  3406                                ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
  3407                                ;*M8957, M8960
  3408                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
  3409                                ;*"HLDA" NOT SET  STATUS = 000000
  3410                                ;*
  3411                                ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
  3412                                ;*M8957, M8960
  3413                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
  3414                                ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
  3415                                ;*
  3416                                ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
  3417                                ;*M8956, M8957
  3418                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
  3419                                ;*CAS DATA COMPARE FAIL
  3420                                ;*CAS REG. 000000
  3421                                ;*
  3422                                ;*CZTMIA DVC FTL ERR 000030 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
  3423                                ;*M8956, M8957, MASSBUS
  3424                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
  3425                                ;*PARITY ERR. WRITING CAS REG. 000000
  3426  011274                        S
   (1)                                ; ************************************************************************
  3427
  3428  011274                                BGNTST
  3429  011274  012702  102332                MOV     #102332,R2      ;LOAD ALTERNATE ZEROS AND ONES
  3430  011300  004737  032246                CALL    CASCOW
  3431  011304                                ENDTST
  3432
  3433                                .SBTTL  TEST 26 - CAS WRITE TEST - FLOAT A 1
  3434  011306                        ST
   (1)                                ; ************************************************************************
   (1)                                ;*TEST TITLE
   (1)                                ;*---- -----
  3435                                ;*TEST 26       CAS WRITE TEST - FLOAT A 1
  3436  011306                        SD
   (1)                                ; ************************************************************************
   (1)                                ;*DESCRIPTION
   (1)                                ;*-----------
  3437                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
  3438                                ;*HOST CPU WITH A DATA PATTERN THAT FLOATS A ONE THROUGH A FIELD OF ZEROS,
  3439                                ;*READING THE PATTERN FROM THE TM78 SIDE, AND COMPARING THE WRITTEN WITH
  3440                                ;*THE READ FOR EACH SHIFT OF THE PATTERN.  DATA COMPARE ERRORS ARE LOGGED.
  3441  011306                        SP
   (1)                                ; ************************************************************************
   (1)                                ;*PROCEDURE
   (1)                                ;*---------
  3442                                ;*BGNTST
```

```
                                ;*  CALL SUBROUTINE CASBOT
                                ;*  IF ERRCOD=0
                                ;*  :  THEN-CONTINUE
                                ;*  :  ELSE-EXIT TEST
                                ;*  ENDIF
                                ;*  LOAD STARTING DATA PATTERN 000001(8)
                                ;*  BGNDO
                                ;*  :  CALL SUBROUTINE CASDAT
                                ;*  :  CALL SUBROUTINE CASWRT
                                ;*  :  CALL SUBROUTINE CASTMR
                                ;*  :  CALL SUBROUTINE CASCMP
                                ;*  :  ROTATE THE DATA PATTERN LEFT
                                ;*  :  DO UNTIL THE DATA PATTERN=ZERO
                                ;*  ENDDO
                                ;*ENDTST
011306                          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
011306                          S
 (1)                            ; ************************************************************************

011306                                  BGNTST
011306  004737  032502                  CALL    CASBOT          ;BOOT UP THE CAS PROGRAM
011312  005705                          TST     ERRCOD
011314  001402                          BEQ     5$
011316                                  EXIT    TST
011322  012702  000001          5$:     MOV     #1,R2           ;LOAD THE STARTING DATA PATTERN
011326  010237  004330          1$:     MOV     R2,CASDTA       ;STORE THE DATA PATTERN
011332                                  BGNSEG
011334  004737  014566                  CALL    START           ;START THE TM78
```

```
3495  011340  004737  032564                CALL    CASDAT          ;FILL THE CAS DATA BUFFER
3496  011344  004737  033414                CALL    HOLDMP
3497  011350  012777  041420  172722        MOV     #CASCMD,@AD80   ;ADDRESS COMMAND BYTE
3498  011356  012777  000400  172716        MOV     #HOLD,@DS80     ;ISSUE THE READ CAS FROM TM78MP COMMAND
3499  011364  004737  014566                CALL    START
3500  011370  004737  032610                CALL    CASWRT          ;GO WRITE CAS FROM HOST
3501  011374                                CKLOOP
3502  011376  012777  000035  172624        MOV     #TSTART,@XFRCMD
3503  011404                                DELAY   100             ;PERFORM A 10MS. TIMEOUT
3504  011434  122777  000372  172566        CMPB    #372,@XFRCMD    ;DONE
3505  011442  001406                        BEQ     3$              ;YES-CONTINUE
3506  011444                                ERRDF   8.,PROCAS,ERM008  ;NO-PRINT THE ERROR
3507  011454                                CKLOOP
3508  011456  000406                        BR      6$              ;EXIT THE MODULE
3509  011460                        3$:     CKLOOP
3510  011462  004737  033020                CALL    CASTMR          ;GO READ CAS FROM TM78
3511  011466  004737  033260                CALL    CASCMP          ;GO COMPARE WRITTEN/READ
3512  011472                                CKLOOP
3513  011474                        6$:     ENDSEG
3514  011476  013702  004330                MOV     CASDTA,R2       ;GET THE PATTERN JUST WRITTEN
3515  011502  000241                        CLC                     ;CLEAR THE C BIT
3516  011504  006102                        ROL     R2              ;SHIFT THE PATTERN LEFT
3517  011506  103307                        BCC     1$
3518  011510                                ENDTST
3519
3520                                .SBTTL  TEST 27 - CAS WRITE TEST - FLOAT A ZERO
3521  011512                        ST
 (1)                                ; ******************************************************************************
 (1)                                ;*TEST TITLE
 (1)                                ;*---- -----
3522                                ;*TEST 27       CAS WRITE TEST - FLOAT A ZERO
3523  011512                        SD
 (1)                                ; ******************************************************************************
 (1)                                ;*DESCRIPTION
 (1)                                ;*-----------
3524                                ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3525                                ;*HOST CPU WITH A DATA PATTERN THAT FLOATS A ZERO THROUGH A FIELD OF ONES,
3526                                ;*READING THE PATTERN FROM THE TM78 SIDE, AND COMPARING THE WRITTEN WITH
3527                                ;*THE READ FOR EACH SHIFT OF THE PATTERN.  DATA COMPARE ERRORS ARE LOGGED.
3528  011512                        SP
 (1)                                ; ******************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
3529                                ;*BGNTST
3530                                ;*  CALL SUBROUTINE CASBOT
3531                                ;*  IF ERRCOD=0
3532                                ;*  :  THEN-CONTINUE
3533                                ;*  :  ELSE-EXIT TEST
3534                                ;*  ENDIF
3535                                ;*  LOAD STARTING DATA PATTERN 177776(8)
3536                                ;*  BGNDO
3537                                ;*  :  CALL SUBROUTINE CASDAT
3538                                ;*  :  CALL SUBROUTINE CASWRT
3539                                ;*  :  CALL SUBROUTINE CASTMR
3540                                ;*  :  CALL SUBROUTINE CASCMP
3541                                ;*  :  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  004737  032502                CALL    CASBOT          ;BOOT UP THE CAS PROGRAM
  011516  005705                        TST     ERRCOD
  011520  001402                        BEQ     5$
  011522                                EXIT    TST
  011526  012702  177776        5$:     MOV     #177776,R2      ;LOAD THE DATA PATTERN
  011532  010237  004330        1$:     MOV     R2,CASDTA       ;STORE THE DATA PATTERN
  011536                                BGNSEG
  011540  004737  014566                CALL    START           ;START THE TM78
  011544  004737  032564                CALL    CASDAT          ;FILL THE CAS DATA BUFFER
  011550  004737  033414                CALL    HOLDMP
  011554  012777  041420  172516        MOV     #CASCMD,@AD80   ;ADDRESS COMMAND BYTE
  011562  012777  000400  172512        MOV     #HOLD,@DS80     ;ISSUE THE READ CAS FROM TM78MP COMMAND
  011570  004737  014566                CALL    START
  011574  004737  032610                CALL    CASWRT          ;GO WRITE CAS FROM HOST
  011600                                CKLOOP
  011602  012777  000035  172420        MOV     #TSTART,@XFRCMD
  011610                                DELAY   100             ;PERFORM A 10MS. TIMEOUT
  011640  122777  000372  172362        CMPB    #372,@XFRCMD    ;DONE
  011646  001406                        BEQ     3$              ;YES-CONTINUE
  011650                                ERRDF   8.,PROCAS,ERM008  ;NO-PRINT THE ERROR
```

```
3594 011660                                  CKLOOP
3595 011662 000406                           BR      6$               ;EXIT THE MODULE
3596 011664                          3$:     CKLOOP
3597 011666 004737 033020                    CALL    CASTMR           ;GO READ CAS FROM TM78
3598 011672 004737 033260                    CALL    CASCMP           ;GO COMPARE WRITTEN/READ
3599 011676                                  CKLOOP
3600 011700                          6$:     ENDSEG
3601 011702 013702 004330                    MOV     CASDTA,R2        ;GET THE PATTERN JUST WRITTEN
3602 011706 000261                           SEC                      ;SET THE C BIT
3603 011710 006102                           ROL     R2               ;MAKE NEXT DATA PATTERN
3604 011712 103707                           BCS     1$
3605 011714                                  ENDTST
3606
3607                                 .SBTTL  TEST 28 - CAS READ TEST - ALL ZEROS
3608 011716                          ST
 (1)                                 ; *******************************************************************
 (1)                                 ;*TEST TITLE
 (1)                                 ;*---- -----
3609                                 ;*TEST 28       CAS READ TEST - ALL ZEROS
3610 011716                          SD
 (1)                                 ; *******************************************************************
 (1)                                 ;*DESCRIPTION
 (1)                                 ;*-----------
3611                                 ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3612                                 ;*TM78 SIDE WITH A DATA PATTERN OF 000000(8), READING THE PATTERN FROM
3613                                 ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
3614                                 ;*ERRORS ARE LOGGED.
3615 011716                          SP
 (1)                                 ; *******************************************************************
 (1)                                 ;*PROCEDURE
 (1)                                 ;*---------
3616                                 ;*BGNTST
3617                                 ;*  SET UP THE DATA PATTERN 000000(8)
3618                                 ;*  CALL SUBROUTINE CASCOR
3619                                 ;*ENDTST
3620 011716                          SE
 (1)                                 ; *******************************************************************
 (1)                                 ;*ERRORS
 (1)                                 ;*------
3621                                 ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3622                                 ;*M8956, M8957, MASSBUS
3623                                 ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3624                                 ;*"NED" WHEN READING MB REG.
3625                                 ;*
3626                                 ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3627                                 ;*M8957, M8960
3628                                 ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3629                                 ;*"HLDA" NOT SET  STATUS = 000000
3630                                 ;*
3631                                 ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3632                                 ;*M8957, M8960
3633                                 ;*RH: AAAAAA  TM: X  TU: X  PORT. X
3634                                 ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3635                                 ;*
3636                                 ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3637                                 ;*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  032430                  ENDTST
011724

                                .SBTTL  TEST 29 - CAS READ TEST - ALL ONES
011726                          ST
 (1)                            ; ****************************************************************************
 (1)                            ;*TEST TITLE
 (1)                            ;*---- -----
                                ;*TEST 29       CAS READ TEST - ALL ONES
011726                          SD
 (1)                            ; ****************************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
                                ;*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
 (1)                            ; ****************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 177777(8)
                                ;*  CALL SUBROUTINE CASCOR
                                ;*ENDTST
011726                          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
011726                                  S
 (1)                                    ; ************************************************************************

                                                BGNTST
011726                                          MOV     #177777,R2      ;LOAD THE DATA PATTERN
011726  012702  177777                  
011732  004737  032430                            CALL    CASCOR
011736                                          ENDTST

                                        .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
011740                          SD
 (1)                            ; ****************************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
                                ;*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.
011740                          SP
 (1)                            ; ****************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 153271(8)
                                ;*  CALL SUBROUTINE CASCOR
                                ;*ENDTST
011740                          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
011740                          S
 (1)                            ; ****************************************************************************

011740                                  BGNTST
011740  012702  153271                  MOV     #153271,R2      ;LOAD THE DATA PATTERN
011744  004737  032430                  CALL    CASCOR
011750                                  ENDTST

                                .SBTTL  TEST 31 - CAS READ TEST - DATA PATTERN 175747
011752                          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  032430                  CALL    CASCOR
011762                                  ENDTST
```

```
                                .SBTTL  TEST 32 - CAS READ TEST - DATA PATTERN 062132
011764                          ST
 (1)                            ; ******************************************************************************
 (1)                            ;*TEST TITLE
 (1)                            ;*---- -----
                                ;*TEST 32       CAS READ TEST - DATA PATTERN 062132
011764                          SD
 (1)                            ; ******************************************************************************
 (1)                            ;*DESCRIPTION
 (1)                            ;*-----------
                                ;*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
 (1)                            ; ******************************************************************************
 (1)                            ;*PROCEDURE
 (1)                            ;*---------
                                ;*BGNTST
                                ;*  SET UP THE DATA PATTERN 062132(8)
                                ;*  CALL SUBROUTINE CASCOR
                                ;*ENDTST
011764                          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
011764                          S
 (1)                            ; ******************************************************************************

011764                                  BGNTST
```

```
3859  011764  012702  062132                MOV     #062132,R2      ;LOAD THE DATA PATTERN
3860  011770  004737  032430                CALL    CASCOR
3861  011774                                ENDTST
3862
3863                                  .SBTTL  TEST 33 - CAS READ TEST - DATA PATTERN 042002
3864  011776                          ST
 (1)                                  ; ***************************************************************************
 (1)                                  ;*TEST TITLE
 (1)                                  ;*---- -----
3865                                  ;*TEST 33       CAS READ TEST - DATA PATTERN 042002
3866  011776                          SD
 (1)                                  ; ***************************************************************************
 (1)                                  ;*DESCRIPTION
 (1)                                  ;*-----------
3867                                  ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
3868                                  ;*TM78 SIDE WITH A DATA PATTERN OF 042002(8), READING THE PATTERN FROM
3869                                  ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
3870                                  ;*ERRORS ARE LOGGED.
3871  011776                          SP
 (1)                                  ; ***************************************************************************
 (1)                                  ;*PROCEDURE
 (1)                                  ;*---------
3872                                  ;*BGNTST
3873                                  ;*  SET UP THE DATA PATTERN 042002(8)
3874                                  ;*  CALL SUBROUTINE CASCOR
3875                                  ;*ENDTST
3876  011776                          SE
 (1)                                  ; ***************************************************************************
 (1)                                  ;*ERRORS
 (1)                                  ;*------
3877                                  ;*CZTMIA DVC FTL ERR 000003 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3878                                  ;*M8956, M8957, MASSBUS
3879                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3880                                  ;*"NED" WHEN READING MB REG.
3881                                  ;*
3882                                  ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3883                                  ;*M8957, M8960
3884                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3885                                  ;*"HLDA" NOT SET  STATUS = 000000
3886                                  ;*
3887                                  ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3888                                  ;*M8957, M8960
3889                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3890                                  ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
3891                                  ;*
3892                                  ;*CZTMIA DVC FTL ERR 000009 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3893                                  ;*M8956, M8957
3894                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3895                                  ;*CAS DATA COMPARE FAIL
3896                                  ;*CAS REG. 000000
3897                                  ;*
3898                                  ;*CZTMIA DVC FTL ERR 000029 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
3899                                  ;*M8956, M8957, MASSBUS
3900                                  ;*RH: AAAAAA  TM: X  TU: X  PORT: X
3901                                  ;*PARITY ERR. READING CAS REG. 000000
3902  011776                          S
```

```
                                        ; *******************************************************************

011776                                          BGNTST
011776  012702  042002                          MOV     #042002,R2      ;LOAD THE DATA PATTERN
012002  004737  032430                          CALL    CASCOR
012006                                          ENDTST

                                        .SBTTL  TEST 34 - CAS READ TEST - DATA PATTERN 070066
012010                                  ST
                                        ; *******************************************************************
                                        ;*TEST TITLE
                                        ;*---- -----
                                        ;*TEST 34       CAS READ TEST - DATA PATTERN 070066
012010                                  SD
                                        ; *******************************************************************
                                        ;*DESCRIPTION
                                        ;*-----------
                                        ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                        ;*TM78 SIDE WITH A DATA PATTERN OF 070066(8), READING THE PATTERN FROM
                                        ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
                                        ;*ERRORS ARE LOGGED.
012010                                  SP
                                        ; *******************************************************************
                                        ;*PROCEDURE
                                        ;*---------
                                        ;*BGNTST
                                        ;*  SET UP THE DATA PATTERN 070066(8)
                                        ;*  CALL SUBROUTINE CASCOR
                                        ;*ENDTST
012010                                  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
                                        ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                        ;*CAS DATA COMPARE FAIL
                                        ;*CAS REG. 000000
                                        ;*M8956, M8957
                                        ;*
                                        ;*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
012010                                  S
                                        ; ********************************************************************
                                        
012010                                          BGNTST
012010  012702  070066                          MOV     #070066,R2      ;LOAD THE DATA PATTERN
012014  004737  032430                          CALL    CASCOR
012020                                          ENDTST
                                        
                                        .SBTTL  TEST 35 - CAS READ TEST - DATA PATTERN 102332
012022                                  ST
                                        ; ********************************************************************
                                        ;*TEST TITLE
                                        ;*----- -----
                                        ;*TEST 35       CAS READ TEST - DATA PATTERN 102332
012022                                  SD
                                        ; ********************************************************************
                                        ;*DESCRIPTION
                                        ;*-----------
                                        ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                        ;*TM78 SIDE WITH A DATA PATTERN OF 102332(8), READING THE PATTERN FROM
                                        ;*THE HOST CPU, AND COMPARING THE WRITTEN WITH THE READ.  DATA COMPARE
                                        ;*ERRORS ARE LOGGED.
012022                                  SP
                                        ; ********************************************************************
                                        ;*PROCEDURE
                                        ;*---------
                                        ;*BGNTST
                                        ;*  SET UP THE DATA PATTERN 102332(8)
                                        ;*  CALL SUBROUTINE CASCOR
                                        ;*ENDTST
012022                                  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
                                        ;*PH: 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
012022                                  S
 (1)                                    ; ************************************************************************

                                                BGNTST
012022                                          MOV     #102332,R2      ;LOAD THE DATA PATTERN
012022  012702  102332                  CALL    CASCOR
012026  004737  032430                  ENDTST
012032

                                        .SBTTL  TEST 36 - CAS READ TEST - FLOAT A 1
012034                                  ST
 (1)                                    ; ************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*---- -----
                                        ;*TEST 36       CAS READ TEST - FLOAT A 1
012034                                  SD
 (1)                                    ; ************************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
                                        ;*THIS TEST CHECKS THE COMMON ADDRESS SPACE BY WRITING THE CAS FROM THE
                                        ;*TM78 SIDE WITH A DATA PATTERN THAT FLOATS A 1 THROUGH A FIELD OF ZEROS,
                                        ;*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.
012034                                  SP
 (1)                                    ; ************************************************************************
 (1)                                    ;*PROCEDURE
 (1)                                    ;*---------
                                        ;*BGNTST
                                        ;*  CALL SUBROUTINE CASBOT
                                        ;*  IF ERRCOD=0
                                        ;*  :  THEN-CONTINUE
                                        ;*  .  ELSE-EXIT TEST
                                        ;*  ENDIF
                                        ;*  LOADING STARTING DATA PATTERN 000001(8)
                                        ;*  BGNDO
                                        ;*  :  CALL SUBROUTINE CASDAT
                                        ;*  :  CALL SUBROUTINE CASTMW
                                        ;*  :  CALL SUBROUTINE CASRED
                                        ;*  :  CALL SUBROUTINE CASCMP
                                        ;*  :  ROTATE THE DATA PATTERN LEFT
                                        ;*  :  DO UNTIL THE DATA PATTERN=ZERO
                                        ;*  ENDDO
                                        ;*ENDTST
012034                                  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
012034                                  S
 (1)                                    ; ************************************************************************
                                                BGNTST
012034                                          CALL    CASBOT          ;BOOT THE CAS PROGRAM
012034  004737  032502                    5$:     MOV     #1,R2           ;LOAD THE DATA PATTERN
012040  005705                            1$:     TST     ERRCOD
012042  001402                                    BEQ     5$
012044                                          EXIT    TST
012050  012702  000001                            MOV     R2,CASDTA       ;STORE THE DATA PATTERN
012054  010237  004330                            BGNSEG
012060                                          CALL    START           ;START THE TM78
012062  004737  014566                          CALL    CASDAT          ;FILL THE CAS DATA BUFFER
012066  004737  032564                          CALL    CASTMW          ;GO WRITE CAS FROM TM78
012072  004737  033070                          CALL    CASRED          ;GO READ CAS FROM HOST
012076  004737  032712                          CKLOOP
012102                                          CALL    CASCMP          ;COMPARE WRITTEN/READ
012104  004737  033260                          CKLOOP
012110                                          ENDSEG
012112                                          MOV     CASDTA,R2       ;GET THE PATTERN JUST WRITTEN
012114  013702  004330                          CLC                     ;CLEAR THE C BIT
012120  000241                                  ROL     R2              ;SHIFT THE PATTERN LEFT
012122  006102                                  BCC     1$              ;DO UNTIL THE ONE IS SHIFTED OUT
012124  103353                                  ENDTST
012126

                                        .SBTTL  TEST 37 - CAS READ TEST - FLOAT A 0
012130                                  ST
 (1)                                    ; ************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*---- -----
                                        ;*TEST 37       CAS READ TEST - FLOAT A 0
012130                                  SD
 (1)                                    ; ************************************************************************
 (1)                                    ;*DESCRIPTION
 (1)                                    ;*-----------
                                        ;*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
```

```
 4130  012130  004737  032502                  CALL    CASBOT          ;BOOT THE CAS PROGRAM
 4131  012134  005705                          TST     ERRCOD
 4132  012136  001402                          BEQ     5$
 4133  012140                                  EXIT    TST
 4134  012144  012702  177776          5$:     MOV     #177776,R2      ;LOAD THE DATA PATTERN
 4135  012150  010237  0C 330          1$:     MOV     R2,CASDTA       ;STORE THE DATA PATTERN
 4136  012154                                  BGNSEG
 4137  012156  004737  014566                  CALL    START           ;START THE TM78
 4138  012162  004737  032564                  CALL    CASDAT          ;FILL THE CAS DATA BUFFER
 4139  012166  004737  033070                  CALL    CASTMW          ;GO WRITE CAS FROM TM78
 4140  012172  004737  032712                  CALL    CASRED          ;GO READ CAS FROM HOST
 4141  012176                                  CKLOOP
 4142  012200  004737  033260                  CALL    CASCMP          ;COMPARE WRITTEN/READ
 4143  012204                                  CKLOOP
 4144  012206                                  ENDSEG
 4145  012210  013702  004330                  MOV     CASDTA,R2       ;GET THE PATTERN JUST WRITTEN
 4146  012214  000261                          SEC                     ;SET THE C BIT
 4147  012216  006102                          ROL     R2              ;ROTATE THE PATTERN LEFT
 4148  012220  103753                          BCS     1$              ;DO UNTIL CARRY IS SET
 4149  012222                                  ENDTST                  ;
 4150
 4151                          .SBTTL  TEST 38 - CAS REGISTER 4 TEST
 4152  012224                 ST
   (1)                          ; ******************************************************************************
   (1)                          ;*TEST TITLE
   (1)                          ;*---- -----
 4153                           ;*TEST 38               CAS REGISTER 4 TEST
 4154  012224                 SE
   (1)                          ; ******************************************************************************
   (1)                          ;*ERRORS
   (1)                          ;*------
 4155                           ;*CZTMIA DVC FTL ERR 00000/ ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 4156                           ;*M8957, M8960
 4157                           ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 4158                           ;*''HLDA'' NOT SET  STATUS = 000000
 4159                           ;*
 4160                           ;*CZTMIA DVC FTL ERR 000008 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 4161                           ;*M8957, M8960
 4162                           ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 4163                           ;*MICRO DIAGNOSTIC RESPONSE TIMEOUT
 4164                           ;*
 4165                           ;*CZTMIA DVC FTL ERR 000020 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 4166                           ;*M8956, M8957
 4167                           ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 4168                           ;*DATA FROM CAS REG 4 NOT AS EXPECTED
 4169                           ;*ACT = 000000
 4170                           ;*EXP = 000000
 4171                           ;*
 4172                           ;*CZTMIA DVC FTL ERR 000021 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
 4173                           ;*M8956, M8957
 4174                           ;*RH: AAAAAA  TM: X  TU: X  PORT: X
 4175                           ;*ATTEN. REG. = 000000 AFTER WRITTEN CLEAR
 4176  012224                 S
   (1)                          ; ******************************************************************************
 4177
 4178  012224                         BGNTST
```

```
 4179  012224  004737  032502            CALL    CASBOT          ;BOOT THE CAS PROGRAM
 4180  012230  005705                    TST     ERRCOD
 4181  012232  001402                    BEQ     5$
 4182  012234                            EXIT    TST
 4183  012240  012702  177777      5$:   MOV     #-1,R2          ;LOAD THE DATA PATTERN
 4184  012244  010237  004330      3$:   MOV     R2,CASDTA       ;STORE THE DATA PATTERN
 4185  012250  004737  032564            CALL    CASDAT          ;FILL THE COMPARE BUFFER
 4186  012254  004737  033070            CALL    CASTMW          ;GO WRITE CAS FROM TM78
 4187  012260  017702  171762            MOV     @AS,R2          ;READ THE ATTENTION SUMMARY
 4188  012264  020237  032102            CMP     R2,MBBUF        ;=EXPECTED?
 4189  012270  001404                    BEQ     1$              ;YES-CONTINUE
 4190  012272                            ERRDF   20.,CASX,ERM020
 4191
 4192  012302                      1$:   CKLOOP
 4193  012304  012777  177777  171734    MOV     #-1,@AS         ;WRITE ALL 1'S TO ATTENTION
 4194  012312  000240                    NOP                     ;WAIT
 4195  012314  017702  171726            MOV     @AS,R2          ;GET THE ATTENTION SUMMARY
 4196  012320  001404                    BEQ     2$              ;ZERO-CONTINUE
 4197                                                            ;ELSE-ERROR
 4198  012322                            ERRDF   21.,CASX,ERM021
 4199
 4200  012332                      2$:   CKLOOP
 4201  012334  013702  004330            MOV     CASDTA,R2       ;GET LAST DATA USED
 4202  012340  000241                    CLC                     ;CLEAR THE C BIT
 4203  012342  006102                    ROL     R2              ;SHIFT IT LEFT
 4204  012344  020227  177400            CMP     R2,#177400      ;ALL ATTENTION BITS SET?
 4205  012350  001335                    BNE     3$              ;NO-CONTINUE
 4206  012352                            ENDTST                  ;YES-END OF TEST
 4207
 4208                                    .SBTTL  TEST 39 - INTERRUPT TEST
 4209  012354                           ST
  (1)                                    ;******************************************************************************
  (1)                                    ;*TEST TITLE
  (1)                                    ;*---- -----
 4210                                    ;*TEST 39       INTERRUPT TEST
 4211  012354                           SD
  (1)                                    ;******************************************************************************
  (1)                                    ;*DESCRIPTION
  (1)                                    ;*-----------
 4212                                    ;*THIS TEST CHECKS THE ABILITY OF THE TM78 TO PROPERLY INTERRUPT THE CPU
 4213                                    ;*THROUGH THE MASS BUS.
 4214  012354                           SP
  (1)                                    ;******************************************************************************
  (1)                                    ;*PROCEDURE
  (1)                                    ;*---------
 4215                                    ;*BGNTST
 4216                                    ;*  ISSUE MASS BUS INIT
 4217                                    ;*  WAIT
 4218                                    ;*  CALL SUBROUTINE HOLDMP
 4219                                    ;*  CLEAR THE ATTENTION SUMMARY REGISTER
 4220                                    ;*  SET UP THE INTERRUPT VECTOR ADDRESS
 4221                                    ;*  SET THE CPU PRIORITY TO ZERO
 4222                                    ;*  LOAD 100241(8) IN CAS REGISTER 20(8)
 4223                                    ;*  LOAD "HOLD" BIT IN CAS REGISTER 21(8)
 4224                                    ;*  IF INTERRUPT OCCURED
 4225                                    ;*  :  THEN - CONTINUE
```

```
                                        ;*  :  ELSE - ERROE
                                        ;*  ENDIF
                                        ;*ENDTST
4229  012354                            SE
 (1)                                    ; ************************************************************************
 (1)                                    ;*ERRORS
 (1)                                    ;*------
4230                                    ;*CZTMIA DVC FTL ERR 000007 ON UNIT NN  TST NNN  SUB 000  PC· XXXXXX
4231                                    ;*M8957, M8960
4232                                    ;*RH: AAAAAA  TM: X  TU: X  PORT: X
4233                                    ;*''HLDA'' NOT SET  STATUS = 000000
4234                                    ;*
4235                                    ;*CZTMIA DVC FTL ERR 000022 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
4236                                    ;*M8957, M8960
4237                                    ;*UNIT U  RH: AAAAAA  TM: X  TU: X  PORT: X
4238                                    ;*CPU WAS NOT INTERRUPTED BY TM78 SETTING ATTENTION
4239  012354                            S
 (1)                                    ; ************************************************************************
4240
4241  012354                                BGNTST
4242  012354  005037  004412                CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
4243  012360  005037  004410                CLR     INTFLG          ;CLEAR THE INTERRUPT FLAG
4244  012364  012777  000040  171646        MOV     #MBINIT,@CS2    ;ISSUE MASS BUS INIT
4245  012372                                DELAY   10              ;WAIT
4246  012422  004737  033414                CALL    HOLDMP          ;HOLD THE TM78 MP
4247  012426  012777  000377  171612        MOV     #377,@AS        ;CLEAR THE ATTENTION BITS
4248  012434  012777  000100  171566        MOV     #100,@XFRCMD    ;SET THE INTERRUPT ENABLE BIT
4249  012442  013701  004362                MOV     RHVEC,R1        ;GET THE USER ENTERED VECTOR
4250  012446  062701  000002                ADD     #2,R1           ;POINT TO THE PSW PORTION
4251  012452  005011                        CLR     (R1)            ;CLEAR THE NEW PSW
4252  012454                                SETVEC  RHVEC,#INTMB,#PRI07     ;SET UP THE INTERRUPT VECTOR
4253  012502                                SETPRI  #PRI00          ;SET CPU PRIORITY TO 0
4254  012510  012777  100240  171562        MOV     #100240,@AD80   ;SET THE TM READY BIT
4255  012516  012777  000500  171556        MOV     #500,@DS80
4256  012524  000240                        NOP
4257  012526  012777  100241  171544        MOV     #100241,@AD80   ;GENERATE AN INTERRUPT
4258  012534  012777  000400  171540        MOV     #HOLD,@DS80
4259  012542  000240                        NOP                     ;
4260  012544  000240                        NOP                     ;
4261  012546  000240                        NOP                     ;
4262  012550  005737  004410                TST     INTFLG          ;DID THE INTERRUPT OCCUR?
4263  012554  001004                        BNE     1$              ;YES-CONTINUE
4264  012556                                ERRDF   22.,PROCAS,ERM022  ;NO-ERROR
4265  012566                            1$: SETPRI  #PRI07          ;SET CPU PRIORITY TO 7
4266  012574                                CKLOOP                  ;CHECK LOOP ON ERROR
4267  012576                                CLRVEC  RHVEC           ;CLEAR THE VECTOR
4268  012604                                ENDTST
4269  012606                                BGNSRV  INTMB
4270  012606  005237  004410                INC     INTFLG
4271  012612                                ENDSRV
4272
4273                                    .SBTTL  TEST 40 - TM78 MICRO TESTS
4274  012614                            ST
 (1)                                    ; ************************************************************************
 (1)                                    ;*TEST TITLE
 (1)                                    ;*----- -----
```

```
                        ;*TEST 40       TM78 MICRO DIAGNOSTICS
012614                  SD
                        ; ************************************************************************
                        ;*DESCRIPTION
                        ;*-----------
                        ;*THIS TEST HAS TWO MODES OF RUNNING THE MICRO DIAGNOSTIC SCRIPT FILE.
                        ;*THE DEFAULT MODE WILL RUN ALL MICRO DIAGNOSTICS FROM TOP TO BOTTOM.
                        ;*THE ALTERNATE MODE ALLOWS FOR MANUAL EXECUTION OF A SINGLE MICRO
                        ;*DIAGNOSTIC, OR OPERATOR ACKNOWLEDGEMENT BEFORE EACH TEST SECTION IS
                        ;*EXECUTED.
012614                  SP
                        ; ************************************************************************
                        ;*PROCEDURE
                        ;*---------
                        ;*BGNTST
                        ;*      IF MANUAL MICRO MODULE SELECTION=0
                        ;*      : THEN-LOAD POINTER TO MICRODIAGNOSTIC FILE NAME
                        ;*      :      CALL SUBROUTINE MICCTL
                        ;*      : ELSE-IF MANUAL INTERVENTION FLAG=1
                        ;*      :      : THEN-PRINT WARNING MESSAGE
                        ;*      :      : ELSE-ASK USER IF DIRECTORY IS WANTED
                        ;*      :      :      IF RESPONSE=YES
                        ;*      :      :      : THEN-PRINT DIRECTORY HEADER
                        ;*      :      :      :      INITIALIZE THE SEQUENCE NUBMER TO 1
                        ;*      :      :      :      LOAD POINTER TO FILE NAME
                        ;*      :      :      :      CALL SUBROUTINE DIRLST
                        ;*      :      :      :      IF ERRCOD NOT=0
                        ;*      :      :      :      : THEN-EXIT TEST
                        ;*      :      :      :      : ELSE-CONTINUE
                        ;*      :      :      :      ENDIF
                        ;*      :      :      : ELSE-CONTINUE
                        ;*      :      :      ENDIF
                        ;*      :      :      BGNDO
                        ;*      :      :      : ASK USER FOR THE NUMBER OF THE DESIRED DIAG.
                        ;*      :      :      : LOAD POINTER TO FILE NAME
                        ;*      :      :      : CALL SUBROUTINE DIRSRC
                        ;*      :      :      : IF ERRCOD NOT=0
                        ;*      :      :      : : THEN-EXIT TEST
                        ;*      :      :      : : ELSE-CONTINUE
                        ;*      :      :      : ENDIF
                        ;*      :      :      : IF SEQNUM=0
                        ;*      :      :      : : THEN-CONTINUE
                        ;*      :      :      : : ELSE-LOAD ERRCOD WITH 14.
                        ;*      :      :      : :      CALL SUBROUTINE SYSERR
                        ;*      :      :      : :      EXIT TEST
                        ;*      :      :      : ENDIF
                        ;*      :      :      : CALL SUBROUTINE LOADER
                        ;*      :      :      : IF ERRCOD NOT=0
                        ;*      :      :      : : THEN-EXIT TEST
                        ;*      :      :      : : ELSE-CONTINUE
                        ;*      :      :      : ENDIF
                        ;*      :      :      : PRINT THE MICRO DIAGNOSTIC HEADER
                        ;*      :      :      : CLEAR BYPFLG
                        ;*      :      :      : BGNDO
                        ;*      :      :      : : CALL SUBROUTINE CONTRL
                        ;*      :      :      : : 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
                                SE
                                ; ************************************************************************
                                ;*ERRORS
                                ;*------
                                ;*CZTMIA DVC FTL ERR 000031 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*MODULE UNDER TEST AS PER MICRO DIAGNOSTIC HEADER LINE
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*TM78 MICRO TEST = 000000
                                ;*TM78 MICRO PC = 000000
                                ;*MB STATUS ERROR - CS2 = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000032 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*MODULE UNDER TEST AS PER MICRO DIAGNOSTIC HEADER LINE
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*TM78 MICRO TEST = 000000
                                ;*TM78 MICRO PC = 000000
                                ;*MB DATA COMP. FAIL
                                ;*BYTE COUNT = 000000
                                ;*ACT = 000000
                                ;*EXP = 000000
                                ;*
                                ;*CZTMIA DVC FTL ERR 000033 ON UNIT NN  TST NNN  SUB 000  PC: XXXXXX
                                ;*MODULE UNDER TEST AS PER MICRO DIAGNOSTIC HEADER LINE
                                ;*RH: AAAAAA  TM: X  TU: X  PORT: X
                                ;*TM78 MICRO TEST = 000000
                                ;*TM78 MICRO PC = 000000
                                ;*NO MB STATUS ERROR WHEN EXPECTED
012614                          S
 (1)                            ; ************************************************************************
                                
012614                                  BGNTST
012614  005037  004412                  CLR     CASLD           ;CLEAR THE CAS PROGRAM LOADED FLAG
012620  005737  002332                  TST     MANTST          ;MANUAL MICRO MODULE SELECTION?
012624  001007                          BNE     1$              ;YES - GO TRY IT
```

```
 4377  012626  012737  013662  004400          MOV     #DXTUID,FILNAM  ;LOAD ADDRESS OF MODULE
 4378  012634  004737  013402                  CALL    MICCTL          ;CALL THE MICRO DIAGNOSTIC CONTROL MODULE
 4379  012640  000137  013146          7$:     JMP     3$              ;END OF THE TEST
 4380
 4381  012644                          1$:     MANUAL                  ;CAN MANUAL INTERVENTION BE DONE?
 4382  012646                                  BCOMPLETE 2$            ;YES - CONTINUE
 4383  012650                                  PRINTF  #FATAL
 4384  012670  000526                         BR      3$              ;END OF THE TEST
 4385  012672                          2$:     GMANIL  DIRQUE,BYPFLG,1,NO
 4386  012706  005737  004404                TST     BYPFLG          ;PRINT THE DIRECTORY
 4387  012712  001422                         BEQ     5$              ;NO - GO INPUT DESIRED FILE
 4388  012714                                  PRINTF  #DIRHED
 4389  012734  012737  000001  004406          MOV     #1,SEQNUM       ;INITIALIZE THE SEQUENCE NUMBER
 4390  012742  012737  013662  004400          MOV     #DXTUID,FILNAM  ;LOAD THE FIRST FILE NAME
 4391  012750  004737  015552                  CALL    DIRLST          ;GO MAKE A DIRECTORY
 4392  012754  005705                         TST     ERRCOD          ;WAS THERE AN ERROR?
 4393  012756  001073                         BNE     3$              ;YES - END IT
 4394  012760                          5$:     GMANID  SEQ,SEQNUM,0,177777,1,77,NO
 4395  013000  012737  013662  004400          MOV     #DXTUID,FILNAM  ;LOAD THE FIRST FILE NAME
 4396  013006  004737  015546                  CALL    DIRSRC          ;GO SEARCH FOR THE PROPER SEQUENCE NUMBER
 4397  013012  005705                         TST     ERRCOD          ;ERROR?
 4398  013014  001054                         BNE     3$              ;YES - END THE ROUTINE
 4399  013016  005737  004406                TST     SEQNUM          ;DID WE FIND THE USER SPECIFIED FILE?
 4400  013022  001405                         BEQ     4$              ;YES - GO LOAD IT
 4401  013024  012705  000014                MOV     #14,ERRCOD      ;LOAD THE EOF ERROR
 4402  013030  004737  015340                CALL    SYSERR          ;GO LOG THE ERROR
 4403  013034  000444                         BR      3$              ;END THE ROUTINE
 4404  013036  004737  013742          4$:     CALL    LOADER          ;GO LOAD THE PROGRAM
 4405  013042  005705                         TST     ERRCOD          ;LOAD ERROR?
 4406  013044  001040                         BNE     3$              ;END THE ROUTINE
 4407  013046                                  PRINTF  #MICRO,#BUFER
 4408  013072  005037  004404                CLR     BYPFLG          ;SET RESPONSE TO - NO
 4409  013076  004737  016102          6$:     CALL    CONTRL          ;START THE TEST
 4410  013102  005705                         TST     ERRCOD          ;CONTROL ERROR?
 4411  013104  001020                         BNE     3$              ;YES - END THE ROUTINE
 4412  013106  005737  004404                TST     BYPFLG          ;IS RESPONSE YES?
 4413  013112  001011                         BNE     8$              ;YES - LOOP MICRO MODULE
 4414  0131'.                                  GMANIL  RERET,BYPFLG,1,NO       ;DO IT AGAIN?
 4415  01313u  005737  004404                TST     BYPFLG          ;LOOP MICRO MODULE?
 4416  013134  001711                         BEQ     5$              ;NO - GO WAIT FOR ANOTHER ONE
 4417  013136  004737  014762          8$:     CALL    DIAGST          ;RESTART THE CODE
 4418  013142  005705                         TST     ERRCOD          ;RESTART ERROR?
 4419  013144  001754                         BEQ     6$              ;NO - GO DO IT AGAIN
 4420  013146                          3$:     ENDTST
 4421  013150  047514  050117  052040  RERET:  .ASCIZ  /LOOP THIS MICRO MODULE?/
 4422                                          .EVEN
 4423  013200  051120  047111  020124  DIRQUE: .ASCIZ  /PRINT DIRECTORY OF MICRO MODULES?/
 4424                                          .EVEN
 4425  013242  047105  042524  020122  SEQ:    .ASCIZ  /ENTER SEQUENCE NUMBER OF MICRO MODULE/
 4426                                          .EVEN
 4427  013310  047045  040445  040515  FATAL:  .ASCIZ  /%N%AMANUAL SELECTION NOT ALLOWED WITH THE UAM FLAG SET%N/
 4428          013402                          .EVEN
 4429  013402  004737  021660          MICCTL: CALL    CLOSEX          ;CLOSE THE CHANNEL
 4430  013406  004737  013730                  CALL    OPENX           ;OPEN THE CHANNEL
 4431  013412  005705                         TST     ERRCOD          ;OPEN CHANNEL ERROR?
 4432  013414  001114                         BNE     NOREX           ;YES-EXIT
```

```
 4433  013416  004737  013742                 CALL    LOADER          ;SKIP OVER THE BCT PROGRAM
 4434  013422  004737  013742          3$:    CALL    LOADER          ;NO-LOAD A SEGMENT
 4435  013426  005705                         TST     ERRCOD          ;LOAD ERROR?
 4436  013430  001106                         BNE     NOREX           ;YES-EXIT
 4437  013432  005737  004402                 TST     EOF             ;NO-END OF FILE?
 4438  013436  001103                         BNE     NOREX           ;EXIT THE MODULE
 4439  013440  012702  021666                 MOV     #BUFER,R2
 4440  013444  122227  000073          6$:    CMPB    (R2)+,#073      ;SEARCH FOR ;
 4441  013450  001375                         BNE     6$
 4442  013452  122227  000040          1$:    CMPB    (R2)+,#040      ;IS IT A SPACE?
 4443  013456  001775                         BEQ     1$              ;YES-IGNORE IT
 4444  013460  005302                         DEC     R2              ;NO - ADJUST THE POINTER
 4445  013462  122227  000115                 CMPB    (R2)+,#115      ;IS IT A M?
 4446  013466  001011                         BNE     2$              ;NO-GET OUT
 4447  013470  122227  000124                 CMPB    (R2)+,#124      ;YES-IS NEXT CHARACTER A T?
 4448  013474  001006                         BNE     2$              ;NO-GET OUT
 4449  013476  121227  000101                 CMPB    (R2),#101       ;IS NEXT CHARACTER AN A?
 4450  013502  001003                         BNE     2$              ;NO-GET OUT
 4451  013504  005737  002326                 TST     MTATST          ;YES-SHOULD MTA TESTS BE SKIPPED?
 4452  013510  001344                         BNE     3$              ;YES-SKIP THEM
 4453  013512                           2$:    MANUAL                  ;CAN I ENTER DIALOG WITH THE OPERATOR
 4454  013514                                 BNCOMPLETE      4$      ;NO - JUST RUN THE TESTS
 4455  013516  005737  002334                 TST     RUNSKP          ;YES - BUT DOES USER WANT RUN/SKIP?
 4456  013522  001426                         BEQ     4$              ;NO - JUST RUN
 4457  013524                                 PRINTF  #MICRO,#BUFER   ;PRINT TEST HEADER
 4458  013550  005037  004404                 CLR     BYPFLG          ;DEFAULT THE QUESTION RESPONSE TO NO
 4459  013554                                 GMANIL  SKIP,BYPFLG,1,YES  ;ASK THE QUESTION
 4460  013570  005737  004404                 TST     BYPFLG          ;SKIP THE MICRO MODULE
 4461  013574  001312                         BNE     3$              ;YES - GO GET THE NEXT MODULE
 4462  013576  000417                         BR      5$              ;NO-GO START TEST
 4463  013600                           4$:    RFLAGS  R2              ;GET USER FLAGS
 4464  013604  032702  001000                 BIT     #PNT,R2         ;PNT FLAG SET
 4465  013610  001412                         BEQ     5$              ;NO-RUN THE TEST
 4466  013612                                 PRINTF  #MICRO,#BUFER   ;YES-PRINT TEST HEADER
 4467  013636  004737  016102          5$:    CALL    CONTRL          ;GO START THE TEST
 4468  013642  005705                         TST     ERRCOD
 4469  013644  001666                         BEQ     3$
 4470  013646  004737  021660          NOREX: CALL    CLOSEX          ;CLOSE THE CHANNEL
 4471  013652  000207                         RTS     PC
 4472
 4473
 4474  013654  047045  052045      000 MICRO:  .ASCIZ  /%N%T/
 4475          013662                         .EVEN
 4476
 4477
 4478
 4479  013662  045513  046524  041101 DXTUID:  .ASCIZ  /KKTMAB.PAK/
 4480          013676                         .EVEN
 4481
 4482  013676  054502  040520  051523 SKIP:   .ASCIZ  /BYPASS THIS MICRO MODULE?/
 4483                                         .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     @BDRIV,@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
```

```
4576  014014  004737  014432                  CALL    COMP            ;NO - GO COMPARE TM78 MP MEMORY WITH
4577                                                                    ;WHAT WAS WRITTEN
4578  014020  005705                          TST     ERRCOD          ;DID A COMPARE ERROR OCCUR?
4579  014022  001010                          BNE     ERLOAD          ;YES - GO LOG THE ERROR
4580  014024  004737  014566                  CALL    START           ;NO - GO START THE TM78 MP MONITOR?
4581  014030  005705                          TST     ERRCOD          ;DID THE MONITOR START?
4582  014032  001004                          BNE     ERLOAD          ;NO-GO LOG A ERROR
4583  014034  004737  015204                  CALL    MESS            ;GO INPUT/BUILD MESSAGE FILE
4584  014040  005705                          TST     ERRCOD          ;MESSAGE FILE ERROR
4585  014042  001402                          BEQ     LOADEX          ;NO-EXIT MODULE
4586  014044  004737  015340          ERLOAD: CALL    SYSERR          ;NO - GO LOG THE ERROR
4587  014050  000207                  LOADEX: RTS     PC              ;RETURN
4588                                  .SBTTL  MODULE 2.1.2.1 - STOP
4589  014052                          SSUB
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
4590                                ;*MODULE 2.1.2.1        STOP THE TM78 MICRO PROCESSOR
4591  014052                          SP
 (1)                                ; ************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
4592                                ;*BGNSUB
4593                                ;*    LOAD A NON-EXISTENT TM78 MICROPROCESSOR MEMORY ADDRESS
4594                                ;*    SET THE HOLD BIT IN CAS REGISTER 21
4595                                ;*    TIMEOUT 100 MICRO SECONDS
4596                                ;*      IF TM78 MICROPROCESSOR STATUS ERROR
4597                                ;*      :   THEN-LOAD ERROR CODE 01
4598                                ;*      :        -EXIT SUBROUTINE
4599                                ;*      :   ELSE-CONTINUE
4600                                ;*      ENDIF
4601                                ;*      IF HOLD ACTIVE SET
4602                                ;*      :   THEN-CONTINUE
4603                                ;*      :        -EXIT SUBROUTINE
4604                                ;*      :   ELSE-LOAD ERROR CODE 02
4605                                ;*      ENDIF
4606                                ;*ENDSUB
4607  014052                          SIO
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE INPUT/OUTPUT
 (1)                                ;*---------- ------------
4608                                ;*
4609                                ;*      INPUT:
4610                                ;*      ERRCOD  ERROR CODE SET TO 0
4611                                ;*
4612                                ;*      OUTPUT:
4613                                ;*      STAT80  TM78 MP STATUS FOR ERROR CODE 01 AND 02
4614                                ;*      ERRCOD  ERROR CODE -AS FOLLOWS
4615                                ;*                      =00-IF NO ERROR DETECTED
4616                                ;*                      =01-IF AN TM78 MP STATUS ERROR
4617                                ;*                          WAS DETECTED
4618                                ;*                      =02-IF THE TM78 MP WILL NOT STOP
4619                                ;*
4620  014052                          S
 (1)                                ; ************************************************************************
4621  014052  012777  077777  170220  STOP:   MOV     #077777,@AD80   ;LOAD A NON-EXISTENT TM78 MP ADDRESS
```

```
 4622  014060  012777  000400  170214          MOV     #HOLD,@DS80     ;SET THE HOLD BIT
 4623                                          ;
 4624  014066                                  DELAY   1               ;PERFORM A 100 MICRO SECOND TIMEOUT
 4625  014116  017737  170160  004366          MOV     @DS80,STAT80    ;GET THE TM78 MP STATUS
 4626  014124  032737  034000  004366          BIT     #HLDSTA,STAT80  ;IS THERE AN TM78 MP STATUS ERROR?
 4627  014132  001403                          BEQ     STOP1           ;NO- GO CHECK HOLD ACTIVE
 4628  014134  012705  000001                  MOV     #01.,ERRCOD     ;YES-LOAD THE STATUS ERROR CODE
 4629  014140  000423                          BR      STOPEX          ,EXIT THE MODULE
 4630  014142  032737  001000  004366  STOP1:  BIT     #HLDA,STAT80    ;IS THE TM78 MP STOPPED?
 4631  014150  001003                          BNE     STOP2           ;YES -EXIT WITH NO ERROR CODE CLEAR
 4632  014152  012705  000002                  MOV     #02.,ERRCOD     ;NO-LOAD THE TM78 MP WILL NOT STOP ERROR CODE
 4633  014156  000414                          BR      STOPEX          ;EXIT THE MODULE
 4634  014160  013702  004360          STOP2:  MOV     TMPORT,R2       ;GET THE PORT NUMBER
 4635  014164  001402                          BEQ     STOP3           ;
 4636  014166  012702  000200                  MOV     #200,R2         ;LOAD PORT 1 SELECT CODE
 4637  014172  012777  100340  170100  STOP3:  MOV     #MBSEL,@AD80    ;ADDRESS THE MB SELECT BYTE
 4638  014200  062702  000400                  ADD     #HOLD,R2        ;SET HOLD BIT IN DATA
 4639  014204  010277  170072                  MOV     R2,@DS80        ;SELECT DESIRED PORT
 4640  014210  000207                  STOPEX: RTS     PC              ;RETURN TO CALLING MODULE
 4641                                  .SBTTL  MODULE 2.1.2.2 - WRITE
 4642  014212                          SSUB
  (1)                                 ;*********************************************************************
  (1)                                 ;*SUBROUTINE TITLE
  (1)                                 ;*---------- -----
 4643                                 ;*MODULE 2.1.2.2        WRITE A PROGRAM TO TM78 MP WCS
 4644  014212                          SP
  (1)                                 ;*********************************************************************
  (1)                                 ;*PROCEDURE
  (1)                                 ;*---------
 4645                                 ;*BGNSUB
 4646                                 ;*    GET THE BYTE COUNT FOR THE RECORD FROM THE BINARY TEST FILE
 4647                                 ;*    BGNDO
 4648                                 ;*    : DO WHILE ERROR CODE=0 AND THE BYTE COUNT FOR THE RECORD NOT=0
 4649                                 ;*    : SET THE CHECKSUM=THE BYTE COUNT
 4650                                 ;*    : GET THE HIGH ORDER BYTE OF THE TM78 MP WCS ADDRESS FROM THE RECORD
 4651                                 ;*    : ADD THE HIGH ORDER BYTE OF THE TM78 MP WCS ADDRESS TO THE CHECKSUM
 4652                                 ;*    : GET THE LOW ORDER BYTE OF THE TM78 MP WCS ADDRESS FROM THE RECORD
 4653                                 ;*    : ADD THE LOW ORDER BYTE OF THE TM78 MP WCS ADDRESS TO THE CHECKSUM
 4654                                 ;*    : ADD THE UNUSED BYTE IN THE RECORD TO THE CHECKSUM
 4655                                 ;*    : BGNDO
 4656                                 ;*    : :    LOAD THE TM78 MP WCS ADDRESS INTO CAS REGISTER 20
 4657                                 ;*    : :    WRITE THE WCS DATA FROM THE RECORD TO CAS REG. 21 WITH THE HOLD BIT
 4658                                 ;*    : :    GET THE TM78 MP STATUS BYTE FROM CAS REGISTER 21
 4659                                 ;*    : :       IF TM78 MP STATUS ERROR
 4660                                 ;*    : :       :   THEN-LOAD ERROR CODE 01
 4661                                 ;*    : :       :   ELSE-CONTINUE
 4662                                 ;*    : :       ENDIF
 4663                                 ;*    : :    ADD THE DATA BYTE TO THE CHECKSUM BYTE
 4664                                 ;*    : :    INCREMENT THE WCS MEMORY ADDRESS
 4665                                 ;*    : :    DECREMENT THE BYTE COUNT
 4666                                 ;*    : :    DO UNTIL BYTE COUNT IS DECREMENTED TO 0
 4667                                 ;*    : ENDDO
 4668                                 ;*    : ADD THE CHECKSUM CALCULATED TO THE CHECKSUM CHARACTER FROM THE RECORD
 4669                                 ;*    :     IF SUM OF CHECKSUM CHARACTERS=0
 4670                                 ;*    :     :   THEN-GET THE BYTE COUNT FROM THE NEXT RECORD
 4671                                 ;*    :     :   ELSE-LOAD ERROR CODE 03
```

```
                                        ;*     :     ENDIF
                                        ;*    ENDDO
                                        ;*ENDSUB
                                        SIO
                                        ; ************************************************************************
                                        ;*SUBROUTINE INPUT/OUTPUT
                                        ;*---------- ------------
                                        ;*      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
                                        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
```

```
 4724  014360  112302                  WRITE3: MOVB    (R3)+,R2        ;GET THE DATA BYTE
 4725  014362  042702  177400                  BIC     #177400,R2      ;REMOVE ANY SIGN EXTENTION BITS
 4726  014366  060237  004350                  ADD     R2,CHKSUM       ;ADD THE DATA BYTE TO THE CHKSUM
 4727                                                                    ;
 4728  014372  062737  00000'  004376          ADD     #1,LOAD80       ;INCREMENT THE TM78 MP WCS ADDRESS
 4729  014400  005301                          DEC     R1              ;DECREMENT THE BYTE COUNT
 4730  014402  001342                          BNE     WRITE2          ;CONTINUE IF NOT ZERO
 4731  014404  112302                          MOVB    (R3)+,R2        ;GET THE CHKSUM BYTE FROM THE INPUT
 4732                                                                    ;RECORD
 4733  014406  042702  177400                  BIC     #177400,R2      ;REMOVE ANY SIGN EXTENTION BITS
 4734  014412  060237  004350                  ADD     R2,CHKSUM       ;ADD THE CHKSUM BYTE FROM THE RECORD
 4735                                                                    ;TO THE CHKSUM CALCULATED
 4736  014416  105737  004350                  TSTB    CHKSUM          ;IS THE CHKSUM RESULT ZERO?
 4737  014422  001675                          BEQ     WRIT            ;YES- GET NEXT BYTE COUNT
 4738  014424  012705  000003                  MOV     #03.,ERRCOD     ;NO- CHECK SUM ERROR
 4739  014430  000675                          BR      WRITEO          ;
 4740                                  .SBTTL  MODULE 2.1.2.3 - COMP
 4741  014432                          SSUB
  (1)                                ; ************************************************************************
  (1)                                ;*SUBROUTINE TITLE
  (1)                                ;*---------- -----
 4742                                ;*MODULE 2.1.2.3        VERIFY TM78 MP WCS WITH WRITTEN
 4743  014432                          SP
  (1)                                ; ************************************************************************
  (1)                                ;*PROCEDURE
  (1)                                ;*---------
 4744                                ;*BGNSUB
 4745                                ;*    GET THE BYTE COUNT FOR THE RECORD FROM THE BINARY TEST FILE
 4746                                ;*    BGNDO
 4747                                ;*    : DO WHILE THE ERROR CODE=0 AND THE BYTE COUNT NOT=0
 4748                                ;*    : GET THE HIGH ORDER BYTE OF THE TM78 MP WCS ADDRESS FROM THE RECORD
 4749                                ;*    : GET THE LOW ORDER BYTE OF THE TM78 MP WCS ADDRESS FROM THE RECORD
 4750                                ;*    : SKIP OVER THE UNUSED BYTE IN THE RECORD
 4751                                ;*    : BGNDO
 4752                                ;*    : :    LOAD THE TM78 MP WCS ADDRESS INTO CAS REGISTER 20
 4753                                ;*    : :    READ THE TM78 MP DATA FROM CAS REGISTER 21
 4754                                ;*    : :       IF TM78 MP STATUS ERROR
 4755                                ;*    : :       :   THEN-LOAD ERROR CODE 01
 4756                                ;*    : :       :   ELSE-CONTINUE
 4757                                ;*    : :       :       IF DATA BYTE EQUAL
 4758                                ;*    : :       :       :   THEN-INCREMENT THE TM78 MP WCS ADDRESS
 4759                                ;*    : :       :       :       -DECREMENT THE BYTE COUNT
 4760                                ;*    : :       :       :   ELSE-STORE THE EXPECTED DATA BYTE
 4761                                ;*    : :       :       :       -STORE THE ACTUAL DATA BYTE
 4762                                ;*    : :       :       :       -LOAD ERROR CODE 04
 4763                                ;*    : :       :       ENDIF
 4764                                ;*    : :       ENDIF
 4765                                ;*    : :    DO UNTIL THE BYTE COUNT IS DECREMENTED TO 0 OR ERROR CODE NOT = 0
 4766                                ;*    : ENDDO
 4767                                ;*    : IF ERROR CODE = ZERO
 4768                                ;*    : :   THEN-GET THE BYTE COUNT OF THE NEXT RECORD
 4769                                ;*    : :   ELSE-CONTINUE
 4770                                ;*    : ENDIF
 4771                                ;*    ENDDO
 4772                                ;*ENDSUB
 4773  014432                          SIO
```

```
                                        ; ******************************************************************
                                        ;*SUBROUTINE INPUT/OUTPUT
                                        ;*---------- ------------
                                        ;*
                                        ;*      INPUT:
                                        ;*      BINBUF  CONTAINING THE LOAD MODULE FOR THE TEST BEING VERIFIED
                                        ;*      ERRCOD  ERROR CODE SET TO 0
                                        ;*
                                        ;*      OUTPUT:
                                        ;*       ERRCOD ERROR CODE - AS FOLLOWS
                                        ;*                      =00 - NO ERROR DETECTED
                                        ;*                      =01 - IF AN TM78 MP STATUS ERROR
                                        ;*                            WAS DETECTED
                                        ;*                      =04 - IF A WCS COMPARE ERROR
                                        ;*                            WAS DETECTED
                                        ;*
                                        ;*      STAT80  TM78 MP STATUS FOR ERROR CODE 01 AND FAILING DATA BYTE
                                        ;*              FOR ERROR CODE 04.
                                        ;*
                                        ;*      ADATA   CONTAINS THE ACTUAL DATA BYTE ON COMPARE ERROR
                                        ;*
                                        ;*      EDATA   CONTAINS THE EXPECTED DATA BYTE ON COMPARE ERROR
                                        ;*
014432                                  S
                                        ; ******************************************************************
014432  012703  021666                  COMP:   MOV     #BUFER,R3       ;GET THE BUFFER ADDRESS
014436  112301                          COMP0:  MOVB    (R3)+,R1        ;GET THE BYTE COUNT FOR THE RECORD
014440  042701  177400                          BIC     #177400,R1      ;REMOVE ANY SIGN EXTENTION BITS
                                                                        ;
014444  005705                                  TST     ERRCOD          ;IS THE ERROR CODE ZERO?
014446  001002                                  BNE     COMPEX          ;NO -EXIT THE MODULE
014450  005701                                  TST     R1              ;YES - IS THE BYTE COUNT ZERO?
014452  001001                                  BNE     COMP1           ;NO - CONTINUE WITH COMPARE
014454  000207                          COMPEX: RTS     PC              ;YES -EXIT THE MODULE
                                                                        ;
014456  112337  004377                  COMP1:  MOVB    (R3)+,HIAD80    ;GET THE HO WCS ADDRESS BYTE
014462  112337  004376                          MOVB    (R3)+,LOAD80    ;GET THE LO WCS ADDRESS BYTE
014466  105723                                  TSTB    (R3)+           ;SKIP OVER THE UNUSED BYTE
                                                                        ;
014470  013777  004376  167602          COMP2:  MOV     LOAD80,@AD80    ;LOAD THE TM78 MP WCS ADDRESS
014476  017737  167600  004366                  MOV     @DS80,STAT80    ;GET THE TM78 MP DATA/STATUS WORD
014504  032737  034000  004366                  BIT     #HLDSTA,STAT80  ;IS THERE A STATUS ERROR?
014512  001403                                  BEQ     COMP3           ;NO - CHECK THE DATA
014514  012705  000001                          MOV     #01.,ERRCOD     ;YES - LOAD THE ERROR CODE
014520  000755                                  BR      COMPEX          ;EXIT THE MODULE

014522  122337  004366                  COMP3:  CMPB    (R3)+,STAT80    ;IS THE DATA VALID?
014526  001410                                  BEQ     COMP4           ;YES - PROCEED
014530  114337  004372                          MOVB    -(R3),EDATA     ;SAVE THE EXPECTED DATA
014534  113737  004366  004370                  MOVB    STAT80,ADATA    ;SAVE THE ACTUAL DATA
014542  012705  000004                          MOV     #04.,ERRCOD     ;NO - LOAD THE ERROR CODE
014546  000742                                  BR      COMPEX          ;EXIT THE MODULE

014550  062737  000001  004376          COMP4:  ADD     #1,LOAD80       ;INCREMENT THE TM78 MP WCS ADDRESS
014556  005301                                  DEC     R1              ;DECREMENT THE BYTE COUNT
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
                ;*
                ;*      STATBO
                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
```

```
4872                                                    ;
4873  014632  017737  167444  004366          MOV     @DS80,STAT80    ;GET THE TM78 MP STATUS
4874  014640  032737  035400  004366          BIT     #CLRSTA,STAT80  ;IS THERE A STATUS ERROR
4875  014646  001403                          BEQ     START1          ;NO - CONTINUE
4876  014650  012705  000001                  MOV     #01.,ERRCOD     ;YES - LOAD THE ERROR CODE
4877  014654  000436                          BR      STAREX          ;EXIT THE MODULE
4878  014656  032737  100000  004366  START1: BIT     #TMRDY,STAT80   ;IS TM READY ACTIVE
4879  014664  001003                          BNE     START2          ;YES - GO START THE DIAGNOSTIC MONITER
4880  014666  012705  000005                  MOV     #05.,ERRCOD     ;NO - LOAD THE ERROR CODE
4881  014672  000427                          BR      STAREX          ;EXIT THE MODULE
4882  014674  005077  167342          START2: CLR     @XFRINT         ;CLEAR THE DATA TRANSFER INTERRUPT CODE
4883  014700  012777  000037  167322          MOV     #DIGMON,@XFRCMD ;ISSUE CODE 37
4884                                                  ;
4885  014706                                  DELAY   100             ;PERFORM A 100 MILLISECOND TIMEOUT
4886                                                  ;
4887  014736  032777  000001  167264          BIT     #1,@XFRCMD      ;TEST FOR CODE ACCEPTED
4888  014744  001402                          BEQ     STAREX          ;YES - EXIT THE MODULE
4889  014746  012705  000006                  MOV     #06.,ERRCOD     ;NO - LOAD THE ERROR CODE
4890  014752  012777  000377  167266  STAREX: MOV     #377,@AS        ;CLEAR THE ATTENTION INTERRUPT
4891  014760  000207                          RTS     PC              ;MODULE EXIT
4892
4893  014762  005005                  DIAGST: CLR     ERRCOD          ;CLEAR THE ERROR CODE
4894  014764  004737  014566                  CALL    START           ;START THE TM78
4895  014770  005705                          TST     ERRCOD          ;ANY START ERRORS
4896  014772  001402                          BEQ     1$              ;NO EXIT
4897  014774  004737  015340                  CALL    SYSERR          ;GO LOG THE ERROR
4898  015000  000207                  1$:     RTS     PC              ;RETURN TO THE USER
4899                                  .SBTTL  MODULE 2.1.2.5 - LDMOD
4900  015002                          SSUB
 (1)                                ;*********************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
4901                                ;*MODULE 2.1.2.5        PACK TM78 MP LOAD MODULE FROM THE LOAD MEDIA
4902  015002                        SP
 (1)                                ;*********************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
4903                                ;*BGNSUB
4904                                ;*  BGNDO
4905                                ;*  :  CALL SUBROUTINE READ
4906                                ;*  :  IF ERROR CODE=0
4907                                ;*  :  :  THEN-CONTINUE
4908                                ;*  :  :  ELSE-IF ERROR CODE=14(8)
4909                                ;*  :  :        :  THEN-CLEAR ERROR CODE
4910                                ;*  :  :        .        INCREMENT THE END OF FILE FLAG
4911                                ;*  :  :        :        EXIT SUBROUTINE
4912                                ;*  :  :        :  ELSE-EXIT SUBROUTINE
4913                                ;*  :  :       ENDIF
4914                                ;*  :  ENDIF
4915                                ;*  :  DO UNTIL CHARACTER READ-:
4916                                ;*  ENDDO
4917                                ;*  CLEAR BUFFER POINTER
4918                                ;*  CLEAR RIGHT/LEFT NIBBLE FLAG
4919                                ;*  BGNDO
4920                                ;*  :  CALL SUBROUTINE READ
4921                                ;*  :  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
015002                  SIO
 (1)                    ; ************************************************************************
 (1)                    ;*SUBROUTINE INPUT/OUTPUT
 (1)                    ;*---------- -----------
                        ;*
                        ;*      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
 (1)                    ; ************************************************************************
015002  004737  015524  LDMOD:  JSR     PC,READ                 ;READ A CHARACTER
015006  005705          LDMOD:  TST     ERRCOD                  ;READ ERROR?
015010  001407          LDMOD:  BEQ     LDMOD1                  ;YES-EXIT LOOP
015012  022705  000014  LDMOD:  CMP     #14,ERRCOD
015016  001010          LDMOD:  BNE     LDMOD2
015020  005005          LDMOD:  CLR     ERRCOD
015022  005237  004402  LDMOD:  INC     EOF
015026  000465          LDMOD:  BR      LMODEX
015030  123727  004344  000072  LDMOD1: CMPB    CHAR,#':                ;NO-CHARACTER=:?
015036  001361          LDMOD:  BNE     LDMOD                   ;NO-CONTINUE
                                                                ;
015040  005705          LDMOD2: TST     ERRCOD                  ;ERROR?
015042  001057          LDMOD:  BNE     LMODEX                  ;YES-EXIT THE MODULE
                                                                ;
```

```
 4974  015044  005004                LDMOD3: CLR     R4              ;CLEAR BUFFER POINTER
 4975  015046  005003                        CLR     R3              ;CLEAR NIBBLE FLAG
 4976                                                                ;
 4977  015050  004737  015524        LDMOD4: JSR     PC,READ         ;READ A CHARACTER
 4978  015054  005705                        TST     ERRCOD          ;READ ERROR?
 4979  015056  001051                        BNE     LMODEX          ;YES-EXIT THE LOOP
 4980  015060  113702  004344                MOVB    CHAR,R2         ;GET THE CHARACTER
 4981  015064  120227  000060                CMPB    R2,#'0          ;IS THE CHARACTER <0?
 4982  015070  100433                        BMI     LDMOD8          ;YES - BAD CHARACTER - DO NOT PROCESS
 4983  015072  120227  000072                CMPB    R2,#':          ;NO - IS THE CHARACTER 0-9?
 4984  015076  100410                        BMI     LDMOD6          ;YES - VALID CHARACTER
 4985  015100  120227  000101                CMPB    R2,#'A          ;NO - IS THE CHARACTER <A?
 4986  015104  100425                        BMI     LDMOD8          ;YES - BAD CHARACTER - DO NOT PROCESS
 4987  015106  120227  000107                CMPB    R2,#'G          ;NO - IS THE CHARACTER A-F?
 4988  015112  100022                        BPL     LDMOD8          ;NO - BAD CHARACTER - DO NOT PROCESS
 4989  015114  062702  000011                ADD     #11,R2          ;ADD THE ALPHA CAHRACTER CONVERSION FACTOR
 4990                                                                ;
 4991  015120  042702  177760        LDMOD6: BIC     #177760,R2      ;REMOVE JUNK BITS
 4992  015124  005703                        TST     R3              ;TEST THE NIBBLE PACK FLAG
 4993  015126  001007                        BNE     LDMOD7          ;NON-ZERO - PACK THE LOW NIBBLE
 4994  015130  006302                        ASL     R2              ;PACK THE HIGH NIBBLE
 4995  015132  006302                        ASL     R2
 4996  015134  006302                        ASL     R2
 4997  015136  006302                        ASL     R2
 4998  015140  110201                        MOVB    R2,R1           ;STORE THE BYTE FOR NEXT PASS
 4999  015142  005203                        INC     R3              ;SET THE LOW NIBBLE INDICATOR
 5000  015144  000405                        BR      LDMOD8          ;CONTINUE
 5001                                                                ;
 5002  015146  050201                LDMOD7: BIS     R2,R1           ;FORM THE FINAL BYTE
 5003  015150  110164  021666                MOVB    R1,BUFER(R4)    ;STORE THE BYTE IN THE LOAD MODULE
 5004  015154  005204                        INC     R4              ;INC. THE LOAD MODULE BYTE POINTER
 5005  015156  005003                        CLR     R3              ;SET THE HIGH NIBBLE INDICATOR
 5006                                                                ;
 5007  015160  123727  004344  000044 LDMOD8: CMPB    CHAR,#'$        ;CHARACTER=$?
 5008  015166  001405                        BEQ     LMODEX          ;YES-EXIT THE MODULE
 5009  015170  020427  010050                CMP     R4,#BUFEND-BUFER ;NO-END OF BUFFER?
 5010  015174  001325                        BNE     LDMOD4          ;NO-CONTINUE
 5011  015176  012705  000017                MOV     #17,ERRCOD      ;YES-QUEUE THE BINARY BUFFER FULL ERROR
 5012  015202  000207                LMODEX: RTS     PC              ;RETURN TO CALLING MODULE
 5013                                                                ;
 5014                                                                ;
 5015
 5016                                .SBTTL  MODULE 2.1.2.6 - MESS
 5017  015204                        SSUB
  (1)                               ;*****************************************************************************
  (1)                               ;*SUBROUTINE TITLE
  (1)                               ;*---------- -----
 5018                               ;*MODULE 2.1.2.6        LOAD THE MESSAGE MODULE
 5019  015204                        SP
  (1)                               ;*****************************************************************************
  (1)                               ;*PROCEDURE
  (1)                               ;*---------
 5020                               ;*BGNSUB
 5021                               ;*    CLEAR MESSAGE BUFFER POINTER
 5022                               ;*    BGNDO
 5023                               ;*    : CALL SUBROUTINE "READ"
```

```
                                ;*    :     IF ERROR CODE=ZERO
                                ;*    :     :   THEN-CONTINUE
                                ;*    :     :   ELSE-EXIT SUBROUTINE
                                ;*    :     ENDIF
                                ;*    : DO UNTIL CHARACTER READ=% OR .
                                ;*    ENDDO
                                ;*    STORE THE % OF ! IN THE MESSAGE BUFFER
                                ;*    INCREMENT THE MESSAGE BUFFER POINTER
                                ;*    BGNDO
                                ;*    : CALL SUBROUTINE "READ"
                                ;*    :     IF ERROR CODE=ZERO
                                ;*    :     :   THEN-CONTINUE
                                ;*    :     :   ELSE-EXIT SUBROUTINE
                                ;*    :     ENDIF
                                ;*    :     IF CHARACTER = TAB
                                ;*    :     :   THEN - REPLACE THE TAB WITH A SPACE
                                ;*    :     :   ELSE - CONTINUE
                                ;*    :     ENDIF
                                ;*    : STORE THE CHARACTER IN THE MESSAGE BUFFER
                                ;*    : INCREMENT THE MESSAGE BUFFER POINTER
                                ;*    :     IF CHARACTER STORED WAS A LINE FEED
                                ;*    :     :   THEN-STORE A ZERO IN THE MESSAGE BUFFER
                                ;*    :     :        -INCREMENT THE MESSAGE BUFFER POINTER
                                ;*    :     :   ELSE-CONTINUE
                                ;*    :     ENDIF
                                ;*    : DO UNTIL BUFFER POINTER=MAX OR CHARACTER-$
                                ;*    ENDDO
                                ;*    IF BUFFER POINTER=MAX
                                ;*    : THEN-LOAD ERROR CODE 16
                                ;*    : ELSE-CONTINUE
                                ;*    ENDIF
                                ;*ENDSUB
015204                          SIO
 (1)                            ; ************************************************************************
 (1)                            ;*SUBROUTINE INPUT/OUTPUT
 (1)                            ;*---------- ------------
                                ;*
                                ;*      INPUT:
                                ;*      ERRCOD  ERROR CODE EQUAL TO ZERO
                                ;*
                                ;*      OUTPUT:
                                ;*      ERRCOD  ERROR CODE AS FOLLOWS:
                                ;*
                                ;*                      =0 - NO ERROR DETECTED
                                ;*                      =14 - UNEXPECTED EOF
                                ;*                      =15 - DISK ACCESS ERROR
                                ;*                      =16 - MESSAGE BUFFER FULL
                                ;*
                                ;*
015204                          S
 (1)                            ; ************************************************************************

015204  005004                  MESS:   CLR     R4              ;CLEAR THE MESSAGE BUFFER PTR

015206  004737  015524          MESS1:  JSR     PC,READ         ;READ A CHARACTER
015212  005705                          TST     ERRCOD          ;READ ERROR?
```

```
5076  015214  001050                        BNE     MESSEX          ;YES-EXIT THE MODULE
5077  015216  123727  004344  000073        CMPB    CHAR,#';        ;NO-IS IT A ;?
5078  015224  001370                        BNE     MESS1           ;NO-KEEP LOOKING
5079  015226  113764  004344  021666        MOVB    CHAR,BUFER(R4)  ;STORE THE CHARACTER
5080  015234  005204                        INC     R4              ;BUMP THE BUFFER POINTER
5081                                        ;
5082  015236  004737  015524        MESS3:  JSR     PC,READ         ;GET A CHARACTER
5083  015242  005705                        TST     ERRCOD          ;READ ERROR?
5084  015244  001034                        BNE     MESSEX          ;YES-EXIT THE MODULE
5085  015246  123727  004344  000011        CMPB    CHAR,#TAB       ;IS THE CHARACTER A TAB
5086  015254  001003                        BNE     MESS2           ;NO - CONTINUE
5087  015256  112737  000040  004344        MOVB    #SPACE,CHAR     ;YES - REPLACE IT WITH A SPACE
5088  015264  113764  004344  021666  MESS2:MOVB    CHAR,BUFER(R4)  ;NO-STORE THE CHARACTER
5089  015272  005204                        INC     R4              ;INCREMENT THE BUFFER POINTER
5090  015274  123727  004344  000012        CMPB    CHAR,#LF        ;IS IT A LF?
5091  015302  001004                        BNE     MESS4           ;NO-CONTINUE
5092  015304  112764  000000  021666        MOVB    #0,BUFER(R4)    ;YES-STORE A LINE TERMINATOR
5093  015312  005204                        INC     R4              ;INCREMENT THE BUFFER POINTER
5094  015314  123727  004344  000044  MESS4:CMPB    CHAR,#'$        ;CHARACTER=$?
5095  015322  001405                        BEQ     MESSEX          ;YES-EXIT
5096  015324  020427  010046                CMP     R4,#BUFEND-BUFER-2  ;NO-END OF BUFFER?
5097  015330  003742                        BLE     MESS3           ;NO-CONTINUE
5098                                                                ;YES-QUEUE THE ERROR
5099  015332  012705  000016                MOV     #16,ERRCOD      ;LOAD-END OF MESSAGE BUFFER AREA ERROR
5100  015336  000207                MESSEX: RTS     PC              ;YES EXIT THE MODULE
5101
5102                                        .SBTTL  MODULE 2.1.2.7 - SYSERR
5103  015340                                SSUB
 (1)                                        ;*****************************************************************************
 (1)                                        ;*SUBROUTINE TITLE
 (1)                                        ;*---------- -----
5104                                        ;*MODULE 2.1.2.7        DIAGNOSTIC MONITOR SYSTEM ERROR REPORTING
5105  015340                                SP
 (1)                                        ;*****************************************************************************
 (1)                                        ;*PROCEDURE
 (1)                                        ;*---------
5106                                        ;*BGNSUB
5107                                        ;*    GET THE ERROR CODE
5108                                        ;*      IF ERROR CODE NOT LEGAL
5109                                        ;*      :   THEN-PRINT ILLEGAL ERROR CODE MESSAGE
5110                                        ;*      :   ELSE-CONSTRUCT THE ERROR MACRO
5111                                        ;*      :        -PRINT THE ERROR
5112                                        ;*      ENDIF
5113                                        ;*ENDSUB
5114  015340                                SIO
 (1)                                        ;*****************************************************************************
 (1)                                        ;*SUBROUTINE INPUT/OUTPUT
 (1)                                        ;*---------- -----------
5115                                        ;*
5116                                        ;*      INPUT:
5117                                        ;*       ERRCOD ERROR CODE FOR THE MESSAGE TO BE PRINTED.
5118                                        ;*
5119  015340                                S
 (1)                                        ;*****************************************************************************
5120  015340  010501                SYSERR: MOV     ERRCOD,R1               ;GET THE ERROR CODE
5121  015342  010137  015400                MOV     R1,SYSERM+2             ;PUT THE ERROR NUMBER IN THE MESSAGE
```

```
5122  015346  020127  000022          CMP     R1,#HEDMPE-HEDJMP/#2    ;VALID MESSAGE NUMBER?
5123  015352  003402                  BLE     1$                      ;YES - CONTINUE
5124  015354  000137  033524  2$:     JMP     SERFAL                  ;NO - ERROR
5125  015360  006301          1$:     ASL     R1                      ;MULTIPLY BY 2
5126  015362  016137  015410  015402  MOV     HEDJMP(R1),SYSERM+4     ;PUT THE HEADER MESSAGE IN THE ERROR
5127  015370  016137  015456  015404  MOV     MSGJMP(R1),SYSERM+6     ;PUT THE MESSAGE IN THE ERROR
5128  015376                  SYSERM: ERRSF   1.,HEAD1,MSG001
5129  015406  000207                  RTS     PC                      ;RETURN
5130                                                                  ;
5131  015410  000000          HEDJMP: .WORD   0                       ;DUMMY TABLE ENTRY
5132  015412  033536                  .WORD   HEAD1                   ;ERROR 01 HEADING VECTOR
5133  015414  033536                  .WORD   HEAD1                   ;ERROR 02 HEADING VECTOR
5134  015416  033536                  .WORD   HEAD1                   ;ERROR 03 HEADING VECTOR
5135  015420  033536                  .WORD   HEAD1                   ;ERROR 04 HEADING VECTOR
5136  015422  033536                  .WORD   HEAD1                   ;ERROR 05 HEADING VECTOR
5137  015424  033536                  .WORD   HEAD1                   ;ERROR 06 HEADING VECTOR
5138  015426  033574                  .WORD   HEAD2                   ;ERROR 07 HEADING VECTOR
5139  015430  033574                  .WORD   HEAD2                   ;ERROR 08 HEADING VECTOR
5140  015432  033574                  .WORD   HEAD2                   ;ERROR 09 HEADING VECTOR
5141  015434  033634                  .WORD   HEAD3                   ;ERROR 10 HEADING VECTOR
5142  015436  033634                  .WORD   HEAD3                   ;ERROR 11 HEADING VECTOR
5143  015440  033634                  .WORD   HEAD3                   ;ERROR 12 HEADING VECTOR
5144  015442  033634                  .WORD   HEAD3                   ;ERROR 13 HEADING VECTOR
5145  015444  033634                  .WORD   HEAD3                   ;ERROR 14 HEADING VECTOR
5146  015446  033634                  .WORD   HEAD3                   ;ERROR 15 HEADING VECTOR
5147  015450  033574                  .WORD   HEAD2                   ;ERROR 16 HEADING VECTOR
5148  015452  033574                  .WORD   HEAD2                   ;ERROR 17 HEADING VECTOR
5149  015454  033574          HEDMPE: .WORD   HEAD2                   ;ERROR 18 HEADING VECTOR
5150
5151  015456  000000          MSGJMP: .WORD   0                       ;DUMMY TABLE ENTRY
5152  015460  033674                  .WORD   MSG001                  ;ERROR 01 MESSAGE VECTOR
5153  015462  034034                  .WORD   MSG002                  ;ERROR 02 MESSAGE VECTOR
5154  015464  034132                  .WORD   MSG003                  ;ERROR 03 MESSAGE VECTOR
5155  015466  034204                  .WORD   MSG004                  ;ERROR 04 MESSAGE VECTOR
5156  015470  034426                  .WORD   MSG005                  ;ERROR 05 MESSAGE VECTOR
5157  015472  034544                  .WORD   MSG006                  ;ERROR 06 MESSAGE VECTOR
5158  015474  034632                  .WORD   MSG007                  ;ERROR 07 MESSAGE VECTOR
5159  015476  034716                  .WORD   MSG008                  ;ERROR 08 MESSAGE VECTOR
5160  015500  035004                  .WORD   MSG009                  ;ERROR 09 MESSAGE VECTOR
5161  015502  035056                  .WORD   MSG010                  ;ERROR 10 MESSAGE VECTOR
5162  015504  035124                  .WORD   MSG011                  ;ERROR 11 MESSAGE VECTOR
5163  015506  035210                  .WORD   MSG012                  ;ERROR 12 MESSAGE VECTOR
5164  015510  035272                  .WORD   MSG013                  ;ERROR 13 MESSAGE VECTOR
5165  015512  035346                  .WORD   MSG014                  ;ERROR 14 MESSAGE VECTOR
5166  015514  035420                  .WORD   MSG015                  ;ERROR 15 MESSAGE VECTOR
5167  015516  035472                  .WORD   MSG016                  ;ERROR 16 MESSAGE VECTOR
5168  015520  035544                  .WORD   MSG017                  ;ERROR 17 MESSAGE VECTOR
5169  015522  035616                  .WORD   MSG018                  ;ERROR 18 MESSAGE VECTOR
5170
5171
5172                          .SBTTL  MODULE 2.1.2.5.1 - READ
5173  015524                  $SUB
 (1)                          ;*********************************************************************
 (1)                          ;*SUBROUTINE TITLE
 (1)                          ;*---------- -----
5174                          ;*MODULE 2.1.2.5.1      READ A CHARACTER
```

```
 5175  015524                        SP
  (1)                                ; ******************************************************************************
  (1)                                ;*PROCEDURE
  (1)                                ;*---------
 5176                                ;*BGNSUB
 5177                                ;*  ISSUE GET BYTE CALL TO THE DIAGNOSTIC SUPERVISOR
 5178                                ;*  IF END OF FILE
 5179                                ;*  :  THEN - LOAD ERROR CODE 14(8)
 5180                                ;*  :  ELSE - CONTINUE
 5181                                ;*  ENDIF
 5182                                ;*ENDSUB
 5183  015524                        SIO
  (1)                                ; ******************************************************************************
  (1)                                ;*SUBROUTINE INPUT/OUTPUT
  (1)                                ;*---------- ------------
 5184                                ;*
 5185                                ;*      INPUT:
 5186                                ;*      ERRCOD  ERROR CODE EQUAL TO ZERO
 5187                                ;*
 5188                                ;*      OUTPUT:
 5189                                ;*
 5190                                ;*      CHAR    THE CHARACTER FROM THE DISK
 5191                                ;*
 5192                                ;*      ERRCOD  SET AS FOLLOWS:
 5193                                ;*
 5194                                ;*                      =0 - IF NO ERROR DETECTED
 5195                                ;*                      =14 - IF NO MORE DATA AVAILABLE END OF FILE
 5196                                ;*                        DETECTED
 5197                                ;*                      =15 - IF DISK ACCESS ERROR DETECTED
 5198                                ;*
 5199  015524                        S
  (1)                                ; ******************************************************************************
 5200
 5201  015524                        READ:   GETBYTE CHAR            ;REQUEST A BYTE FROM THE SUPERVISOR
 5202  015532                                BCOMPLETE       1$      ;IF NOT END OF FILE CONTINUE
 5203  015534  012705  000014                MOV     #14,ERRCOD      ;IF END OF FILE LOAD THE ERROR CODE
 5204  015540  000207                        RTS     PC              ;RETURN TO CALLING MODULE
 5205  015542  005005                1$:     CLR     ERRCOD          ;CLEAR THE ERROR CODE
 5206  015544  000207                        RTS     PC              ;RETURN TO CALLING MODULE
 5207  015546  005003                DIRSRC: CLR     R3              ;SET THE SEARCH FLAG
 5208  015550  000402                        BR      DIR1            ;CONTINUE
 5209  015552  012703  000001        DIRLST: MOV     #1,R3           ;SET THE DIRECTORY LIST FLAG
 5210  015556  005005                DIR1:   CLR     ERRCOD          ;CLEAR THE ERROR CODE
 5211  015560  004737  021660                CALL    CLOSEX          ;CLOSE THE FILE
 5212  015564  004737  013730                CALL    OPENX           ;OPEN THE DESIRED FILE
 5213  015570  005705                        TST     ERRCOD          ;OPEN ERROR?
 5214  015572  001100                        BNE     DIREX           ;YES - LOG THE ERROR
 5215  015574  004737  015524        6$:     CALL    READ            ;GET A CHARACTER FROM THE OPEN FILE
 5216  015600  005705                        TST     ERRCOD          ;READ ERROR?
 5217  015602  001065                        BNE     DIRERR          ;YES - LOG THE ERROR
 5218  015604  123727  004344  000133        CMPB    CHAR,#'[        ;IS THE CHARACTER A [
 5219  015612  001370                        BNE     6$              ;NO - KEEP ON LOOKING
 5220  015614  004737  015524        1$:     CALL    READ            ;GET A CHARACTER FROM THE OPEN FILE
 5221  015620  005705                        TST     ERRCOD          ;READ ERROR?
 5222  015622  001055                        BNE     DIRERR          ;YES - LOG THE ERROR
 5223  015624  123727  004344  000133        CMPB    CHAR,#'[        ;IS THE CHARACTER A [
```

```
5224  015632  001370                        BNE     1$              ;NO - KEEP ON LOOKING
5225  015634  005703                        TST     R3              ;SEARCH ?
5226  015636  001004                        BNE     5$              ;NO - DIRECTORY
5227  015640  005337  004406                DEC     SEQNUM          ;DECREMENT THE SEQUENCE NUMBER
5228  015644  001453                        BEQ     DIREX           ;EXIT IF FOUND
5229  015646  000762                        BR      1$              ;CONTINUE IF NOT
5230  015650  005037  015776          5$:   CLR     NAME            ;CLEAR THE PROGRAM NAME
5231  015654  005037  016000                CLR     NAME+2          ;
5232  015660  005037  016002                CLR     NAME+4          ;
5233  015664  005002                        CLR     R2              ;CLEAR THE CHARACTER COUNTER
5234  015666  004737  015524          2$:   CALL    READ            ;READ A CHARACTER FROM THE OPER FILE
5235  015672  123727  004344  000135        CMPB    CHAR,#']                ;IS THE CHARACTER A ]?
5236  015700  001407                        BEQ     .4$             ;YES - END OF THE PROGRAM NAME
5237  015702  113762  004344  015776        MOVB    CHAR,NAME(R2)   ;SAVE THE CHARACTER
5238  015710  005202                        INC     R2              ;UPDATE THE CHARACTER COUNT
5239  015712  020227  000006                CMP     R2,#6           ;REACHED CHARACTER MAX?
5240  015716  001363                        BNE     2$              ;NO - CONTINUE
5241  015720                          4$:   PRINTF  #DIRENT,SEQNUM,#NAME
5242  015750  005237  004406                INC     SEQNUM          ;UPDATE THE SEQUENCE NUMBER
5243  015754  000717                        BR      1$              ;
5244  015756  020527  000014          DIRERR: CMP   ERRCOD,#14      ;EOF?
5245  015762  001002                        BNE     3$              ;NO - ERROR
5246  015764  005005                        CLR     ERRCOD          ;EOF IS NOT A ERROR FOR THE ROUTINE
5247  015766  000402                        BR      DIREX           ;CONTINUE
5248  015770  004737  015340          3$:   CALL    SYSERR          ;LOG THE ERROR
5249  015774  000207                  DIREX:  RTS     PC              ;RETURN TO THE USER
5250
5251  015776  000000                  NAME:   .WORD   0               ;PROGRAM NAME
5252  016000  000000                          .WORD   0               ;
5253  016002  000000                          .WORD   0               ;
5254  016004  000000                          .WORD   0               ;
5255
5256  016006  047045  040445  042523  DIRHED: .ASCIZ  /%N%ASEQUENCE NUMBER    NAME%N/
5257                                          .EVEN
5258  016044  040445  020040  020040  DIRENT: .ASCIZ  /%A      %02%A           %T%N/
5259          016102                          .EVEN
5260                                  .SBTTL  MODULE 2.1.3 - CONTRL
5261  016102                          SSUB
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5262                                ;*MODULE 2.1.3 - TM78 TEST CONTROL MODULE
5263  016102                          SP
 (1)                                ; ************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5264                                ;*BGNSUB
5265                                ;*  CLEAR THE ERROR CODE
5266                                ;*  SELECT THE TM78 UNDER TEST
5267                                ;*  CALL SUBROUTINE DIAGO
5268                                ;*  IF ERROR CODE=0
5269                                ;*  :  THEN-CONTINUE
5270                                ;*  :  ELSE-CALL SUBROUTINE SYSERR
5271                                ;*  :       EXIT SUBROUTINE
5272                                ;*  ENDIF
5273                                ;*  BGNDO
```

```
5274                                    ;*   :  CALL SUBROUTINE WAIT
5275                                    ;*   :  IF ERROR CODE=0
5276                                    ;*   :  : THEN-CONTINUE
5277                                    ;*   :  : ELSE-CALL SUBROUTINE SYSERR
5278                                    ;*   :  :      EXIT SUBROUTINE
5279                                    ;*   :  ENDIF
5280                                    ;*   :  INPUT CAS REGISTER 3 (MICRO TEST # + ERROR #)
5281                                    ;*   :  IF CAS REGISTER 1=374(8)
5282                                    ;*   :  : THEN-CALL SUBROUTINE ERR78
5283                                    ;*   :  : ELSE-CONTINUF
5284                                    ;*   :  ENDIF
5285                                    ;*   :  IF CAS REGISTER 1=376(8)
5286                                    ;*   :  : THEN-CALL SUBROUTINE UTIL80
5287                                    ;*   :  : ELSE-CONTINUE
5288                                    ;*   :  ENDIF
5289                                    ;*   :  IF CAS REGISTER 1=375(8)
5290                                    ;*   :  : THEN-DEPOSIT 377(8) CAS REGISTER 0
5291                                    ;*   :  :      DEPOSIT 33(8) CAS REGISTER 0
5292                                    ;*   :  : ELSE-CONTINUE
5293                                    ;*   :  ENDIF
5294                                    ;*   :  IF CAS REGISTER 1=373(8)
5295                                    ;*   :  : THEN-CALL SUBROUTINE QUEUE
5296                                    ;*   :  : ELSE-CONTINUE
5297                                    ;*   :  ENDIF
5298                                    ;*   :  IF CAS REGISTER 1=377(8)
5299                                    ;*   :  : THEN-CALL SUBROUTINE QUEUEM
5300                                    ;*   :  : : ELSE-CONTINUE
5301                                    ;*   :  : ENDIF
5302                                    ;*   :  : DO UNTIL CAS REGISTER 1=372(*)
5303                                    ;*   :  ENDDO
5304                                    ;*ENDSUB
5305  016102                            SIO
 (1)                                    ; ***************************************************************************
 (1)                                    ;*SUBROUTINE INPUT/OUTPUT
 (1)                                    ;*---------- -----------
5306                                    ;*      INPUT:
5307                                    ;*         NO REQUIRED INPUT
5308                                    ;*
5309                                    ;*      OUTPUT:
5310                                    ;*         ERRCOD ERROR CODE AS FOLLOWS
5311                                    ;*                        =0- NO CONTROL ERRORS DETECTED
5312                                    ;*                        >0- CONTROL ERROR OCCURED
5313                                    ;*                            ABORT THE TEST
5314                                    ;*
5315  016102                            S
 (1)                                    ; ***************************************************************************
5316  016102  005005                    CONTRL: CLR     ERRCOD                  ;CLEAR THE ERROR CODE
5317  016104  013777  004352  166126            MOV     MBDRIV,@CS2             ;LOAD THE TM78 UNIT NUMBER
5318  016112  004737  016304                    JSR     PC,DIAGO                ;GO START THE TM78 MP TEST LOADED
5319  016116  005705                            TST     ERRCOD                  ;DIAGNOSTIC START ERROR
5320  016120  001034                            BNE     CTLERR                  ;YES - GO LOG THE ERROR
5321  016122  004737  016424            CONTR1: JSR     PC,WAIT                 ;GO WAIT FOR A TM78 MP-INTERRUPT CODE
5322  016126  005705                            TST     ERRCOD                  ;TEST WAIT FAILURE?
5323  016130  001030                            BNE     CTLERR                  ;YES - GO LOG THE ERROR
5324                                                                            ;
5325  016132  017701  166116                    MOV     @D11,R1                 ;GET THE DIAG. 1 REGISTER
```

```
5326  016136  110137  004332                MOVB    R1,DIAGTS          ;STORE THE DIAGNOSTIC TEST NUM.
5327  016142  000301                        SWAB    R1                 ;SWAP THE BYTES
5328  016144  042701  177700                BIC     #177700,R1         ;LEAVE THE DIAGNOSTIC ERROR NUM.
5329  016150  010137  004334                MOV     R1,DIAGER          ;STORE THE DIAGNOSTIC ERROR NUM.
5330  016154  022737  000374  004364        CMP     #374,DINTCD        ;TM78 MP RUN TIME ERROR?
5331  016162  001003                        BNE     CONTR3             ;NO - CONTINUE
5332  016164  004737  016552                JSR     PC,ERR78           ;YES - GO PROCESS THE ERROR
5333  016170  000754                        BR      CONTR1             ;GO WAIT FOR OTHER EVENTS
5334                                                                   ;
5335  016172  022737  000376  004364  CONTR3: CMP    #376,DINTCD        ;TM78 MP RUN TIME UTILITY REQUEST?
5336  016200  001007                        BNE     CONTR4             ;NO - CONTINUE
5337  016202  004737  020604                JSR     PC,UTIL80          ;YES-GO PROCESS THE UTILITY REQ
5338  016206  005705                        TST     ERRCOD             ;UTILITY REQUEST ERROR
5339  016210  001744                        BEQ     CONTR1             ;NO-CONTINUE LOOP
5340  016212  004737  015340          CTLERR: CALL    SYSERR             ;YES-PRINT THE ERROR
5341  016216  000207                        RTS     PC                 ;ABORT THE MODULE
5342                                                                   ;
5343  016220  022737  000375  004364  CONTR4: CMP    #375,DINTCD        ;TM78 MP LOOP ON ERROR - NO ERROR
5344  016226  001007                        BNE     CONTR5             ;NO - CONTINUE
5345  016230  012777  000377  166010        MOV     #377,@AS           ;CLEAR THE INTERRUPT
5346  016236  012777  000033  165764        MOV     #LOPERR,@XFRCMD    ;ISSUE LOOP ON ERROR
5347  016244  000726                        BR      CONTR1             ;YES - BUT NOT IMPLEMENTED
5348  016246  022737  000373  004364  CONTR5: CMP    #373,DINTCD        ;PRINT MESSAGE REQUEST?
5349  016254  001003                        BNE     CONTR6             ;NO - CONTINUE
5350  016256  004737  021534                CALL    QUEUE              ;YES - GO PRINT THE MICRO MESSAGE
5351  016262  000717                        BR      CONTR1             ;CONTINUE TO LOOP
5352  016264  022737  000377  004364  CONTR6: CMP    #377,DINTCD        ;MANUAL INTERVENTION REQUEST?
5353  016272  001003                        BNE     CONTR7             ;NO - CONTINUE
5354  016274  004737  021532                JSR     PC,QUEUEM          ;YES - GO DO PRINT/WAIT SEQUENCE
5355  016300  000710                        BR      CONTR1             ;CONTINUE TO LOOP
5356  016302  000207                  CONTR7: RTS     PC                 ;ASSUME DONE INTERRUPT - RETURN
5357                                  .SBTTL  MODULE 2.1.3.1 - DIAGO
5358  016304                          SSUB
 (1)                                ; ******************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5359                                ;*MODULE        2.1.3.1 START THE TM78 MP TEST
5360  016304                          SP
 (1)                                ; ******************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5361                                ;*BGNSUB
5362                                ;*  CLEAR THE RELIABILITY, SCOPE LOOP & MANUAL FLAG IN CAS REGISTER 11
5363                                ;*  IF USER SPECIFIED RELIABILITY MODE
5364                                ;*  :  THEN-SET THE RELIABILITY FLAG IN CAS REGISTER 11
5365                                ;*  :  ELSE-CONTINUE
5366                                ;*  ENDIF
5367                                ;*  IF MANUAL INTERVENTION ALLOWED
5368                                ;*  :  THEN-SET THE MANUAL INTERVENTION FALG IN CAS REGISTER 11
5369                                ;*  :  ELSE-CONTINUE
5370                                ;*  ENDIF
5371                                ;*  LOAD 377(8) IN CAS REGISTER 4
5372                                ;*  LOAD 35(8) IN CAS REGISTER 0
5373                                ;*  WAIT 10 MILLISECONDS
5374                                ;*  IF CAS REGISTER 0 BITS 5:0=0
5375                                ;*  :  THEN-CONTINUE
```

```
                                ;*  :  ELSE-LOAD ERROR CODE 7(10)
                                ;*  ENDIF
                                ;*ENDSUB
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.
                                ;*
016304                          S
 (1)                            ; ************************************************************************

016304 042777 000340 165750 DIAGO:  BIC     #340,@D12           ;CLEAR THE REL.,SCOPE LOOP & MANUAL FLAG
016312 005737 002330                TST     REL178              ;WAS RELIABILITY MODE SET?
016316 001403                       BEQ     2$                  ;NO-CONTINUE
016320 052777 000100 165734         BIS     #100,@D12
016326                          2$: MANUAL
016330                              BNCOMPLETE 3$
016332 052777 000040 165722         BIS     #40,@D12            ;SET THE MANUAL FLAG
016340 012777 000377 165700 3$:     MOV     #377,@AS            ;CLEAR THE ATTENTION SUMMARY REGISTER
016346 112777 000035 165654         MOVB    #TSTART,@XFRCMD     ;ISSUE THE TEST START CMD.
                                                                ;
016354                          1$: DELAY   100                 ;WAIT 10 MILLISECONDS
                                                                ;
016404 017701 165620                MOV     @XFRCMD,R1          ;GET THE COMMAND REGISTER
016410 042701 177700                BIC     #177700,R1          ;REMOVE JUNK BITS
016414 001402                       BEQ     DIAGEX              ;YES-RETURN
016416 012705 000007                MOV     #07.,ERRCOD     ;NO - LOAD ERROR CODE
016422 000207                   DIAGEX: RTS     PC              ;RETURN TO CALLING ROUTINE
                                .SBTTL  MODULE 2.1.3.2 - WAIT
016424                          SSUB
                                ; ************************************************************************
                                ;*SUBROUTINE TITLE
                                ;*---------- -----
                                ;*MODULE         2.1.3.2 WAIT/TIMEOUT TM78 MP-HOST COMMUNICATION
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 CALLINC 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
```

```
5474                                    ;               INFORMATION FOR PRINTOUT
5475                                    ;       BUFFER  CONTAINS THE MESSAGE FILE READ IN FROM THE BULK
5476                                    ;               STORAGE DEVICE
5477                                    ;
5478                                    ;       OUTPUT:
5479                                    ;               ERROR MESSAGE OUTPUT TO THE SYSTEM LOG DEVICE
5480                                    ;
5481
5482  016552  005001                    ERR78:  CLR     R1              ;CLEAR THE MESS. BUFFER PTR.
5483
5484  016554  126127  021666  000041    10$:    CMPB    BUFER(R1),#'!   ;IS THE CHAR. A .?
5485  016562  001402                            BEQ     1$              ;YES-CONTINUE
5486  016564  005201                            INC     R1              ;NO-UPDATE BUFFER POINTER
5487  016566  000772                            BR      10$             ;LOOP
5488  016570  005201                    1$:     INC     R1              ;
5489                                    ;
5490                                    ;HAVE FOUND THE ! THE NEXT N CHARACTERS ARE THE TEST #
5491                                    ;
5492  016572  005003                            CLR     R3              ;CLEAR RESULT LOCATION
5493  016574  116102  021666            2$:     MOVB    BUFER(R1),R2    ;GET A CHAR.
5494  016600  005201                            INC     R1              ;UPDATE THE POINTER
5495  016602  120227  000060                    CMPB    R2,#'0          ;IS THE CHARACTER < ASCII ZERO?
5496  016606  100412                            BMI     3$              ;YES - END OF TEST NUMBER
5497  016610  120227  000070                    CMPB    R2,#'8          ;NO - IS THE CHARACTER < ASCII 8?
5498  016614  100007                            BPL     3$              ;NO - END OF TEST NUMBER
5499  016616  042702  177770                    BIC     #177770,R2      ;NO-GET THE CHAR
5500  016622  006303                            ASL     R3              ;SHIFT
5501  016624  006303                            ASL     R3              ;THE
5502  016626  006303                            ASL     R3              ;RESULT
5503  016630  050203                            BIS     R2,R3           ;UPDATE THE RESULT
5504  016632  000760                            BR      2$              ;CONTINUE UNTIL A NON-OCTAL CHARACTER
5505                                            ;
5506  016634  042703  177400            3$:     BIC     #177400,R3      ;LEAVE ONLY 8 BITS
5507  016640  120337  004332                    CMPB    R3,DIAGTS       ;THIS TEST?
5508  016644  001343                            BNE     10$             ;NO - CONTINUE
5509                                            ;
5510  016646  116102  021666            6$:     MOVB    BUFER(R1),R2    ;YES-GET NEXT CHAR.
5511  016652  005201                            INC     R1              ;INC THE BUFFER POINTER
5512  016654  120227  000045                    CMPB    R2,#'%          ;IS IT A %?
5513  016660  001372                            BNE     6$              ;NO-CONTINUE
5514  016662  010103                            MOV     R1,R3           ;SAVE THE POINTER
5515  016664  116102  021666            5$:     MOVB    BUFER(R1),R2    ;GET THE NEXT CHARACTER
5516  016670  005201                            INC     R1              ;UPDATE THE CHARACTER POINTER
5517  016672  120227  000046                    CMPB    R2,#'&          ;IS IT A & ?
5518  016676  001372                            BNE     5$              ;NO - CONTINUE TO LOOK
5519  016700  012702  021666                    MOV     #BUFER,R2       ;GET THE BASE BUFFER ADDRESS
5520  016704  060102                            ADD     R1,R2           ;BUILD POINTER TO MODULE CALLOUTS
5521  016706  010237  016736                    MOV     R2,ERR78X+4
5522
5523  016712  105722                    7$:     TSTB    (R2)+           ;LOOK FOR LINE TERMINATOR
5524  016714  001376                            BNE     7$              ;LOOP UNTIL FOUND
5525  016716  005302                            DEC     R2              ;MOVE POINTER BACK TO THE
5526  016720  005302                            DEC     R2              ;CARRIAGE RETURN
5527  016722  005302                            DEC     R2              ;LINE FEED
5528  016724  111237  004414                    MOVB    (R2),SAVE       ;SAVE THE LINE TERMINATOR
5529  016730  105012                            CLRB    (R2)            ;PUT IN A NEW
```

```
5530
5531  016732                          ERR78X: ERRDF   0,ERR78X,MPPC    ;PRINT THE ERROR
5532  016742  113712  004414                  MOVB    SAVE,(R2)       ;RESTORE THE ORIGINAL LINE TERMINATOR
5533  016746  010301                          MOV     R3,R1           ;RESTORE THE % VECTOR
5534  016750  004737  017234                  CALL    ERR78P          ;PRINT THE % LINE
5535  016754  005003                  MSGPAR: CLR     R3
5536  016756  116102  021666          9$:     MOVB    BUFER(R1),R2    ;GET A CHAR
5537  016762  005201                          INC     R1              ;UPDATE THE POINTER
5538  016764  120227  000076                  CMPB    R2,#'>          ;>?
5539  016770  001372                          BNE     9$              ;NO-LOOP
5540  016772  005203                          INC     R3              ;INC. THE MESSAGE PAIR COUNT
5541  016774  020337  004334                  CMP     R3,DIAGER       ;MSG. PAIR=ERROR #
5542  017000  001407                          BEQ     FOUND           ;YES-EXIT LOOP
5543                                                                  ;
5544  017002  116102  021666          8$:     MOVB    BUFER(R1),R2    ;MESSAGE PAIR
5545  017006  005201                          INC     R1              ;UPDATE BUFFER POINTER
5546  017010  120227  000074                  CMPB    R2,#'<          ;<?
5547  017014  001372                          BNE     8$              ;NO-KEEP ON LOOPING
5548                                                                  ;YES-END OF PAIR
5549  017016  000757                          BR      9$              ;TRY TO MATCH ON NEXT
5550                                                                  ;PAIR
5551
5552  017020  004737  017234          FOUND:  CALL    ERR78P          ;GO PRINT THE LINE
5553
5554  017024  116102  021666          3$:     MOVB    BUFER(R1),R2    ;GET A CHARACTER
5555  017030  005201                          INC     R1              ;UPDATE THE POINTER
5556  017032  120227  000076                  CMPB    R2,#'>          ;>?
5557  017036  001770                          BEQ     FOUND           ;YES-PRINT THE LINE
5558  017040  120227  000074                  CMPB    R2,#'<          ;NO-<?
5559  017044  001367                          BNE     3$              ;NO-KEEP LOOPING
5560  017046  122737  000374  004364          CMPB    #374,DINTCD     ;ERROR INTERRUPT
5561  017054  001004                          BNE     SECPAR          ;NO - SKIP EXP/ACT & AUX. PRINT
5562  017056  004737  017450                  CALL    EXACT
5563  017062  004737  017560                  CALL    AUXPNT
5564
5565  017066  004737  017234          SECPAR: CALL    ERR78P          ;PRINT THE LINE
5566                                                                  ;
5567  017072  116102  021666          2$:     MOVB    BUFER(R1),R2    ;GET A CHARACTER
5568  017076  005201                          INC     R1              ;UPDATE THE POINTER
5569  017100  120227  000074                  CMPB    R2,#'<          ;<?
5570  017104  001770                          BEQ     SECPAR          ;YES-GO PRINT IT
5571  017106  120227  000076                  CMPB    R2,#'>          ;NO >?
5572  017112  001410                          BEQ     RESPON          ;YES - EXIT
5573  017114  120227  000043                  CMPB    R2,#'#          ;END OF BUFFER?
5574  017120  001364                          BNE     2$              ;NO - KEEP LOOKING
5575                                                                  ;
5576  017122  122737  000374  004364          CMPB    #374,DINTCD     ;ERROR INTERRUPT?
5577  017130  001401                          BEQ     RESPON          ;YES - CONTINUE
5578  017132  000207                          RTS     PC              ;NO - RETURN TO CALLING MODULE
5579  017134  042777  000200  165120  RESPON: BIC     #200,@DI2       ;CLEAR THE SCOPE LOOP FLAG
5580  017142  012777  040000  165060          MOV     #TRE,@XFRCMD    ;CLEAR THE MB ERROR
5581  017150  005077  165054                  CLR     @XFRCMD         ;FIX UP THE HARDWARE HACK
5582  017154                                  INLOOP                  ;LOOP ON ERROR SPECIFIED?
5583  017156                                  BCOMPLETE       1$      ;YES
5584  017160  012777  000377  165060          MOV     #377,@AS        ;CLEAR THE ATTENTION BIT
5585  017166  012777  000031  165034          MOV     #CONERR,@XFRCMD ;NO - ISSUE CONTINUE ON ERROR COMMAND
```

```
5586  017174  000207                          RTS     PC              ;RETURN
5587                                                                  ;
5588  017176                          1$:     RFLAGS  R2              ;GET THE USER FLAGS
5589  017202  032702  040000                  BIT     #LOE,R2         ;SCOPE LOOP INDICATED?
5590  017206  001403                          BEQ     2$              ;NO-CONTINUE
5591  017210  052777  000200  165044          BIS     #200,@DI2       ;YES-SET THE SCOPE LOOP BIT
5592                                                                  ;
5593  017216  012777  000377  165022  2$:     MOV     #377,@AS        ;CLEAR THE ATTENTION BIT
5594  017224  012777  000033  164776          MOV     #LOPERR,@XFRCMD ;ISSUE LOOP ON ERROR COMMAND
5595  017232  000207                          RTS     PC              ;
5596
5597
5598  017234  012704  021666          ERR78P: MOV     #BUFER,R4       ;CALCULATE STARTING ADDRESS
5599  017240  060104                          ADD     R1,R4           ;OF A CHARACTER STRING
5600  017242  122737  000374  004364          CMPB    #374,DINTCD     ;ERROR INTERRUPT?
5601  017250  001412                          BEQ     1$              ;YES - PRINT THE ERROR LINES WITH DISTINCTION
5602  017252                                  PRINTF  #FMT78P,R4      ;NO - FORCE PRINT THE MESSAGE LINES
5603  017274  000411                          BR      2$
5604  017276                          1$:     PRINTX  #FMT78P,R4      ;PRINT THE LINE
5605  017320  000207                  2$:     RTS     PC              ;RETURN TO USER
5606
5607  017322  052045     000          FMT78P: .ASCIZ  /%T/
5608          017326                          .EVEN
5609  017326                                  BGNMSG  MPPC
5610  017326  004737  044352                  CALL    HEADER
5611  017332                                  PRINTB  #XTNOPC,DIAGER,DIAGTS,@TUSTAT
5612  017366                                  ENDMSG
5613
5614  017370  040445  046524  034067  XTNOPC: .ASCIZ  /%ATM78 MICRO ERROR  %05%A  TST %03%A  PC: %06%N/
5615                                          .EVEN
5616
5617                                  .SBTTL  MODULE 2.1.3.3.1 - EXACT
5618  017450                          SSUB
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5619                                ;*MODULE 2.1.3.3.1 PRINT ACTUAL/EXPECTED DATA
5620  017450                          SP
 (1)                                ; ************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5621                                ;*BGNSUB
5622                                ;*  IF BIT 15 IN CAS REGISTER 3=1
5623                                ;*  :  THEN-PRINT LOW BYTE OF CAS REGISTER 12 AS ACTUAL DATA
5624                                ;*  :  ELSE-CONTINUE
5625                                ;*  ENDIF
5626                                ;*  IF BIT 14 IN CAS REGISTER 3=1
5627                                ;*  :  THEN-PRINT HIGH BYTE OF CAS REGISTER 12 AS EXPECTED DATA
5628                                ;*  :  ELSE-CONTINUE
5629                                ;*  ENDIF
5630                                ;*ENDSUB
5631  017450                          S
 (1)                                ; ************************************************************************
5632
5633  017450  032777  100000  164576  EXACT:  BIT     #100000,@DI1    ;ACTUAL DATA TO PRINT?
5634  017456  001415                          BEQ     1$              ;NO-GO CHECK EXPECTED
```

```
5635  017460  017704  164600                  MOV     @DI3,R4         ;YES
5636  017464  042704  177400                  BIC     #177400,R4      ;GET THE ACTUAL DATA BYTE
5637  017470                                  PRINTX  #FMTACT,R4      ;PRINT IT
5638
5639  017512  032777  040000  164534  1$:     BIT     #040000,@DI1    ;EXPECTED DATA TO PRINT?
5640  017520  001416                          BEQ     2$              ;NO - RETURN
5641  017522  017704  164536                  MOV     @DI3,R4         ;YES
5642  017526  000304                          SWAB    R4
5643  017530  042704  177400                  BIC     #177400,R4      ;GET THE EXPECTED DATA BYTE
5644  017534                                  PRINTX  #FMTEXP,R4
5645  017556  000207                  2$:     RTS     PC
5646
5647                                  .SBTTL  MODULE 2.1.3.3.2 - AUXPNT
5648  017560                          SSUB
 (1)                                ;*****************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5649                                ;*MODULE 2.1.3.3.2 AUXILIARY PRINT REQUESTS
5650  017560                        SP
 (1)                                ;*****************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5651                                ;*BGNSUB
5652                                ;*  IF CAS REGISTER 11 BIT 15:12=0
5653                                ;*  :  THEN-CONTINUE
5654                                ;*  :  ELSE-IF BITS 15:12 RIGHT JUSTIFIED=0 > OR 7
5655                                ;*  :       :  THEN-CONTINUE
5656                                ;*  :       :  ELSE-IF BITS 15:12 RIGHT JUSTIFIED=1
5657                                ;*  :       :       :  THEN-PRINT MESSAGE 1 BELOW
5658                                ;*  :       :       :  ELSE-CONTINUE
5659                                ;*  :       :       ENDIF
5660                                ;*  :       :       IF BITS 15:12 RIGHT JUSTIFIED=2
5661                                ;*  :       :       :  THEN-PRINT MESSAGE 2 BELOW
5662                                ;*  :       :       :  ELSE-CONTINUE
5663                                ;*  :       :       ENDIF
5664                                ;*  :       :       IF BITS 15:12 RIGHT JUSTIFIED-3
5665                                ;*  :       :       :  THEN-PRINT MESSAGE 3 BELOW
5666                                ;*  :       :       :  ELSE-CONTINUE
5667                                ;*  :       :       ENDIF
5668                                ;*  :       :       IF BITS 15:12 RIGHT JUSTIFIED=4
5669                                ;*  :       :       :  THEN-PRINT MESSAGE 4 BELOW
5670                                ;*  :       :       :  ELSE-CONTINUE
5671                                ;*  :       :       ENDIF
5672                                ;*  :       :       IF BITS 15:12 RIGHT JUSTIFIED=5
5673                                ;*  :       :       :  THEN-PRINT MESSAGE 5 BELOW
5674                                ;*  :       :       :  ELSE-CONTINUE
5675                                ;*  :       :       ENDIF
5676                                ;*  :       :       IF BITS 15:12 RIGHT JUSTIFIED=6
5677                                ;*  :       .       :  THEN-PRINT MESSAGE 6 BELOW
5678                                ;*  :       :       :       PRINT MESSAGE 5 BELOW
5679                                ;*  :       :       :  ELSE-CONTINUE
5680                                ;*  :       :       ENDIF
5681                                ;*  :       :       IF BITS 15:12 RIGHT JUSTIFIED=7
5682                                ;*  :       :       :  THEN-PRINT MESSAGE 7 BELOW
5683                                ;*  :       :       :  ELSE-CONTINUE
5684                                ;*  :       :       ENDIF
```

```
5685                            ;*  :       :       IF BITS 15:12 RIGHT JUSTIFIED=10
5686                            ;*  :       :       :  THEN-PRINT MESSAGE 1 BELOW
5687                            ;*  :       :       :       PRINT MESSAGE 2 BELOW
5688                            ;*  :       :       :       PRINT MESSAGE 5 BELOW
5689                            ;*  :       :       :  ELSE-CONTINUE
5690                            ;*  :       :       ENDIF
5691                            ;*  :       ENDIF
5692                            ;*  ENDIF
5693                            ;*ENDSUB
5694  017560                    $
 (1)                            ; ************************************************************************
5695                            ;*      MESSAGE #                       PRINT LINE
5696                            ;*      ---------                       ----------
5697                            ;*
5698                            ;*          1                   REQUEST HOST CPU TO PRINT:
5699                            ;*                              "BYTE/SCLK COUNT NUMBER = LLL"
5700                            ;*                              WHERE: LLL = THE VALUE STORED IN CAS
5701                            ;*                                     REGISTER 5 (THE BYTE COUNT
5702                            ;*                                     REGISTER 16 BITS).
5703                            ;*
5704                            ;*          2                   REQUEST HOST CPU TO PRINT:
5705                            ;*                              DATA FORMAT = MM
5706                            ;*                              SKIP COUNT = NN
5707                            ;*                              WHERE:  MM = DATA FORMAT FROM CAS REG 2
5708                            ;*                                      NN = SKIP COUNT FROM CAS REG 2
5709                            ;*
5710                            ;*          3                   REQUEST HOST CPU TO PRINT:
5711                            ;*                              BYTE-SCLK COUNT = LLL
5712                            ;*                              DATA FORMAT = MM
5713                            ;*                              SKIP COUNT = NN
5714                            ;*                              WHERE:  LLL = AS ABOVE
5715                            ;*                                      MM  = AS ABOVE
5716                            ;*                                      NN  = AS ABOVE
5717                            ;*
5718                            ;*          4                   REQUEST HOST TO PRINT:
5719                            ;*                              TRANSITION COUNT = LLL
5720                            ;*                              WHERE:  LLL = COUNT FROM CAS REGISTER 05
5721                            ;*
5722                            ;*          5                   REQUEST HOST CPU TO PRINT:
5723                            ;*                              EXPECTED 18 BITS =      E EEEEEE
5724                            ;*                              ACTUAL 18 BITS =        A AAAAAA
5725                            ;*
5726                            ;*                              WHERE EXPECTED BITS 15-0 ARE IN CAS REG
5727                            ;*                              14 AND BITS 17-16 ARE IN REG 15...PRINT
5728                            ;*                              FLAG IS SIGN BIT OF CAS REG 15 LOW BYTE.
5729                            ;*
5730                            ;*                              ACTUAL 18 BITS DATA CONTAINED IN REG 16
5731                            ;*                              (BITS 15-0) AND IN REG 17 (BITS 17-16)..
5732                            ;*                              PRINT FLAG IS CAS REG 17 LOW BYTE SIGN BIT.
5733                            ;*
5734                            ;*          6                   REQUEST THE HOST CPU TO PRINT BOTH ROUTINE
5735                            ;*                              #1 AND #5 TO REPORT THE BYTE/SCLK COUNT
5736                            ;*                              AND 18 BITS OF EXPECTED AND/OR ACTUAL
5737                            ;*                              DATA.
5738                            ;*
5739                            ;*          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
5745  017560                            $
 (1)                                    ; ***************************************************************************
5746
5747  017560  017704  164476           AUXPNT: MOV     @D12,R4
5748  017564  032704  170000                   BIT     #170000,R4      ;AUXILIARY PRINT REQ?
5749  017570  001410                           BEQ     AUXILL          ;NO-GO DO SECOND MSG. PAIR
5750  017572  042704  007777                   BIC     #007777,R4      ;REMOVE UNWANTED BITS
5751  017576  000304                           SWAB    R4              ;SWAP BYTES
5752  017600  006204                           ASR     R4              ;SHIFT RIGHT
5753  017602  006204                           ASR     R4              ;SHIFT RIGHT
5754  017604  006204                           ASR     R4              ;SHIFT RIGHT
5755  017606  000174  017614                   JMP     @AUXTBL(R4)
5756  017612  000207                  AUXILL: RTS     PC
5757
5758  017614  017612                  AUXTBL: .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 0 - ILLEGAL
5759  017616  017654                          .WORD   AUX1            ;AUXILIARY PRINT REQUEST 1
5760  017620  017662                          .WORD   AUX2            ;AUXILIARY PRINT REQUEST 2
5761  017622  017670                          .WORD   AUX3            ;AUXILIARY PRINT REQUEST 3
5762  017624  017702                          .WORD   AUX4            ;AUXILIARY PRINT REQUEST 4
5763  017626  017710                          .WORD   AUX5            ;AUXILIARY PRINT REQUEST 5
5764  017630  017716                          .WORD   AUX6            ;AUXILIARY PRINT REQUEST 6
5765  017632  017730                          .WORD   AUX7            ;AUXILIARY PRINT REQUEST 7
5766  017634  017756                          .WORD   AUX8            ;AUXILIARY PRINT REQUEST 8
5767  017636  017612                          .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 9  - ILLEGAL
5768  017640  017612                          .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 10 - ILLEGAL
5769  017642  017612                          .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 11 - ILLEGAL
5770  017644  017612                          .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 12 - ILLEGAL
5771  017646  017612                          .WORD   AUXILL          ;AUXILIARY PRIN  REQUEST 13 - ILLEGAL
5772  017650  017612                          .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 14 - ILLEGAL
5773  017652  017612                          .WORD   AUXILL          ;AUXILIARY PRINT REQUEST 15 - ILLEGAL
5774
5775  017654  004737  020026          AUX1:   CALL    AUX1X           ;GO PRINT AUXILIARY LINE 1
5776  017660  000207                          RTS     PC              ;RETURN TO CALLING MODULE
5777  017662  004737  020106          AUX2:   CALL    AUX2X           ;GO PRINT AUXILIARY LINE 2
5778  017666  000207                          RTS     PC              ;RETURN TO CALLING MODULE
5779  017670  004737  020026          AUX3:   CALL    AUX1X           ;GO PRINT AUXILIARY LINE 1
5780  017674  004737  020106                  CALL    AUX2X           ;GO PRINT AUXILIARY LINE 2
5781  017700  000207                          RTS     PC              ;RETURN TO CALLING MODULE
5782  017702  004737  020264          AUX4:   CALL    AUX4X           ;GO PRINT AUXILIARY LINE 4
5783  017706  000207                          RTS     PC              ;RETURN TO CALLING MODULE
5784  017710  004737  020346          AUX5:   CALL    AUX5X           ;GO PRINT AUXILIARY LINE 5
5785  017714  000207                          RTS     PC              ;RETURN TO CALLING MODULE
5786  017716  004737  020026          AUX6:   CALL    AUX1X           ;GO PRINT AUXILIARY LINE 1
5787  017722  004737  020346                  CALL    AUX5X           ;GO PRINT AUXILIARY LINE 5
5788  017726  000207                          RTS     PC              ;RETURN TO CALLING MODULE
5789  017730                          AUX7:   PRINTX  #AUXMS7,@FC
5790  017754  000207                          RTS     PC
5791  017756  004737  020026          AUX8:   CALL    AUX1X           ;GO PRINT AUXILIARY LINE 1
5792  017762  004737  020106                  CALL    AUX2X           ;GO PRINT AUXILIARY LINE 2
5793  017766  004737  020346                  CALL    AUX5X           ;GO PRINT AUXILIARY LINE 5
5794  017772  000207                          RTS     PC              ;RETURN TO CALLING MODULE
```

```
5795
5796
5797  017774  040445  052523  043502  AUXMS7: .ASCIZ  /%ASUBGROUP NUMBER = %06%N/
5798                                          .EVEN
5799
5800                                  ;THIS AUXILIARY PRINT ROUTINE WILL PRINT THE SCLK/BYTE COUNT BASED ON
5801                                  ;THE CONTENTS OF THE CAS REGISTER 5.
5802
5803  020026                          AUX1X:  PRINTX  #AUXMS1,@FC
5804  020052  000207                          RTS     PC
5805  020054  040445  054502  042524  AUXMS1: .ASCIZ  /%ABYTE-SCLK COUNT = %06%N/
5806                                          .EVEN
5807
5808                                  ;THIS AUXILIARY PRINT ROUTINE WILL PRINT THE DATA FORMAT AND SKIP COUNT
5809                                  ;BASED ON THE DATA FORMAT AND SKIP COUNT INFORMATION IN CAS REGISTER 2
5810                                  ;(MASS BUS REGISTER 14).
5811
5812  020106  017702  164132          AUX2X:  MOV     @TC,R2          ;GET THE TAPE CONTROL REGISTER
5813  020112  000302                          SWAB    R2              ;SWAP THE BYTES
5814  020114  042702  177760                  BIC     #177760,R2      ;GET ONLY THE SKIP COUNT
5815  020120  017704  164120                  MOV     @TC,R4          ;GET THE TAPE CONTROL REGISTER
5816  020124  000304                          SWAB    R4              ;SWAP THE BYTES
5817  020126  042704  177617                  BIC     #177617,R4      ;MASK OUT ONLY THE FORMAT BITS
5818  020132  006204                          ASR     R4              ;JUSTIFY RIGHT
5819  020134  006204                          ASR     R4              ;
5820  020136  006204                          ASR     R4              ;
5821  020140  006204                          ASR     R4              ;
5822  020142                                  PRINTX  #AUXMS2,R4      ;GET ONLY THE DATA FORMAT
5823  020164                                  PRINTX  #AUXMO2,R2
5824  020206  000207                          RTS     PC
5825  020210  040445  040504  040524  AUXMS2: .ASCIZ  /%ADATA FORMAT = %06%N/
5826  020236  040445  045523  050111  AUXMO2: .ASCIZ  /%ASKIP COUNT = %06%N/
5827          020264                          .EVEN
5828
5829                                  ;THIS AUXILIARY PRINT ROUTINE WILL PRINT THE TRANSIITION COUNT BASED
5830                                  ;ON THE CONTENTS OF CAS REGISTER 5.
5831  020264                          AUX4X:  PRINTX  #AUXMS4,@FC
5832  020310  000207                          RTS     PC
5833
5834  020312  040445  051124  047101  AUXMS4: .ASCIZ  /%ATRANSITION COUNT = %06%N/
5835          020346                          .EVEN
5836
5837                                  ;THIS AUXILIARY PRINT ROUTINE WILL PRINT EXPECTED DATA AND/OR ACTUAL
5838                                  ;DATA IN 18 BIT FORMAT (6 OCTAL CHARACTERS).  THE ACTUAL DATA (BITS
5839                                  ;15:0) IS CONTAINED IN CAS REGISTER 16 AND (BITS 17:16) IN CAS REGISTER
5840                                  ;17.  THE EXPECTED DATA (BITS 15:0) IS CONTAINED IN CAS REGISTER 14 AND
5841                                  ;(BITS 17:16) IN CAS REGISTER 15.  ASSOCIATED WITH BOTH THE ACTUAL AND
5842                                  ;EXPECTED DATA IS A PRINT FLAG INDICATING IF THE INFORMATION IS TO BE
5843                                  ;PRINTED.  THE ACTUAL DATA PRINT FLAG IS BIT 7 OF CAS REGISTER 17, AND
5844                                  ;THE PRINT FLAG FOR THE EXPECTED DATA IS BIT 7 OF CAS REGISTER 15.
5845  020346  032777  000200  163716  AUX5X:  BIT     #200,@MO1       ;EXPECTED DATA TO PRINT?
5846  020354  001415                          BEQ     1$              ;NO-GO CHECK FOR ACTUAL
5847  020356  005003                          CLR     R3              ;YES-LOAD THE DISPLACEMENT VALUE
5848  020360  004737  020456                  CALL    AUX18           ;GET THE DATA
5849  020364                                  PRINTX  #AUXMS5,R2,R4   ;
5850  020410  032777  000200  163660  1$:     BIT     #200,@MO3       ;ACTUAL DATA TO PRINT?
```

```
5851  020416  001416                        BEQ     2$              ;NO-RETURN TO USER
5852  020420  012703  000002                MOV     #2,R3           ;YES-LOAD THE DISPLACEMENT VALUE
5853  020424  004737  020456                CALL    AUX18           ;GET THE DATA
5854  020430                                PRINTX  #AUXMO5,R2,R4
5855  020454  000207              2$:       RTS     PC              ;RETURN
5856
5857  020456  017302  004272      AUX18:    MOV     @MO1(R3),R2     ;GET BIT 17:16
5858  020462  042702  177774                BIC     #177774,R2      ;REMOVE UNWANTED BITS
5859  020466  006302                        ASL     R2              ;JUSTIFY THE CHARACTER
5860  020470  017304  004270                MOV     @MO0(R3),R4     ;GET THE MISSING BIT
5861  020474  042704  077777                BIC     #077777,R4      ;JUSTIFY THE BIT
5862  020500  000241                        CLC
5863  020502  006304                        ASL     R4
5864  020504  006304                        ASL     R4
5865  020506  050402                        BIS     R4,R2           ;COMPLETE THE PARTIAL CHARACTER
5866  020510  017304  004270                MOV     @MO0(R3),R4     ;GET THE OTHER 5 CHARACTERS
5867  020514  000207                        RTS     PC              ;RETURN
5868
5869  020516  040445  054105  027124  AUXMS5: .ASCIZ  /%AEXT. EXPECTED = %01%05%N/
5870          020552                        .EVEN
5871  020552  040445  054105  027124  AUXMO5: .ASCIZ  /%AEXT. ACTUAL = %01%05%N/
5872          020604                        .EVEN
5873                                .SBTTL  MODULE 2.1.3.4 - UTIL80
5874  020604                        SSUB
 (1)                                ;*****************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
5875                                ;*MODULE        2.1.3.4 PROCESS TM78 MP UTILITY REQUEST
5876  020604                        SP
 (1)                                ;*****************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
5877                                ;*BGNSUB
5878                                ;*  IF CAS REGISTER 11 BITS 3:0=0 OR 4 OR > 7
5879                                ;*  :  THEN-LOAD ERRCOD WITH 16(10)
5880                                ;*  :       EXIT SUBROUTINE
5881                                ;*  :  ELSE-IF REGISTER 11 BITS 3:0=1 OR 2
5882                                ;*  :       :  THEN-CALL SUBROUTINE CALBYT
5883                                ;*  :       :       IF ERRCOD=0
5884                                ;*  :       :       :  THEN-CALL SUBROUTINE PATGEN
5885                                ;*  :       :       :       IF ERRCOD=0
5886                                ;*  :       :       :       :  THEN-LOAD 377(8) CAS REGISTER 4
5887                                ;*  :       :       :       :       SET UP THE WRITE BUFFER ADDRESS
5888                                ;*  :       :       :       :       LOAD 65(8) CAS REGISTER 0
5889                                ;*  :       :       :       :  ELSE-EXIT SUBROUTINE
5890                                ;*  :       :       :       ENDIF
5891                                ;*  :       :       :  ELSE-EXIT SUBROUTINE
5892                                ;*  :       :       ENDIF
5893                                ;*  :       :  ELSE-CONTINUE
5894                                ;*  :       ENDIF
5895                                ;*  :       IF CAS REGISTER 11 BITS 3:0=3
5896                                ;*  :       :  THEN-CALL SUBROUTINE CALBYT
5897                                ;*  :       :       IF ERRCOD=0
5898                                ;*  :       :       :  THEN-CALL SUBROUTINE PATGEN
5899                                ;*  :       :       :       IF ERRCOD=0
5900                                ;*  :       :       :       :  THEN-LOAD 377(8) TO CAS REGISTER 4
```

```
5901                    ;*  :       :       :       :       LOAD THE READ BUFFER ADDRESS
5902                    ;*  :       :       :       :       LOAD 71(8) TO CAS REGISTER 0
5903                    ;*  :       :       :       :  ELSE-EXIT SUBROUTINE
5904                    ;*  :       :       :       ENDIF
5905                    ;*  :       :       :  ELSE-EXIT SUBROUTINE
5906                    ;*  :       :       ENDIF
5907                    ;*  :       :  ELSE-CONTINUE
5908                    ;*  :       ENDIF
5909                    ;*  :       IF CAS REGISTER 11 BITS 3:0=5
5910                    ;*  :       :  THEN-IF MASSBUS STATUS BIT ''TRE''=1
5911                    ;*  :       :       :  THEN-STATUS ERROR 31 (ON DATA TRANSFER)
5912                    ;*  :       :       :  ELSE-CONTINUE
5913                    ;*  :       :       ENDIF
5914                    ;*  :       :       IF CAS REGISTER 11 BIT 4=1
5915                    ;*  :       :       :  THEN-COMPARE THE DATA
5916                    ;*  :       :       :       IF DATA COMPARE ERROR
5917                    ;*  :       :       :       :  THEN-ERROR 32
5918                    ;*  :       :       :       :  ELSE-CONTINUE
5919                    ;*  :       :       :       ENDIF
5920                    ;*  :       :       :  ELSE-CONTINUE
5921                    ;*  :       :       ENDIF
5922                    ;*  :       :       CLEAR BIT 7 IN CAS REGISTER 11
5923                    ;*  :       :       IF ERROR AND LOOP ON ERROR SPECIFIED
5924                    ;*  :       :       :  THEN-IF SCOPE LOOP SPECIFIED
5925                    ;*  :       :       :       :  THEN-SET BIT 7 IN CAS REGISTER 11
5926                    ;*  :       :       :       :  ELSE-CONTINUE
5927                    ;*  :       :       :       ENDIF
5928                    ;*  :       :       :       LOAD 377(8) IN CAS REGISTER 4
5929                    ;*  :       :       :       LOAD 33(8) IN CAS REGISTER 0
5930                    ;*  :       :       :  ELSE-LOAD 377(8) IN CAS REGISTER 4
5931                    ;*  :       :       :       LOAD 31(8) IN CAS REGISTER 0
5932                    ;*  :       :       ENDIF
5933                    ;*  :       :  ELSE-CONTINUE
5934                    ;*  :       ENDIF
5935                    ;*  :       IF CAS REGISTER 11 BITS 3:0=6
5936                    ;*  :       :  THEN-IF MASSBUS STATUS BIT ''TRE''=1
5937                    ;*  :       :       :  THEN-STATUS ERROR 33 (ON DATA TRANSFER)
5938                    ;*  :       :       :  ELSE-CONTINUE
5939                    ;*  :       :       ENDIF
5940                    ;*  :       :       IF CAS REGISTER 11 BIT 4=1
5941                    ;*  :       :       :  THEN-COMPARE THE DATA
5942                    ;*  :       :       :       IF DATA COMPARE ERROR
5943                    ;*  :       :       :       :  THEN-ERROR 32
5944                    ;*  :       :       :       :  ELSE-CONTINUE
5945                    ;*  :       :       :       ENDIF
5946                    ;*  :       :       :  ELSE-CONTINUE
5947                    ;*  :       :       ENDIF
5948                    ;*  :       :       CLEAR BIT 7 IN CAS REGISTER 11
5949                    ;*  :       :       IF ERROR AND LOOP ON ERROR SPECIFIED
5950                    ;*  :       :       :  THEN-IF SCOPE LOOP SPECIFIED
5951                    ;*  :       :       :       :  THEN-SET BIT 7 IN CAS REGISTER 11
5952                    ;*  :       :       :       :  ELSE-CONTINUE
5953                    ;*  :       :       :       ENDIF
5954                    ;*  :       :       :       LOAD 377(8) IN CAS REGISTER 4
5955                    ;*  :       :       :       LOAD 33(8) IN CAS REGISTER 0
5956                    ;*  :       :       :  ELSE-LOAD 377(8) IN CAS REGISTER 4
```

```
5957                                    ;*  :       :       :       LOAD 31(8) IN CAS REGISTER 0
5958                                    ;*  :       :       ENDIF
5959                                    ;*  :       :  ELSE-CONTINUE
5960                                    ;*  :       ENDIF
5961                                    ;*  :       IF CAS REGISTER 11 BITS 3:0=7
5962                                    ;*  :       :  THEN-LOAD THE BIT UNIT NUMBER IN CAS REGISTER 12
5963                                    ;*  :       :       LOAD 377(8) TO CAS REGISTER 4
5964                                    ;*  :       :       LOAD 31(8) TO CAS REGISTER 0
5965                                    ;*  :       :  ELSE-CONTINUE
5966                                    ;*  :       ENDIF
5967                                    ;*  ENDIF
5968                                    ;*ENDSUB
5969  020604                            S
 (1)                                    ; ************************************************************************
5970  020604  017701  163452            UTIL80: MOV     @DI2,R1         ;GET THE UTILITY REQ #
5971  020610  042701  177760                    BIC     #177760,R1      ;MASK OUT DESIRED BITS
5972  020614  006301                            ASL     R1              ;MULTIPLY BY 2
5973  020616  000171  020622                    JMP     @UTILTB(R1)     ;JUMP TO REQUIRED REQUEST
5974
5975  020622  020772                    UTILTB: .WORD   UTLILL          ;REQUEST CODE 0 INVALID
5976  020624  020662                            .WORD   WGCRPE          ;REQUEST CODE 1 WRITE PE
5977  020626  020662                            .WORD   WGCRPE          ;REQUEST CODE 2 WRITE GCR
5978  020630  020726                            .WORD   RFWD            ;REQUEST CODE 3 READ FORWARD
5979  020632  020772                            .WORD   UTLILL          ;REQUEST CODE 4 INVALID
5980  020634  021000                            .WORD   STNER           ;REQUEST CODE 5 STATUS CHECK-NO ERR
5981  020636  021066                            .WORD   STER            ;REQUEST CODE 6 STATUS CHECK-ERROR
5982  020640  021110                            .WORD   UNITS           ;REQUEST CODE 7 UNITS UNDER TEST
5983  020642  020772                            .WORD   UTLILL          ;REQUEST CODE 8 INVALID
5984  020644  020772                            .WORD   UTLILL          ;REQUEST CODE 9 INVALID
5985  020646  020772                            .WORD   UTLILL          ;REQUEST CODE A INVALID
5986  020650  020772                            .WORD   UTLILL          ;REQUEST CODE B INVALID
5987  020652  020772                            .WORD   UTLILL          ;REQUEST CODE C INVALID
5988  020654  020772                            .WORD   UTLILL          ;REQUEST CODE D INVALID
5989  020656  020772                            .WORD   UTLILL          ;REQUEST CODE E INVALID
5990  020660  020772                            .WORD   UTLILL          ;REQUEST CODE F INVALID
5991
5992                                    ;
5993                                    ;WRITE GCR/PE UTILITY REQUEST
5994                                    ;
5995  020662  004737  021142            WGCRPE: CALL    CALBYT          ;CALCULATE BYTE COUNT
5996  020666  005705                            TST     ERRCOD          ;TEST ERROR CODE
5997  020670  001015                            BNE     WGCRX           ;EXIT IF SET
5998  020672  004737  021312                    CALL    PATGEN          ;GENERATE THE DATA PATTERN
5999  020676  005705                            TST     ERRCOD          ;TEST ERROR CODE
6000  020700  001011                            BNE     WGCRX           ;EXIT IF SET
6001  020702  012777  000377  163336            MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
6002  020710  012777  032102  163316            MOV     #WRTBUF,@BA     ;LOAD THE BUFFER ADDRESS FOR WRITE
6003  020716  012777  000065  163304            MOV     #65,@XFRCMD     ;ISSUE WRITE GCR-NOT 18 BIT COMPAT.
6004  020724  000207                    WGCRX:  RTS     PC
6005
6006                                    ;
6007                                    ;READ FORWARD UTILITY REQUEST
6008                                    ;
6009  020726  004737  021142            RFWD:   CALL    CALBYT          ;CALCULATE THE BYTE COUNT
6010  020732  005705                            TST     ERRCOD          ;TEST ERROR CODE
6011  020734  001015                            BNE     RFWDX           ;EXIT IF SET
```

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 6012  020736  004737  021312                 CALL    PATGEN          ;GENERATE THE DATA PATTERN
 6013  020742  005705                         TST     ERRCOD          ;TEST ERROR CODE
 6014  020744  001011                         BNE     RFWDX           ;EXIT IF SET
 6015  020746  012777  031736  163260         MOV     #REDBUF,@BA     ;LOAD THE BUFFER ADDRESS FOR READ
 6016  020754  012777  000377  163264         MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
 6017  020762  012777  000071  163240         MOV     #71,@XFRCMD     ;ISSUE READ FORWARD
 6018  020770  000207                 RFWDX:  RTS     PC              ;
 6019
 6020                                 ;
 6021                                 ;ILLEGAL UTILITY REQUEST CODE ERROR TRAP
 6022                                 ;
 6023  020772  012705  000020         UTLILL: MOV     #16.,ERRCOD     ;LOAD THE ILLEGAL HOST REQUEST ERROR CODE
 6024  020776  000207                         RTS     PC
 6025
 6026  021000  032777  040000  163222 STNER:  BIT     #040000,@XFRCMD ;TEST THE MASS BUS STATUS
 6027  021006  001404                         BEQ     STNER1          ;CONTINUE IF NONE
 6028  021010                               ERRDF   #31.,,ERM031    ;ELSE - ERROR
 6029
 6030  021020  032777  000020  163234 STNER1: BIT     #000020,@DI2    ;SHOULD DATA BE COMPARED?
 6031  021026  001415                         BEQ     2$              ;NO-EXIT
 6032  021030  005002                         CLR     R2              ;CLEAR THE BUFFER POINTER
 6033  021032  126262  031736  032102 3$:     CMPB    REDBUF(R2),WRTBUF(R2)
 6034  021040  001404                         BEQ     1$
 6035  021042                               ERRDF   #32.,,ERM032    ;ELSE - DATA COMPARE FAILURE
 6036  021052  005202                 1$:     INC     R2              ;UPDATE THE POINTER
 6037  021054  020237  004336                 CMP     R2,BYTCNT       ;DONE?
 6038  021060  001364                         BNE     3$              ;NO - CONTINUE
 6039  021062  000137  017134         2$:     JMP     RESPON          ;GO SPECIFIFY CONTINUE/LOOP ON ERROR
 6040
 6041  021066  032777  040000  163134 STER:   BIT     #040000,@XFRCMD
 6042  021074  001351                         BNE     STNER1
 6043  021076                               ERRDF   #33.,,ERM033
 6044
 6045  021106  000744                         BR      STNER1
 6046
 6047                                 ;
 6048                                 ;UNIT NUMBERS UTILITY REQUEST
 6049                                 ;
 6050  021110  013701  004354         UNITS:  MOV     BINUNT,R1       ;GET THE UNITS WORD
 6051  021114  042701  177760                 BIC     #177760,R1      ;REMOVE UNUSED BITS
 6052  021120  010177  163140                 MOV     R1,@DI3         ;STORE IN CAS REGISTER 12 LOW
 6053  021124  012777  000377  163114         MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
 6054  021132  012777  000031  163070         MOV     #31,@XFRCMD     ;ISSUE DIAGNOSTIC CONTINUE COMMAND
 6055  021140  000207                         RTS     PC              ;RETURN
 6056                                 .SBTTL  MODULE 2.1.3.4.1 - CALBYT
 6057  021142                         $SUB
  (1)                                 ;*********************************************************************
  (1)                                 ;*SUBROUTINE TITLE
  (1)                                 ;*---------- -----
 6058                                 ;*MODULE        2.1.4.1 - CALCULATE BYTE COUNT
 6059  021142                         $D
  (1)                                 ;*********************************************************************
  (1)                                 ;*DESCRIPTION
  (1)                                 ;*-----------
 6060                                 ;*THIS ROUTINE WILL CALCUALTE THE BYTE COUNT FOR A GIVEN TM78 DATA
 6061                                 ;*TRANSFER REQUEST.  THIS BYTE COUNT IS BASED ON THE "SCLOCK" COUNT
```

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                                          ;*RETURNED IN CAS REGISTER 5, MASS BUS REGISTER 6, AND THE DATA FORMAT
                                          ;*IN CAS REGISTER 2, MASS BUS REGISTER 14.
021142                                    S
                                          ; ***********************************************************************

021142  017701  163070      CALBYT: MOV     @FC,R1          ;GET THE NUMBER OF ''SCLK''S
021146  010102                      MOV     R1,R2           ;COPY TO R2
021150  006302                      ASL     R2              ;MULTIPLY BY 2
021152  010237  004336              MOV     R2,BYTCNT       ;SAVE FOR LATER USE
021156  010102                      MOV     R1,R2           ;COPY TO R2
021160  005402                      NEG     R2              ;TAKE TWOS COMPLEMENT
021162  010277  163044              MOV     R2,@WC          ;SET UP THE WORD COUNT
021166  017702  163052              MOV     @TC,R2          ;GET THE DATA FORMAT
021172  042702  107777              BIC     #107777,R2      ;REMOVE JUNK BITS
021176  000302                      SWAB    R2              ;SWAP THE BYTES
021200  006202                      ASR     R2
021202  006202                      ASR     R2
021204  006202                      ASR     R2              ;R2=DATA FORMAT CODE X 2
021206  000172  021212              JMP     @CALTBL(R2)
021212  021232              CALTBL: .WORD   CALX2           ;11 NORMAL FORMAT
021214  021232                      .WORD   CALX2           ;15 NORMAL FORMAT
021216  021242                      .WORD   CALX4           ;10 COMPAT. FORMAT
021220  021246                      .WORD   CALX5           ;10 DUMP FORMAT
021222  021264                      .WORD   CALX9           ;10 HIGH DENSITY FORMAT
021224  021234                      .WORD   CALX1           ;IMAGE FORMAT
021226  021304                      .WORD   CALILL          ;ILLEGAL
021230  021304                      .WORD   CALILL          ;ILLEGAL

021232  006301              CALX2:  ASL     R1              ;MULTIPLY ''SCLK'' COUNT BY 2
021234  010177  162776      CALX1:  MOV     R1,@FC          ;SET UP THE FRAMC COUNT
021240  000207                      RTS     PC
021242  006301              CALX4:  ASL     R1              ;MULTIPLY ''SCLK'' COUNT BY 2
021244  000772                      BR      CALX2           ;GO MULTIPLY AGAIN
021246  010102              CALX5:  MOV     R1,R2           ;COPY THE ''SCLK'' COUNT
021250  006301                      ASL     R1              ;MULTIPLY BY 2
021252  006202                      ASR     R2              ;DIVIDE BY 2
021254  060201                      ADD     R2,R1           ;MULTIPLY BY 5
021256  010177  162754              MOV     R1,@FC          ;STORE IN THE FRAME COUNT
021262  000207                      RTS     PC              ;RETURN
021264  010102              CALX9:  MOV     R1,R2           ;COPY THE ''SCLK'' COUNT
021266  006301                      ASL     R1              ;MULTIPLY BY 2
021270  006202                      ASR     R2              ;DIVIDE COPY BY 2
021272  006202                      ASR     R2              ;DIVIDE COPY BY 4
021274  060201                      ADD     R2,R1           ;MULTIPLY BY 2.25
021276  010177  162734              MOV     R1,@FC
021302  000207                      RTS     PC

021304  012705  000021      CALILL: MOV     #21,ERRCOD      ;LOAD THE ILLEGAL
021310  000207                      RTS     PC              ;RETURN TO CALLING MODULE



                                    .SBTTL  MODULE 2.1.3.4.2 - PATGEN
021312                              SSUB
                                    ; ***********************************************************************
                                    ;*SUBROUTINE TITLE
                                    ;*---------- -----
```

```
                        ;*MODULE        2.1.3.4.2 - GENERATE THE DATA PATTERN
021312                  SD
 (1)                    ; ************************************************************************
 (1)                    ;*DESCRIPTION
 (1)                    ;*-----------
                        ;*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                  S
 (1)                    ; ************************************************************************
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  032102  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
```

```
                                                                    H 10
6166  021454  052701  100000                BIS     #100000,R1      ;
6167  021460  103771                        BCS     3$              ;
6168
6169  021462  012701  177777                MOV     #177777,R1      ;LOAD ALL ONES DATA
6170  021466  004737  021346                CALL    FILLX           ;WRITE TO BUFFER
6171  021472  002016                        BGE     4$              ;DONE?
6172
6173  021474  005001                        CLR     R1              ;LOAD ALL ZEROS DATA
6174  021476  004737  021346                CALL    FILLX           ;WRITE TO BUFFER
6175  021502  002012                        BGE     4$              ;DONE?
6176
6177  021504  012701  052525                MOV     #052525,R1      ;LOAD ALTERNATE ONES DATA
6178  021510  004737  021346                CALL    FILLX           ;WRITE TO BUFFER
6179  021514  002005                        BGE     4$              ;DONE?
6180
6181  021516  012701  125252                MOV     #125252,R1      ;WRITE COMP. ALTER. ONES DATA
6182  021522  004737  021346                CALL    FILLX           ;WRITE TO BUFFER
6183  021526  003716                        BLE     MPDPAR          ;DONE?-NO CONTINUE
6184
6185  021530  000207              4$:       RTS     PC              ;RETURN
6186                                .SBTTL  MODULE 2.1.3.5 - QUEUEM
6187  021532                        SSUB
 (1)                                ; ************************************************************************
 (1)                                ;*SUBROUTINE TITLE
 (1)                                ;*---------- -----
6188                                ;*MODULE 2.1.3.5 - QUEUE A PRINT LINE/MANUAL INTERVENTION
6189  021532                        SP
 (1)                                ; ************************************************************************
 (1)                                ;*PROCEDURE
 (1)                                ;*---------
6190                                ;*BGNSUB
6191                                ;*  PRINT DEVICE HEADER
6192                                ;*  CALL SUBROUTINE MSGPAR
6193                                ;*  IF DATA TRANSFER INTERRUPT CODE=373(8)
6194                                ;*  :  THEN-CONTINUE
6195                                ;*  :  ELSE-PRINT ''TYPE CARRIAGE RETURN TO CONTINUE''
6196                                ;*  :       WAIT FOR CARRIAGE RETURN
6197                                ;*  ENDIF
6198                                ;*  LOAD 377(8) IN CAS REGISTER 4
6199                                ;*  LOAD 31(8) IN CAS REGISTER 1
6200                                ;*ENDSUB
6201  021532                        S
 (1)                                ; ************************************************************************
6202  021532  000240              QUEUEM: NOP                     ;MANUAL INTERVENTION ENTRY
6203  021534  004737  044352      QUEUE:  CALL    HEADER
6204  021540  005001                      CLR     R1              ;CLEAR THE BUFFER POINTER
6205  021542  004737  016754              CALL    MSGPAR          ;GO PRINT THE MESSAGE
6206  021546  122737  000373  004364      CMPB    #373,DINTCD     ;PRINT ONLY REQUEST?
6207  021554  001411                      BEQ     1$              ;YES - DONE
6208  021556  012737  000001  004420      MOV     #1,DUMFLG       ;
6209  021564                              GMANIL  MANMSG,DUMFLG,1,YES
6210  021600  012777  000377  162440  1$: MOV     #377,@AS        ;CLEAR THE ATTENTION SUMMARY REGISTER
6211  021606  012777  000031  162414      MOV     #CONERR,@XFRCMD ;ISSUE CODE 31
6212  021614  000207                      RTS     PC              ;RETURN TO THE CALLING MODULE
6213
6214  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
021666          ; ************************************************************************
                ;*MICRO-DIAGNOSTIC/ERROR MESSAGE BUFFER
021666  010050  BUFER:  .BLKB   4136.           ;4.0K BUFFER
031736          BUFEND:

                S
031736          ; ************************************************************************
                ;*READ DATA BUFFER
031736          MBREAD:                         ;MASS BUS DATA READ
031736  000144  REDBUF: .BLKB   100.            ;READ DATA TRANSFER BUFFER
                ;
                S
032102          ; ************************************************************************
                ;*WRITE DATA BUFFER
032102          MBBUF:                          ;MASS BUS DATA WRITTEN
032102  000144  WRTBUF: .BLKB   100.            ;WRITE DATA TRANSFER BUFFER
```

```
6251
6252  032246  010237  004330          CASCOW: MOV     R2,CASDTA
6253  032252  004737  032502                  CALL    CASBOT          ;BOOT UP THE CAS PROGRAM
6254  032256  005705                          TST     ERRCOD
6255  032260  001062                          BNE     5$
6256  032262                                  BGNSEG
6257  032264  004737  014566                  CALL    START           ;START THE TM78
6258  032270  004737  032564                  CALL    CASDAT          ;FILL THE CAS DATA BUFFER
6259  032274  004737  033414                  CALL    HOLDMP
6260  032300  012777  041420  151772          MOV     #CASCMD,@AD80   ;ADDRESS COMMAND BYTE
6261  032306  012777  000400  151766          MOV     #HOLD,@DS80     ;ISSUE THE READ CAS FROM TM78MP COMMAND
6262  032314  004737  014566                  CALL    START
6263  032320  004737  032610                  CALL    CASWRT          ;GO WRITE CAS FROM HOST
6264  032324                                  CKLOOP
6265  032326  012777  000035  151674          MOV     #TSTART,@XFRCMD
6266  032334                                  DELAY   100             ;PERFORM A 10MS. TIMEOUT
6267  032364  122777  000372  151636          CMPB    #372,@XFRCMD    ;DONE
6268  032372  001406                          BEQ     3$              ;YES-CONTINUE
6269  032374                                  ERRDF   8.,PROCAS,ERM008  ;NO-PRINT THE ERROR
6270  032404                                  CKLOOP
6271  032406  000406                          BR      6$              ;EXIT THE MODULE
6272  032410                          3$:     CKLOOP
6273  032412  004737  033020                  CALL    CASTMR          ;GO READ CAS FROM TM78
6274  032416  004737  033260                  CALL    CASCMP          ;GO COMPARE DATA
6275  032422                                  CKLOOP
6276  032424                          6$:     ENDSEG
6277  032426  000207                  5$:     RTS     PC              ;RETURN
6278  032430  010237  004330          CASCOR: MOV     R2,CASDTA
6279  032434  004737  032502                  CALL    CASBOT          ;BOOT THE CAS PROGRAM
6280  032440  005705                          TST     ERRCOD
6281  032442  001016                          BNE     5$
6282  032444                                  BGNSEG
6283  032446  004737  014566                  CALL    START           ;START THE TM78
6284  032452  004737  032564                  CALL    CASDAT          ;FILL THE CAS DATA BUFFER
6285  032456  004737  033070                  CALL    CASTMW          ;GO WRITE CAS FROM TM78
6286  032462  004737  032712                  CALL    CASRED          ;GO READ CAS FROM HOST
6287  032466                                  CKLOOP
6288  032470  004737  033260                  CALL    CASCMP          ;GO COMPARE DATA
6289  032474                                  CKLOOP
6290  032476                                  ENDSEG
6291  032500  000207                  5$:     RTS     PC              ;RETURN
6292                                  ;
6293                                  ;CASBOT         CAS BOOT SUBROUTINE
6294                                  ;
6295  032502  005737  004412          CASBOT: TST     CASLD           ;IS THE CAS PROGRAM ALREADY LOADED?
6296  032506  001402                          BEQ     3$              ;NO - LOAD IT
6297  032510  005005                          CLR     ERRCOD          ;YES - DON'T LOAD IT BUT CLEAR THE ERRCOD
6298  032512  000422                          BR      2$              ;GET OUT
6299  032514  012737  013662  004400  3$:     MOV     #DXTUID,FILNAM  ;LOAD THE FILE NAME
6300  032522  004737  021660                  CALL    CLOSEX          ;CLOSE THE CHANNEL
6301  032526  004737  013730                  CALL    OPENX           ;OPEN THE CHANNEL
6302  032532  005705                          TST     ERRCOD          ;OPEN CHANNEL ERROR
6303  032534  001007                          BNE     1$              ;YES - RETURN TO USER
6304  032536  004737  013742                  CALL    LOADER          ;NO-LOAD THE TM78
6305  032542  005705                          TST     ERRCOD          ;LOAD ERROR?
6306  032544  001003                          BNE     1$              ;YES - EXIT
```

```
  6307  032546  012737  000001  004412          MOV     #1,CASLD        ;SET THE CAS PROGRAM LOADED FLAG
  6308  032554  004737  021660          1$:     CALL    CLOSEX          ;CLOSE THE CHANNEL
  6309  032560  000207                  2$:     RTS     PC
  6310
  6311
  6312                                  .SBTTL  SUBROUTINE FILL CAS DATA BUFFER - CASDAT
  6313                                  ;
  6314                                  ;CASDAT         FILL CAS DATA BUFFER ROUTINE
  6315                                  ;
  6316                                  ;       INPUT:
  6317                                  ;       CASDTA  DATA WORD TO BE WRITTEN IN THE BUFFER
  6318                                  ;
  6319                                  ;       OUTPUT:
  6320                                  ;       MBBUF   FILLED WITH DESIRED DATA BYTE
  6321                                  ;
  6322                                  ;       REGISTER USED
  6323  032562  000001                  R1
  6324  032564  005001                  CASDAT: CLR     R1              ;CLEAR THE COUNTER
  6325  032566  013761  004330  032102  1$:     MOV     CASDTA,MBBUF(R1)  ;STORE DATA IN THE BUFFER
  6326  032574  005201                          INC     R1              ;BUMP THE COUNTER
  6327  032576  005201                          INC     R1              ;BUMP THE COUNTER
  6328  032600  020127  000036                  CMP     R1,#30.         ;DONE?
  6329  032604  001370                          BNE     1$              ;NO-CONTINUE
  6330  032606  000207                          RTS     PC              ;YES-RETURN
  6331
  6332                                  .SBTTL  SUBROUTINE CAS WRITE FROM HOST - CASWRT
  6333                                  ;
  6334                                  ;CASWRT CAS WRITE SUBROUTINE-FROM HOST
  6335                                  ;
  6336                                  ;       INPUT:
  6337                                  ;       MBBUF   CONTAINING THE DATA TO BE
  6338                                  ;               WRITTEN TO THE CAS
  6339                                  ;
  6340                                  ;       OUTPUT:
  6341                                  ;       NONE
  6342                                  ;
  6343                                  ;       REGISTERS USED:
  6344                                  ;       R1
  6345                                  ;       R2
  6346                                  ;       R3
  6347                                  ;
  6348  032610                          CASWRT: BGNSEG
  6349  032612  013777  004352  151420          MOV     MBDRIV,@CS2     ;LOAD THE UNIT NUMBER
  6350  032620  005001                          CLR     R1              ;CLEAR MB REGISTER TABLE COUNT
  6351  032622  005002                          CLR     R2              ;CLEAR DATA BUFFER POINTER
  6352  032624  116103  033352          1$:     MOVB    MBTBL(R1),R3    ;GET MASS BUS REGISTER #
  6353  032630  016273  032102  004230          MOV     MBBUF(R2),@XFRCMD(R3) ;LOAD THE MASS BUS
  6354  032636  005201                          INC     R1              ;INCREMENT THE CAS REGISTER NUMBER
  6355  032640  004737  033372                  CALL    NONEX           ;CHECK FOR NONEXISTENT DRIVE
  6356  032644  032777  004000  151430          BIT     #CPE,@DS80      ;PARITY ERROR?
  6357  032652  001407                          BEQ     2$              ;NO-EXIT
  6358  032654                                  ERRDF   30.,RHCAS,ERM030  ;YES-ERROR
  6359  032664  052777  040400  151410          BIS     #040400,@DS80   ;DO TM CLR AND KEEP HOLD SET
  6360  032672                          2$:     CKLOOP
  6361  032674  005202                          INC     R2              ;INCREMENT THE BUFFER POINTER
  6362  032676  005202                          INC     R2              ;
```

```
6363  032700  020127  000017            CMP     R1,#15.         ;FINISHED?
6364  032704  001347                    BNE     1$              ;NO=CONTINUE
6365  032706                  3$:       ENDSEG
6366  032710  000207                    RTS     PC              ;YES-RETURN
6367                          .SBTTL  SUBROUTINE CAS READ FROM HOST - CASRED
6368
6369                          ;
6370                          ;CASRED CAS READ SUBROUTINE-FROM HOST
6371                          ;
6372                          ;       INPUT:
6373                          ;       NONE
6374                          ;
6375                          ;       OUTPUT:
6376                          ;       MBREAD  THE DATA READ FROM
6377                          ;               CAS VIA THE MASS BUS.
6378                          ;
6379                          ;       REGISTERS USED
6380                          ;       R1
6381                          ;       R2
6382                          ;       R3
6383  032712                  CASRED: BGNSEG
6384  032714  013777  004352  151316        MOV     MBDRIV,@CS2     ;LOAD THE UNIT NUMBER
6385  032722  005001                    CLR     R1              ;CLEAR MASS BUS REGISTER TABLE COUNT
6386  032724  005002                    CLR     R2              ;CLEAR DATA BUFFER POINTER
6387  032726  116103  033352          1$:     MOVB    MBTBL(R1),R3    ;GET MASS BUS REGISTER NUMBER
6388  032732  017362  004230  031736        MOV     @XFRCMD(R3),MBREAD(R2)  ;GET THE CAS DATA
6389  032740  005201                    INC     R1              ;INCREMENT THE REGISTER NUMBER
6390  032742  004737  033372            CALL    NONEX           ;CHECK FOR NON-EXISTENT DRIVE
6391  032746  032777  020000  151254    BIT     #MCPE,@XFRCMD   ;PARITY ERROR?
6392  032754  001411                    BEQ     2$              ;NO-EXIT
6393  032756                            ERRDF   29.,RHCAS,ERM029  ;YES-ERROR
6394  032766  052777  040000  151234    BIS     #TRE,@XFRCMD    ;RH CLR TO CLR MCPE
6395  032774  005077  151230            CLR     @XFRCMD
6396  033000                  2$:       CKLOOP
6397  033002  005202                    INC     R2              ;INCREMENT THE BUFFER POINTER
6398  033004  005202                    INC     R2              ;
6399  033006  020127  000017            CMP     R1,#15.         ;FINISHED?
6400  033012  001345                    BNE     1$              ;NO-CONTINUE
6401  033014                  3$:       ENDSEG
6402  033016  000207                    RTS     PC              ;YES-RETURN
6403
6404                          .SBTTL  SUBROUTINE CAS READ FROM TM78 MICROPROCESSOR - CASTMR
6405  033020                  CASTMR: BGNSEG
6406  033022  004737  033414            CALL    HOLDMP          ;HALT THE TM78 MP
6407  033026  005001                    CLR     R1              ;CLEAR THE READ DATA BYTE COUNT
6408  033030  012702  042000            MOV     #CASBUF,R2      ;LOAD THE TM78 MP DATA BUFFER ADDRESS
6409  033034  010277  151240          4$:     MOV     R2,@AD80        ;ADDRESS THE TM78 MP DATA BUFFER
6410  033040  000240                    NOP
6411  033042  017703  151234            MOV     @DS80,R3        ;GET THE DATA BYTE
6412  033046  110361  031736            MOVB    R3,MBREAD(R1)   ;STORE THE DATA
6413  033052  005202                    INC     R2              ;INCREMENT TM78 MP ADDRESS
6414  033054  005201                    INC     R1              ;INCREMENT BYTE POINTER
6415  033056  020127  000036            CMP     R1,#30.         ;DONE?
6416  033062  001364                    BNE     4$              ;NO-CONTINUE
6417  033064                  6$:       ENDSEG
6418  033066  000207                    RTS     PC              ;YES-RETURN
```

```
                                        .SBTTL  SUBROUTINE CAS WRITE FROM TM78 MICROPROCESSOR - CASTMW
033070                                  CASTMW: BGNSEG
033072  004737  033414                          CALL    HOLDMP
033076  012777  041420  151174                  MOV     #CASCMD,@AD80   ;ADDRESS COMMAND BYTE
033104  012777  000401  151170                  MOV     #HOLD+1,@DS80   ;WRITE THE WRITE CAS FROM TM78MP COMMAND
033112  000240                                  NOP
033114  012777  042040  151156                  MOV     #CASDAL,@AD80   ;ADDRESS CAS WRITE DATA LOW BYTE
033122  113701  032102                          MOVB    MBBUF,R1        ;GET THE CAS LOW BYTE DATA
033126  042701  177400                          BIC     #177400,R1      ;REMOVE ANY SIGN EXTENTION BITS
033132  062701  000400                          ADD     #HOLD,R1        ;ADD IN THE HOLD BIT
033136  010177  151140                          MOV     R1,@DS80        ;WRITE THE LOW BYTE TO TM78
033142  012777  042041  151130                  MOV     #CASDAH,@AD80   ;ADDRESS CAS WRITE DATA HIGH BYTE
033150  113701  032103                          MOVB    MBBUF+1,R1      ;GET THE CAS HIGH BYTE DATA
033154  042701  177400                          BIC     #177400,R1      ;REMOVE ANY SIGN EXTENTION BITS
033160  062701  000400                          ADD     #HOLD,R1        ;ADD IN THE HOLD BIT
033164  010177  151112                          MOV     R1,@DS80        ;WRITE HIGH BYTE TO TM78
033170  004737  014566                          CALL    STAR1
033174  012777  000035  151026                  MOV     #TSTART,@XFRCMD
033202                                          DELAY   100             ;PERFORM A 100 MS. TIMEOUT
033232  122777  000372  150770                  CMPB    #372,@XFRCMD    ;DONE?
033240  001404                                  BEQ     3$              ;YES-CONTINUE
033242                                          ERRDF   8.,PROCAS,ERM008  ;NO-ERROR
033252                                  3$:     CKLOOP
033254                                          ENDSEG
033256  000207                                  RTS     PC
                                        .SBTTL  SUBROUTINE CAS DATA COMPARE - CASCMP
033260                                  CASCMP: BGNSEG
033262  005001                                  CLR     R1              ;YES-COMPARE THE DATA
033264  026161  032102  031736          7$:     CMP     MBBUF(R1),MBREAD(R1)  ;
033272  001420                                  BEQ     5$              ;
033274  010105                                  MOV     R1,R5           ;COPY INDEX
033276  005205                                  INC     R5              ;ADJUST R5
033300  005205                                  INC     R5              ;ADJUST R5
033302  006205                                  ASR     R5              ;DIVIDE BY 2
033304  020527  000001                          CMP     R5,#1           ;CAS REG 1
033310  001411                                  BEQ     5$              ;YES - IGNORE THE ERROR
033312  020527  000004                          CMP     R5,#4           ;CAS REG 4
033316  001406                                  BEQ     5$              ;YES - IGNORE THE ERROR
033320                                          ERRDF   9.,CASX,ERM009
033330                                          INLOOP                  ;ARE WE LOOPING ON AN ERROR?
033332                                          BCOMPLETE 2$            ;YES - GET OUT OF THE COMPARE BUSINESS
033334  005201                          5$:     INC     R1              ;INCREMENT THE BUFFER POINTER
033336  005201                                  INC     R1              ;
033340  020127  000036                          CMP     R1,#30.         ;DONE
033344  001347                                  BNE     7$              ;NO-CONTINUE
033346                                  2$:     ENDSEG
033350  000207                                  RTS     PC
                                        .SBTTL  TABLE MASS BUS VS. CAS REGISTER
033352      012                         MBTBL:  .BYTE   12              ;CAS REGISTER 1
033353      014                                 .BYTE   14              ;CAS REGISTER 2
033354      024                                 .BYTE   24              ;CAS REGISTER 3
033355      016                                 .BYTE   16              ;CAS REGISTER 4
033356      006                                 .BYTE   6               ;CAS REGISTER 5
033357      026                                 .BYTE   26              ;CAS REGISTER 6
033360      020                                 .BYTE   20              ;CAS REGISTER 7
033361      030                                 .BYTE   30              ;CAS REGISTER 10
```

```
 6475  033362      032                         .BYTE   32              ;CAS REGISTER 11
 6476  033363      034                         .BYTE   34              ;CAS REGISTER 12
 6477  033364      036                         .BYTE   36              ;CAS REGISTER 13
 6478  033365      040                         .BYTE   40              ;CAS REGISTER 14
 6479  033366      042                         .BYTE   42              ;CAS REGISTER 15
 6480  033367      044                         .BYTE   44              ;CAS REGISTER 16
 6481  033370      046                         .BYTE   46              ;CAS REGISTER 17
 6482            033372                        .EVEN
 6483
 6490                                  .SBTTL  NON EXISTENT DRIVE CHECK SUBROUTINE
 6491                                  ;
 6492                                  ;NON EXISTENT DRIVE (NED) SUBROUTINE
 6493                                  ;
 6494                                  ;       INPUT:
 6495                                  ;       NONE
 6496                                  ;
 6497                                  ;       OUTPUT:
 6498                                  ;       CKLOOP ERROR CONTROL
 6499                                  ;       ERROR3 PRINTED ON CONSOLE IF ''NED'' IS ACTIVE
 6500                                  ;
 6501  033372  032777  010000  150640  NONEX:  BIT     #NED,@CS2       ;''NED'' SET?
 6502  033400  001404                        BEQ     MBREGX          ;NO-EXIT
 6503  033402                                ERRDF   3,RHCAS,ERM003  ;YES-PRINT ''NED'' ERROR
 6504  033412  000207                  MBREGX: RTS     PC              ;EXIT THE SUBROUTINE
 6505                                  .SBTTL  HOLD TM78 MICRO PROCESSOR SUBROUTINE
 6506                                  ;
 6507                                  ;HOLDMP SUBROUTINE
 6508                                  ;
 6509                                  ;       INPUT:  NONE
 6510                                  ;
 6511                                  ;       OUTPUT:
 6512                                  ;
 6513                                  ;       ERR7    IF HOLD ACTIVE (HLDA) NOT SET
 6514                                  ;
 6515  033414                          HOLDMP: BGNSEG
 6516  033416  013777  004352  150614          MOV     MBDRIV,@CS2     ;LOAD THE MASS BUSS DRIVE NUMBER
 6517  033424  005077  150600                  CLR     @XFRCMD         ;CLEAR CAS REGISTER 0
 6518  033430  052777  000400  150644          BIS     #HOLD,@DS80     ;STOP THE TM78MP
 6519  033436  000240                          NOP
 6520  033440  000240                          NOP
 6521  033442  000240                          NOP
 6522  033444  017701  150632                  MOV     @DS80,R1        ;GET THE TM78MP STATUS
 6523  033450  032701  001000                  BIT     #HLDA,R1        ;IS ''HLDA'' SET?
 6524  033454  001004                          BNE     1$              ;YES-CONTINUE
 6525  033456                                  ERRDF   7.,PROCAS,ERM007  ;NO-
 6526  033466                          1$:     CKLOOP
 6527  033470  013701  004360                  MOV     TMPORT,R1       ;GET THE PORT NUMBER
 6528  033474  001402                          BEQ     2$              ;
 6529  033476  012701  000200                  MOV     #200,R1         ;LOAD PORT 1 SELECT CODE
 6530  033502  012777  100340  150570  2$:     MOV     #MBSEL,@AD80    ;ADDRESS THE MB SELECT BYTE
 6531  033510  062701  000400                  ADD     #HOLD,R1        ;SET HOLD BIT IN DATA
 6532  033514  010177  150562                  MOV     R1,@DS80        ;SELECT DESIRED PORT
 6533  033520                                  ENDSEG
 6534  033522  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
                                        ;
033524                                  SERFAL: ERRSF   19.,HEAD2,MSG019
033534  000207                                  RTS     PC
033536  046524  034067  046040          HEAD1:  .ASCIZ  /TM78 LOAD ERROR-TEST ABORTED/
        033574                                  .EVEN
033574  046524  034067  041440          HEAD2:  .ASCIZ  /TM78 CONTROL ERROR-TEST ABORTED/
                                                .EVEN
033634  044506  042514  051440          HEAD3:  .ASCIZ  /FILE SERVICE ERROR-TEST ABORTED/
                                                .EVEN
                                        ;*
                                        ;*SYSTEM ERROR MESSAGES
                                        ;*
033674                                  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

033674                                          BGNMSG  MSG001
033674  004737  044352                          CALL    HEADER
033700                                          PRINTB  #FMT001
033720                                          PRINTB  #FMTSTA,STAT80
033744                                          ENDMSG
033746  040445  046524  034067  FMT001: .ASCIZ  /%ATM78 STATUS ERROR%N/
                                                .EVEN
033774  040445  041115  020056  FMTSTA: .ASCIZ  /%AMB. REG. 52 (CAS 21) = %06%N/
        034034                                  .EVEN

034034                                  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

034034                                          BGNMSG  MSG002
034034  004737  044352                          CALL    HEADER
034040                                          PRINTB  #FMT002
034060                                          PRINTB  #FMTSTA,STAT80
034104                                          ENDMSG

034106  040445  044042  042114  FMT002: .ASCIZ  /%A"HLDA" NOT SET%N/
        034132                                  .EVEN

034132                                  S
```

```
 (1)                                ; ********************************************************************************
6594                                ;*TM78CLT SYS FTL ERR 000003  TST 000  SUB 000  PC: 000000
6595                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
6596                                ;*TM78 LOAD ERROR-TEST ABORTED
6597                                ;*WMC CKSUM ERROR
6598
6599  034132                                BGNMSG  MSG003
6600  034132  004737  044352                CALL    HEADER
6601  034136                                PRINTB  #FMT003
6602  034156                                ENDMSG
6603
6604  034160  040445  041527  020123  FMT003: .ASCIZ  /%AWCS CKSUM ERROR%N/
6605                                        .EVEN
6606
6607  034204                            S
 (1)                                ; ********************************************************************************
6608                                ;*TM78CLT SYS FTL ERR 000004  TST 000  SUB 000  PC: 000000
6609                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
6610                                ;*TM78 LOAD ERROR-TEST ABORTED
6611                                ;*WCS VERIFY ERROR
6612                                ;*ADD = 000000
6613                                ;*ACT = 000000
6614                                ;*EXP = 000000
6615
6616  034204                                BGNMSG  MSG004
6617  034204  004737  044352                CALL    HEADER
6618  034210                                PRINTB  #FMT004
6619  034230                                PRINTB  #FMTWAD,LOAD80
6620  034254                                PRINTB  #FMTACT,ADATA
6621  034300                                PRINTB  #FMTEXP,EDATA
6622  034324                                ENDMSG
6623
6624  034326  040445  041527  020123  FMT004: .ASCIZ  /%AWCS VERIFY ERROR%N/
6625          034354                        .EVEN
6626  034354  040445  042101  020104  FMTWAD: .ASCIZ  /%AADD = %06%N/
6627                                        .EVEN
6628  034372  040445  041501  020124  FMTACT: .ASCIZ  /%AACT = %06%N/
6629                                        .EVEN
6630  034410  040445  054105  020120  FMTEXP: .ASCIZ  /%AEXP = %06%N/
6631                                        .EVEN
6632
6633  034426                            S
 (1)                                ; ********************************************************************************
6634                                ;*TM78CLT SYS FTL ERR 000005  TST 000  SUB 000  PC: 000000
6635                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
6636                                ;*TM78 LOAD ERROR-TEST ABORTED
6637                                ;*"TMRDY" RESET AFTER CLEAR CMD.
6638                                ;*STATUS = 000000
6639
6640  034426                                BGNMSG  MSG005
6641  034426  004737  044352                CALL    HEADER
6642  034432                                PRINTB  #FMT005
6643  034452                                PRINTB  #FMTSTA,STAT80
664   034476                                ENDMSG
6645
6646  034500  040445  052042  051115  FMT005: .ASCIZ  /%A"TMRDY" RESET AFTER CLEAR CMD.%N/
```

```
        034544                                  .EVEN
034544                                  S
                                ; **********************************************************************
                                ;*TM78CLT SYS FTL ERR 000006  TST 000  SUB 000  PC: 000000
                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                ;*TM78 LOAD ERROR-TEST ABORTED
                                ;*TM78 MONITOR DID NOT START
034544                                          BGNMSG  MSG006
034544  004737  044352                          CALL    HEADER
034550                                          PRINTB  #FMT006
034570                                          ENDMSG
034572  040445  046524  034067  FMT006: .ASCIZ  /%ATM78 MONITOR DID NOT START%N/
        034632                                  .EVEN
034632                                  S
                                ; **********************************************************************
                                ;*TM78CLT SYS FTL ERR 000007  TST 000  SUB 000  PC: 000000
                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                ;*TM78 CONTROL ERROR-TEST ABORTED
                                ;*MICRO TEST DID NOT START
034632                                          BGNMSG  MSG007
034632  004737  044352                          CALL    HEADER
034636                                          PRINTB  #FMT007
034656                                          ENDMSG
034660  040445  044515  051103  FMT007: .ASCIZ  /%AMICRO TEST DID NOT START%N/
        034716                                  .EVEN
034716                                  S
                                ; **********************************************************************
                                ;*TM78CLT SYS FTL ERR 000008  TST 000  SUB 000  PC: 000000
                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                ;*TM78 CONTROL ERROR-TEST ABORTED
                                ;*TM78 COMMUNICATION TIMEOUT
034716                                          BGNMSG  MSG008
034716  004737  044352                          CALL    HEADER
034722                                          PRINTB  #FMT008
034742                                          ENDMSG
034744  040445  046524  034067  FMT008: .ASCIZ  /%ATM78 COMMUNICATION TIMEOUT%N/
        035004                                  .EVEN
035004                                  S
                                ; **********************************************************************
                                ;*TM78CLT SYS FTL ERR 000009  TST 000  SUB 000  PC: 000000
                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
                                ;*TM78 CONTROL ERROR-TEST ABORTED
                                ;*ILL. REQ. CODE
035004                                          BGNMSG  MSG009
035004  004737  044352                          CALL    HEADER
```

```
 6699  035010                                  PRINTB  #FMT009
 6700  035030                                  ENDMSG
 6701
 6702  035032  040445  046111  027114  FMT009: .ASCIZ  /%AILL. REQ. CODE%N/
 6703          035056                          .EVEN
 6704
 6705  035056                          S
  (1)                                ; ************************************************************************
 6706                                ;*TM78CLT SYS FTL ERR 000010  TST 000  SUB 000  PC: 000000
 6707                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6708                                ;*FIELD SERVICE ERROR-TEST ABORTED
 6709                                ;*OPEN FAILED
 6710
 6711  035056                                  BGNMSG  MSG010
 6712  035056  004737  044352                  CALL    HEADER
 6713  035062                                  PRINTB  #FMT010
 6714  035102                                  ENDMSG
 6715  035104  040445  050117  047105  FMT010: .ASCIZ  /%AOPEN FAILED%N/
 6716                                          .EVEN
 6717
 6718  035124                          S
  (1)                                ; ************************************************************************
 6719                                ;*TM78CLT SYS FTL ERR 000011  TST 000  SUB 000  PC: 000000
 6720                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6721                                ;*FIELD SERVICE ERROR-TEST ABORTED
 6722                                ;*FILE NOT FOUND "FILNAM.EXT"
 6723
 6724  035124                                  BGNMSG  MSG011
 6725  035124  004737  044352                  CALL    HEADER
 6726  035130                                  PRINTB  #FMT011,FILNAM
 6727  035154                                  ENDMSG
 6728  035156  040445  044506  042514  FMT011: .ASCIZ  /%AFILE NOt FOUND "%T%A"%N/
 6729                                          .EVEN
 6730
 6731  035210                          S
  (1)                                ; ************************************************************************
 6732                                ;*TM78CLT SYS FTL ERR 000012  TST 000  SUB 000  PC: 000000
 6733                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6734                                ;*FIELD SERVICE ERROR-TEST ABORTED
 6735                                ;*EOF READING "FILNAM.EXT"
 6736
 6737  035210                                  BGNMSG  MSG012
 6738  035210  004737  044352                  CALL    HEADER
 6739  035214                                  PRINTB  #FMT012,FILNAM
 6740  035240                                  ENDMSG
 6741  035242  040445  047505  020106  FMT012: .ASCIZ  /%AEOF READING "%T%A"%N/
 6742          035272                          .EVEN
 6743
 6744  035272                          S
  (1)                                ; ************************************************************************
 6745                                ;*TM78CLT SYS FTL ERR 000013  TST 000  SUB 000  PC: 000000
 6746                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6747                                ;*FIELD SERVICE ERROR-TEST ABORTED
 6748                                ;*LOAD DEVICE ERROR
 6749
 6750  035272                                  BGNMSG  MSG013
```

```
6751  035272  004737  044352                  CALL    HEADER
6752  035276                                  PRINTB  #FMT013
6753  035316                                  ENDMSG
6754  035320  040445  047514  042101  FMT013: .ASCIZ  /%ALOAD DEVICE ERROR%N/
6755                                          .EVEN
6756
6757  035346                          S
 (1)                                ; ***************************************************************************
6758                                ;*TM78CLT SYS FTL ERR 000014  TST 000  SUB 000  PC: 000000
6759                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
6760                                ;*FIELD SERVICE ERROR-TEST ABORTED
6761                                ;*MSG. BUF. FULL
6762
6763  035346                                  BGNMSG  MSG014
6764  035346  004737  044352                  CALL    HEADER
6765  035352                                  PRINTB  #FMT014
6766  035372                                  ENDMSG
6767  035374  040445  051515  027107  FMT014: .ASCIZ  /%AMSG. BUF. FULL%N/
6768           035420                         .EVEN
6769
6770  035420                          S
 (1)                                ; ***************************************************************************
6771                                ;*TM78CLT SYS FTL ERR 000015  TST 000  SUB 000  PC: 000000
6772                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
6773                                ;*FIELD SERVICE ERROR-TEST ABORTED
6774                                ;*BIN. BUF. FULL
6775
6776  035420                                  BGNMSG  MSG015
6777  035420  004737  044352                  CALL    HEADER
6778  035424                                  PRINTB  #FMT015
6779  035444                                  ENDMSG
6780  035446  040445  044502  027116  FMT015: .ASCIZ  /%ABIN. BUF. FULL%N/
6781           035472                         .EVEN
6782
6783  035472                          S
 (1)                                ; ***************************************************************************
6784                                ;*TM78CLT SYS FTL ERR 000016  TST 000  SUB 000  PC: 000000
6785                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
6786                                ;*TM78 CONTROL ERROR-TEST ABORTED
6787                                ;*ILL. UTIL. REQ.
6788
6789  035472                                  BGNMSG  MSG016
6790  035472  004737  044352                  CALL    HEADER
6791  035476                                  PRINTB  #FMT016
6792  035516                                  ENDMSG
6793  035520  040445  046111  027114  FMT016: .ASCIZ  /%AILL. UTIL. REQ.%N/
6794                                          .EVEN
6795
6796  035544                          S
 (1)                                ; ***************************************************************************
6797                                ;*TM78CLT SYS FTL ERR 000017  TST 000  SUB 000  PC: 000000
6798                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
6799                                ;*TM78 CONTROL ERROR-TEST ABORTED
6800                                ;*ILL. DATA FMT.
6801
6802  035544                                  BGNMSG  MSG017
```

```
 6803  035544  004737  044352                  CALL    HEADER
 6804  035550                                  PRINTB  #FMT017
 6805  035570                                  ENDMSG
 6806  035572  040445  046111  027114  FMT017: .ASCIZ  /%AILL. DATA FMT.%N/
 6807          035616                          .EVEN
 6808
 6809  035616                          S
  (1)                                ; ************************************************************************
 6810                                ;*TM78CLT SYS FTL ERR 000018  TST 000  SUB 000  PC: 000000
 6811                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6812                                ;*TM78 CONTROL ERROR-TEST ABORTED
 6813                                ;*ILL. DATA PAT.
 6814
 6815  035616                                  BGNMSG  MSG018
 6816  035616  004737  044352                  CALL    HEADER
 6817  035622                                  PRINTB  #FMT018
 6818  035642                                  ENDMSG
 6819  035644  040445  046111  027114  FMT018:  .ASCIZ /%AILL. DATA PAT.%N/
 6820          035670                          .EVEN
 6821
 6822  035670                          S
  (1)                                ; ************************************************************************
 6823                                ;*TM78CLT SYS FTL ERR 000019  TST 000  SUB 000  PC: 000000
 6824                                ;*UNIT: X  RH: 000000  TM: X  TU: X  PORT: X
 6825                                ;*ILL. ERR CODE.
 6826  035670                          S
  (1)                                ; ************************************************************************
 6827  035670                                  BGNMSG  MSG019
 6828  035670  004737  044352                  CALL    HEADER
 6829  035674                                  PRINTB  #FMT019
 6830  035714                                  ENDMSG
 6831
 6832
 6833  035716  040445  046111  027114  FMT019: .ASCIZ  /%AILL. ERR CODE.%N/
 6834          035742                          .EVEN
```

```
6835
6836
6837                                    .SBTTL  ERROR MESSAGE AREA
6838
6839                                    ;*
6840                                    ;*ERROR MESSAGES
6841                                    ;*
6842
6843  035742                                    BGNMSG  ERM001
6844  035742  004737  044352                   CALL    HEADER
6845  035746                                    PRINTB  #FMM001,R1,@XFRCMD(R1)
6846  035774                                    ENDMSG
6847  035776  040445  041115  051040  FMM001:  .ASCIZ  /%AMB REG. %06%A = %06%A AFTER MB CLEAR%N/
6848          036050                            .EVEN
6849
6850  036050                                    BGNMSG  ERM002
6851  036050  004737  044352                   CALL    HEADER
6852  036054                                    PRINTB  #FMM002,R1
6853  036076                                    ENDMSG
6854  036100  040445  047042  042105  FMM002:  .ASCIZ  /%A''NED'' WHEN READING MB REG. %06%N/
6855          036144                            .EVEN
6856
6857  036144                                    BGNMSG  ERM003
6858  036144  004737  044352                   CALL    HEADER
6859  036150                                    PRINTB  #FMM003
6860  036170                                    ENDMSG
6861  036172  040445  047042  042105  FMM003:  .ASCIZ  /%A''NED'' WHEN READING MB REG.%N/
6862          036232                            .EVEN
6863
6864  036232                                    BGNMSG  ERM004
6865  036232  004737  044352                   CALL    HEADER
6866  036236                                    PRINTB  #FMM004
6867  036256                                    ENDMSG
6868  036260  040445  052042  051115  FMMC04:  .ASCIZ  /%A''TMRDY'' NOT SET%N/
6869                                            .EVEN
6870
6871  036304                                    BGNMSG  ERM005
6872  036304  004737  044352                   CALL    HEADER
6873  036310                                    PRINTB  #FMM005,R1,R2
6874  036334                                    ENDMSG
6875  036336  040445  047516  026516  FMM005:  .ASCII  /%ANON-EXISTENT REG. %02%A - %06%A SHOULD /
6876  036407     102  020105  042532           .ASCIZ  /BE ZERO%N/
6877          036422                            .EVEN
6878
6879  036422                                    BGNMSG  ERM006
6880  036422  004737  044352                   CALL    HEADER
6881  036426                                    PRINTB  #FMM006,R1
6882  036450                                    ENDMSG
6883  036452  040445  046524  034067  FMM006:  .ASCIZ  /%ATM78 ''ILR'' NOT SET AFTER REG. %02%A READ%N/
6884          036530                            .EVEN
6885
6886  036530                                    BGNMSG  ERM007
6887  036530  004737  044352                   CALL    HEADER
6888  036534                                    PRINTB  #FMT002
6889  036554                                    PRINTB  #FMTSTA,R1
6890  036576                                    ENDMSG
```

```
6891
6892  036600                                    BGNMSG  ERM008
6893  036600  004737  044352                    CALL    HEADER
6894  036604                                    PRINTB  #FMM008
6895  036624                                    ENDMSG
6896  036626  040445  044515  051103  FMM008:   .ASCIZ  /%AMICRO DIAGNOSTIC RESPONSE TIMEOUT%N/
6897                                            .EVEN
6898
6899  036674                                    BGNMSG  ERM009
6900  036674  004737  044352                    CALL    HEADER
6901  036700                                    PRINTB  #FMM009
6902  036720                                    PRINTB  #FNN009,R5
6903  036742                                    PRINTB  #FMTACT,MBREAD(R1)
6904  036766                                    PRINTB  #FMTEXP,MBBUF(R1)
6905  037012                                    ENDMSG
6906  037014  040445  040503  020123  FMM009:   .ASCIZ  /%ACAS DATA COMPARE FAIL%N/
6907  037046  040445  040503  020123  FNN009:   .ASCIZ  /%ACAS REG. %06%N/
6908          037070                            .EVEN
6909
6910  037070                                    BGNMSG  ERM010
6911  037070  004737  044352                    CALL    HEADER
6912  037074                                    PRINTB  #FMM010
6913  037114                                    ENDMSG
6914  037116  040445  046524  034067  FMM010:   .ASCIZ  /%ATM78 DATA BUS CHANGING WHEN ''HLDA'' SET%N/
6915          037172                            .EVEN
6916
6917  037172                                    BGNMSG  ERM011
6918  037172  004737  044352                    CALL    HEADER
6919  037176                                    PRINTB  #FMM011
6920  037216                                    ENDMSG
6921  037220  040445  046524  034067  FMM011:   .ASCIZ  /%ATM78 ADDR BUS CHANGING WHEN ''HLDA'' SET%N/
6922          037274                            .EVEN
6923
6924  037274                                    BGNMSG  ERM012
6925  037274  004737  044352                    CALL    HEADER
6926  037300                                    PRINTB  #FMM012
6927  037320                                    ENDMSG
6928  037322  040447  044042  046117  FMM012:   .ASCIZ  /%A''HOLD'' DID NOT RESET%N/
6929          037354                            .EVEN
6930
6931  037354                                    BGNMSG  ERM013
6932  037354  004737  044352                    CALL    HEADER
6933  037360                                    PRINTB  #FMM013
6934  037400                                    ENDMSG
6935  037402  040445  044042  042114  FMM013:   .ASCIZ  /%A''HLDA'' DID NOT RESET%N/
6936          037434                            .EVEN
6937
6938  037434                                    BGNMSG  ERM014
6939  037434  004737  044352                    CALL    HEADER
6940  037440                                    PRINTB  #FMM014
6941  037460                                    ENDMSG
6942  037462  040445  044042  042114  FMM014:   .ASCIZ  /%A''HLDA'' RESETS WHEN ''HOLD'' + ''CLEAR'' SET%N/
6943                                            .EVEN
6944
6945  037536                                    BGNMSG  ERM015
6946  037536  004737  044352                    CALL    HEADER
```

```
 6947  037542                                        PRINTB  #FMM015
 6948  037562                                        ENDMSG
 6949  037564  040445  052042  051115  FMM015:      .ASCIZ  /%A''TMRDY'' DID NOT RESET%N/
 6950                                                .EVEN
 6951
 6952  037616                                        BGNMSG  ERM016
 6953  037616  004737  044352                        CALL    HEADER
 6954  037622                                        PRINTB  #FMM016
 6955  037642                                        PRINTB  #FMTACT,R2
 6956  037664                                        PRINTB  #FMTEXP,R3
 6957  037706                                        ENDMSG
 6958
 6959  037710  040445  042522  027107  FMM016:      .ASCIZ  /%AREG. 20 COMPARE FAIL%N/
 6960          037742                                .EVEN
 6961
 6962  037742                                        BGNMSG  ERM017
 6963  037742  004737  044352                        CALL    HEADER
 6964  037746                                        PRINTB  #FMM017,R3
 6965  037770                                        ENDMSG
 6966  037772  040445  047520  052122  FMM017:      .ASCIZ  /%APORT %O1%A SELECT BIT NOT SET%N/
 6967                                                .EVEN
 6968
 6969  040034                                        BGNMSG  ERM018
 6970  040034  004737  044352                        CALL    HEADER
 6971  040040                                        PRINTB  #FMM018
 6972  040060                                        ENDMSG
 6973  040062  040445  047516  041440  FMM018:      .ASCIZ  /%ANO CONTENTION ERROR OCCURRED%N/
 6974          040124                                .EVEN
 6975
 6976  040124                                        BGNMSG  ERM019
 6977  040124  004737  044352                        CALL    HEADER
 6978  040130                                        PRINTB  #FMM019
 6979  040150                                        ENDMSG
 6980  040152  040445  044442  051114  FMM019:      .ASCIZ  /%A''ILR'' NOT CLEAR WHEN WRITTEN CLEAR%N/
 6981          040222                                .EVEN
 6982
 6983  040222                                        BGNMSG  ERM020
 6984  040222  004737  044352                        CALL    HEADER
 6985  040226                                        PRINTB  #FMM020
 6986  040246                                        PRINTB  #FMTACT,@AS
 6987  040272                                        PRINTB  #FMTEXP,MBBUF
 6988  040316                                        ENDMSG
 6989  040320  040445  040504  040524  FMM020:      .ASCIZ  /%ADATA FROM CAS REG. 4 NOT AS EXPECTED%N/
 6990          040372                                .EVEN
 6991
 6992  040372                                        BGNMSG  ERM021
 6993  040372  004737  044352                        CALL    HEADER
 6994  040376                                        PRINTB  #FMM021,R2
 6995  040420                                        ENDMSG
 6996  040422  040445  052101  042524  FMM021:      .ASCIZ  /%AATTEN. REG.   %O6%AAFTER WRITTEN CLEAR%N/
 6997          040476                                .EVEN
 6998  040476                                        BGNMSG  ERM022
 6999  040476  004737  044352                        CALL    HEADER
 7000  040502                                        PRINTB  #FMM022
 7001  040522                                        ENDMSG
 7002  040524  040445  050103  020125  FMM022:      .ASCIZ  /%ACPU WAS NOT INTERRUPTED BY TM78 SETTING ATTENTION%N/
```

```
7003                                            .EVEN
7004
7005  040612                                    BGNMSG  ERM023
7006  040612  004737  044352                    CALL    HEADER
7007  040616                                    PRINTB  #FMM023
7008  040636                                    ENDMSG
7009  040640  040445  046524  034067  FMM023:  .ASCIZ  /%ATM78 ''CPE'' NOT SET WHEN ''PAT'' IS SET%N/
7010          040712                            .EVEN
7011
7012  040712                                    BGNMSG  ERM024
7013  040712  004737  044352                    CALL    HEADER
7014  040716                                    PRINTB  #FMM024
7015  040736                                    ENDMSG
7016  040740  040445  046524  034067  FMM024:  .ASCIZ  /%ATM78 ''CPE'' NOT RESET WHEN ''PAT'' IS CLEAR%N/
7017          041016                            .EVEN
7018
7019  041016                                    BGNMSG  ERM025
7020  041016  004737  044352                    CALL    HEADER
7021  041022                                    PRINTB  #FMM025
7022  041042                                    ENDMSG
7023  041044  040445  046524  034067  FMM025:  .ASCIZ  /%ATM78 ''CPE'' SET WHEN ''PAT'' CLEAR%N/
7024                                            .EVEN
7025
7026  041110                                    BGNMSG  ERM026
7027  041110  004737  044352                    CALL    HEADER
7028  041114                                    PRINTB  #FMM026
7029  041134                                    ENDMSG
7030  041136  040445  050115  021040  FMM026:  .ASCIZ  /%AMP ''MCPE'' NOT SET%N/
7031                                            .EVEN
7032
7033  041164                                    BGNMSG  ERM027
7034  041164  004737  044352                    CALL    HEADER
7035  041170                                    PRINTB  #FMM027
7036  041210                                    ENDMSG
7037  041212  040445  041115  021040  FMM027:  .ASCIZ  /%AMB ''MCPE'' SET%N/
7038                                            .EVEN
7039
7040  041234                                    BGNMSG  ERM028
7041  041234  004737  044352                    CALL    HEADER
7042  041240                                    PRINTB  #FMM028
7043  041260                                    PRINTB  #FMTWAD,R3
7044  041302                                    PRINTB  #FMTACT,R4
7045  041324                                    PRINTB  #FMTEXP,R2
7046  041346                                    ENDMSG
7047  041350  040445  046524  034067  FMM028:  .ASCIZ  /%ATM78 MEMORY FAILURE%N/
7048                                            .EVEN
7049
7050  041400                                    BGNMSG  ERM029
7051  041400  004737  044352                    CALL    HEADER
7052  041404                                    PRINTB  #FMM029,R1
7053  041426                                    ENDMSG
7054  041430  040445  040520  044522  FMM029:  .ASCIZ  /%APARITY ERR. READING CAS REG. %06%N/
7055          041476                            .EVEN
7056
7057  041476                                    BGNMSG  ERM030
7058  041476  004737  044352                    CALL    HEADER
```

```
 7059  041502                                        PRINTB  #FMM030,R1
 7060  041524                                        ENDMSG
 7061  041526  040445  040520  044522  FMM030:      .ASCIZ  /%APARITY ERR. WRITING CAS REG. %06%N/
 7062          041574                                .EVEN
 7063
 7064  041574                                        BGNMSG  ERM031
 7065  041574  004737  044352                        CALL    HEADER
 7066  041600                                        PRINTB  #TNOPC,DIAGTS
 7067  041624                                        PRINTB  #FMMPPC,@TUSTAT
 7068  041650                                        PRINTB  #FMM031,@CS2
 7069  041674                                        ENDMSG
 7070  041676  040445  046524  034067  FMMPPC:      .ASCIZ  /%ATM78 MICRO PC = %06%N/
 7071                                                .EVEN
 7072  041726  040445  046524  034067  TNOPC:       .ASCIZ  /%ATM78 MICRO TEST = %06%N/
 7073                                                .EVEN
 7074  041760  040445  041115  051440  FMM031:      .ASCIZ  /%AMB STATUS ERROR - CS2 = %06%N/
 7075                                                .EVEN
 7076
 7077  042020                                        BGNMSG  ERM032
 7078  042020  004737  044352                        CALL    HEADER
 7079  042024                                        PRINTB  #TNOPC,DIAGTS
 7080  042050                                        PRINTB  #FMMPPC,@TUSTAT
 7081  042074                                        PRINTB  #FMM032
 7082  042114                                        PRINTB  #FNN032,R2
 7083  042136                                        PRINTB  #FMTACT,<B,REDBUF(R2)>
 7084  042164                                        PRINTB  #FMTEXP,<B,WRTBUF(R2)>
 7085  042212                                        ENDMSG
 7086  042214  040445  041115  042040  FMM032:      .ASCIZ  /%AMB DATA COMP. FAIL%N/
 7087          042244                                .EVEN
 7088  042244  040445  054502  042524  FNN032:      .ASCIZ  /%ABYTE COUNT = %06%N/
 7089          042272                                .EVEN
 7090
 7091  042272                                        BGNMSG  ERM033
 7092  042272  004737  044352                        CALL    HEADER
 7093  042276                                        PRINTB  #TNOPC,DIAGTS
 7094  042322                                        PRINTB  #FMMPPC,@TUSTAT
 7095  042346                                        PRINTB  #FMM033
 7096  042366                                        ENDMSG
 7097  042370  040445  047516  046440  FMM033:      .ASCIZ  /%ANO MB STATUS ERROR WHEN EXPECTED%N/
 7098          042436                                .EVEN
 7099  042436                                        BGNMSG  ERM034
 7100  042436  004737  044352                        CALL    HEADER
 7101  042442                                        PRINTB  #FMM034,R3
 7102  042464                                        ENDMSG
 7103
 7104  042466  040445  046524  034067  FMM034:      .ASCIZ  /%ATM78 ROM INFORMATION PARITY ERROR %N%AADR %06%N/
 7105                                                .EVEN
 7106
 7107  042550                                        BGNMSG  ERM035
 7108  042550  004737  044352                        CALL    HEADER
 7109  042554                                        PRINTB  #FMM035
 7110  042574                                        PRINTB  #FMMA35,R3,(R5),2(R5)
 7111  042624                                        ENDMSG
 7112  042626  040445  046524  034067  FMM035:      .ASCIZ  /%ATM78 ROM ID# WRONG (CAN NOT LOOP ON THIS ERROR) %N/
 7113  042713     045  040501  051104  FMMA35:      .ASCIZ  /%AADR %06%N%AIDEN %01%N%AVER # %03%N/
 7114                                                .EVEN
```

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7115
7116  042760                                  BGNMSG  ERM036
7117  042760  004737  044352                  CALL    HEADER
7118  042764                                  PRINTB  #FMM036
7119  043004                                  PRINTB  #FMMA35, R3,(R5),2(R5)
7120  043034                                  ENDMSG
7121  043036  040445  047522  020115  FMM036: .ASCIZ  /%AROM PARITY ERROR NOT SET AND SHOULD BE %N/
7122                                          .EVEN
7123
7124  043112                                  BGNMSG  ERM037
7125  043112  004737  044352                  CALL    HEADER
7126  043116                                  PRINTB  #FMM037
7127  043136                                  PRINTB  #FMMA35,R3,(R5),2(R5)
7128  043166                                  ENDMSG
7129
7130  043170  040445  047522  020115  FMM037: .ASCIZ  /%AROM PARITY ERROR %N/
7131                                          .EVEN
7132  043216                                  BGNMSG  ERM040
7133  043216                                  PRINTB  #FMM040
7134  043236                                  ENDMSG
7135
7136  043240  040445  047516  023440  FMM040: .ASCIZ  /%ANO 'DLT' AFTER READ FROM EMPTY SILO%N/
7137                                          .EVEN
7138
7139  043310                                  BGNMSG  ERM041
7140  043310                                  PRINTB  #FMM041
7141  043330                                  ENDMSG
7142
7143  043332  040445  047516  023440  FMM041: .ASCIZ  /%ANO 'SC' AFTER READ FROM EMPTY SILO%N/
7144          043402                          .EVEN
7145
7146  043402                                  BGNMSG  ERM042
7147  043402                                  PRINTB  #FMM042
7148  043422                                  ENDMSG
7149
7150  043424  040445  047516  023440  FMM042: .ASCIZ  /%ANO 'TRE' AFTER READ FROM EMPTY SILO%N/
7151                                          .EVEN
7152
7153  043474                                  BGNMSG  ERM043
7154  043474                                  PRINTB  #FMM043
7155  043514                                  ENDMSG
7156
7157  043516  040445  044447  023522  FMM043: .ASCIZ  /%A'IR' NOT SET AFTER RH CLEAR%N/
7158                                          .EVEN
7159
7160  043556                                  BGNMSG  ERM044
7161  043556                                  PRINTB  #FMM044
7162  043576                                  ENDMSG
7163
7164  043600  040445  047447  023522  FMM044: .ASCIZ  /%A'OR' SET AFTER RH CLEAR%N/
7165                                          .EVEN
7166
7167  043634                                  BGNMSG  ERM045
7168  043634                                  PRINTB  #FMM045
7169  043654                                  ENDMSG
7170
```

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7171  043656  040445  047447  023522  FMM045: .ASCIZ  /%A'OR' SET AFTER 1 SILO LOAD%N/
7172          043716                          .EVEN
7173
7174  043716                                  BGNMSG  ERM046
7175  043716                                  PRINTB  #FMM046
7176  043736                                  ENDMSG
7177
7178  043740  040445  047447  023522  FMM046: .ASCIZ  /%A'OR' RESET AFTER SECOND SILO LOAD%N/
7179                                          .EVEN
7180
7181  044006                                  BGNMSG  ERM047
7182  044006                                  PRINTB  #FMM047
7183  044026                                  ENDMSG
7184
7185  044030  040445  044447  023522  FMM047: .ASCIZ  /%A'IR' NOT RESET BY SILO FULL%N/
7186                                          .EVEN
7187
7188  044070                                  BGNMSG  ERM048
7189  044070                                  PRINTB  #FMM048
7190  044110                                  ENDMSG
7191
7192  044112  040445  047447  023522  FMM048: .ASCIZ  /% 'OR' NOT SET AFTER SILO FULL%N/
7193          044154                          .EVEN
7194
7195  044154                                  BGNMSG  ERM049
7196  044154                                  PRINTB  #FMM049
7197  044174                                  PRINTB  #FMTACT,R2
7198  044216                                  PRINTB  #FMTEXP,R1
7199  044240                                  ENDMSG
7200
7201  044242  040445  040502  020104  FMM049: .ASCIZ  /%ABAD SILO READ%N/
7202                                          .EVEN
7203
7204  044264                                  BGNMSG  ERM050
7205  044264                                  PRINTB  #FMM050
7206  044304                                  ENDMSG
7207
7208  044306  040445  042047  052114  FMM050: .ASCIZ  /%A'DLT' NOT SET BY SILO OVERFLOW%N/
7209          044352                          .EVEN
7210  044352                          HEADER: PRINTB  #FHEAD,XFRCMD,MBDRIV,TMUNIT,TMPORT
7211  044412  000207                          RTS     PC
7212
7213  044414  040445  044122  020072  FHEAD:  .ASCIZ  /%ARH: %06%A TM: %01%A TU: %01%A PORT: %01%N/
7214                                          .EVEN
7215  044470  034115  032471  026066  RHCAS:  .ASCIZ  /M8956, M8957, MASSBUS/
7216  044516  034115  032471  026066  CASX:   .ASCIZ  /M8956, M8957, M8960, M8958, M8953/
7217  044560  034115  032471  026067  PROCAS: .ASCIZ  /M8957, M8960/
7218  044575     115  034470  030066  PRO:    .ASCIZ  /M8960, M8958, M8953/
7219  044621     115  034470  034465  WMC:    .ASCIZ  /M8959/
7220  044627     122  030510  020061  RH11:   .ASCIZ  /RH11 FAILURE/
7221                                          .EVEN
7222                                          .LIST   BEX
7223  044644                                  LASTAD
 (3)  044650                          L$LAST::
```

```
ADATA   004370          1348#  4819*  6620
ADR   = 000020 G        1219#
AD80    004300          1319#  1947*  1950  1956  1977*  2037*  2038  2114*  2122*  2177*  2186*  2271*  2559*
                        2593*  2606*  2671*  2682*  2752*  2764*  2838*  2847*  2971*  3044*  3053  3497*  3584*
                        4254*  4257*  4621*  4637*  4714*  4809*  6260*  6409*  6422*  6425*  6430*  6530*
AS      004246          1045  1058*  1306#  4187  4193*  4195  4247*  4890*  5345*  5399*  5451  5584*  5593*
                        6001*  6016*  6053*  6210*  6986
ASSEMB= 000010           540
AUXILL  017612          5749  5756#  5758  5767  5768  5769  5770  5771  5772  5773
AUXMO2  020236          5823  5826#
AUXMO5  020552          5854  5871#
AUXMS1  020054          5803  5805#
AUXMS2  020210          5822  5825#
AUXMS4  020312          5831  5834#
AUXMS5  020516          5849  5869#
AUXMS7  017774          5789  5797#
AUXPNT  017560          5563*  5747#
AUXTBL  017614          5755  5758#
AUX1    017654          5759  5775#
AUX1X   020026          5775*  5779*  5786*  5791*  5803#
AUX18   020456          5848*  5853*  5857#
AUX2    017662          5760  5777#
AUX2X   020106          5777*  5780*  5792*  5812#
AUX3    017670          5761  5779#
AUX4    017702          5762  5782#
AUX4X   020264          5782*  5831#
AUX5    017710          5763  5784#
AUX5X   020346          5784*  5787*  5793*  5845#
AUX6    017716          5764  5786#
AUX7    017730          5765  5789#
AUX8    017756          5766  5791#
AU.DRP  003406          1064  1075#
AU.RH   003256          1024  1069#
AU.TM   003316          1035  1071#
AU.TO   003210          1051  1067#
AU.TU   003352          1056  1061  1073#
BA      004234          1301#  6002*  6015*
BINUNT  004354           984*  1058  1342#  5451  6050
BIT0  = 000001 G        1219#
BIT00 = 000001 G        1219#
BIT01 = 000002 G        1219#
BIT02 = 000004 G        1219#
BIT03 = 000010 G        1219#
BIT04 = 000020 G        1219#
BIT05 = 000040 G        1219#
BIT06 = 000100 G        1219#
BIT07 = 000200 G        1219#
BIT08 = 000400 G        1219#
BIT09 = 001000 G        1219#
BIT1  = 000002 G        1219#
BIT10 = 002000 G        1219#
BIT11 = 004000 G        1219#
BIT12 = 010000 G        1219#
BIT13 = 020000 G        1219#
BIT14 = 040000 G        1219#
BIT15 = 100000 G        1219#
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BIT2   = 000004 G          1219#
BIT3   = 000010 G          1219#
BIT4   = 000020 G          1219#
BIT5   = 000040 G          1219#
BIT6   = 000100 G          1219#
BIT7   = 000200 G          1219#
BIT8   = 000400 G          1219#
BIT9   = 001000 G          1219#
BOE    = 000400 G          1219#
BUFEND  031736             5009    5096    6240#
BUFER   021666             4407    4439    4457    4466    4690    4795    5003*   5009    5079*   5088*   5092*   5096    5484
                           5493    5510    5515    5519    5536    5544    5554    5567    5598    6239#
BYPFLG  004404             1355#   4385    4386    4408*   4412    4414    4415    4458*   4459    4460
BYTCNT  004336             1335#   6037    6069*   6136
CALBYT  021142             5995*   6009*   6066#
CALILL  021304             6086    6087    6108#
CALTBL  021212             6079    6080#
CALX1   021234             6085    6090#
CALX2   021232             6080    6081    6089#   6093
CALX4   021242             6082    6092#
CALX5   021246             6083    6094#
CALX9   021264             6084    6100#
CASBOT  032502             2966*   3038*   3487*   3574*   4055*   4130*   4179*   6253*   6279*   6295#
CASBUF= 042000             1276#   6408
CASCMD= 041420             1275#   2971    3044    3497    3584    6260    6422
CASCMP  033260             2931*   3511*   3598*   4067*   4142*   6274*   6288*   6445#
CASCOR  032430             3650*   3696*   3768*   3814*   3860*   3906*   3952*   3998*   6278#
CASCOW  032246             3108*   3153*   3199*   3245*   3291*   3338*   3384*   3430*   6252#
CASDAH= 042041             1278#   6430
CASDAL= 042040             1277#   6425
CASDAT  032564             3495*   3582*   4063*   4138*   4185*   6258*   6284*   6324#
CASDTA  004330             1332#   3492*   3514    3579*   3601    4060*   4070    4135*   4145    4184*   4201    6252*   6278*
                           6325
CASLD   004412              989*   1358#   1560*   1727*   1823*   1944*   2032*   2112*   2175*   2269*   2357*   2434*   2547*
                           2668*   2749*   2833*   2919*   4242*   4374*   6295    6307*
CASRED  032712             2930*   4065*   4140*   6286*   6383#
CASTMR  033020             3510*   3597*   6273*   6405#
CASTMW  033070             4064*   4139*   4186*   6285*   6420#
CASWRT  032610             2929*   3500*   3587*   6263*   6348#
CASX    044516             1852    2041    2120    2276    3060    4190    4198    6457    7216#
CHAR    004344             1338#   4968    4980    5007    5077    5079    5085    5087*   5088    5090    5094    5201*   5218
                           5223    5235    5237
CHKSUM  004350             1340#   4699*   4702*   4707*   4711*   4726*   4734*   4736
CKSUM   004340             1336#
CLOSEX  021660             2988*   4429*   4470*   5211*   6230#   6300*   6308*
CLRSTA= 035400             1259#   4874
COMP    014432             4576*   4795#
COMPEX  014454             4800    4803#   4814    4821
COMP0   014436             4796#   4827
COMP1   014456             4802    4805#
COMP2   014470             4809#   4825
COMP3   014522             4812    4816#
COMP4   014550             4817    4823#
CONERR= 000031             1244#   5585    6211
CONTRL  016102             4409*   4467*   5316#
CONTR1  016122             5321#   5333    5339    5347    5351    5355
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CONTR3  016172          5331    5335#
CONTR4  016220          5336    5343#
CONTR5  016246          5344    5348#
CONTR6  016264          5349    5352#
CONTR7  016302          5353    5356#
COUNT   004346          1339#   3043*   3057*
CPE   = 004000          1249#   2364    2374    2381    6356
CR    = 000015          1280#
CS2     004240          1029    1106*   1303#   1567*   1568*   1580*   1581*   1586    1602*   1603    1607    1612    1617
                        1626*   1632    1636    1655*   1660    1671*   1673*   1676    1680*   1728*   1735    1738*   1740*
                        1824*   1829    1832*   1834*   1845*   1847*   2279*   2282*   2361*   2369*   2371*   2444*   2446*
                        2983*   4244*   4569*   4869*   4871*   5317*   6349*   6384*   6501    6516*   7068
CTLERR  016212          5320    5323    5340#
C$AU  = 000052           540#   1155
C$AUTO= 000061           540#   1065
C$BRK = 000022           540#   1048    2980    5450
C$BSEG= 000004           540#   1566    1578    1600    1624    1653    1733    1827    1945    1964    20:6    2558    2592
                        2605    2681    2763    2846    3493    3580    4061    4136    6256    6282    6348    6383    6405
                        6420    6445    6515
C$BSUB= 000002           540#   1565    1669
C$CEFG= 000045           540#
C$CLCK= 000062           540#
C$CLEA= 000012           540#   1117
C$CLOS= 000035           540#   6230
C$CLP1= 000006           540#   1576    1589    1593    1597    1606    1610    1615    1621    1635    1639    1650    1664
                        1679    1685    1741    1835    1839    1844    1853    1952    1958    1962    1967    1971    1975
                        1980    1986    1991    2045    2121    2130    2135    2195    2278    2287    2291    2296    2368
                        2378    2384    2443    2455    2567    2599    2612    2694    2777    2859    2987    3062    3501
                        3507    3509    3512    3588    3594    3596    3599    4066    4068    4141    4143    4192    4200
                        4266    6264    6270    6272    6275    6287    6289    6360    6396    6441    6526
C$CVEC= 000036           540#    988    1021    4267
C$DCLN= 000044           540#
C$DODU= 000051           540#   1063
C$DRPT= 000024           540#
C$DU  = 000053           540#   1135
C$EDIT= 000003           540#    867
C$ERDF= 000055           540#   1575    1588    1592    1596    1605    1609    1614    1619    1634    1638    1648    1662
                        1678    1684    1737    1831    1838    1843    1852    1961    1974    1984    1989    2041    2120
                        2128    2133    2193    2276    2286    2290    2294    2366    2376    2383    2441    2453    2563
                        2583    2597    2610    2690    2773    2853    2986    3060    3506    3593    4190    4198    4264
                        5531    6028    6035    6043    6269    6358    6393    6440    6457    6503    6525
C$ERHR= 000056           540#
C$ERRO= 000060           540#
C$ERSF= 000054           540#   5128    6549
C$ERSO= 000057           540#
C$ESCA= 000010           540#
C$ESEG= 000005           540#   1577    1598    1622    1651    1665    1742    1854    1963    1976    2048    2568    2600
                        2613    2695    2778    2863    3513    3600    4069    4144    6276    6290    6365    6401    6417
                        6442    6464    6533
C$ESUB= 000003           540#   1667    1686
C$ETST= 000001           540#   1687    1754    1858    1992    2049    2136    2196    2297    2385    2456    2618    2699
                        2782    2867    2932    2990    3063    3109    3154    3200    3246    3292    3339    3385    3431
                        3518    3605    3651    3697    3769    3815    3861    3907    3953    3999    4074    4149    4206
                        4268    4420
C$EXIT= 000032           540#    991    1108    2969    2976    3041    3049    3490    3577    4058    4133    4182
C$GETB= 000026           540#   5201
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C$GETW= 000027          540#
C$GMAN= 000043          540#  4385  4394  4414  4459  6209
C$GPHR= 000042          540#   964
C$GPLO= 000030          540#
C$GPRI= 000040          540#
C$INIT= 000011          540#   993
C$INLP= 000020          540#  5582  6458
C$MANI= 000050          540#  4381  4453  5396
C$MEM = 000031          540#
C$MSG = 000023          540#  5612  6571  6588  6602  6622  6644  6658  6672  6686  6700  6714  6727
                       6740  6753  6766  6779  6792  6805  6818  6830  6846  6853  6860  6867  6874
                       6882  6890  6895  6905  6913  6920  6927  6934  6941  6948  6957  6965  6972
                       6979  6988  6995  7001  7008  7015  7022  7029  7036  7046  7053  7060  7069
                       7085  7096  7102  7111  7120  7128  7134  7141  7148  7155  7162  7169  7176
                       7183  7190  7199  7206
C$OPEN- 000034          540#  4499
C$PNTB= 000014          540#  5611  6569  6570  6586  6587  6601  6618  6619  6620  6621  6642  6643
                       6657  6671  6685  6699  6713  6726  6739  6752  6765  6778  6791  6804  6817
                       6829  6845  6852  6859  6866  6873  6881  6888  6889  6894  6901  6902  6903
                       6904  6912  6919  6926  6933  6940  6947  6954  6955  6956  6964  6971  6978
                       6985  6986  6987  6994  7000  7007  7014  7021  7028  7035  7042  7043  7044
                       7045  7052  7059  7066  7067  7068  7079  7080  7081  7082  7083  7084  7093
                       7094  7095  7101  7109  7110  7118  7119  7126  7127  7133  7140  7147  7154
                       7161  7168  7175  7182  7189  7196  7197  7198  7205  7210
C$PNTF= 000017          540#  1024  1035  1051  1056  1061  1064  4383  4388  4407  4457  4466  5241
                       5602
C$PNTS= 000016          540#
C$PNTX= 00C015          540#  5604  5637  5644  5789  5803  5822  5823  5831  5849  5854
C$QIO = 000377          540#
C$RDBU= 000007          540#
C$REFG= 000047          540#   955   957
C$RESE= 000033          540#   990
C$REVI= 000003          540#   867
C$RFLA= 000021          540#  4463  5456  5588
C$RPT = 000025          540#   945
C$SEFG= 000046          540#
C$SPRI= 000041          540#   954  4253  4265
C$SVEC= 000037          540#  1018  4252
C$TPRI= 000013          540#
DB      004252         1308#  1585  1611* 1616* 1628* 1641  1657*
DFPTBL  002310 G        897#
DIAGER  004334         1334#  5329* 5541  5611
DIAGEX  016422         5406   5408#
DIAGMC= 000000          540
DIAGO   016304         5318   5392#
DIAGST  014762         2973*  3046*  4417* 4893#
DIAGTS  004332         1333#  5326*  5507  5611  7066  7079  7093
DIGMON= 000037         1242#  4883
DINTCD  004364         1346#  5330  5335  5343  5348  5352  5446* 5462* 5464  5560  5576  5600  6206
DIRENT  016044         5241   5258#
DIRERR  015756         5217   5222  5244#
DIREX   015774         5214   5228  5247  5249#
DIRHED  016006         4388   5256#
DIRLST  015552         4391*  5209#
DIRQUE  013200         4385   4423#
DIRSPC  015546         4396*  5207#
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DIR1     015556          5208    5210#
DI1      004254          1309#   2362*   2379*   2437    2449    5325    5633    5639
DI2      004262          1312#   5392*   5395*   5398*   5579*   5591*   5747    5970    6030    6120
DI3      004264          1313#   5635    5641    6052*
DROPIT   003154          1025    1036    1052    1063#
DS80     004302          1320#   1840    1848*   1849    1965    1969    1978*   1981    2115*   2117    2123*   2125    2184*
                         2187    2272*   2273    2283    2363    2372*   2373    2380    2436*   2447*   2560    2561    2564*
                         2594    2595    2598*   2607    2608    2611*   2675*   2685    2692*   2757*   2768    2775*   2841*
                         2849    2856*   2972*   3045*   3498*   3585*   4255*   4258*   4622*   4625    4639*   4718*   4720
                         4810    4873    6261*   6356    6359*   6411    6423*   6429*   6434*   6518*   6522    6532*
DT       004256          1310#
DUMFLG   004420          1361#   6208*   6209
DXTUID   013662          4377    4390    4395    4479#   6299
EDATA    004372          1349#   4818*   6621
EF.CON=  000036 G         955    1219#
EF.NEW=  000035 G         957    1219#
EF.PWR=  000034 G        1219#
EF.RES=  000037 G        1219#
EF.STA=  000040 G        1219#
EOF      004402          1354#   4437    4563*   4567    4966*
ERLOAD   014044          4566    4572    4575    4579    4582    4586#
ERM001   035742 G        1575    1678    1684    6843#
ERM002   036050 G        1737    1831    6850#
ERM003   036144 G        6503    6857#
ERM004   036232 G        2120    2276    6864#
ERM005   036304 G        1838    6871#
ERM006   036422 G        1843    6879#
ERM007   036530 G        6525    6886#
ERM008   036600 G        2986    3506    3593    6269    6440    6892#
ERM009   036674 G        6457    6899#
ERM010   037070 G        1974    6910#
ERM011   037172 G        1961    6917#
ERM012   037274 G        1984    2286    6924#
ERM013   037354 G        1989    2290    6931#
ERM014   037434 G        2128    6938#
ERM015   037536 G        2133    2294    6945#
ERM016   037616 G        2041    6952#
ERM017   037742 G        2193    6962#
ERM018   040034 G        3060    6969#
ERM019   040124 G        1852    6976#
ERM020   040222 G        4190    6983#
ERM021   040372 G        4198    6992#
ERM022   040476 G        4264    6998#
ERM023   040612 G        2366    7005#
ERM024   040712 G        2376    7012#
ERM025   041016 G        2383    7019#
ERM026   041110 G        2441    7026#
ERM027   041164 G        2453    7033#
ERM028   041234 G        2690    2773    2853    7040#
ERM029   041400 G        6393    7050#
ERM030   041476 G        6358    7057#
ERM031   041574 G        6028    7064#
ERM032   042020 G        6035    7077#
ERM033   042272 G        6043    7091#
ERM034   042436 G        2563    7099#
ERM035   042550 G        2583    7107#
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ERM036  042760 G          2597    7116#
ERM037  043112 G          2610    7124#
ERM040  043216 G          1588    7132#
ERM041  043310 G          1592    7139#
ERM042  043402 G          1596    7146#
ERM043  043474 G          1605    7153#
ERM044  043556 G          1609    7160#
ERM045  043634 G          1614    7167#
ERM046  043716 G          1619    7174#
EPM047  044006 G          1634    7181#
ERM048  044070 G          1638    7188#
ERM049  044154 G          1648    7195#
ERM050  044264 G          1662    7204#
ERRLP   004226            1239#   2551*   2565*   2569
ERR78   016552            5332    5482#
ERR78P  017234            5534*   5552*   5565*   5598#
ERR78X  016732            5521*   5531#
EVL    = 000004 G         1219#
EVPAR  = 002000           1250#   2436
EXACT   017450            5562*   5633#
EXAUTO  003206            1060    1065#
E$END  = 002100            540#
E$LOAD= 000035             540#    867
FATAL   013310            4383    4427#
FC      004236            1302#   5789    5803    5831    6066    6090*   6098*   6105*
FHEAD   044414            7210    7213#
FILERR  004342            1337#
FILLX   021346            6133#   6146*   6151*   6153*   6157*   6159*   6163*   6170*   6174*   6178*   6182*
FILNAM  004400            1353#   4377*   4390*   4395*   4499    6299*   6726    6739
FMMA35  042713            7110    7113#   7119    71?
FMMPPC  041676            7067    7070#   7080    7094
FMM001  035776            6845    6847#
FMM002  036100            6852    6854#
FMM003  036172            6859    6861#
FMM004  036260            6866    6868#
FMM005  036336            6873    6875#
FMM006  036452            6881    6883#
FMM008  036626            6894    6896#
FMM009  037014            6901    6906#
FMM010  037116            6912    6914#
FMM011  037220            6919    6921#
FMM012  037322            6926    6928#
FMM013  037402            6933    6935#
FMM014  037462            6940    6942#
FMM015  037564            6947    6949#
FMM016  037710            6954    6959#
FMM017  037772            6964    6966#
FMM018  040062            6971    6973#
FMM019  040152            6978    6980#
FMM020  040320            6985    6989#
FMM021  040422            6994    6996#
FMM022  040524            7000    7002#
FMM023  040640            7007    7009#
FMM024  040740            7014    7016#
FMM025  041044            7021    7023#
FMM026  041136            7028    7030#
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FMM027  041212          7035    7037#
FMM028  041350          7042    7047#
FMM029  041430          7052    7054#
FMM030  041526          7059    7061#
FMM031  041760          7068    7074#
FMM032  042214          7081    7086#
FMM033  042370          7095    7097#
FMM034  042466          7101    7104#
FMM035  042626          7109    7112#
FMM036  043036          7118    7121#
FMM037  043170          7126    7130#
FMM040  043240          7133    7136#
FMM041  043332          7140    7143#
FMM042  043424          7147    7150#
FMM043  043516          7154    7157#
FMM044  043600          7161    7164#
FMM045  043656          7168    7171#
FMM046  043740          7175    7178#
FMM047  044030          7182    7185#
FMM048  044112          7189    7192#
FMM049  044242          7196    7201#
FMM050  044306          7205    7208#
FMTACT  034372          5637    6620    6628#   6903    6955    6986    7044    7083    7197
FMTEXP  034410          5644    6621    6630#   6904    6956    6987    7045    7084    7198
FMTSTA  033774          6570    6574#   6587    6643    6889
FMTWAD  034354          6619    6626#   7043
FMT001  033746          6569    6572#
FMT002  034106          6586    6590#   6888
FMT003  034160          6601    6604#
FMT004  034326          6618    6624#
FMT005  034500          6642    6646#
FMT006  034572          6657    6660#
FMT007  034660          6671    6674#
FMT008  034744          6685    6688#
FMT009  035032          6699    6702#
FMT010  035104          6713    6715#
FMT011  035156          6726    6728#
FMT012  035242          6739    6741#
FMT013  035320          6752    6754#
FMT014  035374          6765    6767#
FMT015  035446          6778    6780#
FMT016  035520          6791    6793#
FMT017  035572          6804    6806#
FMT018  035644          6817    6819#
FMT019  035716          6829    6833#
FMT78P  017322          5602    5604    5607#
FNN009  037046          6902    6907#
FNN032  042244          7082    7088#
FOUND   017020          5542    5552#   5557
F$AU  = 000015           540#   1142    1155
F$AUTO= 000020           540#   1015    1065
F$BGN = 000040           540#    928     936     953     991     995    1015    1084    1099    1108    1122    1128    1142
                        1148    1164    1196    1559    1565    1566    1578    1600    1624    1653    1667    1669    1686
                        1687    1726    1733    1754    1822    1827    1858    1943    1945    1964    1992    2031    2036
                        2049    2111    2136    2174    2196    2268    2297    2356    2385    2433    2456    2546    2558
                        2592    2605    2618    2667    2681    2699    2748    2763    2782    2832    2846    2867    2918
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                    2932  2965  2969  2976  2990  3037  3041  3049  3063  3106  3109  3151  3154
                    3197  3200  3243  3246  3289  3292  3336  3339  3382  3385  3428  3431  3486
                    3490  3493  3518  3573  3577  3580  3605  3648  3651  3694  3697  3766  3769
                    3812  3815  3858  3861  3904  3907  3950  3953  3996  3999  4054  4058  4061
                    4074  4129  4133  4136  4149  4178  4182  4206  4241  4268  4269  4373  4420
                    5609  6256  6282  6348  6383  6405  6420  6445  6515  6567  6584  6599  6616
                    6640  6655  6669  6683  6697  6711  6724  6737  6750  6763  6776  6789  6802
                    6815  6827  6843  6850  6857  6864  6871  6879  6886  6892  6899  6910  6917
                    6924  6931  6938  6945  6952  6962  6969  6976  6983  6992  6998  7005  7012
                    7019  7026  7033  7040  7050  7057  7064  7077  7091  7099  7107  7116  7124
                    7132  7139  7146  7153  7160  7167  7174  7181  7188  7195  7204
F$CLEA= 000007        540#  1099  1117
F$DU  = 000016        540#  1122  1135
F$END = 000041        540#   936   945   991   993  1065  1088  1108  1117  1128  1135  1148  1155
                    1171  1213  1559  1565  1577  1598  1622  1651  1665  1667  1669  1686  1687
                    1726  1742  1754  1822  1854  1858  1943  1963  1976  1992  2031  2048  2049
                    2111  2136  2174  2196  2268  2297  2356  2385  2433  2456  2546  2568  2600
                    2613  2618  2667  2695  2699  2748  2778  2782  2832  2863  2867  2918  2932
                    2965  2969  2976  2990  3037  3041  3049  3063  3106  3109  3151  3154  3197
                    3200  3243  3246  3289  3292  3336  3339  3382  3385  3428  3431  3486  3490
                    3513  3518  3573  3577  3600  3605  3648  3651  3694  3697  3766  3769  3812
                    3815  3858  3861  3904  3907  3950  3953  3996  3999  4054  4058  4069  4074
                    4129  4133  4144  4149  4178  4182  4206  4241  4268  4271  4373  4420  5612
                    6276  6290  6365  6401  6417  6442  6464  6533  6571  6588  6602  6622  6644
                    6658  6672  6686  6700  6714  6727  6740  6753  6766  6779  6792  6805  6818
                    6830  6846  6853  6860  6867  6874  6882  6890  6895  6905  6913  6920  6927
                    6934  6941  6948  6957  6965  6972  6979  6988  6995  7001  7008  7015  7022
                    7029  7036  7046  7053  7060  7069  7085  7096  7102  7111  7120  7128  7134
                    7141  7148  7155  7162  7169  7176  7183  7190  7199  7206
F$HARD= 000004        540#  1164  1171
F$HW  = 000013        540#   897   904
F$INIT= 000006        540#   953   993
F$JMP = 000050        540#   936   991  1108  1128  1148  2969  2976  3041  3049  3490  3577  4058
                    4133  4182
F$MOD = 000000        540#
F$MSG = 000011        540#  5609  5612  6567  6571  6584  6588  6599  6602  6616  6622  6640  6644
                    6655  6658  6669  6672  6683  6686  6697  6700  6711  6714  6724  6727  6737
                    6740  6750  6753  6763  6766  6776  6779  6789  6792  6802  6805  6815  6818
                    6827  6830  6843  6846  6850  6853  6857  6860  6864  6867  6871  6874  6879
                    6882  6886  6890  6892  6895  6899  6905  6910  6913  6917  6920  6924  6927
                    6931  6934  6938  6941  6945  6948  6952  6957  6962  6965  6969  6972  6976
                    6979  6983  6988  6992  6995  6998  7001  7005  7008  7012  7015  7019  7022
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                    7139  7141  7146  7148  7153  7155  7160  7162  7167  7169  7174  7176  7181
                    7183  7188  7190  7195  7199  7204  7206
F$PROT= 000021        540#   995   999
F$PWR = 000017        540#
F$RPT = 000012        540#   928   945
F$SEG = 000003        540#  1566  1577  1578  1598  1600  1622  1624  1651  1653  1665  1733  1742
                    1827  1854  1945  1963  1964  1976  2036  2048  2558  2568  2592  2600  2605
                    2613  2681  2695  2763  2778  2846  2863  3493  3513  3580  3600  4061  4069
                    4136  4144  6256  6276  6282  6290  6348  6365  6383  6401  6405  6417  6420
                    6442  6445  6464  6515  6533
F$SOFT= 000005        540#  1196  1213
F$SRV = 000010        540#  1084  1088  4269  4271
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F$SUB  = 000002          540#  1565  1667  1669  1686
F$SW   = 000014          540#   910   921
F$TEST= 000001           540#  1559  1687  1726  1754  1822  1858  1943  1992  2031  2049  2111  2136
                        2174  2196  2268  2297  2356  2385  2433  2456  2546  2618  2667  2699  2748
                        2782  2832  2867  2918  2932  2965  2990  3037  3063  3106  3109  3151  3154
                        3197  3200  3243  3246  3289  3292  3336  3339  3382  3385  3428  3431  3486
                        3518  3573  3605  3648  3651  3694  3697  3766  3769  3812  3815  3858  3861
                        3904  3907  3950  3953  3996  3999  4054  4074  4129  4149  4178  4206  4241
                        4268  4373  4420
G$CNTO= 000200           540#
G$DELM= 000372           540#  1047  1107  1570  1582  1675  1739  1833  1846  1954  1968  2124  2370
                        2445  2979  3503  3590  4245  4624  4870  4885  5402  5449  6266  6457
G$DISP= 000003           540#
G$EXCP= 000400           540#
G$HILI= 000002           540#
G$LOLI= 000001           540#
G$NO   = 000000          540#  4385  4394  4414
G$OFFS= 000400           540#  1165  1166  1167  1168  1169  1170  1203  1204  1205  1206  4385  4394
                        4414  4459  6209
G$OFSI= 000376           540#  1165  1166  1167  1168  1169  1170  1203  1204  1205  1206  4385  4394
                        4414  4459  6209
G$PRMA= 000001           540#  1165
G$PRMD= 000002           540#  1167  1168  1169  1170  4394
G$PRML= 000000           540#  1166  1203  1204  1205  1206  4385  4414  4459  6209
G$RADA= 000140           540#
G$RADB= 000000           540#
G$RADD= 000040           540#
G$RADL= 000120           540#  1166  1203  1204  1205  1206  4385  4414  4459  6209
G$RADO= 000020           540#  1165  1167  1168  1169  1170  4394
G$XFER= 000004           540#
G$YES  = 000010          540#  1165  1166  1167  1168  1169  1170  1203  1204  1205  1206  4459  6209
HARDPT  004324           964*   966  1330#
HEADER  044352          5610*  6203*  6568*  6585*  6600*  6617*  6641*  6656*  6670*  6684*  6698*  6712*  6725*
                        6738*  6751*  6764*  6777*  6790*  6803*  6816*  6828*  6844*  6851*  6858*  6865*  6872*
                        6880*  6887*  6893*  6900*  6911*  6918*  6925*  6932*  6939*  6946*  6953*  6963*  6970*
                        6977*  6984*  6993*  6999*  7006*  7013*  7020*  7027*  7034*  7041*  7051*  7058*  7065*
                        7078*  7092*  7100*  7108*  7117*  7125*  7210#
HEAD1   033536          5128  5132  5133  5134  5135  5136  5137  6551#
HEAD2   033574          5138  5139  5140  5147  5148  5149  6549  6553#
HEAD3   033634          5141  5142  5143  5144  5145  5146  6555#
HEDJMP  015410          5122  5126  5131#
HEDMPE  015454          5122  5149#
HELP   = 000000          527#   534   557   858   871   885   915   930   938  1100  1110  1123  1129
                        1143  1149  1197  1207  1284  1363  6484  6541
HIADBO  004377          1352#  4703*  4805*
HLDA   = 001000          1254#  1987  2126  2288  4630  6523
HLDSTA= 034000          1260#  4626  4721  4811
HOE    = 100000 G        1219#
HOLD   = 000400          1253#  1848  1982  2115  2123  2183  2272  2284  2372  2436  2447  2674  2691
                        2756  2774  2840  2855  2972  3045  3498  3585  4258  4622  4638  4717  6261
                        6423  6428  6433  6518  6531
HOLDMP  033414          1946*  2033*  2113*  2176*  2270*  2358*  2435*  2548*  2669*  2750*  2834*  2920*  2970*
                        3042*  3496*  3583*  4246*  6259*  6406*  6421*  6515#
IBE    = 010000 G        1219#
IDU    = 000040 G        1219#
IER    = 020000 G        1219#
```

```
ILR    = 010000          1251#   1841    1850
INTFLG  004410           1357#   4243*   4262    4270*
INTMB   012606 G         4252    4269#
INTO    002442            970#    974
ISR    = 000100 G        1219#
IXE    = 004000 G        1219#
I$AU   = 000041           540#   1142#   1155#
I$AUTO= 000041            540#   1015#   1065#
I$CLN  = 000041           540#   1099#   1108    1117#
I$DU   = 000041           540#   1122#   1135#
I$HRD  = 000041          1164#   1171#
I$INIT= 000041            540#    953#    991     993#
I$MOD  = 000041           540#
I$MSG  = 000041           540#   5609#   5612#   6567#   6571#   6584#   6588#   6599#   6602#   6616#   6622#   6640#   6644#
                         6655#   6658#   6669#   6672#   6683#   6686#   6697#   6700#   6711#   6714#   6724#   6727#   6737#
                         6740#   6750#   6753#   6763#   6766#   6776#   6779#   6789#   6792#   6802#   6805#   6815#   6818#
                         6827#   6830#   6843#   6846#   6850#   6853#   6857#   6860#   6864#   6867#   6871#   6874#   6879#
                         6882#   6886#   6890#   6892#   6895#   6899#   6905#   6910#   6913#   6917#   6920#   6924#   6927#
                         6931#   6934#   6938#   6941#   6945#   6948#   6952#   6957#   6962#   6965#   6969#   6972#   6976#
                         6979#   6983#   6988#   6992#   6995#   6998#   7001#   7005#   7008#   7012#   7015#   7019#   7022#
                         7026#   7029#   7033#   7036#   7040#   7046#   7050#   7053#   7057#   7060#   7064#   7069#   7077#
                         7085#   7091#   7096#   7099#   7102#   7107#   7111#   7116#   7120#   7124#   7128#   7132#   7134#
                         7139#   7141#   7146#   7148#   7153#   7155#   7160#   7162#   7167#   7169#   7174#   7176#   7181#
                         7183#   7188#   7190#   7195#   7199#   7204#   7206#
I$PROT= 000040            540#    995#
I$PTAB= 000041            540#
I$PWR  = 000041           540#
I$RPT  = 000041           540#    928#    945#
I$SEG  = 000041           540#   1559    1565    1566#   1577#   1578#   1598#   1600#   1622#   1624#   1651#   1653#   1665#
                         1669    1726    1733#   1742#   1822    1827#   1854#   1943    1945#   1963#   1964#   1976#   2031
                         2036#   2048#   2111    2174    2268    2356    2433    2546    2558#   2568#   2592#   2600#   2605#
                         2613#   2667    2681#   2695#   2748    2763#   2778#   2832    2846#   2863#   2918    2965    3037
                         3106    3151    3197    3243    3289    3336    3382    3428    3486    3493#   3513#   3573    3580#
                         3600#   3648    3694    3766    3812    3858    3904    3950    3996    4054    4061#   4069#   4129
                         4136#   4144#   4178    4241    4373    6256#   6276#   6282#   6290#   6348#   6365#   6383#   6401#
                         6405#   6417#   6420#   6442#   6445#   6464#   6515#   6533#
I$SETU= 000041            540#
I$SFT  = 000041          1196#   1213#
I$SRV  = 000041           540#   1084#   1088#   4269#   4271#
I$SUB  = 000041           540#   1559    1565#   1667#   1669#   1686#   1726    1822    1943    2031    2111    2174    2268
                         2356    2433    2546    2667    2748    2832    2918    2965    3037    3106    3151    3197    3243
                         3289    3336    3382    3428    3486    3573    3648    3694    3766    3812    3858    3904    3950
                         3996    4054    4129    4178    4241    4373
I$TST  = 000041           540#   1559#   1565    1669    1687#   1726#   1754#   1822#   1858#   1943#   1992#   2031#   2049#
                         2111#   2136#   2174#   2196#   2268#   2297#   2356#   2385#   2433#   2456#   2546#   2618#   2667#
                         2699#   2748#   2782#   2832#   2867#   2918#   2932#   2965#   2969    2976    2990#   3037#   3041
                         3049    3063#   3106#   3109#   3151#   3154#   3197#   3200#   3243#   3246#   3289#   3292#   3336#
                         3339#   3382#   3385#   3428#   3431#   3486#   3490    3518#   3573#   3577    3605#   3648#   3651#
                         3694#   3697#   3766#   3769#   3812#   3815#   3858#   3861#   3904#   3907#   3950#   3953#   3996#
                         3999#   4054#   4058    4074#   4129#   4133    4149#   4178#   4182    4206#   4241#   4268#   4373#
                         4420#
J$JMP  = 000167           540#    936    1128    1148
LDMOD   015002           4564*   4960#   4969
LDMOD1  015030           4962    4968#
LDMOD2  015040           4964    4971#
LDMOD3  015044           4974#
```

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LDMOD4  015050            4977#   5010
LDMOD6  015120            4984    4991#
LDMOD7  015146            4993    5002#
LDMOD8  015160            4982    4986    4988    5000    5007#
LF    = 000012            1281#   5090
LMODEX  015202            4967    4972    4979    5008    5012#
LOADER  013742            4404*   4433*   4434*   4562#   6304*
LOADEX  014050            4568    4585    4587#
LOAD80  004376            1351#   4708*   4714    4728*   4806*   4809    4823*   6619
LOE   = 040000 G          1219#   5457    5589
LOPERR= 000033            1245#   5346    5594
LOT   = 000010 G          1219#
L$ACP   002110 G           867#
L$APT   002036 G           867#
L$AU    003532 G           867    1142#
L$AUT   002070 G           867#
L$AUTO  002566 G           867    1015#
L$CCP   002106 G           867#
L$CLEA  003460 G           867    1099#
L$CO    002032 G           867#
L$DEPO  002011 G           867#
L$DESC  002130 G           867     869#
L$DESP  002076 G           867#
L$DEVP  002060 G           867#
L$DISP  002166 G           867     883#
L$DLY   002116 G           867#   1047    1107    1570    1582    1675    1739    1833    1846    1954    1968    2124    2370
                          2445    2979    3503    3590    4245    4624    4870    4885    5402    5449    6266    6437
L$DTP   002040 G           867#
L$DTYP  002034 G           867#
L$DU    003524 G           867    1122#
L$DUT   002072 G           867#
L$DVTY  002122 G           867     868#
L$EF    002052 G           867#
L$ENVI  002044 G           867#
L$ETP   002102 G           867#
L$EXP1  002046 G           867#
L$EXP4  002064 G           867#
L$EXP5  002066 G           867#
L$HARD  003542 G           867    1164#
L$HIME  002120 G           867#
L$HPCP  002016 G           867#
L$HPTP  002022 G           867#
L$HW    002310 G           867     897#
L$ICP   002104 G           867#
L$INIT  002344 G           867     953#
L$LADP  002026 G           867#
L$LAST  044650 G           867    7223#
L$LOAD  002100 G           867#
L$LUN   002074 G           867#
L$MREV  002050 G           867#
L$NAME  002000 G           867#
L$PRIO  002042 G           867#
L$PROT  002560 G           867     995#
L$PRT   002112 G           867#
L$REPP  002062 G           867#
L$REV   002010 G           867#
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L$RPT   002336 G          928#
L$SOFT  004166 G          867    1196#
L$SPC   002056 G          867#
L$SPCP  002020 G          867#
L$SPTP  002024 G          867#
L$STA   002030 G          867#
L$SW    002326 G          867     910#
L$TEST  002114 G          867#
L$TIML  002014 G          867#
L$UNIT  002012 G          867#    960
L10000  002324            897     904#
L10001  002336            910     921#
L10002  002342            936     945#
L10003  002556            991     993#
L10005  003206           1065#
L10006  003456           1088#
L10007  003522           1108    1117#
L10010  003530           1128    1135#
L10011  003536           1148    1155#
L10012  003630           1164    1171#
L10013  004216           1196    1213#
L10014  005414           1687#
L10015  005256           1667#
L10016  005412           1686#
L10017  005600           1754#
L10020  006074           1858#
L10021  006400           1992#
L10022  006464           2049#
L10023  006650           2136#
L10024  006760           2196#
L10025  007136           2297#
L10026  007342           2385#
L10027  007516           2456#
L10030  010116           2618#
L10031  010256           2699#
L10032  010422           2782#
L10033  010602           2867#
L10034  010656           2932#
L10035  011034           2969    2976    2990#
L10036  011166           3041    3049    3063#
L10037  011176           3109#
L10040  011210           3154#
L10041  011222           3200#
L10042  011234           3246#
L10043  011246           3292#
L10044  011260           3339#
L10045  011272           3385#
L10046  011304           3431#
L10047  011510           3490    3518#
L10050  011714           3577    3605#
L10051  011724           3651#
L10052  011736           3697#
L10053  011750           3769#
L10054  011762           3815#
L10055  011774           3861#
L10056  012006           3907#
```

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L10057  012020          3953#
L10060  012032          3999#
L10061  012126          4058    4074#
L10062  012222          4133    4149#
L10063  012352          4182    4206#
L10064  012604          4268#
L10065  012612          4271#
L10066  013146          4420#
L10067  017366          5612#
L10070  033744          6571#
L10071  034104          6588#
L10072  034156          6602#
L10073  034324          6622#
L10074  034476          6644#
L10075  034570          6658#
L10076  034656          6672#
L10077  034742          6686#
L10100  035030          6700#
L10101  035102          6714#
L10102  035154          6727#
L10103  035240          6740#
L10104  035316          6753#
L10105  035372          6766#
L10106  035444          6779#
L10107  035516          6792#
L10110  035570          6805#
L10111  035642          6818#
L10112  035714          6830#
L10113  035774          6846#
L10114  036076          6853#
L10115  036170          6860#
L10116  036256          6867#
L10117  036334          6874#
L10120  036450          6882#
L10121  036576          6890#
L10122  036624          6895#
L10123  037012          6905#
L10124  037114          6913#
L10125  037216          6920#
L10126  037320          6927#
L10127  037400          6934#
L10130  037460          6941#
L10131  037562          6948#
L10132  037706          6957#
L10133  037770          6965#
L10134  040060          6972#
L10135  040150          6979#
L10136  040316          6988#
L10137  040420          6995#
L10140  040522          7001#
L10141  040636          7008#
L10142  040736          7015#
L10143  041042          7022#
L10144  041134          7029#
L10145  041210          7036#
L10146  041346          7046#
```

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L10147  041426            7053#
L10150  041524            7060#
L10151  041674            7069#
L10152  042212            7085#
L10153  042366            7096#
L10154  042464            7102#
L10155  042624            7111#
L10156  043034            7120#
L10157  043166            7128#
L10160  043236            7134#
L10161  043330            7141#
L10162  043422            7148#
L10163  043514            7155#
L10164  043576            7162#
L10165  043654            7169#
L10166  043736            7176#
L10167  044026            7183#
L10170  044110            7190#
L10171  044240            7199#
L10172  044304            7206#
MANMSG  021616            6209    6214#
MANTST  002332             913#   4375
MBBUF   032102            2923*   4188    6249#   6325*   6353    6426    6431    6447    6904    6987
MBDRIV  004352             976*   1030    1035    1341#   1568    1581    1671    1680    1728    1740    1824    1834    1847
                          2282    2359    2371    2446    2983    4569    4871    5317    6349    6384    6516    7210
MBINIT= 000040            1106    1264#   1738    1832    1845    2279    2369    2444    4244    4869
MBREAD  031736            6244#   6388*   6412*   6447    6903
MBREGX  033412            6502    6504#
MBSEL = 100340            1268#   2177    2186    4637    6530
MBTBL   033352            6352    6387    6467#
MCPE  = 020000            1252#   2439    2451    6391
MESS    015204            4583*   5072#
MESSEX  015336            5076    5084    5095    5100#
MESS1   015206            5074#   5078
MESS2   015264            5086    5088#
MESS3   015236            5082#   5097
MESS4   015314            5091    5094#
MICCTL  013402            4378*   4429#
MICRO   013654            4407    4457    4466    4474#
MOINT   004266            1040*   1053    1314#
MOO     004270            1043*   1315#   5860    5866
MO1     004272            1316#   5845    5857
MO2     004274            1317#
MO3     004276            1318#   5850
MPDPAR  021364            6128    6145#   6183
MPPC    017326 G          5531    5609#
MSGJMP  015456            5127    5151#
MSGPAR  016754            5535#   6205*
MSG001  033674 G          5128    5152    6567#
MSG002  034034 G          5153    6584#
MSG003  034132 G          5154    6599#
MSG004  034204 G          5155    6616#
MSG005  034426 G          5156    6640#
MSG006  034544 G          5157    6655#
MSG007  034632 G          5158    6669#
MSG008  034716 G          5159    6683#
```

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MSG009  035004 G        5160    6697#
MSG010  035056 G        5161    6711#
MSG011  035124 G        5162    6724#
MSG012  035210 G        5163    6737#
MSG013  035272 G        5164    6750#
MSG014  035346 G        5165    6763#
MSG015  035420 G        5166    6776#
MSG016  035472 G        5167    6789#
MSG017  035544 G        5168    6802#
MSG018  035616 G        5169    6815#
MSG019  035670 G        6549    6827#
MSG1    003630          1165    1172#
MSG10   004143          1166    1183#
MSG2    003643          1168    1173#
MSG3    003652          1169    1174#
MSG4    003661          1170    1175#
MSG5    003675          1176#   1203
MSG6    003750          1177#   1204
MSG7    004012          1167    1178#
MSG8    004034          1179#   1205
MSG9    004076          1180#   1206
MTATST  002326           911#   4451
NAME    015776          5230*   5231*   5232*   5237*   5241    5251#
NED   = 010000          1033    1248#   1735    1829    6501
NONEX   033372          1951*   1957*   1966*   1970*   1979*   6355*   6390*   6501#
NON54   004304          1321#
NON56   004306          1322#
NON60   004310          1323#
NON62   004312          1324#
NON64   004314          1325#
NON66   004316          1326#
NON70   004320          1327#
NON72   004322           973    1328#
NOREX   013646          4432    4436    4438    4470#
NXMFLG  003450          1017*   1022    1080#   1086*
NXMLOC= 000004          1010#   1018    1021
NXMTRP  003452 G        1018    1084#
OPENX   013730          4430*   4499#   5212*   6301*
O$APTS= 000000           540#    867
O$AU  = 000001           540#    856#    867
O$BGNR= 000000           540#    867
O$BGNS= 000001           540#    856#    867
O$DU  = 000001           540#    856#    867
O$ERRT= 000000           540#    867
O$GNSW= 000001           540#    856#    867
O$POIN= 000001           540#    856#    867
O$SETU= 000000           540#    867    7223
PAT   = 000020          1263#   2360
PATGEN  021312          5998*   6012*   6120#
PATILL  021340          6127    6130#
PATTBL  021334          6125    6127#
PC80    004374          1350#
PNT   = 001000 G        1219#   4464
PRES  = 040000          1013#   1059
PRI   = 002000 G        1219#
PRI00 = 000000 G        1219#   4253
```

```
PRI01 = 000040 G          1219#
PRI02 = 000100 G          1219#
PRI03 = 000140 G          1219#
PRI04 = 000200 G          1219#
PRI05 = 000240 G          1219#
PRI06 = 000300 G          1219#
PRI07 = 000340 G           954    1018    1219#   4252    4265
PRO     044575            2128    2193    2563    2583    2597    2610    2690    2773    2853    7218#
PROCAS  044560            1961    1974    1984    1989    2133    2286    2290    2294    2986    3506    3593    4264    6269
                          6440    6525    7217#
QUEUE   021534            5350*   6203#
QUEUEM  021532            5354    6202#
RDYTST  005262            1563    1671#
READ    015524            4960    4977    5074    5082    5201#   5215*   5220*   5234*
REDBUF  031736            6015    6033    6245#   7083
REL178  002330             912#   5393
RERET   013150            4414    4421#
RESPON  017134            5572    5577    5579#   6039
RFWD    020726            5978    6009#
RFWDX   020770            6011    6014    6018#
RHCAS   044470            1575    1678    1684    1737    1831    1838    1843    2366    2376    2383    2441    2453    6358
                          6393    6503    7215#
RHTYP   004416             987*   1360#   1561
RHVEC   004362             986*    988    1345#   4249    4252    4267
RH11    044627            1588    1592    1596    1605    1609    1614    1619    1634    1638    1648    1662    7220#
ROMIDT  004216            1234#   2556    2578
RUNSKP  002334             914#   4455
SAVE    004414            1359#   5528*   5532
SECPAR  017066            5561    5565#   5570
SENSDN= 000001            1012#   1054
SENSGO= 000011            1011#   1043
SEQ     013242            4394    4425#
SEQNUM  004406            1356#   4389*   4394    4399    5227*   5241    5242*
SERFAL  033524            5124    6549#
SFPTBL  002326 G           910#
SKIP    013676            4459    4482#
SN      004260            1311#
SPACE = 000040            1283#   5087
STAREX  014752            4877    4881    4888    4890#
START   014566            3494*   3499*   3581*   3586*   4062*   4137*   4580*   4869#   4894*   6257*   6262*   6283*   6435*
START1  014656            4875    4878#
START2  014674            4879    4882#
STAT80  004366            1347#   4625*   4626    4630    4720*   4721    4810*   4811    4816    4819    4873*   4874    4878
                          6570    6587    6643
STER    021066            5981    6041#
STMRDY= 000100            1272#   2115    2272
STNER   021000            5980    6026#
STNER1  021020            6027    6030#   6042    6045
STOP    014052            4570*   4621#
STOPEX  014210            4629    4633    4640#
STOP1   014142            4627    4630#
STOP2   014160            4631    4634#
STOP3   014172            4635    4637#
SVCGBL= 000000             540#    549#    867     868     869     883     897     910     928     953     995    1015    1084
                          1099    1122    1142    1164    1196    4269    5609    6567    6584    6599    6616    6640    6655
                          6669    6683    6697    6711    6724    6737    6750    6763    6776    6789    6802    6815    6827
```

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                    6843    6850    6857    6864    6871    6879    6886    6892    6899    6910    6917    6924    6931
                    6938    6945    6952    6962    6969    6976    6983    6992    6998    7005    7012    7019    7026
                    7033    7040    7050    7057    7064    7077    7091    7099    7107    7116    7124    7132    7139
                    7146    7153    7160    7167    7174    7181    7188    7195    7204    7223#
SVCINS= 177777       540#    546#    867     868     869     883     897     910     936     945     954     955     956
                     957     958     964     965     988     990     991     993    1018    1021    1024    1035    1047
                    1048    1051    1056    1061    1063    1064    1065    1088    1107    1108    1117    1128    1135
                    1148    1155    1164    1165    1166    1167    1168    1169    1170    1171    1196    1203    1204
                    1205    1206    1213    1565    1566    1570    1575    1576    1577    1578    1582    1588    1589
                    1592    1593    1596    1597    1598    1600    1605    1606    1609    1610    1614    1615    1619
                    1621    1622    1624    1634    1635    1638    1639    1648    1650    1651    1653    1662    1664
                    1665    1667    1669    1675    1678    1679    1684    1685    1686    1687    1733    1737    1739
                    1741    1742    1754    1827    1831    1833    1835    1838    1839    1843    1844    1846    1852
                    1853    1854    1858    1945    1952    1954    1958    1961    1962    1963    1964    1967    1968
                    1971    1974    1975    1976    1980    1984    1986    1989    1991    1992    2036    2041    2045
                    2048    2049    2120    2121    2124    2128    2130    2133    2135    2136    2193    2195    2196
                    2276    2278    2286    2287    2290    2291    2294    2296    2297    2366    2368    2370    2376
                    2378    2383    2384    2385    2441    2443    2445    2453    2455    2456    2558    2563    2567
                    2568    2583    2592    2597    2599    2600    2605    2610    2612    2613    2618    2681    2690
                    2694    2695    2699    2763    2773    2777    2778    2782    2846    2853    2859    2863    2867
                    2932    2969    2976    2979    2980    2986    2987    2990    3041    3049    3060    3062    3063
                    3109    3154    3200    3246    3292    3339    3385    3431    3490    3493    3501    3503    3506
                    3507    3509    3512    3513    3518    3577    3580    3588    3590    3593    3594    3596    3599
                    3600    3605    3651    3697    3769    3815    3861    3907    3953    3999    4058    4061    4066
                    4068    4069    4074    4133    4136    4141    4143    4144    4149    4182    4190    4192    4198
                    4200    4206    4245    4252    4253    4264    4265    4266    4267    4268    4271    4381    4382
                    4383    4385    4388    4394    4407    4414    4420    4453    4454    4457    4459    4463    4466
                    4499    4624    4870    4885    5128    5201    5202    5241    5396    5397    5402    5449    5450
                    5456    5531    5582    5583    5588    5602    5604    5611    5612    5637    5644    5789    5803
                    5822    5823    5831    5849    5854    6028    6035    6043    6209    6230    6256    6264    6266
                    6269    6270    6272    6275    6276    6282    6287    6289    6290    6348    6358    6360    6365
                    6383    6393    6396    6401    6405    6417    6420    6437    6440    6441    6442    6445    6457
                    6458    6459    6464    6503    6515    6525    6526    6533    6549    6569    6570    6571    6586
                    6587    6588    6601    6602    6618    6619    6620    6621    6622    6642    6643    6644    6657
                    6658    6671    6672    6685    6686    6699    6700    6713    6714    6726    6727    6739    6740
                    6752    6753    6765    6766    6778    6779    6791    6792    6804    6805    6817    6818    6829
                    6830    6845    6846    6852    6853    6859    6860    6866    6867    6873    6874    6881    6882
                    6888    6889    6890    6894    6895    6901    6902    6903    6904    6905    6912    6913    6919
                    6920    6926    6927    6933    6934    6940    6941    6947    6948    6954    6955    6956    6957
                    6964    6965    6971    6972    6978    6979    6985    6986    6987    6988    6994    6995    7000
                    7001    7007    7008    7014    7015    7021    7022    7028    7029    7035    7036    7042    7043
                    7044    7045    7046    7052    7053    7059    7060    7066    7067    7068    7069    7079    7080
                    7081    7082    7083    7084    7085    7093    7094    7095    7096    7101    7102    7109    7110
                    7111    7118    7119    7120    7126    7127    7128    7133    7134    7140    7141    7147    7148
                    7154    7155    7161    7162    7168    7169    7175    7176    7182    7183    7189    7190    7196
                    7197    7198    7199    7205    7206    7210    7223
SVCSUB= 177777       540#    548#    1565    1669
SVCTAG= 177777       540#    550#    904     921     945     993     1065    1088    1117    1135    1155    1171    1213
                    1577    1598    1622    1651    1665    1667    1686    1687    1742    1754    1854    1858    1963
                    1976    1992    2048    2049    2136    2196    2297    2385    2456    2568    2600    2613    2618
                    2695    2699    2778    2782    2863    2867    2932    2990    3063    3109    3154    3200    3246
                    3292    3339    3385    3431    3513    3518    3600    3605    3651    3697    3769    3815    3861
                    3907    3953    3999    4069    4074    4144    4149    4206    4268    4271    4385    4394    4414
                    4420    4459    5612    6209    6276    6290    6365    6401    6417    6442    6464    6533    6571
                    6588    6602    6622    6644    6658    6672    6686    6700    6714    6727    6740    6753    6766
                    6779    6792    6805    6818    6830    6846    6853    6860    6867    6874    6882    6890    6895
```

```
                    6905   6913   6920   6927   6934   6941   6948   6957   6965   6972   6979   6988   6995
                    7001   7008   7015   7022   7029   7036   7046   7053   7060   7069   7085   7096   7102
                    7111   7120   7128   7134   7141   7148   7155   7162   7169   7176   7183   7190   7199
                    7206
SVCTST= 177777       540#   547#  1559   1726   1822   1943   2031   2111   2174   2268   2356   2433   2546
                    2667   2748   2832   2918   2965   3037   3106   3151   3197   3243   3289   3336   3382
                    3428   3486   3573   3648   3694   3766   3812   3858   3904   3950   3996   4054   4129
                    4178   4241   4373
SYSERM  015376      5121*  5126*  5127*  5128#
SYSERR  015340      4402*  4586*  4897*  5120#  5248*  5340*
S$LSYM= 010000       540#   904#   921#   945#   993#  1065#  1088#  1117#  1135#  1155#  1171#  1213#  1566#
                    1578#  1600#  1624#  1653#  1667#  1686#  1687#  1733#  1754#  1827#  1858#  1945#  1964#
                    1992#  2036#  2049#  2136#  2196#  2297#  2385#  2456#  2558#  2592#  2605#  2618#  2681#
                    2699#  2763#  2782#  2846#  2867#  2932#  2990#  3063#  3109#  3154#  3200#  3246#  3292#
                    3339#  3385#  3431#  3493#  3518#  3580#  3605#  3651#  3697#  3769#  3815#  3861#  3907#
                    3953#  3999#  4061#  4074#  4136#  4149#  4206#  4268#  4271#  4385#  4394#  4414#  4420#
                    4459#  5612#  6209#  6256#  6282#  6348#  6383#  6405#  6420#  6445#  6515#  6571#  6588#
                    6602#  6622#  6644#  6658#  6672#  6686#  6700#  6714#  6727#  6740#  6753#  6766#  6779#
                    6792#  6805#  6818#  6830#  6846#  6853#  6860#  6867#  6874#  6882#  6890#  6895#  6905#
                    6913#  6920#  6927#  6934#  6941#  6948#  6957#  6965#  6972#  6979#  6988#  6995#  7001#
                    7008#  7015#  7022#  7029#  7036#  7046#  7053#  7060#  7069#  7085#  7096#  7102#  7111#
                    7120#  7128#  7134#  7141#  7148#  7155#  7162#  7169#  7176#  7183#  7190#  7199#  7206#
TAB    = 000011     1282#  5085
TC       004244     1305#  5812   5815   6073
TMCLR  = 040000     1255#  2123
TMPORT  004360       985*  1344#  2179   4634   6527   7210
TMRDST= 100240     1269#  2114   2271
TMRDY  = 100000     1256#  2118   2131   2274   2292   4878
TMUNIT  004356       979*  1041   1056   1061   1343#  7210
TNOPC   041726     7066   7072#  7079   7093
TRE    = 040000     1031   1265#  5580   6394
TSTART= 000035     1243#  2977   3050   3502   3589   5400   6265   6436
TUSTAT  004250     1057   1307#  5611   7067   7080   7094
T$ARGC= 000005       867#  1024#  1035#  1051#  1056#  1061#  1064#  4383#  4388#  4407#  4457#  4466#  5241#
                    5602#  5604#  5611#  5637#  5644#  5789#  5803#  5822#  5823#  5831#  5849#  5854#  6569#
                    6570#  6586#  6587#  6601#  6618#  6619#  6620#  6621#  6642#  6643#  6657#  6671#  6685#
                    6699#  6713#  6726#  6739#  6752#  6765#  6778#  6791#  6804#  6817#  6829#  6845#  6852#
                    6859#  6866#  6873#  6881#  6888#  6889#  6894#  6901#  6902#  6903#  6904#  6912#  6919#
                    6926#  6933#  6940#  6947#  6954#  6955#  6956#  6964#  6971#  6978#  6985#  6986#  6987#
                    6994#  7000#  7007#  7014#  7021#  7028#  7035#  7042#  7043#  7044#  7045#  7052#  7059#
                    7066#  7067#  7068#  7079#  7080#  7081#  7082#  7083#  7084#  7093#  7094#  7095#  7101#
                    7109#  7110#  7118#  7119#  7126#  7127#  7133#  7140#  7147#  7154#  7161#  7168#  7175#
                    7182#  7189#  7196#  7197#  7198#  7205#  7210#
T$CODE= 000130      1165#  1166#  1167#  1168#  1169#  1170#  1203#  1204#  1205#  1206#  4385#  4394#  4414#
                    4459#  6209#
T$ERRN= 000023       540#  1575#  1588#  1592#  1596#  1605#  1609#  1614#  1619#  1634#  1638#  1648#  1662#
                    1678#  1684#  1737#  1831#  1838#  1843#  1852#  1961#  1974#  1984#  1989#  2041#  2120#
                    2128#  2133#  2193#  2276#  2286#  2290#  2294#  2366#  2376#  2383#  2441#  2453#  2563#
                    2583#  2597#  2610#  2690#  2773#  2853#  2986#  3060#  3506#  3593#  4190#  4198#  4264#
                    5128#  5531#  6028#  6035#  6043#  6269#  6358#  6393#  6440#  6457#  6503#  6525#  6549#
T$EXCP= 000000      1165#  1167#  1168#  1169#  1170#  4394#
T$FLAG= 000040       936#   991#  1108#  1128#  1148#  2969#  2976#  3041#  3049#  3490#  3577#  4058#  4133#
                    4182#
T$GMAN= 000000       540#  4394#
T$HILI= 000077      1165#  1167#  1168#  1169#  1170#  4394#
T$LAST= 000001       540#  7223#
```

```
T$LOLI= 000001   1165#  1167#  1168#  1169#  1170#  4394#
T$LSYM= 010000    540#   904    921    945    993   1065   1088   1117   1135   1155   1171   1213   1667
                 1686   1687   1754   1858   1992   2049   2136   2196   2297   2385   2456   2618   2699
                 2782   2867   2932   2990   3063   3109   3154   3200   3246   3292   3339   3385   3431
                 3518   3605   3651   3697   3769   3815   3861   3907   3953   3999   4074   4149   4206
                 4268   4271   4420   5612   6571   6588   6602   6622   6644   6658   6672   6686   6700
                 6714   6727   6740   6753   6766   6779   6792   6805   6818   6830   6846   6853   6860
                 6867   6874   6882   6890   6895   6905   6913   6920   6927   6934   6941   6948   6957
                 6965   6972   6979   6988   6995   7001   7008   7015   7022   7029   7036   7046   7053
                 7060   7069   7085   7096   7102   7111   7120   7128   7134   7141   7148   7155   7162
                 7169   7176   7183   7190   7199   7206
T$LTNO= 000050   7223#
T$NEST- 177777    540#   897#   904#   910#   921#   928#   945#   953#   993#   995#   999#  1015#  1065#
                 1084#  1088#  1099#  1117#  1122#  1135#  1142#  1155#  1164#  1171#  1196#  1213#  1559#
                 1565#  1566#  1577#  1578#  1598#  1600#  1622#  1624#  1651#  1653#  1665#  1667#  1669#
                 1686#  1687#  1726#  1733#  1742#  1754#  1822#  1827#  1854#  1858#  1943#  1945#  1963#
                 1964#  1976#  1992#  2031#  2036#  2048#  2049#  2111#  2136#  2174#  2196#  2268#  2297#
                 2356#  2385#  2433#  2456#  2546#  2558#  2568#  2592#  2600#  2605#  2613#  2618#  2667#
                 2681#  2695#  2699#  2748#  2763#  2778#  2782#  2832#  2846#  2863#  2867#  2918#  2932#
                 2965#  2990#  3037#  3063#  3106#  3109#  3151#  3154#  3197#  3200#  3243#  3246#  3289#
                 3292#  3336#  3339#  3382#  3385#  3428#  3431#  3486#  3493#  3513#  3518#  3573#  3580#
                 3600#  3605#  3648#  3651#  3694#  3697#  3766#  3769#  3812#  3815#  3858#  3861#  3904#
                 3907#  3950#  3953#  3996#  3999#  4054#  4061#  4069#  4074#  4129#  4136#  4144#  4149#
                 4178#  4206#  4241#  4268#  4269#  4271#  4373#  4420#  5609#  5612#  6256#  6276#  6282#
                 6290#  6348#  6365#  6383#  6401#  6405#  6417#  6420#  6442#  6445#  6464#  6515#  6533#
                 6567#  6571#  6584#  6588#  6599#  6602#  6616#  6622#  6640#  6644#  6655#  6658#  6669#
                 6672#  6683#  6686#  6697#  6700#  6711#  6714#  6724#  6727#  6737#  6740#  6750#  6753#
                 6763#  6766#  6776#  6779#  6789#  6792#  6802#  6805#  6815#  6818#  6827#  6830#  6843#
                 6846#  6850#  6853#  6857#  6860#  6864#  6867#  6871#  6874#  6879#  6882#  6886#  6890#
                 6892#  6895#  6899#  6905#  6910#  6913#  6917#  6920#  6924#  6927#  6931#  6934#  6938#
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                 6992#  6995#  6998#  7001#  7005#  7008#  7012#  7015#  7019#  7022#  7026#  7029#  7033#
                 7036#  7040#  7046#  7050#  7053#  7057#  7060#  7064#  7069#  7077#  7085#  7091#  7096#
                 7099#  7102#  7107#  7111#  7116#  7120#  7124#  7128#  7132#  7134#  7139#  7141#  7146#
                 7148#  7153#  7155#  7160#  7162#  7167#  7169#  7174#  7176#  7181#  7183#  7188#  7190#
                 7195#  7199#  7204#  7206#
T$NSO = 000011    897#   904    910#   921    928#   945    953#   993    995#   999   1015#  1065   1084#
                 1088   1099#  1117   1122#  1135   1142#  1155   1164#  1171   1196#  1213   1559#  1687
                 1726#  1754   1822#  1858   1943#  1992   2031#  2049   2111#  2136   2174#  2196   2268#
                 2297   2356#  2385   2433#  2456   2546#  2618   2667#  2699   2748#  2782   2832#  2867
                 2918#  2932   2965#  2990   3037#  3063   3106#  3109   3151#  3154   3197#  3200   3243#
                 3246   3289#  3292   3336#  3339   3382#  3385   3428#  3431   3486#  3518   3573#  3605
                 3648#  3651   3694#  3697   3766#  3769   3812#  3815   3858#  3861   3904#  3907   3950#
                 3953   3996#  3999   4054#  4074   4129#  4149   4178#  4206   4241#  4268   4269#  4271
                 4373#  4420   5609#  5612   6256#  6276   6282#  6290   6348#  6365   6383#  6401   6405#
                 6417   6420#  6442   6445#  6464   6515#  6533   6567#  6571   6584#  6588   6599#  6602
                 6616#  6622   6640#  6644   6655#  6658   6669#  6672   6683#  6686   6697#  6700   6711#
                 6714   6724#  6727   6737#  6740   6750#  6753   6763#  6766   6776#  6779   6789#  6792
                 6802#  6805   6815#  6818   6827#  6830   6843#  6846   6850#  6853   6857#  6860   6864#
                 6867   6871#  6874   6879#  6882   6886#  6890   6892#  6895   6899#  6905   6910#  6913
                 6917#  6920   6924#  6927   6931#  6934   6938#  6941   6945#  6948   6952#  6957   6962#
                 6965   6969#  6972   6976#  6979   6983#  6988   6992#  6995   6998#  7001   7005#  7008
                 7012#  7015   7019#  7022   7026#  7029   7033#  7036   7040#  7046   7050#  7053   7057#
                 7060   7064#  7069   7077#  7085   7091#  7096   7099#  7102   7107#  7111   7116#  7120
                 7124#  7128   7132#  7134   7139#  7141   7146#  7148   7153#  7155   7160#  7162   7167#
                 7169   7174#  7176   7181#  7183   7188#  7190   7195#  7199   7204#  7206
```

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T$NS1 = 000003   1565#  1667   1669#  1686   1733#  1742   1827#  1854   1945#  1963   1964#  1976   2036#
                 2048   2558#  2568   2592#  2600   2605#  2613   2681#  2695   2763#  2778   2846#  2863
                 3493#  3513   3580#  3600   4061#  4069   4136#  4144
T$NS2 = 000003   1566#  1577   1578#  1598   1600#  1622   1624#  1651   1653#  1665
T$PTNU= 000000    540#
T$SAVL= 177777    540#
T$SEGL= 177777    540#  1566#  1577#  1578#  1598#  1600#  1622#  1624#  1651#  1653#  1665#  1733#  1742#
                 1827#  1854#  1945#  1963#  1964#  1976#  2036#  2048#  2558#  2568#  2592#  2600#  2605#
                 2613#  2681#  2695#  2763#  2778#  2846#  2863#  3493#  3513#  3580#  3600#  4061#  4069#
                 4136#  4144#  6256#  6276#  6282#  6290#  6348#  6365#  6383#  6401#  6405#  6417#  6420#
                 6442#  6445#  6464#  6515#  6533#
T$SEKO= 010010   1566#  1577   1578#  1598   1600#  1622   1624#  1651   1653#  1665   1733#  1742   1827#
                 1854   1945#  1963   1964#  1976   2036#  2048   2558#  2568   2592#  2600   2605#  2613
                 2681#  2695   2763#  2778   2846#  2863   3493#  3513   3580#  3600   4061#  4069   4136#
                 4144   6256#  6276   6282#  6290   6348#  6365   6383#  6401   6405#  6417   6420#  6442
                 6445#  6464   6515#  6533
T$SUBN= 000000    540#  1559#  1565#  1669#  1726#  1822#  1943#  2031#  2111#  2174#  2268#  2356#  2433#
                 2546#  2667#  2748#  2832#  2918#  2965#  3037#  3106#  3151#  3197#  3243#  3289#  3336#
                 3382#  3428#  3486#  3573#  3648#  3694#  3766#  3812#  3858#  3904#  3950#  3996#  4054#
                 4129#  4178#  4241#  4373#
T$TAGL= 177777    540#
T$TAGN= 010173    540#   897#   910#   928#   953#   995#  1015#  1084#  1099#  1122#  1142#  1164#  1196#
                 1559#  1565#  1669#  1726#  1822#  1943#  2031#  2111#  2174#  2268#  2356#  2433#  2546#
                 2667#  2748#  2832#  2918#  2965#  3037#  3106#  3151#  3197#  3243#  3289#  3336#  3382#
                 3428#  3486#  3573#  3648#  3694#  3766#  3812#  3858#  3904#  3950#  3996#  4054#  4129#
                 4178#  4241#  4269#  4373#  5609#  6567#  6584#  6599#  6616#  6640#  6655#  6669#  6683#
                 6697#  6711#  6724#  6737#  6750#  6763#  6776#  6789#  6802#  6815#  6827#  6843#  6850#
                 6857#  6864#  6871#  6879#  6886#  6892#  6899#  6910#  6917#  6924#  6931#    38#  6945#
                 6952#  6962#  6969#  6976#  6983#  6992#  6998#  7005#  7012#  7019#  7026#  7033#  7040#
                 7050#  7057#  7064#  7077#  7091#  7099#  7107#  7116#  7124#  7132#  7139#  7146#  7153#
                 7160#  7167#  7174#  7181#  7188#  7195#  7204#
T$TFMP= 000011    883#   904#   921#   936#   945#   991#   993#   999#  1065#  1088#  1108#  1117#  1128#
                 1135#  1148#  1155#  1165#  1166#  1167#  1168#  1169#  1170#  1171#  1203#  1204#  1205#
                 1206#  1213#  1577#  1598#  1622#  1651#  1665#  1667#  1686#  1687#  1742#  1754#  1854#
                 1858#  1963#  1976#  1992#  2048#  2049#  2136#  2196#  2297#  2385#  2456#  2568#  2600#
                 2613#  2618#  2695#  2699#  2778#  2782#  2863#  2867#  2932#  2969#  2976#  2990#  3041#
                 3049#  3063#  3109#  3154#  3200#  3246#  3292#  3339#  3385#  3431#  3490#  3513#  3518#
                 3577#  3600#  3605#  3651#  3697#  3769#  3815#  3861#  3907#  3953#  3999#  4058#  4069#
                 4074#  4133#  4144#  4149#  4182#  4206#  4268#  4271#  4385#  4394#  4414#  4420#  4459#
                 5612#  6209#  6276#  6290#  6365#  6401#  6417#  6442#  6464#  6533#  6571#  6588#  6602#
                 6622#  6644#  6658#  6672#  6686#  6700#  6714#  6727#  6740#  6753#  6766#  6779#  6792#
                 6805#  6818#  6830#  6846#  6853#  6860#  6867#  6874#  6882#  6890#  6895#  6905#  6913#
                 6920#  6927#  6934#  6941#  6948#  6957#  6965#  6972#  6979#  6988#  6995#  7001#  7008#
                 7015#  7022#  7029#  7036#  7046#  7053#  7060#  7069#  7085#  7096#  7102#  7111#  7120#
                 7128#  7134#  7141#  7148#  7155#  7162#  7169#  7176#  7183#  7190#  7199#  7206#
T$TEST= 000050    540#  1559#  1565   1669   1726#  1822#  1943#  2031#  2111#  2174#  2268#  2356#  2433#
                 2546#  2667#  2748#  2832#  2918#  2965#  3037#  3106#  3151#  3197#  3243#  3289#  3336#
                 3382#  3428#  3486#  3573#  3648#  3694#  3766#  3812#  3858#  3904#  3950#  3996#  4054#
                 4129#  4178#  4241#  4373#  7223
T$TSTM= 177777    540#   945    954    955    957    964    988    990    991    993   1018   1021   1024
                 1035   1048   1051   1056   1061   1063   1064   1065   1108   1117   1135   1155   1565
                 1566   1575   1576   1577   1578   1588   1589   1592   1593   1596   1597   1598   1600
                 1605   1606   1609   1610   1614   1615   1619   1621   1622   1624   1634   1635   1638
                 1639   1648   1650   1651   1653   1662   1664   1665   1667   1669   1678   1679   1684
                 1685   1686   1687   1733   1737   1741   1742   1754   1827   1831   1835   1838   1839
                 1843   1844   1852   1853   1854   1858   1945   1952   1958   1961   1962   1963   1964
```

```
                    1967  1971  1974  1975  1976  1980  1984  1986  1989  1991  1992  2036  2041
                    2045  2048  2049  2120  2121  2128  2130  2133  2135  2136  2193  2195  2196
                    2276  2278  2286  2287  2290  2291  2294  2296  2297  2366  2368  2376  2378
                    2383  2384  2385  2441  2443  2453  2455  2456  2558  2563  2567  2568  2583
                    2592  2597  2599  2600  2605  2610  2612  2613  2618  2681  2690  2694  2695
                    2699  2763  2773  2777  2778  2782  2846  2853  2859  2863  2867  2932  2969
                    2976  2980  2986  2987  2990  3041  3049  3060  3062  3063  3109  3154  3200
                    3246  3292  3339  3385  3431  3490  3493  3501  3506  3507  3509  3512  3513
                    3518  3577  3580  3588  3593  3594  3596  3599  3600  3605  3651  3697  3769
                    3815  3861  3907  3953  3999  4058  4061  4066  4068  4069  4074  4133  4136
                    4141  4143  4144  4149  4182  4190  4192  4198  4200  4206  4252  4253  4264
                    4265  4266  4267  4268  4381  4383  4385  4388  4394  4407  4414  4420  4453
                    4457  4459  4463  4466  4499  5128  5201  5241  5396  5450  5456  5531  5582
                    5588  5602  5604  5611  5612  5637  5644  5789  5803  5822  5823  5831  5849
                    5854  6028  6035  6043  6209  6230  6256  6264  6269  6270  6272  6275  6276
                    6282  6287  6289  6290  6348  6358  6360  6365  6383  6393  6396  6401  6405
                    6417  6420  6440  6441  6442  6445  6457  6458  6464  6503  6515  6525  6526
                    6533  6549  6569  6570  6571  6586  6587  6588  6601  6602  6618  6619  6620
                    6621  6622  6642  6643  6644  6657  6658  6671  6672  6685  6686  6699  6700
                    6713  6714  6726  6727  6739  6740  6752  6753  6765  6766  6778  6779  6791
                    6792  6804  6805  6817  6818  6829  6830  6845  6846  6852  6853  6859  6860
                    6866  6867  6873  6874  6881  6882  6888  6889  6890  6894  6895  6901  6902
                    6903  6904  6905  6912  6913  6919  6920  6926  6927  6933  6934  6940  6941
                    6947  6948  6954  6955  6956  6957  6964  6965  6971  6972  6978  6979  6985
                    6986  6987  6988  6994  6995  7000  7001  7007  7008  7014  7015  7021  7022
                    7028  7029  7035  7036  7042  7043  7044  7045  7046  7052  7053  7059  7060
                    7066  7067  7068  7069  7079  7080  7081  7082  7083  7084  7085  7093  7094
                    7095  7096  7101  7102  7109  7110  7111  7118  7119  7120  7126  7127  7128
                    7133  7134  7140  7141  7147  7148  7154  7155  7161  7162  7168  7169  7175
                    7176  7182  7183  7189  7190  7196  7197  7198  7199  7205  7206  7210
T$TSTS= 000001        540#  1559#  1726#  1822#  1943#  2031#  2111#  2174#  2268#  2356#  2433#  2546#  2667#
                    2748#  2832#  2918#  2965#  3037#  3106#  3151#  3197#  3243#  3289#  3336#  3382#  3428#
                    3486#  3573#  3648#  3694#  3766#  3812#  3858#  3904#  3950#  3996#  4054#  4129#  4178#
                    4241#  4373#
T$$AU  = 010011     1142#  1148  1155
T$$AUT= 010005      1015#  1065
T$$CLE= 010007      1099#  1108  1117
T$$DU  = 010010     1122#  1128  1135
T$$HAR= 010012      1164#  1171
T$$HW  = 010000      897#   904
T$$INI= 010003       953#   991   993
T$$MSG= 010172      5609#  5612  6567#  6571  6584#  6588  6599#  6602  6616#  6622  6640#  6644  6655#
                    6658   6669#  6672  6683#  6686  6697#  6700  6711#  6714  6724#  6727  6737#  6740
                    6750#  6753  6763#  6766  6776#  6779  6789#  6792  6802#  6805  6815#  6818  6827#
                    6830   6843#  6846  6850#  6853  6857#  6860  6864#  6867  6871#  6874  6879#  6882
                    6886#  6890  6892#  6895  6899#  6905  6910#  6913  6917#  6920  6924#  6927  6931#
                    6934   6938#  6941  6945#  6948  6952#  6957  6962#  6965  6969#  6972  6976#  6979
                    6983#  6988  6992#  6995  6998#  7001  7005#  7008  7012#  7015  7019#  7022  7026#
                    7029   7033#  7036  7040#  7046  7050#  7053  7057#  7060  7064#  7069  7077#  7085
                    7091#  7096  7099#  7102  7107#  7111  7116#  7120  7124#  7128  7132#  7134  7139#
                    7141   7146#  7148  7153#  7155  7160#  7162  7167#  7169  7174#  7176  7181#  7183
                    7188#  7190  7195#  7199  7204#  7206
T$$PRO= 010004       995#
T$$RPT= 010002       928#   936   945
T$$SEG= 010010      1566#  1577#  1578#  1598#  1600#  1622#  1624#  1651#  1653#  1665#  1733#  1742#  1827#
                    1854#  1945#  1963#  1964#  1976#  2036#  2048#  2558#  2568#  2592#  2600#  2605#  2613#
```

```
                    2681#   2695#   2763#   2778#   2846#   2863#   3493#   3513#   3580#   3600#   4061#   4069#   4136#
                    4144#   6256#   6276#   6282#   6290#   6348#   6365#   6383#   6401#   6405#   6417#   6420#   6442#
                    6445#   6464#   6515#   6533#
T$$SOF= 010013      1196#   1213
T$$SRV= 010065      1084#   1088    4269#   4271
T$$SUB= 010016      1565#   1667    1669#   1686
T$$SW = 010001       910#    921
T$$TES= 010066      1559#   1687    1726#   1754    1822#   1858    1943#   1992    2031#   2042    2111#   2136    2174#
                    2196    2268#   2297    2356#   2385    2433#   2456    2546#   2618    2667#   2699    2748#   2782
                    2832#   2867    2918#   2932    2965#   2969    2976    2990    3037#   3041    3049    3063    3106#
                    3109    3151#   3154    3197#   3200    3243#   3246    3289#   3292    3336#   3339    3382#   3385
                    3428#   3431    3486#   3490    3518    3573#   3577    3605    3648#   3651    3694#   3697    3766#
                    3769    3812#   3815    3858#   3861    3904#   3907    3950#   3953    3996#   3999    4054#   4058
                    4074    4129#   4133    4149    4178#   4182    4206    4241#   4268    4373#   4420
T1      004422 G     883    1559#
T1.1    004440     1565#
T1.2    005260     1669#
T10     007344 G     883    2433#
T11     007520 G     883    2546#
T12     010120 G     883    2667#
T13     010260 G     883    2748#
T14     010424 G     883    2832#
T15     010604 G     883    2918#
T16     010660 G     883    2965#
T17     011036 G     883    3037#
T18     011170 G     883    3106#
T19     011200 G     883    3151#
T2      005416 G     883    1726#
T20     011212 G     883    3197#
T21     011224 G     883    3243#
T22     011236 G     883    3289#
T23     011250 G     883    3336#
T24     011262 G     883    3382#
T25     011274 G     883    3428#
T26     011306 G     883    3486#
T27     011512 G     883    3573#
T28     011716 G     883    3648#
T29     011726 G     883    3694#
T3      005602 G     883    1822#
T30     011740 G     883    3766#
T31     011752 G     883    3812#
T32     011764 G     883    3858#
T33     011776 G     883    3904#
T34     012010 G     883    3950#
T35     012022 G     883    3996#
T36     012034 G     883    4054#
T37     012130 G     883    4129#
T38     012224 G     883    4178#
T39     012354 G     883    4241#
T4      006076 G     883    1943#
T40     012614 G     883    4373#
T5      006402 G     883    2031#
T6      006466 G     883    2111#
T7      006652 G     883    2174#
T8      006762 G     883    2268#
T9      007140 G     883    2356#
```

```
UAM    = 000200 G   1219#
UNINUM  004326       959*   960    963*   964   1063   1064   1331#
UNITS   021110      5982   6050#
UTILTB  020622      5973   5975#
UTIL80  020604      5337   5970#
UTLILL  020772      5975   5979   5983   5984   5985   5986   5987   5988   5989   5990   6023#
WAIT    016424      5321   5446#
WAITO   016430      5448#  5458
WAIT1   016434      5449#  5455
WAIT2   016522      5453   5462#
WAIT3   016550      5460   5465   5467#
WC      004232      1300#  6072*
WGCRPE  020662      5976   5977   5995#
WGCRX   020724      5997   6000   6004#
WMC     044621      7219#
WRIT    014216      4691#  4737
WRITE   014212      4573*  4690#
WRITEX  014234      4694   4697#
WRITE0  014224      4693#  4739
WRITE1  014236      4696   4699#
WRITE2  014310      4714#  4730
WRITE3  014360      4722   4724#
WRTBUF  032102      6002   6033   6133*  6250#  7084
XFRCMD  004230       968   1019   1299#  1571*  1572*  1573   1583*  1584*  1590   1594   1672*  1682   1729*
                    1734   1825*  1828   2438   2450   2977*  2984   3050*  3051   3055   3502*  3504   3589*
                    3591   4248*  4883*  4887   5346*  5400*  5404   5580*  5581*  5585*  5594*  6003*  6017*
                    6026   6041   6054*  6211*  6265*  6267   6353*  6388   6391   6394*  6395*  6436*  6438
                    6517*  6845   7210
XFRINT  004242      1304#  4882*  5462   5463*
XTNOPC  017370      5611   5614#
X$ALWA= 000000       540#
X$FALS= 000040       540#
X$OFFS= 000400       540#
X$TRUE= 000020       540#
.       = 044650     538#   868#   869#   936    991   1047   1107   1108   1128   1148   1184#  1570   1582
                    1675   1739   1833   1846   1954   1968   2124   2370   2445   2969   2976   2979   3041
                    3049   3490   3503   3577   3590   4058   4133   4182   4245   4428#  4475#  4480#  4624
                    4870   4885   5259#  5402   5449   5608#  5827#  5835#  5870#  5872#  6215#  6239#  6245#
                    6250#  6266   6437   6482#  6552#  6575#  6591#  6625#  6647#  6661#  6675#  6689#  6703#
                    6742#  6768#  6781#  6807#  6820#  6834#  6848#  6855#  6862#  6877#  6884#  6908#  6915#
                    6922#  6929#  6936#  6960#  6974#  6981#  6990#  6997#  7010#  7017#  7055#  7062#  7087#
                    7089#  7098#  7144#  7172#  7193#  7209#
```

```
BCOMPL   956   958  4382  5202  5583  6459
BGNAU   1142
BGNAUT  1015
BGNCLN  1099
BGNDU   1122
BGNHRD  1164
BGNHW    897
BGNINI   953
BGNMSG  5609  6567  6584  6599  6616  6640  6655  6669  6683  6697  6711  6724  6737  6750  6763
        6776  6789  6802  6815  6827  6843  6850  6857  6864  6871  6879  6886  6892  6899  6910
        6917  6924  6931  6938  6945  6952  6962  6969  6976  6983  6992  6998  7005  7012  7019
        7026  7033  7040  7050  7057  7064  7077  7091  7099  7107  7116  7124  7132  7139  7146
        7153  7160  7167  7174  7181  7188  7195  7204
BGNPRO   995
BGNRPT   928
BGNSEG  1566  1578  1600  1624  1653  1733  1827  1945  1964  2036  2558  2592  2605  2681  2763
        2846  3493  3580  4061  4136  6256  6282  6348  6383  6405  6420  6445  6515
BGNSFT  1196
BGNSRV  1084  4269
BGNSUB  1565  1669
BGNSW    910
BGNTST  1559  1726  1822  1943  2031  2111  2174  2268  2356  2433  2546  2667  2748  2832  2918
        2965  3037  3106  3151  3197  3243  3289  3336  3382  3428  3486  3573  3648  3694  3766
        3812  3858  3904  3950  3996  4054  4129  4178  4241  4373
BNCOMP   965  4454  5397
BREAK   1048  2980  5450
BRESET   990
CKLOOP  1576  1589  1593  1597  1606  1610  1615  1621  1635  1639  1650  1664  1679  1685  1741
        1835  1839  1844  1853  1952  1958  1962  1967  1971  1975  1980  1936  1991  2045  2121
        2130  2135  2195  2278  2287  2291  2296  2368  2378  2384  2443  2455  2567  2599  2612
        2694  2777  2859  2987  3062  3501  3507  3509  3512  3588  3594  3596  3599  4066  4068
        4141  4143  4192  4200  4266  6264  6270  6272  6275  6287  6289  6360  6396  6441  6526
CLOSE   6230
CLRVEC   988  1021  4267
DELAY   1047  1107  1570  1582  1675  1739  1833  1846  1954  1968  2124  2370  2445  2979  3503
        3590  4245  4624  4870  4885  5402  5449  6266  6437
DESCRI   869
DEVTYP   868
DISPAT   883
DODU    1063
ENDAU   1155
ENDAUT  1065
ENDCLN  1117
ENDDU   1135
ENDHRD  1171
ENDHW    904
ENDINI   993
ENDMSG  5612  6571  6588  6602  6622  6644  6658  6672  6686  6700  6714  6727  6740  6753  6766
        6779  6792  6805  6818  6830  6846  6853  6860  6867  6874  6882  6890  6895  6905  6913
        6920  6927  6934  6941  6948  6957  6965  6972  6979  6988  6995  7001  7008  7015  7022
        7029  7036  7046  7053  7060  7069  7085  7096  7102  7111  7120  7128  7134  7141  7148
        7155  7162  7169  7176  7183  7190  7199  7206
ENDPRO   999
ENDRPT   945
ENDSEG  1577  1598  1622  1651  1665  1742  1854  1963  1976  2048  2568  2600  2613  2695  2778
        2863  3513  3600  4069  4144  6276  6290  6365  6401  6417  6442  6464  6533
```

```
ENDSFT   1213
ENDSRV   1088    4271
ENDSUB   1667    1686
ENDSW     921
ENDTST   1687    1754    1858    1992    2049    2136    2196    2297    2385    2456    2618    2699    2782    2867    2932
         2990    3063    3107    3154    3200    3246    3292    3339    3385    3431    3518    3605    3651    3697    3769
         3815    3861    3907    3953    3999    4074    4149    4206    4268    4420
EQUALS   1219
ERRDF    1575    1588    1592    1596    1605    1609    1614    1619    1634    1638    1648    1662    1678    1684    1737
         1831    1838    1843    1852    1961    1974    1984    1989    2041    2120    2128    2133    2193    2276    2286
         2290    2294    2366    2376    2383    2441    2453    2563    2583    2597    2610    2690    2773    2853    2986
         3060    3506    3593    4190    4198    4264    5531    6028    6035    6043    6269    6358    6393    6440    6457
         6503    6525
ERRSF    5128    6549
EXIT      936     991    1108    1128    1148    2969    2976    3041    3049    3490    3577    4058    4133    4182
GETBYT   5201
GMANID   4394
GMANIL   4385    4414    4459    6209
GPHARD    964
GPRMA    1165
GPRMD    1167    1168    1169    1170    4394#
GPRML    1166    1203    1204    1205    1206    4385#   4414#   4459#   6209#
HEADER    867
INLOOP   5582    6458
LASTAD   7223
MANUAL   4381    4453    5396
MSBYTE    867#
MSCHEC    936#    991#   1108#   1128#   1148#   2969#   2976#   3041#   3049#   3490#   3577#   4058#   4133#   4182#
MSCNTO   1165#   1166#   1167#   1168#   1169#   1170#   1203#   1204#   1205#   1206#   4385#   4394#   4414#   4459#   6209#
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M$MCLO	540#														
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                2867#  2932#  2969#  2976#  2980#  2986#  2987#  2990#  3041#  3049#  3060#  3062#  3063#  3109#  3154#
                3200#  3246#  3292#  3339#  3385#  3431#  3490#  3493#  3501#  3506#  3507#  3509#  3512#  3513#  3518#
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                4388#  4394#  4407#  4414#  4420#  4453#  4457#  4459#  4463#  4466#  4499#  5128#  5201#  5241#  5396#
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                6440#  6441#  6442#  6445#  6457#  6458#  6464#  6503#  6515#  6525#  6526#  6533#  6549#  6569#  6570#
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                6902#  6903#  6904#  6905#  6912#  6913#  6919#  6920#  6926#  6927#  6933#  6934#  6940#  6941#  6947#
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                7082#  7083#  7084#  7085#  7093#  7094#  7095#  7096#  7101#  7102#  7109#  7110#  7111#  7118#  7119#
                7120#  7126#  7127#  7128#  7133#  7134#  7140#  7141#  7147#  7148#  7154#  7155#  7161#  7162#  7168#
                7169#  7175#  7176#  7182#  7183#  7189#  7190#  7196#  7197#  7198#  7199#  7205#  7206#  7210#
M$TSTL           945#   954#   955#   957#   964#   988#   990#   991#   993#  1018#  1021#  1024#  1035#  1048#  1051#
                1056#  1061#  1063#  1064#  1065#  1108#  1117#  1135#  1155#  1565#  1566#  1575#  1576#  1577#  1578#
                1588#  1589#  1592#  1593#  1596#  1597#  1598#  1600#  1605#  1606#  1609#  1610#  1614#  1615#  1619#
```

```
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          1669#  1678#  1679#  1684#  1685#  1686#  1687#  1733#  1737#  1741#  1742#  1754#  1827#  1831#  1835#
          1838#  1839#  1843#  1844#  1852#  1853#  1854#  1858#  1945#  1952#  1958#  1961#  1962#  1963#  1964#
          1967#  1971#  1974#  1975#  1976#  1980#  1984#  1986#  1989#  1991#  1992#  2036#  2041#  2045#  2048#
          2049#  2120#  2121#  2128#  2130#  2173#  2135#  2136#  2193#  2195#  2196#  2276#  2278#  2286#  2287#
          2290#  2291#  2294#  2296#  2297#  2356#  2368#  2376#  2378#  2383#  2384#  2385#  2441#  2443#  2453#
          2455#  2456#  2558#  2563#  2567#  2568#  2583#  2592#  2597#  2599#  2600#  2605#  2610#  2612#  2613#
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          2867#  2972#  2969#  2976#  2980#  2986#  2987#  2990#  3041#  3049#  3060#  3062#  3063#  3109#  3154#
          3200#  3246#  3292#  3339#  3385#  3431#  3490#  3493#  3501#  3506#  3507#  3509#  3512#  3513#  3518#
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          6853#  6859#  6860#  6866#  6867#  6873#  6874#  6881#  6882#  6888#  6889#  6890#  6894#  6895#  6901#
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          6994#  6995#  7000#  7001#  7007#  7008#  7014#  7015#  7021#  7022#  7028#  7029#  7035#  7036#  7042#
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M$WORD     867#   883#   936#   991#  1108#  1128#  1148#  1165#  1166#  1167#  1168#  1169#  1170#  1203#  1204#
          1205#  1206#  1575#  1588#  1592#  1596#  1605#  1609#  1614#  1619#  1634#  1638#  1648#  1662#  1678#
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          6440#  6457#  6503#  6525#  6549#  7223
OPEN      4499
POINTE     856
PRINTB    5611   6569   6570   6586   6587   6601   6618   6619   6620   6621   6642   6643   6657   6671   6685
          6699   6713   6726   6739   6752   6765   6778   6791   6804   6817   6829   6845   6852   6859   6866
          6873   6881   6888   6889   6894   6901   6902   6903   6904   6912   6919   6926   6933   6940   6947
          6954   6955   6956   6964   6971   6978   6985   6986   6987   6994   7000   7007   7014   7021   7028
          7035   7042   7043   7044   7045   7052   7059   7066   7067   7068   7079   7080   7081   7082   7083
          7084   7093   7094   7095   7101   7109   7110   7118   7119   7126   7127   7133   7140   7147   7154
          7161   7168   7175   7182   7189   7196   7197   7198   7205   7210
PRINTF    1024   1035   1051   1056   1061   1064   4383   4388   4407   4457   4466   5241   5602
PRINTX    5604   5637   5644   5789   5803   5822   5823   5831   5849   5854
READEF     955    957
RFLAGS    4463   5456   5588
S          846#  1557   1725   1821   1941   2030   2109   2172   2266   2354   2431   2545   2665   2746   2830
          2917   2963   3035   3104   3149   3195   3241   3297   3333   3380   3426   3484   3571   3646   3692
          3764   3810   3856   3902   3948   3994   4052   4127   4176   4239   4371   4498   4560   4620   4689
          4794   4868   4959   5070   5119   5199   5315   5390   5445   5631   5694   5745   5969   6064   6119
          6201   6229   6237   6242   6247   6560   6577   6593   6607   6633   6649   6663   6677   6691   6705
          6718   6731   6744   6757   6770   6783   6796   6809   6822   6826
SD         805#  1372   1692   1758   1862   1997   2053   2141   2201   2301   2390   2461   2625   2706   2787
```

```
        2871    2936    2996    3068    3113    3159    3205    3251    3297    3344    3390    3436    3523    3610    3656
        3702    3728    3774    3820    3866    3912    3956    4004    4079    4211    4276    6059    6115
SE       816#   1506    1720    1801    1910    2018    2088    2162    2240    2333    2416    2515    2652    2733    2817
        2891    2958    3025    3078    3123    3169    3215    3261    3307    3354    3400    3458    3545    3620    3666
        3738    3784    3830    3876    3922    3968    4026    4101    4154    4229    4347
SETPRI   954    4253    4265
SETVEC  1018    4252
SIO      836#   4492    4547    4607    4675    4773    4852    4944    5056    5114    5183    5305    5379    5433    6223
SP       826#   1383    1699    1765    1877    2003    2065    2144    2213    2310    2397    2468    2629    2710    2790
        2875    2941    3001    3073    3118    3164    3210    3256    3302    3349    3395    3441    3528    3615    3661
        3705    3733    3779    3825    3871    3917    3963    4009    4084    4214    4282    4487    4505    4591    4644
        4743    4831    4902    5019    5105    5175    5263    5360    5412    5620    5650    5876    6189    6219
SSUB     795#   4485    4503    4589    4642    4741    4829    4900    5017    5103    5173    5261    5358    5410    5618
        5648    5874    6057    6113    6187    6217
ST       785#   1370    1690    1756    1860    1995    2051    2139    2199    2299    2388    2459    2623    2704    2785
        2869    2934    2994    3066    3111    3157    3203    3249    3295    3342    3388    3434    3521    3608    3654
        3700    3772    3818    3864    3910    3956    4002    4077    4152    4209    4274
SVC      539#    540
XFER     936#    991#   1108#   1128#   1148#   2969#   2976#   3041#   3049#   3490#   3577#   4058#   4133#   4182#

. ABS.  044650     000

 ERRORS DETECTED:  0

 CZTMIB.BIN,CZTMIB/CRF/EQ:ONEFILE=SVC33/ML,ZTMIB1.P11,ZTMIB2.P11,ZTMIB5.P11,ZTMIB4.P11,ZTMIB6.P11,ZTMIB3.P11,ZTMIB7.P11
 RUN-TIME: 59 64 6 SECONDS
 RUN-TIME RATIO: 1360/131=10.3
 CORE USED:  23K  (46 PAGES)
```