TM02-TU16

TM02-TU16/TE16

MD-11-DZTUB-F

EP-DZTUB-F-DL-F

FICHE 1 OF 1

OCT 1977

digital

MADE IN USA

PRODUCT CODE: MAINDEC-11-DZTUB-F-D

PRODUCT TITLE: TM02-TU16/TE16 BASIC FUNCTION TEST

DATE CREATED: 15 AUGUST 1977

MAINTAINER: DIAGNOSTIC ENGINEERING

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D01

SEQ 0003

1. ABSTRACT

THIS PROGRAM IS INTENDED TO TEST ALL OF THE BASIC FUNCTIONAL LEVEL OPERATIONS OF THE TM02-TU16/TE16 MAG TAPE SYSTEM. ALL FUNCTIONS; WRITE, READ, SPACE, ERASE, REWIND, ETC; WILL BE TESTED. IN ADDITION TO THE TM02-TU16/TE16 TESTS, THE RH WILL BE TESTED SEPARATELY IN SO FAR AS IT IS POSSIBLE TO SEPARATE THE RH FROM THE TM02-TU16/TE16 ITSELF.

2. REQUIREMENTS (HARDWARE)

A. ANY PDP-11 PROCESSOR - WITH OR WITHOUT A HARDWARE SWITCH REGISTER
B. 8K OF CORE
C. CONSOLE TTY
D. TM02 MAGTAPE CONTROLLER
E. MASS BUS CONTROLLER
F. TU16 OR TE16 MAG TAPE TRANSPORT

3. LOADING PROCEEDURE

USE STANDARD BINARY LOADING PROCEEDURE

4. STARTING PROCEEDURE

****SOFTWARE SWITCH REGISTER IS LOCATED AT LOC. 176(REFER TO SECTION 5 FOR MORE DETAIL)

THERE ARE TWO (2) STARTING ADDRESSES THAT MAYBE USED: 200(8) AND 210(8)

A. 200(8): STARTING AT THIS ADDRESS WILL CAUSE THE PROGRAM IDENTIFICATION TO BE PRINTED FOLLOWED BY REQUESTS FOR THE VARIOUS PARAMETERS NEEDED BY THE PROGRAM.

B. 210(8): THIS ADDRESS IS INTENDED FOR USE AS A RESTART ONLY AND WILL USE THE CURRENT PARAMETER VALUES.

4.1 SAMPLE START AT 200(8): OPERATOR RESPONSES ARE IN PARENS.

SEQ 0004

```
***SWR=XXXXXX NEW=    WILL BE PRINTED FIRST IF SOFTWARE SWITCH REGISTER IS SELECTED.
        (REFER TO SECTION 5 FOR OPERATOR ACTION)
TM02-TU16/TE16 BASIC FUNCTION TEST
ENTER CONDITIONS IN OCTAL

REGISTER START: 172440 (CR)
VECTOR: 224 (CR)
DRIVE NUMBER: 0 (3)
SLAVE NUMBER: 0 (6) SERIAL NO: 200
RH11 OR RH70: (0)
RH ONLY: (0)
NRZ ONLY: (1) -NRZ (NON-RETURN-TO ZERO) IS THE METHOD OF RECORDING
              ON MAGNETIC TAPE.

        THIS EXAMPLE SLOWS THE PROGRAM START USING THE RH11
        ADDRESS (CS1) OF 172440, AN INTERRUPT VECTOR OF 224,
        DRIVE NUMBER 3, AND SLAVE NUMBER 6, NRZ ONLY.
        NOTE THAT THE CURRENT VALUES FOR EACH PARAMETER IS
        PRINTED AND MAY OR NOT BE CHANGED.

***IF THE SOFTWARE SWITCH REGISTER IS SELECTED THE FIRST TYPE OUT WILL BE
   AS FOLLOWS:  SWR=XXXXXX NEW=
   THIS WILL BE TYPED OUT BEFORE THE HEADER MESSAGE (REFER TO SECTION 5 FOR
   A MORE DETAIL DESCRIPTION FOR OPERATOR ACTION.)
```

5. CONSOLE SWITCH SETTING

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED.

CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

1) TYPE CONTROL G (↑G); THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM; I.E. SCOPE ROUTINE AND AFTER EVERY HALT.

2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE ''NEW='' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:

   A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A (CR). (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED)
   IF A (CR) IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.

   B) IF A CONTROL U (↑U) IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

ALL SWITCHES EXCEPT 5-9 ARE USED AND THE NORMAL, OR DEFAULT,
RUN IS DONE WITH ALL SWITCHES SET TO ZERO (0).
ALL HARDWARE SWITCHES ARE DYNAMIC, AND MAY BE CHANGED AT ANY TIME.
***BUT, THE SOFTWARE SWITCH REGISTER CAN ONLY BE LOADED DYNAMICALLY
AS STATED ABOVE UNDER CONTROL HEADING.

SEQ 0006

SW15(100000): 1=HALT ON ERROR
0=CONTINUE
SW14(040000): 1=LOOP ON ERROR (SCOPE: RH TESTS ONLY)
0=CONTINUE
SW13(020000): 1=DO NOT PRINT ERRORS
0=PRINT ALL ERRORS
SW12(010000): 1=INHIBIT ITERATION
0=DO ALL ITERATIONS PER TEST
SW11(004000): 1=CONTINUOUS CYCLE
0=HALT AT END OF PASS
SW10(002000): 1=HALT AT END OF CURRENT TEST
0=CONTMUE
SW9-5: N/A
SW4-0: SELECT TEST NUMBER::00=ALL TESTS

THE USE OF SW0-4 IS TO ALLOW SELECTION AND CONTINUOUS
EXECUTION OF ANY TEST. THE TEST SELECTION MAY BE CHANGED AT
ANY TIME, HOWEVER IT IS ADVISABLE TO USE SW10 TO STOP THE
PROGRAM AT THE END OF THE CURRENT TEST BEFORE CHANGING NUMBER.

6. ERROR PRINTOUTS

THE ERROR PRINTOUTS FOR EACH TEST WILL APPEAR IN THE SAME GENERAL FORMAT. THE FIRST LINE WILL ALWAYS SHOW THE TEST NUMBER AND ITS TITLE. THE SECOND LINE WILL BE AN EXPLANATION OF THE ERROR. THE FOLLOWING LINES WILL SHOW THE APPROPRIATE REGISTER OR ADDRESS VALUES THAT ARE APPLICABLE TO THE INDIVIDUAL TEST

EXAMPLES:

1. THIS EXAMPLE SHOWS A TYPICAL ERROR PRINTOUT FOR THE WRITE READ TEST: A WRITE CRC ERROR OCCURRED ON SLAVE 6.

```
FT13: WRITE-READ TEST
WRITE ERROR NRZ
CS1     WC      BA      FC      CS2     DS      ER      TC
144260  000000  015650  000000  000103  150600  100000  101306
```

2. THIS EXAMPLE SHOWS A TYPICAL SPACE ERROR: THE FC IS NOT ZERO AT THE END OF THE OPERATION.

```
FT14:SPACE TEST
SPACE REVERSE ERROR NRZ
CS1     WC      BA      FC      CS2     DS      ER      TC
144230  177700  017162  177740  000114  150600  001000  161700
```

3. THIS EXAMPLE SHOWS A SPACE OPERATION WHICH RESULTED IN INCORRECT POSITIONING. SHOULD BE AT RECORD 20, IS AT RECORD 22.

```
FT14: SPACE TEST
POSITION ERROR:
REVERSE ERROR EXPT:20 RCVD:22
```

7. OPERATION

THE PROCEEDURES FOR OPERATING THIS PROGRAM ARE QUITE SIMPLE
AND REQUIRE ONLY A FEW STEP:

1. LOAD ADDRESS 200 OR 210
2. SET SWITCHES FOR DESIRED TEST CYCLE
   ****REFER TO SECTION 5 FOR DYNAMIC LOADING
   OF SOFTWARE SWITCH REGISTER.***
3. PRESS START
4. ENTER APPROPRIATE RESPONES TO THE TTY REQUESTS

ALL HARDWARE SWITCHES ARE DYNAMIC AND MAY BE CHANGED AT ANY
TIME. THE NORMAL, OR DEFAULT, OPERATING SEQUENCE IS ALL
SWITCHES DOWN (ZERO). THE END OF EACH PASS IS NOTED BY A
MESSAGE STATING END OF PASS AND THE NUMBER OF THAT PASS.
*****FOR THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER REFER TO SECTION 5 ******

SINGLE TEST SELECTION: (SW0-SW4)

WHEN SW0-4 ARE SET TO ZERO (00) THE SCHEDULAR WILL
EXECUTE ALL OF THE TESTS IN SEQUENCE (1-24). IF SW0-4 IS
SET TO SOME SPECIFIC TEST NUMBER (1-24) THAT PARTICULAR TEST
WILL BE EXECUTED CONTINUOUSLY. ANY TEST MAY BE SINGLE
SELECTED IN ANY ORDER; HOWEVER, THE BEST WAY TO AFFECT
THE CHANGE IS TO USE SW10 TO HALT THE CURRENT TEST, THEN
CHANGE NUMBER AND PRESS CONTINUE.

RH11 OR RH70 OPTION:

A ONE RESPONSE IS FOR THE RH70;
A ZERO RESPONSE IS FOR THE RH11.

RH ONLY OPTION:

BY RESPONDING TO THE REQUEST (RH ONLY:) WITH
A ONE (1), ONLY THE TESTS WHICH ARE POINTED TO
THE RH (TESTS 1 - 10) WILL BE EXECUTED IN
EACH PASS.

8. TEST DESCRIPTION

THE FOLLOWING IS A LIST OF ALL TESTS IN THEIR PROPER SEQUENCE.
A BASIC DESCRIPTION OF EACH TEST IS PROVIDED TO AID IN UNDERSTANDING
OF THE ERROR MESSAGES ASSOCIATED WITH EACH ONE.

A. RH TESTS: THE FIRST TEN (10) TESTS WILL PERFORM BASIC RH OPERATIONS AS FAR AS IS POSSIBLE WITHOUT REQUIRING THE TM02-TU16/TE16 ITSELF. (SEE RH ONLY OPTION; PAR 7)

FT1: RH ADDRESSING: THIS TEST WILL ASSURE THAT THE RH WILL RESPOND WITHOUT CAUSING A BUS TRAP TO ALL TM02 REGISTER ADDRESS IN SEQUENCE STARTING AT THE ADDRESS OF CS1 ENTERED BY THE OPERATOR.

FT2: RH REGISTER BITS READ/WRITE: THIS TEST WILL ASSURE THAT ALL BITS OF THE RH WRITE/READ REGISTERS CAN BE SET AND RESET.

FT3: RH INITIALIZE: THIS TEST WILL ASSURE THAT A RH INITIALIZE (BIT 5 OF CS2=1) WILL INDEED CLEAR THE RH ERRORS.

* FT4: SILO TEST 1: THIS TEST WILL ASSURE THAT A READ FROM AN EMPTY SILO WILL CAUSE DLT TO SET.

* FT5: SILO TEST 2: THIS TEST WILL ASSURE THAT BOTH THE IR AND OR BITS WILL CORRECTLY RESPOND TO LOADING OF THE SILO WITH ALL ZEROS AND THEN A WORD OF ALL ONES.

* FT6: SILO TEST 3: THIS TEST WILL WRITE AND THEN READ THE ENTIRE SILO TO ASSURE THAT DATA CAN BE PROPERLY FILLED AND READ. ALSO THE PROPER STATUS OF IR AND OR ARE CHECKED.

* FT7: SILO TEST 4: THIS TEST WILL ASSURE PROPER RH11 RESPONSE TO SILO OVERFLOW.

* FT10: SILO TEST 5: THIS TEST WILL ASSURE SILO RESET BY RH11 INITIALIZE.

**** NOTE: SILO TESTS (FT4-FT10) ARE FOR THE RH11 ONLY. *****

B. TM02-TU16/TE16 BASIC FUNCTIONS: THE FOLLOWING FOURTEEN (14) TESTS WILL ASSURE OPERATION OF THE MAG TAPE BASIC FUNCTIONS.

FT11: NOP TEST: THIS TEST WILL ASSURE THAT THE NOP FUNCTION EXECUTES WITH NO ERROR.

FT12: REWIND TEST: THIS TEST WILL ASSURE THAT THE REWIND FUNCTION WILL POSITION THE TAPE TO BOT WITH NO ERROR.

1. ISSUE A REWIND COMMAND
2. AWAIT PIP RESET (MOTION STOPPED)
3. ASSURE THAT NO ERROR OCCURED
4. END

FT13: WRITE/READ TEST: THIS TEST WILL ASSURE THAT THE UNIT UNDER TEST CAN WRITE AND READ IN ALL DENSITIES (FOR BOTH PE AND NRZ).

1. REWIND TO BOT
2. WRITE 100 RECORDS
   A, ALL ONES DATA
   B, 200 FRAMES
   C, 200 BPI; ODD
3. CHECK FOR ERRORS ON EACH RECORD
4. READ REVERSE THEN FORWARD ALL 100 RECORDS
5. CHECK FOR ERRORS ON EACH RECORD
6. REPEAT STEPS 2 THRU 5 FOR 556,800,1600 BPI
7. END.

DATA RELATED ERRORS (PARITY ERROR, CRC ERROR, ETC) ARE IGNORED.THE ACTUAL DATA READ IS NOT CHECKED; ONLY THE FUNCTION IS TESTED, NOT THE MEDIUM.

FT14: SPACE TEST: THIS TEST WILL ASSURE THAT PROPER POSITIONING IS MAINTAINED BY BOTH SPACE FORWARD AND REVERSE.

1. REWIND TO BOT
2. WRITE 100 RECORDS
   A. EACH RECORD IS ONE FRAME LARGER THAN THE LAST.
      THIS WILL ALLOW FOR POSITION CHECKING BY RECORD SIZE.
3. EACH RECORD IS ERROR CHECKED.
4. DATA RELATED ERRORS ARE IGNORED.
5. NOW SPACE REVERSE 77 RECORDS AND READ REVERSE 1, THE FRAME COUNT SHOULD BE 100.
   THIS IS THE SIZE OF THE FIRST RECORD.
6. NOW SPACE FORWARD 76 RECORDS AND READ FORWARD 1, THE FRAME COUNT SHOULD BE 177.
   THIS IS THE SIZE OF THE NEXT TO LAST RECORD.
7. CONTINUE THE SPACE AND READ (DECREMENTING THE RECORD COUNT EACH TIME) UNTIL ALL POSITIONS HAVE BEEN CHECKED. IF POSITION IS LOST; TEST ENDS.
8. REPEAT STEPS 1 THRU 7 FOR PE.
9. END

FT15: ERASE TEST: THIS TEST WILL ASSURE THAT THE ERASE FUNCTION WILL INDEED ERASE TAPES.

1. REWIND TO BOT
2. ISSUE 200 ERRASE COMMANDS.
3. ASSURE NO ERRORS FOR EACH COMMAND.
4. REWIND TO BOT.
5. ISSUE A READ FORWARD COMMAND.
6. THE TAPE SHOULD MOVE FORWARD UNTIL STOPPED BY OPI (APPROX 25 FT).
7. ASSURE NO ERRORS OTHER THAN OPI.
8. END

FT16: TAPE MARK WRITE/READ: THIS TEST WILL ASSURE THAT A TAPE MARK CAN BE WRITTEN AND READ IN BOTH PE AND NRZ.

1. REWIND TO BOT.
2. ISSUE A WRITE TAPE MARK COMMAND.
3. ASSURE NO ERRORS.
4. ASSURE THAT TAPE MARK STATUS IS SET IN DRIVE STATUS (BIT 2).
5. READ REVERSE.
6. ASSURE THAT TAPE MARK IS SET.
7. ASSURE THAT NO ERRORS OTHER THAN FCE OCCURED.
8. READ FORWARD.
9. REPEAT STEPS 6 AND 7
10. REPEAT STEPS 1 THRU 9 FOR PE.
11. END

FT17: TAPE MARK SPACE TEST: THIS TEST WILL ASSURE THAT SPACING WILL BE TERMINATED BY RECOGNITION OF TAPE MARK BOTH IN PE AND NRZ.

1. REWIND TO BOT.
2. WRITE THE FOLLOWING PATTERN OF TAPE MARKS AND DATA RECORDS:

TM:20 RECS:TM:40 RECS:TM:60 RECS:TM:100 RECS:TM:

3. ASSURE NO ERRORS.
4. ASSURE THAT TAPE MARK STATUS IS SET FOR TM WRITES.
5. NOW SPACE REVERSE 200 RECORDS.
6. THE SPACE OPERATION SHOULD STOP ON EACH TAPE MARK IT FINDS. THEREFOR 5 SPACE COMMANDS ARE ISSUED TO COVER THE ENTIRE PATTERN WRITTEN ON TAPE.
   BOT SHOULD NEVER BE REACHED AND THE FRAME COUNT WILL REFELCT THE NUMBER OF RECORDS BETWEEN TAPE MARKS.
7. REPEAT STEP 6 IN THE FORWARD DIRECTION.
8. ASSURE NO ERRORS OTHER THAN FCE.
9. REPEAT STEPS 1 THRU 8 FOR PE
10. END

FT20: WRITE CHECK TEST: BOTH WRITE CHECK FORWARD AND REVERSE ARE TESTED IN BOTH PE AND NRZ.

1. REWIND TO BOT.
2. WRITE A 400 FRAME RECORD USING DATA PATTERN 3 (125125).
3. ASSURE NO ERRORS OCCURED.
4. ISSUE A REVERSE WRITE CHECK COMMAND.
5. ASSURE NO ERRORS OCCURED.
6. REPEAT STEP 5 FOR A FORWARD WRITE CHECK.
7. REPEAT STEPS 1 THRU 6 FOR PE.
8. END

FT21: ERASE HEAD TEST: THIS TEST WILL ASSURE THAT THE ERASE HEAD ITSELF IS OPERATING.

1. REWIND TO BOT.
2. WRITE 2 RECORDS OF 800(10) FRAMES EACH. EACH RECORD WILL BE 1 INCH OF TAPE. DATA IS NOT ALL ONES.
3. REWIND TO BOT.
4. NOW WRITE A 400(10) FRAME RECORD. THIS RECORD WILL BE ONE HALF INCH OF TAPE. THE ERASE HEAD SHOULD CLEAR THE REMAINDER OF THE FIRST RECORD (ONE HALF INCH).
5. REWIND TO BOT.
6. NOW READ THE SHORT FIRST RECORD. IT SHOULD BE 400(10) FRAMES.
7. NOW READ THE SECOND RECORD. IT SHOULD BE STILL 800(10) FRAMES.
8. IF THE SECOND RECORD IS TOO LONG, THE ERASE HEAD DID NOT FUNCTION OR IT IS IN THE WRONG POLARITY.
10. END

FT22: BUFFERED COMMAND: THIS TEST WILL ASSURE THAT THE TM02 WILL ACCEPT AND EXECUTE ANOTHER COMMAND WHILE ITS SELECTED SLAVE IS REWINDING.

1. REWIND TO BOT.
2. ISSUE 3 LONG WRITE COMMANDS TO ASSURE BEING OFF BOT.
3. ISSUE A REWIND COMMAND.
4. AS SOON AS DRIVE READY BECOMES SET, ISSUE ANOTHER WRITE COMMAND.
5. THE NEXT DRIVE READY SHOULD BE AFTER THE TAPE HAS REACHED BOT AND EXECUTED THE BUFFERED WRITE COMMAND.
6. ASSURE NO ERRORS OCCURED.
7. END

FT23: READ IN PRESET: THIS TEST WILL ASSURE THAT UNIT 0
IS REWOUND AND SET TO 800 BPI NORMAL.
(ONLY IF SLAVE 0 IS SELECTED).

1. ISSUE A WRITE COMMAND TO ASSURE
   BEING OFF BOT.
2. ISSUE THE READ-IN PRESET COMMAND.
3. AWAIT MOTION STOP.
4. ASSURE THAT BOT WAS REACHED.
5. ASSURE THAT THE TAPE CONTROL REGISTER
   IS SET TO 800 BPI,NORMAL,ODD.
6. END

(THIS TEST IS ONLY PERFORMED IF THE SELECTED SLAVE IS ZERO (0).

FT24: REWIND: OFF LINE THIS TEST WILL ASSURE
THAT THE UNIT WILL REWIND AND
GO OFF LINE. (NOT IF IN CONTINUOUS CYCLE)

1. ISSUE THE REWIND OFF-LINE COMMAND.
2. ASSURE THAT MOL (BIT 12 OF DRIVE STATUS)
   IS RESET INDICATING THE UNIT WENT OFF LINE.
3. END

(THIS TEST IS NOT PERFORMED WHEN CONTINUOUS CYCLE OPERATION IS SELECTED: SW 11 = 1)

9. LISTING

SEQ 0014

```
                        .TITLE TM02-TU16/TE16 BASIC FUNCTION TEST
                        ;MAINDEC-11-DZTUB-F-D
                        ;15 AUGUST 1977
                        ;R. BARNES
                        ;REVISED APRIL  1976 BY S. CARPENTER
                        ;       1) SUPPORTS SOFTWARE SWITCH REGISTER
                        ;       2) SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER
                        .ABS


                        ;CONSOLE SWITCHES*********
                        ;
                        ;SW1(100000):   1=HALT ON ERROR
                        ;               0=CONTINUE
                        ;SW14(040000)   1=LOOP ON ERROR (SCOPE(040000) RH TESTS ONLY)
                        ;               0=CONTINUE
                        ;SW13(02000):   1=DO NOT PRINT ERRORS
                        ;               0=PRINT ERRORS
                        ;SW12(010000):  1=INHIBIT ITERATIONS
                        ;               0=DO ITERATIONS
                        ;SW11(004000):  1=CONTINUOUS CYCLE
                        ;               0=HALT AT END OF PASS
                        ;SW10(002000):  1=HALT AT END OF EACH TEST
                        ;               0=CONTINUE
                        ;SW0-4:         SELECT TEST NUMBER :: 00=ALL TESTS
```

```
                        ;TU16/TE16 REGISTER BITS**********
                        ;15 ;14 ;13 ;12 ;11 ;10 ;09 ;08 ;07 ;06 ;05 ;04 ;03 ;02 ;01 ;00 ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;CS1:                   ;SC ;TRE;MCP;SPR;DNA;PSL;A17;A16;RDY;IE ;FUN;FUN;FUN;FUN;FUN;GO ;
                        ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;WC:                    ; WORD                                                         ;
                        ; COUNT                                                        ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;BA:                    ; BUS                                                          ;
                        ; ADDRESS                                                      ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;FC:                    ; FRAME                                                        ;
                        ; COUNT                                                        ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;CS2:                   ;DLT;WCE;UPE;NED;NEM;PGE;MXF;NDP;OR ;IR ;CLR;PAT;BAI;U2 ;U1 ;U0 ;
                        ;   ;   ;   ;   ;   ;   ;   ;ERR;   ;   ;   ;   ;   ;   ;   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;DS:                    ;ATA;ERR;PIP;MOL;WRL;EOT;SPR;DPR;DRY;SSC;PES;SDN;IDB;TMK;BOT;SLA;
                        ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;ER:                    ;CDE;UNS;OPI;DTE;NEF;CS ;FCE;NSG;PEF;INC;DAT;FMT;CNT;RMR;ILR;ILF;
                        ;CRC;   ;   ;   ;ITM;   ;   ;   ;LRC;VPE;BPE;   ;BPE;   ;   ;   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;ATS:                   ; ATTENTION                                                    ;
                        ; SUMMARY                                                      ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;CC:                    ; CHECK                                                        ;
                        ; CHARACTER                                                    ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;DB:                    ; DATA                                                         ;
                        ; BUFFER                                                       ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;MR:                    ;DB ;DB ;DB ;DB ;DB ;DB ;DB ;DB ;WRT;MM ;OP ;OP ;OP ;OP ;MM ;
                        ; 0 ; 1 ; 2 ; 3 ; 4 ; 5 ; 6 ; 7 ; P ;CLK;CLK; 4 ; 3 ; 2 ; 1 ;GO ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;DT:                    ; DRIVE     ; 7 ;    ;SLV;                                   ;
                        ; TYPE      ;CH ;    ;PR ;                                   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;SN:                    ; SERIAL                                                       ;
                        ; NUMBER                                                       ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;TC:                    ;ACL;FCS;TCW;ENA;SPR;DEN;DEN;DEN;FMT;FMT;FMT;FMT;EVN;SSN;SSN;SSN;
                        ;   ;   ;DT ;   ;   ; 4 ; 2 ; 1 ; 8 ; 4 ; 2 ; 1 ;PAR; 4 ; 2 ; 1 ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

```
                                ,REGISTER EQUIVS**********

            000000              R0=%0
            000001              R1=%1
            000002              R2=%2
            000003              R3=%3
            000004              R4=%4
            000005              R5=%5
            000006              SP=%6
            000007              PC=%7

                                ;TRAP CATCHERS**********

            000000              .=0
            000200              .REPT 200
                                .+2
                                HALT
                                .ENDR

                                ;TTY INTERRUPT VECTOR**********

            000060              .=60
000060      012144              TTINT           ;TTY INTERRUPT HEADER ADDRESS
000062      000000              0

                                ;SOFTWARE SWITCH REGISTER**********

            000176              .=176
000176      000000              SWREG:  0               ;SOFTWARE SWITCH REGISTER


                                ;*******************************************************************************

                                ;THIS PROGRAM SUPPORTS THE SOFTWARE SWITCH REGISTER LOC.176.
                                ;REFER TO SECTION 5 OF DOCUMENT FOR DESCRIPTION

                                ;*******************************************************************************
                                ;START ADDRESS***********

            000200              .=200
000200      005000              CLR     R0
000202      000167  001372      JMP     START   ;PROGRAM START

            000210              .=210
000210      000240              NOP
000212      012700  000001      MOV     #1,R0   ;SET NO HEADER FLAG
000216      000167  001356      JMP     START

                                ;TM02 INTERRUPT VECTOR**********

            000224              .=224
000224      012130              MTINT           ;TAPE INTERRUPT HANDLER ADDRESS
000226      000340              340
```

```
                        000600                  .=600
                                                ;MASS BUS REGISTER EQUIVS**********

000600  172440          C1:     172440
000602  172442          WC:     172442
000604  172444          BA:     172444
000606  172446          FC:     172446
000610  172450          CS:     172450
000612  172452          DS:     172452
000614  172454          ER:     172454
000616  172456          AS:     172456
000620  172460          CC:     172460
000622  172462          DB:     172462
000624  172464          MR:     172464
000626  172466          DT:     172466
000630  172470          SN:     172470
000632  172472          TC:     172472

                                                ;CONSTANTS**********

000634  177776          PSW:    177776          ;PROCESSOR STATUS
000636  177570          SWR:    177570          ;SWITCH REGISTER
000640  177560          TKS:    177560          ;TTY READER STATUS
000642  177562          TKB:    177562          ;TTY READ BUFFER
000644  177564          TPS:    177564          ;TTY PUNCH STATUS
000646  177566          TPB:    177566          ;TTY PUNCH BUFFER
000650  177777          SERNUM: 177777          ;SERIAL NUMBER
000652  000011          DRVTP:  011             ;DRIVE TYPE
000654  000010          ITAMT:  10              ;ITERATION AMOUNT
000656  000224          VECT:   224             ;INTERRUPT VECTOR(RH)
000660  172440          REGS:   172440          ;STARTING REGISTER ADDRESS
000662  000004          BTRP:   4               ;BUS TRAP ADDRESS
000664  000006          BTRP2:  6               ;BUS TRAP PRIORITY LEVEL 7
```

```
                                        ;FLAGS AND COUNTERS**********

000666  000000          TOB:    0
000670  000000          TIB:    0
000672  000000          RH17F:  0
000674  000000          HDRFL:  0
000676  000000          EMADDR: 0
000700  000000          DRVN:   0
000702  000000          SLVN:   0
000704  000000          BADDR:  0
000706  000000          FCNT:   0
000710  000000          WCNT:   0
000712  000000          RCNT:   0
000714  000000          ERRP:   0
000716  000000          ERRP1:  0
000720  000000          RRD.    0
000722  000000          RFD:    0
000724  000000          RDYDX:  0
000726  000000          OPDYX:  0
000730  000000          SCNT:   0
000732  000000          PFLG:   0
000734  000000          RTRN:   0
000736  000000          ERADD:  0
000740  000000          TEMP1:  0
000742  000000          TEMP2:  0
000744  000000          TEMP3:  0
000746  000000          STMSK:  0
000750  000000          ITCNT:  0
000752  000000          DSAV:   0
000754  000000          SAV1:   0
000756  000000          SAV2:   0
000760  000000          SAV3:   0
000762  000000          SCOLP:  0
000764  000000          ITRLP:  0
000766  000000          EXFL:   0
000770  000000          PEXFL:  0
000772  000000          STFLG:  0
000774  000000          LTADD:  0
000776  000000          FUN:    0
001000  000000          SERFL:  0
001002  000000          CRCNT:  0
001004  000000          UDES:   0
001006  000000          PATRN:  0
001010  000000          RHTF:   0
001012  000000          NRZOF:  0
001014  000000          RHOF:   0
001016  000000          PCNTR:  0
001020  000000          TEMPST: 0
001022  000000          COUNT:  0
001024  000000          RDSW:   0

                                        ;DATA PATTERN GENERATORS*****

001026  000000          DATBL:  0
001030  011706          DATA0:  DAT1    ;ALL ONE BITS
001032  011730          DATA1:  DAT2    ;ALL ZERO BITS
```

```
   216  001034  011736                DATA2:  DAT3    ;ALTERNATING ONE/ZERO BITS
   217  001036  011746                DATA3:  DAT4    ;ALL BITS 0-377
```

```
                                ;LOGIC TEST ENTRY TABLE**********

001040  000000          TSTTBL: 0
001042  000000                  0
001044  002774                  FT1
001046  002774                  FT1
001050  003074                  FT2
001052  003074                  FT2
001054  003420                  FT3
001056  003420                  FT3
001060  003636                  FT4
001062  003636                  FT4
001064  003764                  FT5
001066  003764                  FT5
001070  004166                  FT6
001072  004166                  FT6
001074  004454                  FT7
001076  004454                  FT7
001100  004550                  FT10
001102  004550                  FT10
001104  004704                  FT11
001106  004704                  FT11
001110  005022                  FT12
001112  005022                  FT12
001114  005134                  FT13
001116  005134                  FT13
001120  005466                  FT14
001122  005466                  FT14
001124  006362                  FT15
001126  006362                  FT15
001130  006562                  FT16
001132  006562                  FT16
001134  007024                  FT17
001136  007024                  FT17
001140  007440                  FT20
001142  007440                  FT20
001144  007700                  FT21
001146  007700                  FT21
001150  010230                  FT22
001152  010230                  FT22
001154  010434                  FT23
001156  010434                  FT23
001160  010654                  FT24
001162  010654                  FT24
001164  000000                  0
001166  000000                  0
001170  000000                  0
001172  000000                  0
```

```
                001600                          .=1600
                                                ;PROGRAM START AND HOUSEKEEPING**********
                                        START:  NOP
001600  000240
001602  012777  000340  177024                  MOV     #340,@PSW       ;SET PRIORITY
001610  012706  000500                          MOV     #500,SP         ;SET STACK POINTER
                                        SUSWR:  MOV     @#6,-(SP)               ;SAVE VECTORS
001614  013746  000006
001620  013746  000004                          MOV     @#4,-(SP)
001624  012737  001644  000004                  MOV     #1$,@#4                 ;SET UP FOR TIMEOUT
001632  022777  177777  176776                  CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
001640  001402                                  BEQ     2$
001642  000404                                  BR      3$
                                        1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
001644  022626
001646  012767  000176  176762          2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
001654  012637  000004                  3$:     MOV     (SP)+,@#4               ;RESTORE VECTORS
001660  012637  000006                          MOV     (SP)+,@#6
001664  023727  000636  000176                  CMP     @#SWR,#SWREG            ;IS SOFTWARE REG USED
001672  001002                                  BNE     4$                      ;BRANCH IF NO
001674  004767  011476                          JSR     PC,CNTLU                ;ALLOW SOFTARE SWITCH REGISTER TO BE CHANGED
001700  005700                          4$:     TST     R0              ;SEE IF PRINT HEADER
001702  001402                                  BEQ     STOA            ;IF SO: BR
001704  000167  000562                          JMP     ST4             ;ELSE SKIP
001710  012704  013744                  STOA:   MOV     #MSG3,R4
001714  004767  010610                          JSR     PC,TTOUT        ;PRINT TITLE
001720  012704  014056                  STOB:   MOV     #MSG4,R4
001724  004767  010600                          JSR     PC,TTOUT        ;REQUEST REGISTER ADDRESS
001730  016703  176724                          MOV     REGS,R3
001734  004767  010734                          JSR     PC,OCTP         ;PRINT CURRENT ADDRESS
001740  012705  000660                          MOV     #REGS,R5        ;SET ADDRESS SAVE LOC
001744  012701  000006                          MOV     #6,R1           ;SET SIZE OF RESPONSE
001750  012702  176400                          MOV     #176400,R2      ;SET UPPER LIMIT
001754  012703  172300                          MOV     #172300,R3      ;SET LOWER LIMIT
001760  004767  010310                          JSR     PC,TTR          ;GO GET RESPONSE
001764  012704  014101                          MOV     #MSG5,R4
001770  004767  010534                          JSR     PC,TTOUT        ;REQUEST VECTOR
001774  016703  176656                          MOV     VECT,R3
002000  004767  010670                          JSR     PC,OCTP         ;PRINT CURRENT VECTOR
002004  012705  000656                          MOV     #VECT,R5        ;SET ADDRESS SAVE LOC
002010  012701  000003                          MOV     #3,R1           ;SET SIZE OF RESPONSE
002014  012702  000224                          MOV     #224,R2         ;SET UPPER LIMIT
002020  012703  000150                          MOV     #150,R3         ;SET LOWER LIMIT
002024  004767  010244                          JSR     PC,TTR          ;GO GET RESPONSE
002030  016700  176622                          MOV     VECT,R0         ;GET VECTOR
002034  012720  012130                          MOV     #MTINT,(R0)+    ;LOAD INTERRUPT ADDRESS IN VECTOR
002040  012710  000340                          MOV     #340,(R0)       ;LOAD PRIORITY
002044  016700  176610                          MOV     REGS,R0         ;GET START OF REGS
002050  012701  000016                          MOV     #16,R1          ;SET NUMBER OF REGS
002054  012702  000600                          MOV     #C1,R2          ;GET START OF TABLE
002060  010022                          STO:    MOV     R0,(R2)+        ;BUILD TABLE
002062  062700  000002                          ADD     #2,R0           ;BUMP ADDRESS
002066  005301                                  DEC     R1              ;SEE IF DONE
002070  001373                                  BNE     STO             ;IF NOT: BR
002072  012702  000666                          MOV     #TOB,R2
002076  012700  000054                          MOV     #54,R0
002102  005022                          ST1:    CLR     (R2)+           ;CLEAR FLAGS + COUNTERS
```

```
323  002104  005300                          DEC     R0
324  002106  001375                          BNE     ST1
325  002110  012767  000001  176672          MOV     #1,RHTF         ;SET ADDRESS TEST FLAG
326  002116  000167  000376                  JMP     TSRH            ;GO DO INITIAL ADDRESS TEST PASS
327  002122  012704  014162          ST1A:   MOV     #MSG10,R4
328  002126  004767  010376                  JSR     PC,TTOUT        ;REQUEST DRIVE NUMBER
329  002132  012705  000700                  MOV     #DRVN,R5        ;SET ADDRESS OF DRIVE NUMBER SAVE
330  002136  012701  000001                  MOV     #1,R1           ;SET SIZE OF RESPONSE
331  002142  012702  000007                  MOV     #7,R2           ;SET UPPER LIMIT
332  002146  012703  000000                  MOV     #0,R3           ;SET LOWER LIMIT
333  002152  004767  010116                  JSR     PC,TTR          ;GO GET RESPONSE
334  002156  012777  000040  176424          MOV     #40,@CS         ;SET INIT
335  002164  056777  176510  176416          BIS     DRVN,@CS        ;SET DRIVE NUMBER
336  002172  005777  176402                  TST     @C1             ;ACCESS DRIVE
337  002176  032777  010000  176404          BIT     #10000,@CS      ;SEE IF NED
338  002204  001405                          BEQ     ST2             ;IF NOT: BR
339  002206  012704  015114                  MOV     #MSG41,R4
340  002212  004767  010312                  JSR     PC,TTOUT        ;PRINT NOT AVAIL
341  002216  000741                          BR      ST1A            ;REDO DRIVE REQUEST
342  002220  012704  014202          ST2:    MOV     #MSG11,R4
343  002224  004767  010300                  JSR     PC,TTOUT        ;REQUEST SLAVE NUMBER
344  002230  012705  000702                  MOV     #SLVN,R5        ;SET ADDRESS OF SLAVE SAVE
345  002234  012701  000001                  MOV     #1,R1           ;SET SIZE OF RESPONSE
346  002240  012702  000007                  MOV     #7,R2           ;SET UPPER LIMIT
347  002244  012703  000000                  MOV     #0,R3           ;SET LOWER LIMIT
348  002250  004767  010020                  JSR     PC,TTR          ;GO GET RESPONSE
349  002254  012777  000040  176326          MOV     #40,@CS         ;INIT
350  002262  056777  176412  176320          BIS     DRVN,@CS        ;SET DRIVE NUMBER
351  002270  016777  176406  176334          MOV     SLVN,@TC        ;LOAD SLAVE NUMBER
352  002276  032777  002000  176322          BIT     #2000,@DT       ;SEE IF SLAVE PRESENT
353  002304  001005                          BNE     ST3             ;IF SO: BR
354  002306  012704  015135                  MOV     #MSG42,R4
355  002312  004767  010212                  JSR     PC,TTOUT        ;PRINT NON-EXIST SLAVE
356  002316  000740                          BR      ST2             ;REDO SLAVE REQUEST
357  002320  012704  015156          ST3:    MOV     #MSG43,R4
358  002324  004767  010200                  JSR     PC,TTOUT        ;PRINT SERIAL NUMBER TAG
359  002330  017703  176274                  MOV     @SN,R3
360  002334  004767  010662                  JSR     PC,SNPT         ;PRINT SERIAL NUMBER
361  002340  012704  015740                  MOV     #MSG61,R4
362  002344  004767  010160                  JSR     PC,TTOUT        ;REQUEST RH11 OR RH70
363  002350  012705  000672                  MOV     #RH17F,R5       ;GET ADDRESS OF FLAG
364  002354  012701  000001                  MOV     #1,R1           ;SET SIZE OF RESPONSE
365  002360  012702  000001                  MOV     #1,R2           ;SET UPPER LIMIT
366  002364  012703  000000                  MOV     #0,R3           ;SET LOWER LIMIT
367  002370  004767  007700                  JSR     PC,TTR          ;GET RESPONSE
368  002374  012704  015760                  MOV     #MSG62,R4
369  002400  004767  010124                  JSR     PC,TTOUT        ;REQUEST RH11 ONLY RESPONSE
370  002404  012705  001014                  MOV     #RH0F,R5        ;SET FLAG ADDRESS
371  002410  012701  000001                  MOV     #1,R1           ;SET SIZE OF RESPONSE
372  002414  012702  000001                  MOV     #1,R2           ;SET UPPER LIMIT
373  002420  012703  000000                  MOV     #0,R3           ;SET LOWER LIMIT
374  002424  004767  007644                  JSR     PC,TTR          ;GO GET RESPONSE
375  002430  005767  176360                  TST     RH0F            ;SEE IF RH11 ONLY
376  002434  001016                          BNE     ST4             ;IF SO: BR
377  002436  012704  015631                  MOV     #MSG55,R4
378  002442  004767  010062                  JSR     PC,TTOUT        ;REQUEST NRZ ONLY RESPONSE
```

```
   379  002446  012705  001012                MOV     #NRZOF,R5       ;SET FLAG ADDRESS
   380  002452  012701  000001                MOV     #1,R1           ;SET SIZE OF RESPONSE
   381  002456  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
   382  002462  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
   383  002466  004767  007602                JSR     PC,TTR          ;GO GET RESPONSE
   384  002472  005067  176320  ST4:          CLR     PCNTR           ;CLEAR PASS COUNTER
```

```
                                        ;TEST SCHEDULAR**********
                                
002476  000240          TSCD:   NOP
002500  005067  176266          CLR     STFLG           ;CLEAR SINGLE TEST FLAG
002504  017700  176126          MOV     @SWR,R0
002510  042700  177740          BIC     #177740,R0
002514  005700                  TST     R0
002516  001055                  BNE     STSCD           ;GO SELECT SINGLE TEST
002520  012767  001040  176246  TSRH:   MOV     #TSTTBL,LTADD
002526  062767  000004  176240  TSCD0:  ADD     #4,LTADD
002534  016767  176234  176222          MOV     LTADD,ITRLP
002542  062767  000002  176214          ADD     #2,ITRLP        ;SET ITERATION ADDRESS
002550  005777  176220                  TST     @LTADD
002554  001002                  BNE     TSCD1
002556  000167  000144                  JMP     TEND            ;GO TO END ROUTINE
002562  000240          TSCD1:  NOP
002564  005067  176156          CLR     STMSK
002570  005067  176120          CLR     ERRP
002574  005067  176074          CLR     HDRFL           ;CLEAR PRINT HEADER FLAG
002600  017700  176170          MOV     @LTADD,R0       ;SET POINTER TO TEST
002604  000110                  JMP     (R0)            ;GO TO TEST
002606  000240          TSCD2:  NOP
002610  032777  002000  176020  BIT     #2000,@SWR      ;SEE IF HALT ON TEST
002616  001401                  BEQ     TSCD3           ;IF NOT: BR
002620  000000                  HALT
002622  004767  010476  TSCD3:  JSR     PC,CKSWR                ;CHECK FOR CNTL G
002626  000240                  NOP
002630  005767  176136          TST     STFLG           ;SE IF SINGLE TEST
002634  001734                  BEQ     TSCD0           ;IF NOT: BR
002636  017700  175774          MOV     @SWR,R0
002642  042700  177740          BIC     #177740,R0      ;MASK TEST NUMBER
002646  005700                  TST     R0              ;SEE IF RETURN TO ALL
002650  001712                  BEQ     TSCD            ;IF SO: BR
002652  000240          STSCD:  NOP
002654  012767  000001  176110  MOV     #1,STFLG        ;SET SINGLE TEST FLAG
002662  022700  000025          CMP     #25,R0          ;SEE IF EXCEEDED TESTS
002666  003417                  BLE     TEND            ;IF SO: BR
002670  000241                  CLC
002672  006100                  ROL     R0
002674  006100                  ROL     R0              ;SET TABLE MODIFIER
002676  012767  001040  176070  MOV     #TSTTBL,LTADD
002704  060067  176064          ADD     R0,LTADD        ;SET TEST POINTER
002710  016767  176060  176046  MOV     LTADD,ITRLP
002716  062767  000002  176040  ADD     #2,ITRLP        ;SET ITERATION POINTER
002724  000716                  BR      TSCD1
002726  012704  014114  TEND:   MOV     #MSG6,R4
002732  004767  007572          JSR     PC,TTOUT        ;PRINT END OF PASS
002736  016703  176054          MOV     PCNTR,R3
002742  004767  007726          JSR     PC,OCTP         ;PRINT PASS NUMBER
002746  032777  004000  175662  BIT     #4000,@SWR      ;SEE IF HALT ON PASS
002754  001001                  BNE     TENDX           ;IF NOT: BR
002756  000000                  HALT
002760  004767  010340  TENDX:  JSR     PC,CKSWR                ;CHECK FOR CNTL G
002764  005267  176026          INC     PCNTR           ;BUMP PASS COUNTER
002770  000167  177502          JMP     TSCD            ;RESTART
```

```
                                                ;RH ADDRESSING TEST**********
                                        FT1:    MOV     #MSFT1,EMADDR   ;SET HEADER
                                                MOV     #TRAP,@BTRP     ;SET TRAP HANDLER ADDRESS
                                                MOV     #340,@BTRP2
                                                MOV     #16,R0          ;SET NUMBER OF REGISTER
                                                MOV     #C1,R1          ;GET FIRST ADDRESS (CS1)
                                        FT1A:   TST     (R1)            ;REFERENCE REGISTER
                                                NOP                     ;IF ADDRESS IS BAD, BUS TRAP WILL OCCUR
                                        FT1B:   DEC     R0              ;SEE IF DONE ALL
                                                BEQ     FT1X            ;IF SO: BR
                                                ADD     #2,R1           ;BUMP ADDRESS POINTER
                                                BR      FT1A            ;CONTINUE
                                        FT1X:   MOV     #6,@BTRP        ;RESET TRAP CATCHER
                                                TST     RHTF            ;SEE IF INITIAL ADDRESS TEST PASS
                                                BEQ     FT1XX           ;IF NOT: BR
                                                CLR     RHTF            ;CLEAR FLAG
                                                JMP     ST1A            ;RETURN
                                        FT1XX:  JMP     TSCD2           ;RETURN TO SCHEDULAR
```

```
                                        ;RH REGISTER BITS READ/WRITE**********

003074  012767  016020  175574  FT2:    MOV     #MSFT2,EMADDR   ;SET TEST HEADER
003102  012701  177777                  MOV     #-1,R1          ;SET ALL ONES PATTERN
003106  004767  006770          FT2A:   JSR     PC,INIT1        ;GO INIT
003112  016700  175464                  MOV     WC,R0           ;GET ADDRESS OF WORD COUNT
003116  010102                          MOV     R1,R2           ;SET EXPT REGISTER BIT PATTERN
003120  010110                          MOV     R1,(R0)         ;LOAD PATTERN
003122  021002                          CMP     (R0),R2         ;SEE IF EXPT=RCVD
003124  001410                          BEQ     FT2B            ;IF SO: BR
003126  012767  014442  175602          MOV     #MSG25,ERADD    ;SET CODE
003134  012767  003106  175620          MOV     #FT2A,SCOLP     ;SET SCOPE
003142  004767  000116                  JSR     PC,FT2ER        ;GO DO ERROR
003146  016700  175432          FT2B:   MOV     BA,R0           ;GET ADDRESS OF BUS ADDRESS
003152  010102                          MOV     R1,R2
003154  042702  000001                  BIC     #1,R2           ;SET EXPT PATTERN
003160  010110                          MOV     R1,(R0)         ;LOAD PATTERN
003162  020210                          CMP     R2,(R0)         ;SEE IF EXPT=RCVD
003164  001410                          BEQ     FT2C            ;IF SO:BR
003166  012767  014450  175542          MOV     #MSG26,ERADD    ;SET ERROR CODE
003174  012767  003146  175560          MOV     #FT2B,SCOLP     ;SET SCOPE ADDRESS
003202  004767  000056                  JSR     PC,FT2ER        ;GO DO ERROR
003206  016700  175410          FT2C:   MOV     DB,R0           ;GET ADDRESS OF DATA BUFFER
003212  010102                          MOV     R1,R2
003214  010110                          MOV     R1,(R0)         ;LOAD PATTERN
003216  012703  004000                  MOV     #4000,R3
003222  005303          FT2D:   DEC     R3              ;DELAY
003224  001376                  BNE     FT2D
003226  020210                  CMP     R2,(R0)         ;SEE IF EXPT=RCVD
003230  001410                  BEQ     FT2E            ;IF SO: BR
003232  012767  014456  175476  MOV     #MSG27,ERADD    ;SET ERROR CODE
003240  012767  003206  175514  MOV     #FT2C,SCOLP     ;SET SCOPE ADDRESS
003246  004767  000012          JSR     PC,FT2ER        ;GO DO ERROR
003252  005701          FT2E:   TST     R1              ;SEE IF DONE RESET
003254  001454                  BEQ     FT2X            ;IF SO: BR
003256  005001                  CLR     R1              ;SET ZERO PATTERN
003260  000167  177622          JMP     FT2A            ;DO ZERO BITS
003264  000240          FT2ER:  NOP
003266  032777  020000  175342  BIT     #20000,@SWR     ;SEE IF PRINT ERROR
003274  001034                  BNE     FT2ERB          ;IF NOT: BR
003276  005767  175372          TST     HDRFL           ;SEE ID DONE HEADER
003302  001004                  BNE     FT2ERA          ;IF SO: BR
003304  016704  175366          MOV     EMADDR,R4
003310  004767  007214          JSR     PC,TTOUT        ;DO HEADER
003314  012767  000001  175352  FT2ERA: MOV     #1,HDRFL        ;SET FLAG
003322  016704  175410          MOV     ERADD,R4
003326  004767  007176          JSR     PC,TTOUT        ;PRINT ERROR CODE
003332  012704  014406          MOV     #MSG22,R4
003336  004767  007166          JSR     PC,TTOUT        ;PRINT EXPT TAG
003342  010103                  MOV     R1,R3
003344  004767  007312          JSR     PC,OCTPE        ;PRINT EXPT
003350  012704  014416          MOV     #MSG23,R4
003354  004767  007150          JSR     PC,TTOUT        ;PRINT RCVD TAG
003360  011003                  MOV     (R0),R3
003362  004767  007274          JSR     PC,OCTPE        ;PRINT RCVD
```

```
   516  003366  005777  175244          FT2ERB: TST     @SWR            ;SEE IF HALT ON ERROR
   517  003372  100001                          BPL     FT2ERC          ;IF NOT: BR
   518  003374  000000                          HALT
   519  003376  004767  006366          FT2ERC: JSR     PC,SCOPE        ;GO SEE IF SCOPE ON ERROR
   520  003402  000240                          NOP
   521  003404  000207                          RTS     PC              ;IF NO SCOPE: CONTINUE TEST
   522  003406  000240                  FT2X:   NOP
   523  003410  004767  006416                  JSR     PC,ITER         ;GO SEE IF ITERATIONS
   524  003414  000167  177166                  JMP     TSCD2           ;RETURN TO SCHEDULAR
```

```
                                        ;RH INITIALIZE TEST**********

003420  012767  016055  175250  FT3:    MOV     #MSFT3,EMADDR   ;SET TEST HEADER
003426  012767  003420  175326          MOV     #FT3,SCOLP
003434  004767  006442                  JSR     PC,INIT1        ;GO INIT
003440  052777  020000  175142          BIS     #20000,@CS      ;FORCE UPE =1
003446  000240                          NOP
003450  004767  006426                  JSR     PC,INIT1        ;GO INIT
003454  005777  175120                  TST     @C1             ;SEE IF SC IS RESET
003460  100005                          BPL     FT3A            ;IF SO: BR
003462  012767  014514  175246          MOV     #MSG29,ERADD    ;SET ERROR CODE
003470  004767  000060                  JSR     PC,FT3ER        ;GO DO ERROR
003474  032777  040000  175076  FT3A:   BIT     #40000,@C1      ;SEE IF TRE IS RESET
003502  001405                          BEQ     FT3B            ;IF SO: BR
003504  012767  014543  175224          MOV     #MSG30,ERADD    ;SET ERROR CODE.
003512  004767  000036                  JSR     PC,FT3ER        ;GO DO ERROR
003516  017701  175066          FT3B:   MOV     @CS,R1          ;GET CS2
003522  042701  000307                  BIC     #307,R1         ;MARK IR/OR
003526  005701                          TST     R1              ;SEE IF RESET
003530  001405                          BEQ     FT3X            ;IF SO: BR
003532  012767  014573  175176          MOV     #MSG31,ERADD    ;SET ERROR CODE
003540  004767  000010                  JSR     PC,FT3ER        ;GO DO ERROR
003544  004767  006262          FT3X:   JSR     PC,ITER         ;GO SEE IF ITERATION
003550  000167  177032                  JMP     TSCD2           ;RETURN TO SCHEDULAR
003554  032777  020000  175054  FT3ER:  BIT     #20000,@SWR     ;SEE IF PRINT ERROR
003562  001015                          BNE     FT3ERB          ;IF NOT: BR
003564  005767  175104                  TST     HDRFL           ;SEE IF DONE HEADER
003570  001006                          BNE     FT3ERA          ;IF SO: BR
003572  016704  175100                  MOV     EMADDR,R4
003576  004767  006726                  JSR     PC,TTOUT        ;PRINT HEADER
003602  005267  175066                  INC     HDRFL
003606  016704  175124          FT3ERA: MOV     ERADD,R4
003612  004767  006712                  JSR     PC,TTOUT        ;PRINT ERROR CODE
003616  005777  175014          FT3ERB: TST     @SWR            ;SEE IF HALT ON ERROR
003622  100001                          BPL     FT3ERC          ;IF NOT: BR
003624  000000                          HALT
003626  000240          FT3ERC: NOP
003630  004767  006134                  JSR     PC,SCOPE        ;GO SEE IF SCOPE
003634  000207                          RTS     PC              ;IF NOT: BR
```

```
                                        ;RH11 SILO TEST 1: EPMTY SILO READ**********

003636  005767  175030        FT4:    TST     RH17F
003642  001141                        BNE     FT5X            ;IF RH70: BR
003644  012767  016107  175024        MOV     #MSFT4,EMADDR   ;SET TEST TEST HEADER
003652  012777  000040  174730        MOV     #40,@CS         ;INIT
003660  017700  174736                MOV     @DB,R0          ;READ DB
003664  005777  174720                TST     @CS             ;SEE IF DLT IS SET
003670  100013                        BPL     FT4ER           ;IF NOT: BR
003672  005777  174702                TST     @C1             ;SEE IF SC IS SET
003676  100014                        BPL     FT4ERA          ;IF NOT: BR
003700  032777  040000  174672        BIT     #40000,@C1      ;SEE IF TRE IS SET
003706  001414                        BEQ     FT4ERB          ;IF NOT: BR
003710  004767  006116        FT4X:   JSR     PC,ITER         ;GO SEE IF ITERATION
003714  000167  176666                JMP     TSCD2           ;RETURN TO SCHEDULAR
003720  012767  014623  175010  FT4ER:  MOV     #MSG32,ERADD    ;SET ERROR CODE
003726  000407                        BR      FT4ERC
003730  012767  014641  175000  FT4ERA: MOV     #MSG33,ERADD    ;SET ERROR CODE
003736  000403                        BR      FT4ERC
003740  012767  014656  174770  FT4ERB: MOV     #MSG34,ERADD    ;SET ERROR CODE.
003746  000240                FT4ERC: NOP
003750  012767  003636  175004        MOV     #FT4,SCOLP      ;SET SCOPE ADDRESS
003756  004767  177572                JSR     ^C,FT3ER        ;GO PRINT ERROR
003762  000752                        BR      FT4X
```

```
                                                ;RH11 SILO TEST 2: IR/OR CHECK**********

003764 005767 174702          FT5:    TST     RH17F           ;SEE IF RH70
003770 001066                         BNE     FT5X            ;IF SO: BR
003772 012767 016137 174676           MOV     #MSFT5,EMADDR   ;SET TEST HEADER
004000 012767 004006 174754           MOV     #FT5A,SCOLP     ;SET SCOPE ADDRESS
004006 004767 006070          FT5A:   JSR     PC,INIT1        ;GO INIT
004012 032777 000100 174570           BIT     #100,@CS        ;SEE IF IR IS SET
004020 001005                         BNE     FT5B            ;IF SO: BR
004022 012767 014674 174706           MOV     #MSG35,ERADD    ;SET ERROR CODE
004030 004767 000122                  JSR     PC,FT5ER        ;GO DO ERROR
004034 032777 000200 174546   FT5B:   BIT     #200,@CS        ;SEE IF OR IS RESET
004042 001405                         BEQ     FT5C            ;IF SO: BR
004044 012767 014721 174664           MOV     #MSG36,ERADD    ;SET ERROR CODE
004052 004767 000100                  JSR     PC,FT5ER        ;GO DO ERROR
004056 012777 000000 174536   FT5C:   MOV     #0,@DB          ;LOAD ZERO INTO SILO
004064 032777 000200 174516           BIT     #200,@CS        ;SEE THAT OR RESET
004072 001405                         BEQ     FT5D            ;IF IT DOES: BR
004074 012767 014750 174634           MOV     #MSG37,ERADD    ;SET ERROR CODE
004102 004767 000050                  JSR     PC,FT5ER        ;GO DO ERROR
004106 012777 177777 174506   FT5D:   MOV     #-1,@DB         ;LOAD SILO WITH -1
004114 012700 004000                  MOV     #4000,R0
004120 032777 000200 174462   FT5E:   BIT     #200,@CS        ;SEE IF OR IS SET
004126 001007                         BNE     FT5X            ;IF SO: BR
004130 005300                         DEC     R0
004132 001372                         BNE     FT5E            ;AWAIT OR
004134 012767 014750 174574           MOV     #MSG37,ERADD    ;SET ERROR CODE
004142 004767 000010                  JSR     PC,FT5ER        ;GO DO ERROR
004146 004767 005660          FT5X:   JSR     PC,ITER         ;GO SEE IF ITERATION
004152 000167 176430                  JMP     TSCD2           ;RETURN TO SCHEDULAR
004156 004767 177372          FT5ER:  JSR     PC,FT3ER        ;GO PRINT ERROR
004162 000240                         NOP
004164 000207                         RTS     PC              ;CONTINUE TEST
```

```
                                        ;RH11 SILO TEST 3: SILO DATA TEST**********

004166  005767  174500        FT6:    TST     RH17F
004172  001052                        BNE     FT6X            ;IF RH70: BR
004174  012767  016167  174474        MOV     #MSFT6,EMADDR   ;SET TEST HEADER
004202  012767  004210  174552        MOV     #FT6A,$COLP     ;SET SCOPE ADDRESS
004210  004767  005666        FT6A:   JSR     PC,INIT1        ;GO INIT
004214  005000                        CLR     R0              ;PRESET DATA
004216  010077  174400        FT6B:   MOV     R0,@DB          ;LOAD SILO
004222  005200                        INC     R0              ;BUMP DATA
004224  022700  000102                CMP     #102,R0         ;SEE IF FILLED ALL
004230  001372                        BNE     FT6B            ;IF NOT: BR
004232  032777  000100  174350        BIT     #100,@CS        ;SEE IF IR IS RESET.
004240  001405                        BEQ     FT6C            ;IF SO: BR
004242  012767  015061  174466        MOV     #MSG40,ERADD    ;SET ERROR CODE
004250  004767  000054                JSR     PC,FT6ER        ;GO DO ERROR
004254  032777  000200  174326  FT6C: BIT     #200,@CS        ;SEE IF OR IS SET
004262  001005                        BNE     FT6D            ;IF SO: BR
004264  012767  015007  174444        MOV     #MSG38,ERADD    ;SET ERROR CODE
004272  004767  000032                JSR     PC,FT6ER        ;GO DO ERROR
004276  005000        FT6D:   CLR     R0              ;PRESET DATA
004300  017701  174316  FT6E:   MOV     @DB,R1          ;READ SILO
004304  020001                        CMP     R0,R1           ;SEE IF EXPT=RCVD
004306  001014                        BNE     FT6DE           ;IF NOT: BR
004310  005200                        INC     R0              ;BUMP DATA
004312  022700  000102                CMP     #102,R0         ;SEE IF DONE ALL
004316  001370                        BNE     FT6E            ;IF NOT: BR
004320  004767  005506        FT6X:   JSR     PC,ITER         ;GO SEE IF ITERATION
004324  000167  176256                JMP     TSCD2           ;RETURN TO SCHEDULAR
004330  000240        FT6ER:  NOP
004332  004767  177216                JSR     PC,FT3ER        ;GO PRINT ERROR
004336  000207                        RTS     PC              ;RETURN
004340  000000        FT6DE:  NOP
004342  032777  020000  174266        BIT     #20000,@SWR     ;SEE IF PRINT ERROR
004350  001032                        BNE     FT6DEB          ;IF NOT: BR
004352  005767  174316                TST     HDRFL           ;SEE IF DONE HEADER
004356  016701  174314                MOV     EMADDR,R1
004362  004767  006142                JSR     PC,TTOUT        ;PRINT HEADER
004366  005267  174302                INC     HDRFL           ;SET FLAG
004372  012704  015041        FT6DEA: MOV     #MSG39,R4
004376  004767  006126                JSR     PC,TTOUT        ;PRINT SILO READ ERROR
004402  012704  014406                MOV     #MSG22,R4
004406  004767  006116                JSR     PC,TTOUT        ;PRINT EXPT TAG
004412  010003                        MOV     R0,R3
004414  004767  006254                JSR     PC,OCTP         ;PRINT EXPT
004420  012704  014416                MOV     #MSG23,R4
004424  004767  006100                JSR     PC,TTOUT        ;PRINT RCVD TAG
004430  010103                        MOV     R1,R3
004432  004767  006236                JSR     PC,OCTP         ;PRINT RCVD
004436  005777  174174        FT6DEB: TST     @SWR            ;SEE IF HALT ON ERROR
004442  100001                        BPL     FT6DEX          ;IF NOT: BR
004444  000000                        HALT
004446  004767  006652        FT6DEX: JSR     PC,CKSWR                ;CHECK FOR CNTL G
004452  000207                        RTS     PC              ;RETURN TO TEST
```

```
                                                ;RH11 SILO TEST 4: SILO OVERFLOW**********

004454  005767  174212          FT7:    TST     RH17F
004460  001021                          BNE     FT7X            ;IF RH70: BR
004462  012767  016217  174206          MOV     #MSFT7,EMADDR   ;SET TEST HEADER
004470  012767  004454  174264          MOV     #FT7,SCOLP      ;SET SCOPE ADDRESS
004476  004767  005400                  JSR     PC,INIT1        ;GO INIT
004502  012700  000103                  MOV     #103,R0         ;SET SIZE OF SILO +1
004506  010077  174110          FT7A:   MOV     R0,@DB          ;LOAD SILO
004512  005300                          DEC     R0              ;SEE IF DONE
004514  001374                          BNE     FT7A            ;IF NOT: BR
004516  005777  174066                  TST     @CS             ;SEE IF DLT IS SET
004522  100004                          BPL     FT7ER           ;IF NOT: BR
004524  004767  005302          FT7X:   JSR     PC,ITER         ;GO SEE IF ITERATION
004530  000167  176052                  JMP     TSCD2           ;RETURN TO SCHEDULAR
004534  012767  014623  174174  FT7ER:  MOV     #MSG32,ERADD    ;SET ERROR CODE
004542  004767  177006                  JSR     PC,FT3ER        ;GO DO ERROR
004546  000766                          BR      FT7X
```

```
                                        ;RH11 SILO TEST 5: SILO RESET**********

004550  005767  174116        FT10:   TST     RH17F
004554  001034                        BNE     FT10X           ;IF RH70: BR
004556  012767  016247  174112        MOV     #MSFT10,EMADDR  ;SET TEST HEADER
004564  012767  004550  174170        MOV     #FT10,SCOLP     ;SET SCOPE ADDRESS
004572  012777  000040  174010        MOV     #40,@CS         ;INITIALIZE
004600  012700  000004                MOV     #4,R0           ;SET NUMBER OF SILO WRITER
004604  010077  174012        FT10A:  MOV     R0,@DB          ;WRITE SILO
004610  005300                        DEC     R0              ;SEE IF DONE
004612  001374                        BNE     FT10A           ;IF NOT: BR
004614  052777  000040  173766        BIS     #40,@CS         ;INITIALIZE
004622  012777  177777  173772        MOV     #-1,@DB         ;WRITE SILO
004630  017701  173766                MOV     @DB,R1          ;READ SILO 1
004634  017701  173762                MOV     @DB,R1          ;READ SILO 2
004640  005777  173744                TST     @CS             ;SEE IF DLT IS SET
004644  100011                        BPL     FT10ER          ;IF NOT: BR
004646  004767  005160        FT10X:  JSR     PC,ITER         ;GO SEE IF ITERATION
004652  005767  174136                TST     RH0F            ;SEE IF RH11 ONLY
004656  001402                        BEQ     FT10XX          ;IF NOT: BR
004660  000167  176042                JMP     TEND            ;ELSE GO TO END
004664  000167  175716        FT10XX: JMP     TSCD2           ;RETURN TO SCHEDULAR
004670  012767  014623  174040 FT10ER: MOV     #MSG32,ERADD    ;SET ERROR CODE
004676  004767  176652                JSR     PC,FT3ER        ;GO DO ERROR
004702  000761                        BR      FT10X
```

```
                                                ;NOP TEST*****
                                        FT11:   NOP
004704  000240                                  NOP
004706  012767  004704  174046                  MOV     #FT11,SCOLP     ;SET SCOPE ADDRESS
004714  004767  005162                          JSR     PC,INIT1
004720  012767  000300  174056                  MOV     #300,UDES       ;SET TC= ALL NRZ,NORM,ODD
004726  012767  177777  173752                  MOV     #-1,FCNT        ;SET FC= ALL OVER
004734  012767  177777  173746                  MOV     #-1,WCNT        ;SET WC= ALL OVER
004742  012767  177777  173734                  MOV     #-1,BADDR       ;SET BA= ALL OVER
004750  012767  000001  173746                  MOV     #1,RDYDX        ;SET DELAY
004756  012767  000001  173742                  MOV     #1,OPDYX        ;SET OP DELAY
004764  012767  000001  174004                  MOV     #1,FUN          ;SET NOP FUNCTIONS CODE
004772  004767  003760                          JSR     PC,EXEC         ;GO EXECUTE COMMAND
004776  000240                                  NOP
005000  012767  016300  173670                  MOV     #MSFT11,EMADDR
005006  004767  00417?                          JSR     PC,ERCHK        ;GO CHECK REGISTER
005012  004767  005C14                          JSR     PC,ITER         ;GO SEE IF ITERATIONS
005016  000167  175564                          JMP     TSCD2           ;RETURN TO SCHEDULAR
```

```
                                                ;REWIND TEST*****
                                
005022  000240                          FT12:   NOP
005024  012767  005022  173730                  MOV     #FT12,SCOLP
005032  004767  005044                          JSR     PC,INIT1        ;GO INITIALIZE
005036  052777  001700  173566                  BIS     #1700,@TC       ;SET TO NRZ,NORMAL
005044  012767  177760  173634                  MOV     #-20,FCNT       ;SET FC=20
005052  012767  177770  173630                  MOV     #-10,WCNT       ;SET WC=10
005060  012767  016760  173616                  MOV     #WDATA,BADDR    ;SET BA=WRITE BUFFER
005066  012767  000007  173702                  MOV     #7,FUN          ;SET REWIND OP CODE
005074  004767  003656                          JSR     PC,EXEC         ;GO EXECUTE COMMAND
005100  000240                                  NOP
005102  032777  020000  173502          FT12A:  BIT     #20000,@DS
005110  001374                                  BNE     FT12A           ;AWAIT PIP
005112  012767  016320  173556                  MOV     #MSFT12,EMADDR
005120  004767  004062                          JSR     PC,ERCHK        ;GO CHECK FOR ERROR
005124  004767  004702                          JSR     PC,ITER         ;GO SEE IF ITERATION
005130  000167  175452                          JMP     TSCD2           ;RETURN TO SCHEDULAR
```

```
                                        ;WRITE/READ TEST*****

005134  000240                FT13:   NOP
005136  012767  000001  173560        MOV     #1,RDYDX
005144  012767  000001  173554        MOV     #1,OPDYX
005152  012767  000100  173532        MOV     #100,RCNT       ;SET RECORD COUNT
005160  012767  016343  173510        MOV     #MSFT13,EMADDR  ;SET TEST HEADER
005166  012767  000001  173612        MOV     #1,PATRN
005174  004767  004414                JSR     PC,DSUP         ;SET UP ALL ONES DATA PATTERN
005200  012767  000300  173576        MOV     #300,UDES       ;REWIND TO BOT
005206  004767  003676        FT13A:  JSR     PC,RWND         ;SET 200 BPI, NORMAL
005212  012767  177600  173466        MOV     #-200,FCNT      ;SET FC
005220  012767  177700  173462        MOV     #-100,WCNT      ;SET WC
005226  012767  016760  173450        MOV     #WDATA,BADDR    ;SET BA
005234  012767  000061  173534        MOV     #61,FUN         ;SET WRITE OP-CODE
005242  012767  014222  173444        MOV     #MSG12,ERRP
005250  004767  003502        FT13B:  JSR     PC,EXEC         ;GO EXECUTE COMMAND
005254  005067  173502                CLR     SCOLP           ;NO SCOPE LOOP
005260  004767  003722                JSR     PC,ERCHK        ;GO CHECK ERROR
005264  005367  173422                DEC     RCNT            ;SEE IF DONE ALL
005270  001367                        BNE     FT13B           ;IF NOT: BR
005272  012767  000100  173412        MOV     #100,RCNT       ;SET RECORD COUNT
005300  012767  020472  173376        MOV     #RDATA,BADDR
005306  062767  000200  173370        ADD     #200,BADDR      ;SET BA
005314  012767  000077  173454        MOV     #77,FUN         ;SET READ REVERSE OP-CPDE
005322  012767  014240  173364        MOV     #MSG13,ERRP
005330  004767  003422        FT13C:  JSR     PC,EXEC         ;GO EXECUTE COMMAND
005334  004767  003646                JSR     PC,ERCHK        ;GO CHECK ERROR
005340  005367  173346                DEC     RCNT            ;SEE IF READ ALL
005344  001371                        BNE     FT13C           ;IF NOT:BR
005346  162767  000200  173330        SUB     #200,BADDR      ;SET BA
005354  012767  000071  173414        MOV     #71,FUN         ;SET READ FORWARD OP-CODE
005362  012767  014265  173324        MOV     #MSG14,ERRP
005370  012767  000100  173314        MOV     #100,RCNT       ;SET RECORD COUNT
005376  004767  003354        FT13D:  JSR     PC,EXEC         ;GO EXECUTE COMMAND
005402  004767  003600                JSR     PC,ERCHK        ;GO CHECK ERRORS
005406  005367  173300                DEC     RCNT            ;SEE IF DONE ALL
005412  001371                        BNE     FT13D           ;IF NOT:BR
005414  032767  002000  173362        BIT     #2000,UDES      ;SEE IF DONE PE
005422  001017                        BNE     FT13X           ;IF SO: BR
005424  062767  000400  173352        ADD     #400,UDES       ;SELECT NEXT DENSITY
005432  032767  002000  173344        BIT     #2000,UDES      ;SEE IF PE
005440  001403                        BEQ     FT13E           ;IF NOT: BR
005442  005767  173344                TST     NRZOF           ;SEE IF NRZ ONLY
005446  001005                        BNE     FT13X           ;IF SO: BR
005450  012767  000100  173234  FT13E: MOV     #100,RCNT       ;RESET RECORD COUNT
005456  000167  177524                JMP     FT13A           ;GO DO NEXT DENSITY
005462  000167  175120        FT13X:  JMP     TSCD2           ;RETURN TO SCHEDULAR
```

```
                                                ;SPACE TEST*****
                                        FT14:   NOP
005466  000240                                    MOV     #MSFT14,EMADDR  ;SET TEST HEADER
005470  012767  016372  173200                    MOV     #1700,UDES      ;SET NRZ,NORMAL
005476  012767  001700  173300                    MOV     #1700,UDES      ;SET NRZ,NORMAL
005504  004767  003400                    FT14A1: JSR     PC,RWND         ;GO INITIALIZE
005510  012767  000100  173174                    MOV     #100,RCNT       ;SET NUMBER OF RECORDER
005516  012767  177777  011234                    MOV     #-1,WDATA       ;SET DATA PATTERN
005524  012767  177700  173154                    MOV     #-100,FCNT      ;PRESET FRAME CNT
005532  012767  177740  173150                    MOV     #-40,WCNT       ;PRESET WORD CNT
005540  004767  004336                    FT14A:  JSR     PC,INIT1        ;GO REWIND
005544  012767  001000  173154                    MOV     #1000,OPDYX
005552  012767  040000  173144                    MOV     #40000,RDYDX
005560  012767  000061  173210                    MOV     #61,FUN         ;SET WRITE OP-CODE
005566  012767  102300  173152                    MOV     #102300,STMSK   ;MASK DATA RELATED ERRORS
005574  052777  000010  173006                    BIS     #10,@CS         ;INHIBIT BUS ADDRESS INCREMENT
005602  004767  003150                            JSR     PC,EXEC         ;GO EXECUTE COMMAND
005606  000240                                    NOP
005610  012767  015275  173076                    MOV     #MSG46,ERRP     ;SET ERROR CODE
005616  004767  003364                            JSR     PC,ERCHK        ;GO CHECK ERRORS
005622  005767  173152                            TST     SERFL           ;SEE IF ERROR
005626  001402                                    BEQ     FT14A2          ;IF NOT: BR
005630  000167  000466                            JMP     FT14X           ;ELSE EXIT
005634  162767  000001  173044            FT14A2: SUB     #1,FCNT         ;BUMP FC
005642  032767  000001  173036                    BIT     #1,FCNT         ;SEE IF SHOULD BUMP WC
005650  001403                                    BEQ     FT14A3          ;IF NOT: BR
005652  162767  000001  173030                    SUB     #1,WCNT         ;BUMP WC
005660  005367  173026                    FT14A3: DEC     RCNT            ;SEE IF DONE ALL
005664  001325                                    BNE     FT14A           ;WRITE ALL RECORDS
005666  000240                                    NOP
005670  012767  000100  173022                    MOV     #100,RRD        ;PRESET RECORD POSITION
005676  012767  000176  173016                    MOV     #176,RFD
005704  000240                                    NOP
005706  012767  177701  173014                    MOV     #-77,SCNT       ;SET SPACE AMOUNT
005714  012767  000033  173054  FT14B:           MOV     #33,FUN         ;SET OP-CODE SPACE REVERSE
005722  004767  003030                            JSR     PC,EXEC         ;GO EXECUTE COMMAND
005726  012767  015346  172760                    MOV     #MSG48,ERRP     ;SET ERROR CODE
005734  004767  003246                            JSR     PC,ERCHK        ;GO CHECK ERRORS
005740  005767  173034                            TST     SERFL           ;SEE IF ERROR
005744  001166                                    BNE     FT14X           ;IF SO: BR
005746  004767  000070                            JSR     PC,FT14RR       ;GO READ REVERSE + CHECK DATA
005752  000240                                    NOP
005754  012767  000031  173014                    MOV     #31,FUN         ;SET SPACE FORWARD OP-CODE
005762  005267  172742                            INC     SCNT            ;SET SPACE AMOUNT
005766  001555                                    BEQ     FT14X           ;IF DONE: BR
005770  004767  002762                            JSR     PC,EXEC         ;GO EXECUTE COMMAND
005774  012767  015321  172712                    MOV     #MSG47,ERRP     ;SET ERROR CODE
006002  004767  003200                            JSR     PC,ERCHK        ;GO CHECK ERROR
006006  005767  172766                            TST     SERFL           ;SEE IF ERROR FLAG
006012  001143                                    BNE     FT14X           ;IF NO: BR
006014  004767  000064                            JSR     PC,FT14RF       ;GO READ FORWARD FOR POSITION CHECK
006020  000240                                    NOP
006022  005267  172702                            INC     SCNT            ;DECREMENT SPACE AMOUNT
006026  001535                                    BEQ     FT14X           ;IF DONE: BR
006030  005267  172664                            INC     RRD             ;BUMP DATA EXPT
006034  005367  172662                            DEC     RFD             ;BUMP DATA EXPT
```

```
865  006040  000725                        BR      FT14B
866  006042  000240                FT14RR: NOP
867  006044  012767  020472  172632        MOV     #RDATA,@BADDR   ;SET BA
868  006052  012767  000077  172716        MOV     #77,FUN         ;SET READ REVERSE OP-CODE
869  006060  004767  002672                JSR     PC,EXEC         ;GO EXECUTE COMMAND
870  006064  000240                        NOP
871  006066  016705  172626                MOV     RRD,R5
872  006072  020577  172510                CMP     R5,@#FC         ;SEE IF CORRECT RECORD
873  006076  001020                        BNE     FT14RER         ;IF NOT: BR
874  006100  000167  000026                JMP     FT14EC          ;GO CLEAR RH11 ERROR BIT
875  006104  000240                FT14RF: NOP
876  006106  012767  000071  172662        MOV     #71,FUN         ;SET READ FORWARD OP-CODE
877  006114  004767  002636                JSR     PC,EXEC         ;GO EXECUTE COMMAND
878  006120  016705  172576                MOV     RFD,R5
879  006124  020577  172456                CMP     R5,@#FC         ;SEE IF CORRECT RECORD
880  006130  001003                        BNE     FT14RER         ;IF NOT: BR
081  006132  004767  003744        FT14EC: JSR     PC,INIT1        ;CLEAR RH
882  006136  000207                        RTS     PC              ;RETURN
883  006140  000240                FT14RER: NOP
884  006142  032777  020000  172466        BIT     #20000,@#SWR    ;SEE IF PRINT INHIBITED
885  006150  001060                        BNE     FT14R3          ;IF SO: BR
886  006152  012704  016372                MOV     #MSFT14,R4
887  006156  004767  004346                JSR     PC,TTOUT        ;PRINT HEADER
888  006162  012704  014140                MOV     #MSG9,R4
889  006166  004767  004336                JSR     PC,TTOUT        ;PRINT ERROR TYPE
890  006172  012704  014373                MOV     #MSG20,R4       ;SET NRZ TAG POINTER
891  006176  032767  002000  172600        BIT     #2000,@DES      ;SEE IF PE
892  006204  001402                        BEQ     FT14RO          ;IF NOT: BR
893  006206  012704  014401                MOV     #MSG21,R4       ;ELSE SET PE TAG POINTER
894  006212  004767  004312        FT14RO: JSR     PC,TTOUT        ;PRINT TAG
895  006216  032767  000002  172552        BIT     #2,FUN          ;SEE IF READ REVERSE
896  006224  001003                        BNE     FT14R1          ;IF SO: BR
897  006226  012704  014353                MOV     #MSG17,R4
898  006232  000402                        BR      FT14R2          ;GO PRINT
899  006234  012704  014333        FT14R1: MOV     #MSG16,R4
900  006240  004767  004264        FT14R2: JSR     PC,TTOUT        ;PRINT FRWD/REV
901  006244  012704  014406                MOV     #MSG22,R4
902  006250  004767  004254                JSR     PC,TTOUT        ;PRINT EXPT TAG
903  006254  010503                        MOV     R5,R3
904  006256  042703  177700                BIC     #177700,R3      ;MASK RECORD NUMBER
905  006262  004767  004406                JSR     PC,OCTP         ;PRINT EXPT RECORD NUMBER
906  006266  012704  014416                MOV     #MSG23,R4
907  006272  004767  004232                JSR     PC,TTOUT        ;PRINT RCVD TAG
908  006276  017703  172304                MOV     @#FC,R3
909  006302  042703  177700                BIC     #177700,R3      ;MASK RECORD NUMBER
910  006306  004767  004362                JSR     PC,OCTP         ;PRINT ACTUAL RECORD NUMBER
911  006312  005777  172320        FT14R3: TST     @#SWR           ;SEE IF HALT ON ERROR
912  006316  100001                        BPL     FT14X           ;IF NOT: BR
913  006320  000000                        HALT
914  006322  004767  004776        FT14X:  JSR     PC,CKSWR                ;CHECK FOR CNTL G
915  006326  005767  172460                TST     NRZOF           ;SEE IF NRZ ONLY
916  006332  001011                        BNE     FT14XX          ;IF SO: BR
917  006334  032767  002000  172442        BIT     #2000,@DES      ;SEE IF DONE PE
918  006342  001005                        BNE     FT14XX          ;IF SO: BR
919  006344  012767  002300  172432        MOV     #2300,@DES      ;SET TO PE
920  006352  000167  177126                JMP     FT14A1          ;DO IN PE
```

```
   921  006356  000167  174224          FT14XX: JMP     TSCD2           ;RETURN TO SCHEDULAR
```

```
                                        ;ERASE TEST*****
                                
006362  000240          FT15:   NOP
006364  005067  172356          CLR     STMSK
006370  012767  000100  172326  MOV     #100,RDYDX
006376  012767  000010  172322  MOV     #10,OPDYX
006404  012767  016414  172264  MOV     #MSFT15,EMADDR  ;SET TEST HEADER
006412  004767  002472          JSR     PC,RWND         ;REWIND
006416  012767  020472  172260  MOV     #RDATA,BADDR    ;SET BA
006424  012767  001700  172352  MOV     #1700,UDES      ;SET NRZ, NORMAL
006432  012767  000025  172336  FT15A:  MOV     #25,FUN         ;SET ERASE OP-CODE
006440  012767  000200  172244  MOV     #200,RCNT       ;SET TO ERASE 128 TIMES
006446  004767  002304          FT15B:  JSR     PC,EXEC         ;GO EXECUTE COMMAND
006452  012767  015275  172234  MOV     #MSG46,ERRP     ;SET ERROR CODE
006460  004767  002522          JSR     PC,ERCHK        ;GO CHECK ERRORS
006464  005767  172310          TST     SERFL           ;SEE IF ANY ERRORS
006470  001032                  BNE     FT15X           ;IF SO EXIT
006472  005367  172214          DEC     RCNT            ;SEE IF DONE ERASING
006476  001363                  BNE     FT15B           ;IF NOT: BR
006500  000240                  NOP
006502  004767  002402          JSR     PC,RWND         ;REWIND
006506  012767  177600  172174  MOV     #-200,WCNT      ;SET WC
006514  012767  000071  172254  MOV     #71,FUN         ;SET READ FORWARD OP-CODE
006522  012767  000040  172174  MOV     #40,RDYDX       ;SET DELAY
006530  004767  002222          JSR     PC,EXEC         ;GO EXECUTE COMMAND
006534  000240                  NOP
006536  012767  015671  172150  MOV     #MSG60,ERRP     ;SET ERROR CODE
006544  012767  020000  172174  MOV     #20000,STMSK
006552  004767  002430          JSR     PC,ERCHK        ;GO CHECK ERRORS
006556  000167  174024  FT15X:  JMP     TSCD2           ;RETURN TO SCHEDULAR
```

```
952                                             ;TAPE MARK WRITE/READ TEST*****
953
954  006562  000240                    FT16:    NOP
955  006564  012767  000001  172132            MOV     #1,RDYDX
956  006572  012767  001000  172126            MOV     #1000,OPDYX
957  006600  012767  016436  172070            MOV     #MSFT16,EMADDR  ;SET HEADER
958  006606  012767  001700  172170            MOV     #1700,UDES      ;SET TO NRZ,NORMAL,ODD
959  006614  004767  002270            FT16A:  JSR     PC,RWND         ;REWIND
960  006620  012767  177760  172060  FT16B:   MOV     #-20,FCNT       ;FC=20
961  006626  012767  177770  172054            MOV     #-10,WCNT       ;WC=10
962  006634  012767  000027  172134            MOV     #27,FUN         ;SET WRITE TAPE MARK OP-CODE
963  006642  004767  002110                    JSR     PC,EXEC         ;GO EXECUTE COMMAND
964  006646  012767  001000  172072            MOV     #1000,STMSK     ;SET FOR FCE MASK
965  006654  012767  014222  172032            MOV     #MSG12,ERRP     ;SET ERROR CODE
966  006662  004767  002320                    JSR     PC,ERCHK        ;GO CHECK ERROR
967  006666  004767  002662                    JSR     PC,TMCHK        ;GO SEE IF TM SET
968  006672  012767  000077  172076            MOV     #77,FUN         ;SET USED REVERSE OP-CODE
969  006700  004767  002052                    JSR     PC,EXEC         ;GO EXECUTE COMMAND
970  006704  012767  001000  172034            MOV     #1000,STMSK     ;SET FCE ERROR MASK
971  006712  012767  014240  171774            MOV     #MSG13,ERRP     ;SET ERROR CODE
972  006720  004767  002262                    JSR     PC,ERCHK        ;GO CHECK ERRORS
973  006724  004767  002624                    JSR     PC,TMCHK        ;GO SEE IF TM SET
974  006730  012767  000071  172040            MOV     #71,FUN         ;SET READ  FORWARD OP-CODE
975  006736  004767  002014                    JSR     PC,EXEC         ;GO EXECUTE COMMAND
976  006742  012767  014265  171744            MOV     #MSG14,ERRP     ;SET ERROR CODE
977  006750  004767  002232                    JSR     PC,ERCHK        ;TO CHECK ERRORS
978  006754  004767  002574                    JSR     PC,TMCHK        ;GO SEE IF TM SET
979  006760  032767  002000  172016            BIT     #2000,UDES      ;SEE IF DONE PE
980  006766  001012                            BNE     FT16X           ;IF SO: BR
981  006770  005767  172016                    TST     NRZOF           ;SEE IF NRZ ONLY
982  006774  001007                            BNE     FT16X           ;IF SO: BR
983  006776  012767  002300  172000            MOV     #2300,UDES      ;SET PE, NORMAL
984  007004  004767  003072                    JSR     PC,INIT1        ;INITIALIZE
985  007010  000167  177604                    JMP     FT16B           ;DO IN PE
986  007014  004767  003012            FT16X:  JSR     PC,ITER         ;DO ITERATIONS
987  007020  000167  173562                    JMP     TSCD2           ;RETURN TO SCHEDULAR
988
```

```
                                                ;TAPE MARK SPACE TEST**********

007024  005067  171662          FT17:   CLR     RCNT
007030  012767  016477  171640          MOV     #MSFT17,EMADDR  ;SET HEADER
007036  012767  001700  171740          MOV     #1700,UDES      ;SET TO NRZ
007044  004767  002040          FT17A:  JSR     PC,RWND         ;REWIND TAPE
007050  012767  000027  171720  FT17B:  MOV     #27,FUN
007056  012767  040000  171640          MOV     #40000,RDYDX    ;SET DRY DELAY
007064  012767  040000  171634          MOV     #40000,OPDYX    ;SET OP DELAY
007072  004767  001660                  JSR     PC,EXEC         ;GO WRITE TM
007076  012767  102300  171642          MOV     #102300,STMSK   ;MASK DATA RELATED ERRORS
007104  012767  014312  171602          MOV     #MSG15,ERRP     ;SET ERROR TYPE
007112  004767  002070                  JSR     PC,ERCHK        ;GO CHECK ERROR
007116  005767  171656                  TST     SERFL           ;SEE IF ERROR
007122  001144                          BNE     FT17X           ;IF SO: BR
007124  004767  002424                  JSR     PC,TMCHK        ;GO SEE IF TM SET
007130  000240                          NOP
007132  000240                          NOP
007134  032767  000100  171550          BIT     #100,RCNT       ;SEE IF DONE PATTERN
007142  001046                          BNE     FT17D           ;IF SO: BR
007144  062767  000020  171540          ADD     #20,RCNT        ;ADD 20 TO RECORD COUNT
007152  016767  171534  171560          MOV     RCNT,TEMP1      ;SAVE RECORD COUNT
007160  012767  177600  171522          MOV     #-200,WCNT      ;WC=128
007166  012767  177400  171512          MOV     #-400,FCNT      ;FC=256
007174  012767  016760  171502          MOV     #WDATA,BADDR    ;BA=WRITE BUFFER
007202  012767  000061  171566          MOV     #61,FUN         ;SET WRITE OP CODE
007210  000240                  FT17C:  NOP
007212  000240                          NOP
007214  004767  001536                  JSR     PC,EXEC         ;GO WRITE
007220  012767  014222  171466          MOV     #MSG12,ERRP     ;SET ERROR CODE
007226  012767  102300  171512          MOV     #102300,STMSK   ;MASK DATA RELATED ERRORS
007234  004767  001746                  JSR     PC,ERCHK        ;GO CHECK ERROR
007240  005767  171534                  TST     SERFL           ;SEE IF ERROR
007244  001073                          BNE     FT17X           ;IF SO: BR
007246  005367  171466                  DEC     TEMP1           ;SEE IF DONE ALL
007252  001356                          BNE     FT17C           ;IF NOT: BR
007254  000167  177570                  JMP     FT17B           ;ELSE GO DO TM
007260  000240                  FT17D:  NOP
007262  012767  000033  171506          MOV     #33,FUN         ;SET SPACE REVERSE
007270  012767  014333  171416          MOV     #MSG16,ERRP     ;SET ERROR CODE
007276  012767  177600  171424  FT17D1: MOV     #-200,SCNT      ;SET TO 200 RECORDS
007304  012767  000005  171400          MOV     #5,RCNT         ;SET NUMBER OF OPS TO DO
007312  004767  002564          FT17E:  JSR     PC,INIT1        ;GO INIT
007316  004767  001434                  JSR     PC,EXEC         ;GO SPACE
007322  012767  001000  171416          MOV     #1000,STMSK     ;SET ERROR MASK
007330  004767  001652                  JSR     PC,ERCHK        ;GO CHECK ERROR
007334  005767  171440                  TST     SERFL           ;SEE IF ERROR
007340  001035                          BNE     FT17X           ;IF SO: BR
007342  004767  002206                  JSR     PC,TMCHK        ;GO SEE IF TM SET
007346  005367  171340                  DEC     RCNT            ;SEE IF DONE SPACES
007352  001357                          BNE     FT17E           ;IF NOT: BR
007354  022767  000031  171414          CMP     #31,FUN         ;SEE IF DONE FORWARD
007362  001410                          BEQ     FT17F           ;IF SO: BR
007364  012767  014353  171322          MOV     #MSG17,ERRP     ;SET ERROR CODE
007372  012767  000031  171376          MOV     #31,FUN         ;SET TO SPACE FORWARD
```

```
 1045  007400  000167  177672                    JMP     FT17D1          ;DO FORWARD
 1046  007404  032767  002000  171372  FT17F:    BIT     #2000,UDES      ;SEE IF DONE PE
 1047  007412  001010                            BNE     FT17Y           ;IF SO: BR
 1048  007414  005767  171372                    TST     NRZOF           ;SEE IF NRZ ONLT
 1049  007420  001005                            BNE     FT17X           ;IF SO: BR
 1050  007422  012767  002300  171354            MOV     #2300,UDES      ;SET TO PE
 1051  007430  000167  177410                    JMP     FT17A           ;GO PE
 1052  007434  000167  173146          FT17X:    JMP     TSCD2           ;RETURN  TO SCHEDULAR
```

```
1053
1054                                        ;WRITE CHECK TEST**********
1055
1056  007440  000240                FT20:   NOP
1057  007442  012767  016525  171226        MOV     #MSFT20,EMADDR  ;SET HEADER
1058  007450  004767  001434                JSR     PC,RWND         ;REWIND
1059  007454  012767  000003  171324        MOV     #3,PATRN
1060  007462  004767  002126                JSR     PC,DSUP         ;GO SET PATTERN 3
1061  007466  012767  016760  171210        MOV     #WDATA,BADDR    ;SET BA
1062  007474  012767  177400  171204        MOV     #-400,FCNT      ;SET FC
1063  007502  012767  177600  171200        MOV     #-200,WCNT      ;SET WC
1064  007510  012767  001700  171266        MOV     #1700,UDES      ;SET NRZ NORMAL
1065  007516  012767  000061  171252  FT20A: MOV     #61,FUN         ;SET WRITE OP CODE
1066  007524  004767  001226                JSR     PC,EXEC         ;GO WRITE RECORD
1067  007530  012767  015275  171156        MOV     #MSG46,ERRP     ;SET ERROR CODE
1068  007536  004767  001444                JSR     PC,ERCHK        ;GO CHECK ERROR
1069  007542  005767  171232                TST     SERFL           ;SEE IF ERORR
1070  007546  001050                        BNE     FT20X           ;IF SO: BR
1071  007550  012767  014333  171136        MOV     #MSG16,ERRP     ;SET REVERSE ERROR TAG
1072  007556  012767  000057  171212        MOV     #57,FUN         ;SET REVERSE WRITE CHECK OP-CODE
1073  007564  062767  000376  171112        ADD     #376,BADDR      ;SET BA FOR REVERSE CHECK
1074  007572  004767  001160                JSR     PC,EXEC         ;GO DO REVERSE CHECK
1075  007576  004767  001404                JSR     PC,ERCHK        ;GO CHECK ERROR
1076  007602  012767  014353  171104  FT20B: MOV     #MSG17,ERRP     ;SET FORWARD TAG
1077  007610  012767  000051  171160        MOV     #51,FUN         ;SET FORWARD CHECK OP CODE
1078  007616  162767  000376  171060        SUB     #376,BADDR      ;SET BA FOR FORWARD CHECK
1079  007624  004767  001126                JSR     PC,EXEC         ;GO DO FORWARD CHECK
1080  007630  004767  001352                JSR     PC,ERCHK        ;GO CHECK ERROR
1081  007634  032767  002000  171142  FT20C: BIT     #2000,UDES      ;SEE IF DONE PE
1082  007642  001012                        BNE     FT20X           ;IF SO: BR
1083  007644  005767  171142                TST     NRZOF           ;SEE IF NRZ ONLY
1084  007650  001007                        BNE     FT20X           ;IF SO: BR
1085  007652  012767  002300  171124        MOV     #2300,UDES      ;ELSE SET PE
1086  007660  004767  002216                JSR     PC,INIT1        ;GO INIT
1087  007664  000167  177626                JMP     FT20A           ;DO IN PE
1088  007670  004767  002136          FT20X: JSR     PC,ITER         ;DO ITERATIONS
1089  007674  000167  172706                JMP     TSCD2           ;RETURN TO SCHEDULAR
```

```
1090
1091                                        ;ERASE HEAD TEST*****
1092
1093  007700  012767  016556  170770  FT21:   MOV     #MSFT21,EMADDR  ;SET TEST HEADER
1094  007706  004767  001176                  JSR     PC,RWND         ;GO REWIND
1095  007712  012767  000003  171066          MOV     #3,PATRN
1096  007720  004767  001670                  JSR     PC,DSUP         ;GO SET PATTERN 3
1097  007724  012767  016760  170752          MOV     #WDATA,BADDR    ;SET BA=WRITE BUFFER
1098  007732  012767  176340  170746          MOV     #-1440,FCNT     ;SET FC=800
1099  007740  012767  177160  170742          MOV     #-620,WCNT      ;SET WC=400
1100  007746  012767  001700  171030          MOV     #1700,UDES      ;SET NRZ, NORMAL
1101  007754  012767  000061  171014          MOV     #61,FUN         ;SET WRITE OP-CODE
1102  007762  004767  000770                  JSR     PC,EXEC         ;GO DO WRITE 1
1103  007766  012767  014222  170720          MOV     #MSG12,ERRP     ;SET ERROR CODE
1104  007774  004767  001206                  JSR     PC,ERCHK        ;GO CHECK FOR ERROR
1105  010000  004767  000752                  JSR     PC,EXEC         ;YES DO WRITE 2
1106  010004  004767  001176                  JSR     PC,ERCHK        ;YES CHECK FOR ERROR
1107  010010  000240                          NOP
1108  010012  004767  001072                  JSR     PC,RWND         ;GO REWIND
1109  010016  012767  177160  170662          MOV     #-620,FCNT      ;SET FC=400
1110  010024  012767  177470  170656          MOV     #-310,WCNT      ;SET WC=200
1111  010032  004767  000720                  JSR     PC,EXEC         ;GO REWRITE RECORD 1-WH TO EH
1112  010036  000240          FT21A:  NOP
1113  010040  004767  001044                  JSR     PC,RWND         ;REWIND
1114  010044  012767  020472  170632          MOV     #RDATA,BADDR    ;SET BA=READ BUFFER
1115  010052  012767  177160  170626          MOV     #-620,FCNT      ;SET FC=400
1116  010060  012767  177470  170622          MOV     #-310,WCNT      ;SET WC=200
1117  010066  012767  000071  170702          MOV     #71,FUN         ;SET READ OP-CODE
1118  010074  004767  000656                  JSR     PC,EXEC         ;GO READ RECORD 1
1119  010100  012767  014265  170606          MOV     #MSG14,ERRP     ;SET ERROR CODE
1120  010106  004767  001074                  JSR     PC,ERCHK        ;GO CHECK FOR ERROR
1121  010112  000240                          NOP
1122  010114  052777  000010  170466          BIS     #10,@CS         ;INHIBIT BA INCREMENT
1123  010122  012767  176340  170556          MOV     #-1440,FCNT     ;SET FC=800
1124  010130  012767  177160  170552          MOV     #-620,WCNT      ;SET WC=400
1125  010136  004767  000614                  JSR     PC,EXEC         ;GO READ RECORD 2
1126  010142  022777  001440  170436          CMP     #1440,@FC       ;SEE IF READ RECORD 2
1127  010150  001423                          BEQ     FT21X           ;IF SO: BR
1128  010152  022777  001441  170426          CMP     #1441,@FC       ;++F CHECK FOR 801 FRAMES
1129  010160  001417                          BEQ     FT21X           ;++F IF SO: BR
1130  010162  012767  015242  170546          MOV     #MSG45,ERADD    ;++F SET ERROR CODE
1131  010170  022777  001440  170410          CMP     #1440,@FC       ;++F MORE THAN 801 FRAMES ?
1132  010176  101403                          BLOS    1$              ;++F IF SO: BR
1133  010200  012767  015173  170530          MOV     #MSG44,ERADD    ;++F SET ERROR CODE
1134  010206  012767  010036  170546  1$:     MOV     #FT21A,SCOLP    ;SET SCOPE ADDRESS
1135  010214  004767  173334                  JSR     PC,FT3ER        ;GO PRINT ERROR
1136  010220  004767  001606          FT21X:  JSR     PC,ITER         ;GO SEE IF ITERATION
1137  010224  000167  172356                  JMP     TSCD2           ;RETURN TO SCHEDULAR
1138
1139
```

```
1140                                                ;BUFFERED COMMAND TEST*****
1141
1142  010230  012767  016605  170440  FT22:   MOV     #MSFT22,EMADDR  ;SET TEST HEADER
1143  010236  004767  000646                  JSR     PC,RWND         ;GO REWIND
1144  010242  012700  000003                  MOV     #3,R0           ;SET NUMBER OF WRITES
1145  010246  012767  001700  170530          MOV     #1700,UDES      ;SET TO NRZ NORMAL
1146  010254  012767  016760  170422          MOV     #WDATA,BADDR    ;SET BA=WRITE BUFFER
1147  010262  012767  177000  170416          MOV     #-1000,FCNT     ;SET FC=1000
1148  010270  012767  177400  170412          MOV     #-400,WCNT      ;SET WC=400
1149  010276  012767  000061  170472          MOV     #61,FUN         ;SET WRITE OP-CODE
1150  010304  004767  000446          FT22A:  JSR     PC,EXEC         ;GO DO WRITE
1151  010310  005300                          DEC     R0              ;SEE IF DONE ALL
1152  010312  001374                          BNE     FT22A           ;IF NOT: BR
1153  010314  000240                          NOP
1154  010316  012777  000007  170254          MOV     #7,@C1          ;START REWIND
1155  010324  032777  000200  170260  FT22B:  BIT     #200,@DS
1156  010332  001774                          BEQ     FT22B
1157  010334  004767  001542                  JSR     PC,INIT1        ;INITIALIZE
1158  010340  012767  000010  170356          MOV     #10,RDYDX       ;SET LONG READY DELAY
1159  010346  004767  000404                  JSR     PC,EXEC         ;ISSUE BUFFERED WRITE
1160  010352  000240                          NOP
1161  010354  012767  015373  170332          MOV     #MSG49,ERRP     ;SET ERROR CODE
1162  010362  012767  102300  170356          MOV     #102300,STMSK   ;MARK DATA ERROR
1163  010370  004767  000612                  JSR     PC,ERCHK        ;GO CHECK ERROR
1164  010374  032777  000002  170210          BIT     #2,@DS          ;SEE IF BOT IS SET
1165  010402  001410                          BEQ     FT22X           ;IF NOT: BR
1166  010404  012767  015421  170324          MOV     #MSG50,ERADD    ;SET ERROR CODE
1167  010412  012767  010230  170342          MOV     #FT22,SCOLP
1168  010420  004767  173130                  JSR     PC,FT3ER        ;GO DO ERROR
1169  010424  004767  001402          FT22X:  JSR     PC,ITER         ;GO SEE IF ITERATION
1170  010430  000167  172152                  JMP     TSCD2           ;RETURN TO SCHEDULAR
1171
1172
```

```
1173                                            ;READ-IN PRESET TEST*****
1174
1175  010434  005767  170242          FT23:   TST     SLVN            ;SEE IF SLAVE SELECT=0
1176  010440  001103                  BNE     FT23X           ;IF NOT:BR
1177  010442  012767  016642  170226          MOV     #MSFT23,EMADDR  ;SET TEST HEADER
1178  010450  004767  001426                  JSR     PC,INIT1        ;GO INIT
1179  010454  012767  001700  170322          MOV     #1700,UDES      ;SET TO NRZ NORMAL
1180  010462  012767  016760  170214          MOV     #WDATA,BADDR    ;SET BA=WRITE BUFFER
1181  010470  012767  177400  170210          MOV     #-400,FCNT      ;SET FC=400
1182  010476  012767  177600  170204          MOV     #-200,WCNT      ;SET WC=200
1183  010504  012767  000061  170264          MOV     #61,FUN         ;SET WRITE OP-CODE
1184  010512  004767  000240                  JSR     PC,EXEC         ;GO DO WRITE
1185  010516  000240                  NOP
1186  010520  004767  001356                  JSR     PC,INIT1        ;INITIALIZE
1187  010524  012767  000021  170244          MOV     #21,FUN         ;SET READ-IN PRESET OP CODE
1188  010532  004767  000220                  JSR     PC,EXEC         ;GO DO COMMAND
1189  010536  005000                  CLR     R0
1190  010540  012703  000004                  MOV     #4,R3           ;SET MULT
1191  010544  032777  020000  170040  FT23A:  BIT     #20000,@DS      ;SEE IF PIP RESET
1192  010552  001404                  BEQ     FT23B           ;IF SO: BR
1193  010554  005300                  DEC     R0
1194  010556  001372                  BNE     FT23A           ;AWAIT PIP RESET
1195  010560  005303                  DEC     R3
1196  010562  001370                  BNE     FT23A           ;DELAY
1197  010564  032777  000002  170020  FT23B:  BIT     #2,@DS          ;SEE IF BOT
1198  010572  001010                  BNE     FT23C           ;IF SO: BR
1199  010574  012767  015457  170134          MOV     #MSG51,ERADD    ;SET ERROR CODE
1200  010602  012767  010434  170152          MOV     #FT23,SCOLP
1201  010610  004767  172740                  JSR     PC,FT3ER        ;GO DO ERROR
1202  010614  012701  141000          FT23C:  MOV     #141000,R1      ;SET EXPT TC
1203  010620  016700  170006                  MOV     TC,R0           ;SET TC ADDRESS
1204  010624  020110                  CMP     R1,(R0)         ;SEE IF EXPT=RCVD
1205  010626  001410                  BEQ     FT23X           ;IF SO: BR
1206  010630  012767  015513  170100          MOV     #MSG52,ERADD    ;SET ERROR CODE
1207  010636  012767  010434  170116          MOV     #FT23,SCOLP     ;CLEAR SCOPE ADDRESS
1208  010644  004767  172414                  JSR     PC,FT2ER        ;GO DO ERROR
1209  010650  000167  171732          FT23X:  JMP     TSCD2           ;RETURN TO SCHEDULAR
1210
1211
```

```
1212                                                ;REWIND: OFF LINE TEST*****
1213
1214  010654  032777  004000  167754  FT24:   BIT     #4000,@SWR      ;SEE IF IN CONTINUOUS MODE
1215  010662  001033                    BNE     FT24XX          ;IF SO: BR
1216  010664  012767  016675  170004            MOV     #MSFT24,EMADDR  ;SET TEST HEADER
1217  010672  004767  001204                    JSR     PC,INITI        ;GO INITIAIZE
1218  010676  012777  000003  167674            MOV     #3,@C.          ;ISSUE REWIND: OFF LINE COMMAND
1219  010704  012700  004000                    MOV     #4000,R0
1220  010710  005300                FT24A:  DEC     R0              ;DELAY
1221  010712  001376                    BNE     FT24A
1222  010714  032777  010000  167670            BIT     #10000,@DS      ;SEE IF MOL IS RESET
1223  010722  001407                    BEQ     FT24X           ;IF SO: BR
1224  010724  005067  170032                    CLR     SCOLP           ;ASSURE NO SCOPE
1225  010730  012767  015532  170000            MOV     #MSG53,ERADD    ;SET ERROR CODE
1226  010736  004767  172612                    JSR     PC,FT3ER        ;GO DO ERROR
1227  010742  012704  015556            FT24X:  MOV     #MSG54,R4
1228  010746  004767  001556                    JSR     PC,TTOUT        ;PRINT ON LINE REQUEST
1229  010752  000167  171630            FT24XX: JMP     TSCD2           ;RETURN TO SCHEDULAR
1230
1231
```

```
                                                ;COMMAND EXECUTE SUBROUTINE*****
                                        EXEC:   NOP
010756  000240                                    BIS     UDES,@TC        ;LOAD TAPE CONT
010760  056777  170020  167644                    MOV     WCNT,@WC        ;LOAD WC
010766  016777  167716  167606                    MOV     FCNT,@FC        ;LOAD FC
010774  016777  167706  167604                    MOV     BADDR,@BA       ;LOAD BA
011002  016777  167676  167574                    MOV     #31,FUN         ;SEE IF SPACE FORWARD
011010  022767  000031  167760                    CMP     EXECA           ;IF SO: BR
011016  001404                                    BEQ     #33,FUN         ;SEE IF SPACE REVERSE
011020  022767  000033  167750                    CMP     EXECB           ;IF NOT: BR
011026  001003                                    BNE     SCNT,@FC        ;SET SPACE COUNT
011030  016777  167674  167550        EXECA:      MOV
011036  000240                        EXECB:      NOP
011040  016777  167732  167532                    MOV     FUN,@C1         ;LOAD OP-CODE + GO
011046  000240                                    NOP
011050  016703  167650                            MOV     RDYDX,R3        ;SET DELAY
011054  005004                                    CLR     R4
011056  032777  000200  167526        EXECC:      BIT     #200,@DS        ;SEE IF DRY
011064  001004                                    BNE     EXECX           ;IF SO: BR
011066  005304                                    DEC     R4
011070  001372                                    BNE     EXECC
011072  005303                                    DEC     R3              ;DELAY FOR DRY
011074  001370                                    BNE     EXECC
011076  016703  167624                EXECX:      MOV     OPDYX,R3
011102  005303                        EXECXA:     DEC     R3              ;DELAY
011104  001376                                    BNE     EXECXA
011106  000207                        EXECXX:     RTS     PC              ;RETURN TO CALLER
```

```
1260                                            ;REWIND SUBROUTINE*****
1261
1262  011110  000240                  RWND:     NOP
1263  011112  004767  000764                    JSR     PC,INIT1        ;INIT
1264  011116  012777  000007  167454            MOV     #7,@C1          ;START REWIND
1265  011124  012700  040000                    MOV     #40000,R0
1266  011130  005300                  RWNDA:    DEC     R0
1267  011132  001376                            BNE     RWNDA           ;DELAY
1268  011134  032777  020000  167450  RWNDB:    BIT     #20000,@DS
1269  011142  001374                            BNE     RWNDB           ;AWAIT PIP
1270  011144  032777  000002  167440            BIT     #2,@DS          ;SEE IF BOT
1271  011152  001012                            BNE     RWNDX           ;IF SO: BR
1272  011154  016704  167516                    MOV     EMADDR,R4
1273  011160  004767  001344                    JSR     PC,TTOUT        ;PRINT HEADER
1274  011164  012704  013726                    MOV     #MSG2,R4
1275  011170  004767  001334                    JSR     PC,TTOUT        ;PRINT REWIND ERROR
1276  011174  000167  171406                    JMP     TSCD2           ;RETURN TO SECHEDULAR
1277  011200  004767  000676          RWNDX:    JSR     PC,INIT1        ;INIT
1278  011204  000207                            RTS     PC              ;RETURN TO CALLER
1279
```

```
1280                                        ;ERROR CHECK SUBROUTINE*****
1281
1282  011206  005067  167566          ERCHK:  CLR     SERFL           ;CLEAR FLAG
1283  011212  017767  167374  167532          MOV     @DS,DSAV        ;SAVE DRIVE STATUS REGISTER
1284  011220  032777  040000  167364          BIT     #40000,@DS      ;SEE IF ERROR
1285  011226  001001                          BNE     ERPT            ;IF SO: BR
1286  011230  000207                          RTS     PC              ;RETURN
1287  011232  017704  167356          ERPT:   MOV     @ER,R4          ;GET ERROR REGISTER
1288  011236  032767  002000  167540          BIT     #2000,UDES      ;SEE IF PE
1289  011244  001403                          BEQ     ERPTA1          ;IF SO: BR
1290  011246  042767  000200  167472          BIC     #200,STMSK      ;RESET PEF MASK
1291  011254  046704  167466          ERPTA1: BIC     STMSK,R4        ;MASK DONT CARE BITS
1292  011260  001530                          BEQ     ERPTX           ;IF NO UNEXPECTED ERRORS: BR
1293  011262  012767  000001  167510  ERPTG:  MOV     #1,SERFL        ;SET FLAG
1294  011270  032777  020000  167340          BIT     #20000,@SWR     ;SEE IF SHOULD PRINT ERRORS
1295  011276  001115                          BNE     ERPTD           ;IF NOT: BR
1296  011300  005767  167370                  TST     HDRFL           ;SEE IF DONE HEADER
1297  011304  001006                          BNE     ERPTA           ;IF SO: BR
1298  011306  005267  167362                  INC     HDRFL           ;SET HEADER FLAG
1299  011312  016704  167360                  MOV     EMADDR,R4
1300  011316  004767  001206                  JSR     PC,TTOUT        ;PRINT HEADER
1301  011322  016704  167366          ERPTA:  MOV     ERRP,R4         ;GET ERROR CODE
1302  011326  001414                          BEQ     ERPTB           ;IF NONE: BR
1303  011330  004767  001174                  JSR     PC,TTOUT        ;PRINT ERROR CODE
1304  011334  012704  014373                  MOV     #MSG20,R4       ;SET NRZ TAG
1305  011340  032777  002000  167264          BIT     #2000,@TC       ;SEE IF PE
1306  011346  001402                          BEQ     ERPT1A          ;IF NOT: BR
1307  011350  012704  014401                  MOV     #MSG21,R4       ;ELSE SET PE TAG
1308  011354  004767  001150          ERPT1A: JSR     PC,TTOUT        ;PRINT TAG
1309  011360  016704  167332          ERPTB:  MOV     ERRP1,R4        ;SEE IF CODE 2
1310  011364  001402                          BEQ     ERPTB1          ;IF NOT: BR
1311  011366  004767  001136                  JSR     PC,TTOUT        ;PRINT CODE 2
1312  011372  032777  010000  167236  ERPTB1: BIT     #10000,@SWR     ;SEE IF ITERATION
1313  011400  001010                          BNE     ERPTC           ;IF NOT: BR
1314  011402  012704  015645                  MOV     #MSG56,R4
1315  011406  004767  001116                  JSR     PC,TTOUT        ;PRINT ITER TAG
1316  011412  016703  167332                  MOV     ITCNT,R3
1317  011416  004767  001252                  JSR     PC,OCTP         ;PRINT ITERATION
1318  011422  012704  013640          ERPTC:  MOV     #MSG1,R4
1319  011426  004767  001076                  JSR     PC,TTOUT        ;PRINT REGISTER TAG
1320  011432  017703  167142                  MOV     @CS1,R3
1321  011436  004767  001220                  JSR     PC,OCTPE        ;PRINT CS1
1322  011442  017703  167134                  MOV     @WC,R3
1323  011446  004767  001210                  JSR     PC,OCTPE        ;PRINT WC
1324  011452  017703  167126                  MOV     @BA,R3
1325  011456  004767  001200                  JSR     PC,OCTPE        ;PRINT BA
1326  011462  017703  167120                  MOV     @FC,R3
1327  011466  004767  001170                  JSR     PC,OCTPE        ;PRINT FC
1328  011472  017703  167112                  MOV     @CS,R3
1329  011476  004767  001160                  JSR     PC,OCTPE        ;PRINT CS2
1330  011502  017703  167104                  MOV     @DS,R3
1331  011506  004767  001150                  JSR     PC,OCTPE        ;PRINT DS
1332  011512  017703  167076                  MOV     @ER,R3
1333  011516  004767  001140                  JSR     PC,OCTPE        ;PRINT ER
1334  011522  017703  167104                  MOV     @TC,R3
1335  011526  004767  001130                  JSR     PC,OCTPE        ;PRINT TC
```

```
 1336  011532  005777  167100          ERPTD:  TST     @SWR            ;SEE IF HALT ON ERROR
 1337  011536  100001                          BPL     ERPTX           ;IF NOT: BR
 1338  011540  000000                          HALT
 1339  011542  004767  001556          ERPTX:  JSR     PC,CKSWR                ;CHECK FOR CNTL G
 1340  011546  004767  000330                  JSR     PC,INIT1        ;INIT
 1341  011552  000207                  ERPTXX: RTS     PC              ;RETURN
 1342
 1343
```

```
1344                                                ;TAPE MARK STATUS CHECK**********
1345
1346  011554  032767  000004  167170  TMCHK:  BIT     #4,DSAV         ;SEE IF TM SET
1347  011562  001401                    BEQ     TMCHK1          ;IF NOT: BR
1348  011564  000207                    RTS     PC              ;ELSE RETURN
1349  011566  005767  167206            TST     SERFL           ;SEE IF HAD ERROR
1350  011572  001374                    BNE     TMCHK0          ;IF SO: BR
1351  011574  012767  015655  167114    MOV     #MSG57,ERRP1    ;SET ERROR CODE 2
1352  011602  004767  177454            JSR     PC,ERPTG        ;GO PRINT TM ERROR
1353  011606  005067  167104            CLR     ERRP1           ;CLEAR CODE 2 FLAG
1354  011612  000207                    RTS     PC              ;RETURN
1355
1356                                                ;DATA SETUP ROUTINE**********
1357
1358  011614  000240            DSUP:   NOP
1359  011616  012703  016760    DS0:    MOV     #WDATA,R3       ;R3 = ADDRS OF WRITE BUFFER
1360  011622  016701  167160            MOV     PATRN,R1        ;R1 = PATTERN SELECTOR
1361  011626  000241                    CLC
1362  011630  006101                    ROL     R1              ;MAKE PATTERN SELECTOR EVEN
1363  011632  000171  001026            JMP     @DATBL(R1)      ;GO GENERATE PATTERN
1364  011636  032777  010000  166762  DS1:    BIT     #10000,@DT      ;SEE IF SEVEN TRACK
1365  011644  001410                    BEQ     DS3             ;IF NOT: BR
1366  011646  012702  000640            MOV     #640,R2         ;SET BUFFER SIZE
1367  011652  012701  016760            MOV     #WDATA,R1       ;SET START OF BUFFER
1368  011656  042721  140300    DS2:    BIC     #140300,(R1)+   ;MASK FOR 7 CH
1369  011662  005302                    DEC     R2              ;SEE IF DONE
1370  011664  001374                    BNE     DS2             ;IF NOT: BR
1371  011666  012702  000640    DS3:    MOV     #640,R2         ;R2=BUFFER SIZE +2
1372  011672  012701  020472            MOV     #RDATA,R1       ;R1=READ DATA START
1373  011676  005021            DS4:    CLR     (R1)+           ;CLEAR BUFFER
1374  011700  005302                    DEC     R2              ;SEE IF DONE ALL
1375  011702  001375                    BNE     DS4             ;IF NOT: BR
1376  011704  000207                    RTS     PC              ;EXIT
1377
1378                                                ;ALL ONES**********
1379
1380  011706  012701  177777    DAT1:   MOV     #-1,R1          ;R1=DATA
1381  011712  012702  000640    DAT1A:  MOV     #640,R2         ;R2=WORD COUNT +2
1382  011716  010123            DAT1B:  MOV     R1,(R3)+        ;LOAD BUFFER
1383  011720  005302                    DEC     R2              ;SEE IF DONE
1384  011722  001375                    BNE     DAT1B           ;IF NOT: BR
1385  011724  000167  177706            JMP     DS1             ;RETURN
1386
1387                                                ;ALL ZEROS**********
1388
1389  011730  005001            DAT2:   CLR     R1              ;R1=DATA
1390  011732  000167  177754            JMP     DAT1A           ;LOAD BUFFER
1391
```

```
1392                                        ;ONE/ZERO IN ALTERNATING CHARACTERS**********
1393
1394  011736  012701  125125        DAT3:   MOV     #125125,R1      ;R1=DATA
1395  011742  000167  177744                JMP     DAT1A           ;LOAD BUFFER
1396
1397                                        ;ALL BITS 0-377**********
1398
1399  011746  005001                DAT4:   CLR     R1              ;R1=STARTING DATA
1400  011750  012702  001500                MOV     #1500,R2        ;R2=CHARACTER COUNT
1401  011754  110123                DAT4A:  MOVB    R1,(R3)+        ;LOAD BUFFER
1402  011756  105201                        INCB    R1              ;BUMP DATA
1403  011760  005302                        DEC     R2              ;SEE IF DONE
1404  011762  001374                        BNE     DAT4A           ;IF NOT: BR
1405  011764  000167  177646                JMP     DS1             ;RETURN
1406
1407
1408                                        ;SCOPE LOOP ON ERROR SUBROUTINE**********
1409
1410  011770  004767  001330        SCOPE:  JSR     PC,CKSWR                ;CHECK FOR CNTL G
1411  011774  000240                        NOP
1412  011776  032777  040000  166632        BIT     #40000,@SWR     ;SEE IF LOOP ON ERROR
1413  012004  001001                        BNE     SCOPE1          ;IF SO: BR
1414  012006  000207                        RTS     PC              ;ELSE EXIT
1415  012010  000240                SCOPE1: NOP
1416  012012  005767  166744                TST     SCOLP           ;SEE IF SCOPE ADDRESS
1417  012016  001001                        BNE     SCOPE2          ;IF NOT: BR
1418  012020  000207                        RTS     PC              ;ELSE EXIT
1419  012022  005726                SCOPE2: TST     (SP)+           ;RESET STACK
1420  012024  005726                        TST     (SP)+
1421  012026  000177  166730                JMP     @SCOLP          ;LOOP ON ERROR
1422
1423                                        ;TEST ITERATION SUBROUTINE**********
1424
1425  012032  004767  001266        ITER:   JSR     PC,CKSWR                ;CHECK FOR CNTL G
1426  012036  000240                        NOP
1427  012040  032777  010000  166570        BIT     #10000,@SWR     ;SEE IF ITERATIONS
1428  012046  001403                        BEQ     ITER1           ;IF SO: BR
1429  012050  005067  166674        ITER0:  CLR     ITCNT           ;CLEAR ITERATION COUNTER
1430  012054  000207                        RTS     PC              ;ELSE EXIT
1431  012056  005267  166666        ITER1:  INC     ITCNT           ;BUMP COUNTER
1432  012062  026767  166662  1665E        CMP     ITCNT,ITAMT     ;SEE IF DONE ALL
1433  012070  001767                        BEQ     ITER0           ;IF SO: BR
1434  012072  005726                        TST     (SP)+           ;RESET STACK
1435  012074  017700  166664                MOV     @ITRLP,R0       ;SET ITERATION POINTER
1436  012100  000110                        JMP     (R0)            ;GO ITERATE
1437
1438                                        ;INITIALIZE SUBROUTINE**********
1439
1440  012102  000240                INIT1:  NOP
1441  012104  012777  000040  166476        MOV     #40,@CS         ;INIT
1442  012112  016777  166562  166470 INIT2:  MOV     DRVN,@CS        ;SELECT DRIVE
1443  012120  016777  166556  166504        MOV     SLVN,@TC        ;SELECT SLAVE
1444  012126  000207                        RTS     PC              ;RETURN
1445
```

```
                                                ;MAG TAPE INTERRUPT HANDLER**********
                                        MTINT:  NOP
                                                CMP     (SP)+,(SP)+     ;RESET STACK POINTER
                                                NOP
                                                NOP
                                                JMP     @RTRN           ;RETURN TO CALLER

                                                ;TTY INTERRUPT HANDLER**********

                                        TTINT:  NOP
                                                NOP
                                                NOP
                                                RTI

                                                ;BUS ADDRESS TRAP HANDLER**********

                                        TRAP:   NOP
                                                BIT     #20000,@SWR     ;SEE IF SHOULD PRINT ERRORS
                                                BNE     TRAP2           ;IF NOT: BR
                                                TST     HDRFL           ;SEE IF DONE HEADER
                                                BNE     TRAP1           ;IF SO: BR
                                                INC     HDRFL           ;ELSE SET HEADER FLAG
                                                MOV     EMADDR,R4
                                                JSR     PC,TTOUT        ;PRINT HEADER
                                        TRAP1:  MOV     #MSG24,R4
                                                JSR     PC,TTOUT        ;PRINT ERROR
                                                MOV     R1,R3
                                                JSR     PC,OCTP         ;PRINT ADDRESS OF TRAP
                                        TRAP2:  TST     @SWR            ;SEE IF HALT ON ERROR
                                                BPL     TRAPX           ;IF NOT: BR
                                                HALT
                                        TRAPX:  JSR     PC,CKSWR                ;CHECK FOR CNTL G
                                                CMP     (SP)+,(SP)+     ;RESET STACK
                                                MOV     #FT1A,SCOLP     ;SET SCOPE ADDRESS
                                                JSR     PC,SCOPE        ;GO SEE IF SCOPE LOOP
                                                TST     RHTF            ;SEE IF INITIAL ADDRESS TEST
                                                BEQ     TRAPXX          ;IF NOT: BR
                                                JMP     STOB            ;ELSE REDO ADDRESS REQUEST
                                        TRAPXX: JMP     FT1B            ;RETURN TO TEST 1
```

```
1487                                    ;*********************************************************
1488                                    ;TTY ENTRY SUBROUTINE:
1489                                    ;
1490                                    ;THIS SUBROUTINE IS USED BY THE TEST CONDITION
1491                                    ;ENTRY ROUTINE TO READ THE RESPONSE ENTERED
1492                                    ;AT THE TTY AND CHECK THEM FOR LEGALITY AND
1493                                    ;LIMITS.  ALL RESPONSE MUST BE TYPED IN OCTAL
1494                                    ;(0-7) AND MUST FALL WITHIN THE LIMITS SET BY
1495                                    ;THE CALLING ROUTINE.
1496                                    ;IF AN ENTRY IS ILLEGAL OR OUTSIDE THE LIMITS,
1497                                    ;A QUESTION MARK IS TYPED (?) AND THE RESPONSE
1498                                    ;MAY BE REENTERED.
1499                                    ;ENTRIES MAY NOT EXCEED SIX (6) CHARACTERS AND
1500                                    ;MPY BE TERMINATED AT LESS THAN SIX BY TYPING A
1501                                    ;CARRIAGE RETURN
1502                                    ;*********************************************************
1503
1504  012274  005067  166440    TTR:    CLR     TEMP1           ;CLEAR FIRST CHARACTER FLAG
1505  012300  005000              TTR0: CLR     R0
1506  012302  004767  000152            JSR     PC,TTIN         ;GO READ CHARACTER
1507  012306  122767  000015  166354    CMPB    #15,TIB         ;SEE IF CR
1508  012314  001005                    BNE     TTR1            ;IF NOT: BR
1509  012316  005767  166416            TST     TEMP1           ;SEE IF FIRST CHARACTER
1510  012322  001446                    BEQ     TTR5            ;IF SO: BR
1511  012324  000167  000066            JMP     TTR2            ;ELSE GO LOAD VALUE
1512  012330  122767  000060  166332 TTR1: CMPB  #60,TIB         ;SEE IF CHAR IS LESS THAN 0
1513  012336  101402                    BLOS    TTR1A           ;IF NOT: BR
1514  012340  000167  000076            JMP     TINER           ;ELSE GO TO ERROR
1515  012344  122767  000070  166316 TTR1A: CMPB  #70,TIB        ;SEE IF CHAR IS GREATER THAN 7
1516  012352  101002                    BHI     TTR1B           ;IF NOT: BR
1517  012354  000167  000062            JMP     TINER           ;ELSE GO TO ERROR
1518  012360  005267  166354    TTR1B:  INC     TEMP1           ;SET FIRST CHARACTER FLAG
1519  012364  000241                    CLC
1520  012366  006100                    ROL     R0
1521  012370  000241                    CLC
1522  012372  006100                    ROL     R0              ;SHIFT 3 LEFT
1523  012374  000241                    CLC
1524  012376  006100                    ROL     R0
1525  012400  042767  177770  166262    BIC     #177770,TIB     ;STRIP ASCII
1526  012406  056700  166256            BIS     TIB,R0          ;LOAD CHARACTER
1527  012412  005301                    DEC     R1              ;SEE IF DONE
1528  012414  001332                    BNE     TTR0            ;IF NOT: BR
1529  012416  020002              TTR2: CMP     R0,R2           ;SEE IF EXCEEDED MAXIMUM LIMIT
1530  012420  101402                    BLOS    TTR3            ;IF NOT: BR
1531  012422  000167  000014            JMP     TINER           ;ELSE GO TO ERROR
1532  012426  020300              TTR3: CMP     R3,R0           ;SEE IF BELOW MINIMUM LIMIT
1533  012430  101402                    BLOS    TTR4            ;IF NOT: BR
1534  012432  000167  000004            JMP     TINER           ;ELSE GO TO ERROR
1535  012436  010015              TTR4: MOV     R0,(R5)         ;LOAD VALUE
1536  012440  000207              TTR5: RTS     PC              ;EXIT
1537
```

```
1538                                            ;TTY ENTRY ERROR SUBROUTINE**********
1539
1540  012442  012704  014132          TINER:  MOV     #MSG7,R4
1541  012446  004767  000056                  JSR     PC,TTOUT        ;PRINT?
1542  012452  162716  000020                  SUB     #20,(SP)        ;RESET SP TO START OF VALUE ROUTINE
1543  012456  000207                          RTS     PC              ;REDO VALUE ENTRY
1544
1545                                            ;TTY READ SUBROUTINE**********
1546
1547  012460  005077  166154          TTIN:   CLR     @TKS
1548  012464  005077  166152                  CLR     @TKB
1549  012470  105777  166144                  TSTB    @TKS
1550  012474  100375                          BPL     .-4
1551  012476  017767  166140  166164          MOV     @TKB,TIB
1552  012504  042767  177600  166156          BIC     #177600,TIB
1553  012512  105777  166126          TTIN2:  TSTB    @TPS
1554  012516  100375                          BPL     TTIN2
1555  012520  116777  166144  166120          MOVB    TIB,@TPB
1556  012526  000207                          RTS     PC
1557
1558                                            ;TTY OUTPUT SUBROUTINE************
1559
1560  012530  112467  166132          TTOUT:  MOVB    (R4)+,TOB
1561  012534  122767  000043  166124          CMPB    #43,TOB
1562  012542  001446                          BEQ     TEX
1563  012544  122767  000045  166114          CMPB    #45,TOB
1564  012552  001403                          BEQ     TCRLF
1565  012554  004767  000064                  JSR     PC,TOG
1566  012560  000763                          BR      TTOUT
1567  012562  112767  000015  166076  TCRLF:  MOVB    #15,TOB
1568  012570  004767  000050                  JSR     PC,TOG
1569  012574  012703  000004                  MOV     #4,R3
1570  012600  005067  166062          TCRLFA: CLR     TOB
1571  012604  004767  000034                  JSR     PC,TOG
1572  012610  005303                          DEC     R3
1573  012612  001372                          BNE     TCRLFA          ;DO FILLERS
1574  012614  112767  000012  166044          MOVB    #12,TOB
1575  012622  004767  000016                  JSR     PC,TOG
1576  012626  105767  166172                  TSTB    RDSW
1577  012632  100401                          BMI     1$
1578  012634  000735                          BR      TTOUT
1579  012636  005067  166162          1$:     CLR     RDSW
1580  012642  000406                          BR      TEX
1581  012644  105777  165774          TOG:    TSTB    @TPS
1582  012650  100375                          BPL     TOG
1583  012652  116777  166010  165766          MOVB    TOB,@TPB
1584  012660  000207                  TEX:    RTS     PC
1585
1586
```

```
                                        ;OCTAL OUTPUT SUBROUTINE************
                
012662 012767 000001 000222 OCTPE:  MOV     #1,OFL
012670 010304               OCTPE1: MOV     R3,R4           ;SEE IF NUMBER IS ZERO
012672 000410               OCTP:   BR      OCTP0
012674 005067 000212                CLR     OFL             ;CLEAR FLAG FOR LEADING ZERO
012700 010304                       MOV     R3,R4           ;SEE IF NUMBER IS ZERO
012702 001004                       BNE     OCTP0           ;IF NOT ZERO: BR
012704 004767 000162                JSR     PC,OCTPG1       ;ELSE PRINT ZERO
012710 000167 000120                JMP     OCTP3           ;SPACE AND EXIT
012714 032704 100000        OCTP0:  BIT     #100000,R4      ;SEE IF MSD = 1
012720 001406                       BEQ     OCTP1           ;IF NOT: BR
012722 012704 000001                MOV     #1,R4
012726 004767 000116                JSR     PC,OCTPG        ;PRINT 1
012732 000167 000006                JMP     OCTP2
012736 005004               OCTP1:  CLR     R4
012740 004767 000104                JSR     PC,OCTPG        ;PRINT 0
012744 010304               OCTP2:  MOV     R3,R4
012746 006004                       ROR     R4
012750 006004                       ROR     R4
012752 006004                       ROR     R4              ;POSITION DIGIT
012754 006004                       ROR     R4
012756 000304                       SWAB    R4
012760 004767 000064                JSR     PC,OCTPG        ;PRINT DIGIT 2
012764 010304                       MOV     R3,R4
012766 006004                       ROR     R4
012770 000304                       SWAB    R4
012772 004767 000052                JSR     PC,OCTPG        ;PRINT DIGIT 3
012776 010304                       MOV     R3,R4
013000 006104                       ROL     R4
013002 006104                       ROL     R4
013004 000304                       SWAB    R4
013006 004767 000036                JSR     PC,OCTPG        ;PRINT DIGIT 4
013012 010304                       MOV     R3,R4
013014 006004                       ROR     R4
013016 006004                       ROR     R4
013020 006004                       ROR     R4
013022 004767 000022                JSR     PC,OCTPG
013026 010304                       MOV     R3,R4
013030 004767 000014                JSR     PC,OCTPG        ;PRINT DIGIT 5
013034 012767 000240 165624 OCTP3:  MOV     #240,TOB
013042 004767 177576                JSR     PC,TOG          ;PRINT SPACE
013046 000207                       RTS     PC              ;EXIT
013050 042704 177770        OCTPG:  BIC     #177770,R4
013054 001004                       BNE     OCTPG0
013056 005767 000030                TST     OFL
013062 001001                       BNE     OCTPG0
013064 000207                       RTS     PC
013066 005267 000020        OCTPG0: INC     OFL
013072 052704 000260        OCTPG1: BIS     #260,R4
013076 010467 165564                MOV     R4,TOB
013102 004767 177536                JSR     PC,TOG
013106 010304                       MOV     R3,R4
013110 000207                       RTS     PC
013112 000000               OFL:    0                       ;FIRST CHAR FLAG
```

```
1643                                                    ;DATA CHARACTER OUTPUT SUBROUTINE************
1644
1645  013114  005067  165546          DOUT:   CLR     TOB
1646  013120  012704  000010                  MOV     #10,R4          ;SET NUMBER TO PRINT
1647  013124  110367  165536                  MOVB    R3,TOB
1648  013130  105777  165510          DOUT1:  TSTB    @TPS
1649  013134  100375                          BPL     DOUT1
1650  013136  132767  000200  165522          BITB    #200,TOB
1651  013144  001404                          BEQ     DOUT2
1652  013146  012777  000061  165472          MOV     #061,@TPB
1653  013154  000403                          BR      DOUT3
1654  013156  012777  000060  165462  DOUT2:  MOV     #060,@TPB
1655  013164  006167  165476          DOUT3:  ROL     TOB
1656  013170  005304                          DEC     R4
1657  013172  001356                          BNE     DOUT1
1658  013174  000207                          RTS     PC
1659  013176  016703  165542          DOUTD:  MOV     TEMP3,R3
1660  013202  000303                          SWAB    R3
1661  013204  004767  177704                  JSR     PC,DOUT
1662  013210  016703  165530                  MOV     TEMP3,R3
1663  013214  004767  177674                  JSR     PC,DOUT
1664  013220  000207                          RTS     PC
1665
1666                                                    ;TU16/TE16 SERIAL NUMBER PRINT SUBROUTINE**********
1667
1668  013222  010304                  SNPT:   MOV     R3,R4
1669  013224  000304                          SWAB    R4
1670  013226  006004                          ROR     R4
1671  013230  006004                          ROR     R4
1672  013232  006004                          ROR     R4
1673  013234  006004                          ROR     R4              ;GET FIRST DIGIT
1674  013236  004767  000036                  JSR     PC,SNPG         ;GO PRINT
1675  013242  010304                          MOV     R3,R4
1676  013244  000304                          SWAB    R4              ;GET SECOND DIGIT
1677  013246  004767  000026                  JSR     PC,SNPG         ;GO PRINT
1678  013252  010304                          MOV     R3,R4
1679  013254  006004                          ROR     R4
1680  013256  006004                          ROR     R4
1681  013260  006004                          ROR     R4
1682  013262  006004                          ROR     R4              ;GET THIRD DIGIT
1683  013264  004767  000010                  JSR     PC,SNPG         ;GO PRINT
1684  013270  010304                          MOV     R3,R4           ;GET FOURTH DIGIT
1685  013272  004767  000002                  JSR     PC,SNPG         ;GO PRINT
1686  013276  000207                          RTS     PC              ;EXIT
1687  013300  012767  000260  165360  SNPG:   MOV     #260,TOB        ;SET BASE = 0
1688  013306  042704  177760                  BIC     #177760,R4      ;MASK DIGIT
1689  013312  050467  165350                  BIS     R4,TOB          ;SET ASCII
1690  013316  004767  177322                  JSR     PC,TOG          ;TYPE DIGIT
1691  013322  000207                          RTS     PC              ;RETURN
1692
1693                                                    ;CKSWR ROUTINE THAT ALLOWS THE LOADING OF LOC.176, SWREG**********
1694                                                    ;FROM THE TTY AT SELECTED POINTS WITHIN THE PROGRAM**********
1695
1696  013324  022767  000176  165304  CKSWR:  CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
1697  013332  001041                          BNE     OUT                     ;NO, GET OUT
1698  013334  105777  165300                  TSTB    @TKS                    ;YES,WAIT FOR
```

```
1699  013340  100036                        BPL     OUT                     ;READY, GET CHARACTER
1700  013342  017767  165274  165320        MOV     @TKB,TIB                ;AND STRIP OFF
1701  013350  042767  177600  165312        BIC     #177600,TIB             ;THE GARBAGE
1702  013356  022767  000007  165304        CMP     #7,TIB          ;IS IT A ^G
1703  013364  001024                        BNE     OUT
1704  013366  012704  016731                MOV     #$CNTG,R4
1705  013372  004767  177132                JSR     PC,TTOUT
1706  013376  012704  016735        CNTLU:  MOV     #$MSWR,R4
1707  013402  004767  177122                JSR     PC,TTOUT
1708  013406  017703  165224                MOV     @SWR,R3
1709  013412  004767  177244                JSR     PC,OCTPE
1710  013416  012704  016744                MOV     #$MNEW,R4
1711  013422  004767  177102                JSR     PC,TTOUT
1712  013426  005037  001020                CLR     @#TEMPST
1713  013432  004767  000002                JSR     PC,$READ                ;GO READ A LINE
1714  013436  000207                OUT:    RTS     PC                      ;RETURN TO MAIN BODY OF PROGRAM
1715
1716  013440  005067  165354        $READ:  CLR     TEMPST
1717  013444  012767  000007  165350        MOV     #7,COUNT
1718  013452  004767  177002        1$:     JSR     PC,TTIN         ;GO  READ A CHARACTER
1719  013456  042767  177600  165204        BIC     #177600,TIB     ;STRIP OFF GARBAGE
1720  013464  122767  000025  165176        CMPB    #25,TIB         ;IS IT A ^U?
1721  013472  001002                        BNE     2$              ;BRANCH IF NOT
1722  013474  005726                3$:     TST     (SP)+           ;POP THE STACK
1723  013476  000737                        BR CNTLU                ;START OVER
1724  013500  122767  000015  165162  2$:     CMPB    #15,TIB         ;IS IT A <CR>?
1725  013506  001013                        BNE     4$              ;BRANCH IF NOT
1726  013510  012767  000200  165306        MOV     #200,RDSW
1727  013516  004767  177040                JSR     PC,TCRLF        ;ECHO IT WITH <LF>
1728  013522  022767  000007  165272        CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
1729  013530  001037                        BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
1730  013532  005726                8$:     TST     (SP)+           ;POP THE STACK
1731  013534  000740                        BR      OUT             ;GET OUT
1732  013536  122767  000060  165124  4$:     CMPB    #60,TIB
1733  013544  003004                        BGT     5$
1734  013546  122767  000067  165114        CMPB    #67,TIB
1735  013554  003005                        BGT     6$
1736  013556  012704  016754          5$:     MOV     #$QUEST,R4
1737  013562  004767  176742                JSR     PC,TTOUT
1738  013566  000742                        BR      3$              ;START OVER IF NOT LEGAL CHARACTER
1739  013570  006367  165224          6$:     ASL     TEMPST
1740  013574  006367  165220                ASL     TEMPST
1741  013600  006367  165214                ASL     TEMPST
1742  013604  142767  000060  165056        BICB    #60,TIB         ;GET NITTY-GRITTY
1743  013612  156767  165052  165200        BISB    TIB,TEMPST
1744  013620  005367  165176                DEC     COUNT           ;ONLY WANT 6   DIGITS
1745  013624  001754                        BEQ     5$
1746  013626  000711                        BR      1$
1747  013630  016777  165164  165000  7$:     MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
1748  013636  000735                        BR      8$
1749
```

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1750                                                    ;MESSAGE TABLE*****
1751
1752  013640  041445  030523  020040  MSG1:   .ASCII  /%CS1    WC     BA     FC     CS2    /
1753  013646  020040  041527  020040
1754  013654  020040  041040  020101
1755  013662  020040  020040  041506
1756  013670  020040  020040  041440
1757  013676  031123  020040  020040
1758  013704  051504  020040  020040          .ASCII  /DS     ER     TC%*/
1759  013712  042440  020122  020040
1760  013720  020040  041524  021445
1761  013726  051045  053505  047111  MSG2:   .ASCII  /%REWIND ERROR*/
1762  013734  020104  051105  047522
1763  013742  021522
1764  013744  022445  046524  031060  MSG3:   .ASCII  /%%TM02-TU16-TE16 BASIC FUNCTION TEST (DZTUB-F)%/
1765  013752  052055  030525  026466
1766  013760  042524  033061  041040
1767  013766  051501  041511  043040
1768  013774  047125  052103  047511
1769  014002  020116  042524  052123
1770  014010  024040  055104  052524
1771  014016  026502  024506     045
1772  014023     105  052116  051105          .ASCII  /ENTER CONDITIONS IN OCTAL%*/
1773  014030  041440  047117  044504
1774  014036  044524  047117  020123
1775  014044  047111  047440  052103
1776  014052  046101  021445
1777  014056  051045  043505  051511  MSG4:   .ASCII  /%REGISTER START = */
1778  014064  042524  020122  052123
1779  014072  051101  020124  020075
1780  014100     043
1781  014101     045  042526  052103  MSG5:   .ASCII  /%VECTOR = */
1782  014106  051117  036440  021440
1783  014114  042445  042116  047440  MSG6:   .ASCII  /%END OF PASS */
1784  014122  020106  040520  051523
1785  014130  021440
1786  014132  037440  021440          MSG7:   .ASCII  / ? */
1787  014136  021445                  MSG8:   .ASCII  /%*/
1788  014140  050045  051517  052111  MSG9:   .ASCII  /%POSITION ERROR: */
1789  014146  047511  020116  051105
1790  014154  047522  035122  021440
1791  014162  042045  044522  042526  MSG10:  .ASCII  /%DRIVE NUMBER: */
1792  014170  047040  046525  042502
1793  014176  035122  021440
1794  014202  051445  040514  042526  MSG11:  .ASCII  /%SLAVE NUMBER: */
1795  014210  047040  046525  042502
1796  014216  035122  021440
1797  014222  053445  044522  042524  MSG12:  .ASCII  /%WRITE ERROR */
1798  014230  042440  051122  051117
1799  014236  021440
1800  014240  051045  040505  020104  MSG13:  .ASCII  /%READ REVERSE ERROR */
1801  014246  042522  042526  051522
1802  014254  020105  051105  047522
1803  014262  020122     043
1804  014265     045  042522  042101  MSG14:  .ASCII  /%READ FORWARD ERROR */
1805  014272  043040  051117  040527
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1806  014300  042122  042440  051122
1807  014306  051117  021440
1808  014312  053445  044522  042524  MSG15:  .ASCII  /%WRITE TM ERROR #/
1809  014320  052040  020115  051105
1810  014326  047522  020122     043
1811  014333     045  042522  042526  MSG16:  .ASCII  /%REVERSE ERROR #/
1812  014340  051522  020105  051105
1813  014346  047522  020122     043
1814  014353     045  047506  053522  MSG17:  .ASCII  /%FORWARD ERROR #/
1815  014360  051101  020104  051105
1816  014366  047522  020122     043
1817  014373     040  051116  020132  MSG20:  .ASCII  / NRZ #/
1818  014400     043
1819  014401     040  042520  021440  MSG21:  .ASCII  / PE #/
1820  014406  042440  050130  035124  MSG22:  .ASCII  / EXPT: #/
1821  014414  021440
1822  014416  051040  053103  035104  MSG23:  .ASCII  / RCVD: #/
1823  014424  021440
1824  014426  041045  051525  052040  MSG24:  .ASCII  /%BUS TRAP: #/
1825  014434  040522  035120  021440
1826  014442  053445  035103  021440  MSG25:  .ASCII  /%WC: #/
1827  014450  041045  035101  021440  MSG26:  .ASCII  /%BA: #/
1828  014456  042045  035102  021440  MSG27:  .ASCII  /%DB: #/
1829  014464  044445  044516  020124  MSG28:  .ASCII  /%INIT DID NOT CLEAR RH #/
1830  014472  044504  020104  047516
1831  014500  020124  046103  040505
1832  014506  020122  044122  021440
1833  014514  051445  020103  047516  MSG29:  .ASCII  /%SC NOT RESET BY INIT #/
1834  014522  020124  042522  042523
1835  014530  020124  054502  044440
1836  014536  044516  020124     043
1837  014543     045  051124  020105  MSG30:  .ASCII  /%TRE NOT RESET BY INIT #/
1838  014550  047516  020124  042522
1839  014556  042523  020124  054502
1840  014564  044440  044516  020124
1841  014572     043
1842  014573     045  051503  020062  MSG31:  .ASCII  /%CS2 NOT RESET BY INIT #/
1843  014600  047516  020124  042522
1844  014606  042523  020124  054502
1845  014614  044440  044516  020124
1846  014622     043
1847  014623     045  046104  020124  MSG32:  .ASCII  /%DLT NOT SET #/
1848  014630  047516  020124  042523
1849  014636  020124     043
1850  014641     045  041523  047040  MSG33:  .ASCII  /%SC NOT SET #/
1851  014646  052117  051440  052105
1852  014654  021440
1853  014656  052045  042522  047040  MSG34:  .ASCII  /%TRE NOT SET #/
1854  014664  052117  051440  052105
1855  014672  021440
1856  014674  044445  020122  047516  MSG35:  .ASCII  /%IR NOT SET BY INIT #/
1857  014702  020124  042523  020124
1858  014710  054502  044440  044516
1859  014716  020124     043
1860  014721     045  051117  047040  MSG36:  .ASCII  /%OR NOT RESET BY INIT #/
1861  014726  052117  051040  051505
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1862  014734  052105  041040  020131
1863  014742  047111  052111  021440
1864  014750  047445  020122  047516  MSG37:  .ASCII  /%OR NOT RESET BY 1 SILO ENTRY #/
1865  014756  020124  042522  042523
1866  014764  020124  054502  030440
1867  014772  051440  046111  020117
1868  015000  047105  051124  020131
1869  015006     043
1870  015007     045  051117  047040  MSG38:  .ASCII  /%OR NOT SET BY SILO FULL #/
1871  015014  052117  051440  052105
1872  015022  041040  020131  044523
1873  015030  047514  043040  046125
1874  015036  020114     043
1875  015041     045  040502  020104  MSG39:  .ASCII  /%BAD SILO READ #/
1876  015046  044523  047514  051040
1877  015054  040505  020104     043
1878  015061     045  051111  047040  MSG40:  .ASCII  /%IR NOT RESET BY SILO FULL#/
1879  015066  052117  051040  051505
1880  015074  052105  041040  020131
1881  015102  044523  047514  043040
1882  015110  046125  021514
1883  015114  047040  047117  042455  MSG41:  .ASCII  / NON-EXIST DRIVE#/
1884  015122  044530  052123  042040
1885  015130  044522  042526     043
1886  015135     040  047516  026516  MSG42:  .ASCII  / NON-EXIST SLAVE#/
1887  015142  054105  051511  020124
1888  015150  046123  053101  021505
1889  015156  051440  051105  040511  MSG43:  .ASCII  / SERIAL NO: #/
1890  015164  020114  047516  020072
1891  015172     043
1892  015173     045  051105  051501  MSG44:  .ASCII  /%ERASE HEAD INOPERATIVE/
1893  015200  020105  042510  042101
1894  015206  044440  047516  042520
1895  015214  040522  044524  042526
1896  015222  041445  042510  045503          .ASCII  /%CHECK POLARITY#/
1897  015230  050040  046117  051101
1898  015236  052111  021531
1899  015242  042445  040522  042523  MSG45:  .ASCII  /%ERASE HEAD POLARITY WRONG#/
1900  015250  044040  040505  020104
1901  015256  047520  040514  044522
1902  015264  054524  053440  047522
1903  015272  043516     043
1904  015275     045  042523  026524  MSG46:  .ASCII  /%SET-UP WRITE ERROR#/
1905  015302  050125  053440  044522
1906  015310  042524  042440  051122
1907  015316  051117     043
1908  015321     045  050123  041501  MSG47:  .ASCII  /%SPACE FORWARD ERROR#/
1909  015326  020105  047506  053522
1910  015334  051101  020104  051105
1911  015342  047522  021522
1912  015346  051445  040520  042503  MSG48:  .ASCII  /%SPACE REVERSE ERROR#/
1913  015354  051040  053105  051105
1914  015362  042523  042440  051122
1915  015370  051117     043
1916  015373     045  052502  043106  MSG49:  .ASCII  /%BUFFERED WRITE ERROR#/
1917  015400  051105  042105  053440
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1918  015406  044522  042524  042440
1919  015414  051122  051117     043
1920  015421     045  047502  020124  MSG50:  .ASCII  /%BOT SET AFTER BUFFERED WRITE#/
1921  015426  042523  020124  043101
1922  015434  042524  020122  052502
1923  015442  043106  051105  042105
1924  015450  053440  044522  042524
1925  015456     043
1926  015457     045  047516  041040  MSG51:  .ASCII  /%NO BOT FROM READ IN PRESET#/
1927  015464  052117  043040  047522
1928  015472  020115  042522  042101
1929  015500  044440  020116  051120
1930  015506  051505  052105     043
1931  015513     045  041524  044440  MSG52:  .ASCII  /%TC INCORRECT #/
1932  015520  041516  051117  042522
1933  015526  052103  021440
1934  015532  051445  040514  042526  MSG53:  .ASCII  /%SLAVE NOT OFF LINE#/
1935  015540  047040  052117  047440
1936  015546  043106  046040  047111
1937  015554  021505
1938  015556  022445  042522  042523  MSG54:  .ASCII  /%%RESET SLAVE TO ON LINE BEFORE CONTINUING#/
1939  015564  020124  046123  053101
1940  015572  020105  047524  047440
1941  015600  020116  044514  042516
1942  015606  041040  043105  051117
1943  015614  020105  047503  052116
1944  015622  047111  044525  043516
1945  015630     043
1946  015631     045  051116  020132  MSG55:  .ASCII  /%NRZ ONLY: #/
1947  015636  047117  054514  020072
1948  015644     043
1949  015645     040  052111  051105  MSG56:  .ASCII  / ITER: #/
1950  015652  020072     043
1951  015655     045  046524  047040  MSG57:  .ASCII  /%TM NOT SET#/
1952  015662  052117  051440  052105
1953  015670     043
1954  015671     045  044505  044124  MSG60:  .ASCII  /%EITHER TAPE NOT ERASED OR OPI PROBLEM#/
1955  015676  051105  052040  050101
1956  015704  020105  047516  020124
1957  015712  051105  051501  042105
1958  015720  047440  020122  050117
1959  015726  020111  051120  041117
1960  015734  042514  021515
1961  015740  051045  030510  020061  MSG61:  .ASCII  /%RH11 OR RH70: #/
1962  015746  051117  051040  033510
1963  015754  035060  021440
1964  015760  051045  020110  047117  MSG62:  .ASCII  /%RH ONLY: #/
1965  015766  054514  020072     043
1966
```

```
                                                        ;TEST HEADERS*****
                                                
015773    045  043045  030524  MSFT1:  .ASCII  /%%FT1:RH ADDRESSING #/
016000  051072  020110  042101
016006  051104  051505  044523
016014  043516  021440
016020  022445  052106  035062  MSFT2:  .ASCII  /%%FT2:RH REGISTER BITS TEST #/
016026  044122  051040  043505
016034  051511  042524  020122
016042  044502  051524  052040
016050  051505  020124     043
016055     045  043045  031524  MSFT3:  .ASCII  /%%FT3:RH INITIALIZE TEST #/
016062  051072  020110  047111
016070  052111  040511  044514
016076  042532  052040  051505
016104  020124     043
016107     045  043045  032124  MSFT4:  .ASCII  /%%FT4:RH11 SILO TEST 1 #/
016114  051072  030510  020061
016122  044523  047514  052040
016130  051505  020124  020061
016136     043
016137     045  043045  032524  MSFT5:  .ASCII  /%%FT5:RH11 SILO TEST 2 #/
016144  051072  030510  020061
016152  044523  047514  052040
016160  051505  020124  020062
016166     043
016167     045  043045  033124  MSFT6:  .ASCII  /%%FT6:RH11 SILO TEST 3 #/
016174  051072  030510  020061
016202  044523  047514  052040
016210  051505  020124  020063
016216     043
016217     045  043045  033524  MSFT7:  .ASCII  /%%FT7:RH11 SILO TEST 4 #/
016224  051072  030510  020061
016232  044523  047514  052040
016240  051505  020124  020064
016246     043
016247     045  043045  030524  MSFT10: .ASCII  /%%FT10:RH11 SILO TEST 5 #/
016254  035060  044122  030461
016262  051440  046111  020117
016270  042524  052123  032440
016276  021440
016300  022445  052106  030461  MSFT11: .ASCII  /%%FT11:NOP TEST#/
016306  047072  050117  052040
016314  051505  021524
016320  022445  052106  031061  MSFT12: .ASCII  /%%FT12:REWIND TEST#/
016326  051072  053505  047111
016334  020104  042524  052123
016342     043
016343     045  043045  030524  MSFT13: .ASCII  /%%FT13:WRITE-READ TEST#/
016350  035063  051127  052111
016356  026505  042522  042101
016364  052040  051505  021524
016372  022445  052106  032061  MSFT14: .ASCII  /%%FT14:SPACE TEST#/
016400  051472  040520  042503
016406  052040  051505  021524
016414  022445  052106  032461  MSFT15: .ASCII  /%%FT15:ERASE TEST#/
```

```
2023  016422  042472  040522  042523
2024  016430  052040  051505  021524
2025  016436  022445  052106  033061  MSFT16: .ASCII  /%%FT16:TAPE MARK WRITE-READ TEST#/
2026  016444  052072  050101  020105
2027  016452  040515  045522  053440
2028  016460  044522  042524  051055
2029  016466  040505  020104  042524
2030  016474  052123     043
2031  016477     045  043045  030524  MSFT17: .ASCII  /%%FT17:TM SPACE TEST #/
2032  016504  035067  046524  051440
2033  016512  040520  042503  052040
2034  016520  051505  020124     043
2035  016525     045  043045  031124  MSFT20: .ASCII  /%%FT20:WRITE CHECK TEST #/
2036  016532  035060  051127  052111
2037  016540  020105  044103  041505
2038  016546  020113  042524  052123
2039  016554  021440
2040  016556  022445  052106  030462  MSFT21: .ASCII  /%%FT21:ERASE HEAD TEST#/
2041  016564  042472  040522  042523
2042  016572  044040  040505  020104
2043  016600  042524  052123     043
2044  016605     045  043045  031124  MSFT22: .ASCII  /%%FT22:BUFFERED COMMAND TEST#/
2045  016612  035062  052502  043106
2046  016620  051105  042105  041440
2047  016626  046517  040515  042116
2048  016634  052040  051505  021524
2049  016642  022445  052106  031462  MSFT23: .ASCII  /%%FT23:READ IN PRESET TEST#/
2050  016650  051072  040505  020104
2051  016656  047111  050040  042522
2052  016664  042523  020124  042524
2053  016672  052123     043
2054  016675     045  043045  031124  MSFT24: .ASCII  /%%FT24:REWIND-OFF LINE TEST#/
2055  016702  035064  042522  044527
2056  016710  042116  047455  043106
2057  016716  046040  047111  020105
2058  016724  042524  052123     043
2059  016731     045  043536     043  $CNTG:  .ASCII  /%↑G#/
2060  016735     045  053523  036522  $MSWR:  .ASCII  /%SWR= #/
2061  016742  021440
2062  016744  020040  042516  036527  $MNEW:  .ASCII  /  NEW= #/
2063  016752  021440
2064  016754  022477     043          $QUEST: .ASCII  /?%#/
2065
2066
2067          016760                          .EVEN
2068  016760  000000                  WDATA:  0
2069          020472                          .=.+1510
2070  020472  000000                  RDATA:  0
2071
2072          000001                          .END
```

```
AS      000616          137#
BA      000604          132#    474     1238#   1324
BADDR   000704          169#    732#    750#    774#    783#    784#    791#    867#    930#    1014#   1061#   1073#   1078#
                        1097#   1114#   1146#   1180#   1238
BTRP    000662          158#    444#    454#
BTRP2   000664          159#    445#
CC      000620          138#
CKSWR   013324          410     437     677     914     1339    1410    1425    1478    1696#
CNTLU   013376          286     1706#   1723
COUNT   001022          208#    1717#   1728    1744#
CRCNT   001002          200#
CS      000610          134#    334#    335#    337     349#    350#    531#    542     571#    573     598     602     607
                        613     637     641     691     705#    710#    714     824#    1122#   1328    1441#   1442#
C1      000600          130#    315     336     447     534     538     575     577     1154#   1218#   1245#   1264#   1320
DATAO   001030          214#
DATA1   001032          215#
DATA2   001034          216#
DATA3   001036          217#
DATBL   001026          213#    1363
DAT1    011706          214     1380#
DAT1A   011712          1381#   1390    1395
DAT1B   011716          1382#   1384
DAT2    011730          215     1389#
DAT3    011736          216     1394#
DAT4    011746          217     1399#
DAT4A   011754          1401#   1404
DB      000622          139#    483     572     606#    611#    633#    646     688#    707#    711#    712     713
DOUT    013114          1645#   1661    1663
DOUTD   013176          1659#
DOUT1   013130          1648#   1649    1657
DOUT2   013156          1651    1654#
DOUT3   013164          1653    1655#
DRVN    000700          167#    329     335     350     1442
DRVTP   000652          154#
DS      000612          135#    754     1155    1164    1191    1197    1222    1249    1268    1270    1283    1284    1330
DSAV    000752          188#    1283#   1346
DSUP    011614          769     1060    1096    1358#
DSO     011616          1359#
DS1     011636          1364#   1385    1405
DS2     011656          1368#   1370
DS3     011666          1365    1371#
DS4     011676          1373#   1375
DT      000626          141#    352     1364
EMADDR  000676          166#    443#    463#    503     528#    554     570#    595#    629#    661     684#    703#    738#
                        756#    767#    812#    928#    957#    993#    1057#   1093#   1142#   1177#   1216#   1272    1299
                        1469
ER      000614          136#    1287    1332
ERADD   000736          182#    471#    480#    491#    506     536#    540#    546#    557     581#    583#    585#    600#
                        604#    609#    617#    639#    643#    695#    721#    1130#   1133#   1166#   1199#   1206#   1225#
ERCHK   011206          739     757     779     788     796     828     846     856     936     950     966     972     977
                        1002    1021    1035    1068    1075    1080    1104    1106    1120    1163    1282#
ERPT    011232          1285    1287#
ERPTA   011322          1297    1301#
ERPTA1  011254          1289    1291#
ERPTB   011360          1302    1309#
ERPTB1  011372          1310    1312#
```

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ERPTC   011422          1313    1318#
ERPTD   011532          1295    1336#
ERPTG   011262          1293#   1352
ERPTX   011542          1292    1337    1339#
ERPTXX  011552          1341#
ERPT1A  011354          1306    1308#
ERRP    000714           173#    402#    776#    786#    793#    827#    845#    855#    935#    948#    965#    971#    976#
                        1001#   1019#   1029#   1043#   1067#   1071#   1076#   1103#   1119#   1161#   1301
ERRP1   000716           174#   1309    1351#   1353#
EXEC    010756           736     752     777     787     795     825     844     854     869     877     934     946     963
                         969     975     999    1018    1033    1066    1074    1079    1102    1105    1111    1118    1125
                        1150    1159    1184    1188    1234#
EXECA   011030          1240    1243#
EXECB   011036          1242    1244#
EXECC   011056          1249#   1252    1254
EXECX   011076          1250    1255#
EXECXA  011102          1256#   1257
EXECXX  011106          1258#
EXFL    000766           194#
FC      000606           133#    872     879     908    1126    1128    1131    1237#   1243#   1326
FCNT    000706           170#    730#    748#    772#    817#    832#    833     960#   1013#   1062#   1098#   1109#   1115#
                        1123#   1147#   1181#   1237
FT1     002774           223     224     443#
FT1A    003026           448#    453    1480
FT1B    003032           450#   1485
FT1X    003044           451     454#
FT1XX   003070           456     459#
FT10    004550           237     238     701#    704
FT10A   004604           707#    709
FT10ER  004670           715     721#
FT10X   004646           702     716#    723
FT10XX  004664           718     720#
FT11    004704           239     240     726#    727
FT12    005022           241     242     744#    745
FT12A   005102           754#    755
FT13    005134           243     244     763#
FT13A   005206           771#    807
FT13B   005250           777#    781
FT13C   005330           787#    790
FT13D   005376           795#    798
FT13E   005450           803     806#
FT13X   005462           800     805     808#
FT14    005466           245     246     811#
FT14A   005540           819#    837
FT14A1  005504           814#    920
FT14A2  005634           830     832#
FT14A3  005660           834     836#
FT14B   005714           843#    865
FT14EC  006132           874     881#
FT14RE  006140           873     880     883#
FT14RF  006104           859     875#
FT14RR  006042           849     866#
FT14R0  006212           892     894#
FT14R1  006234           896     899#
FT14R2  006240           898     900#
FT14R3  006312           885     911#
```

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FT14X   006322   831     848     853     858     862     912     914#
FT14XX  006356   916     918     921#
FT15    006362   247     248     924#
FT15A   006432   932#
FT15B   006446   934#    940
FT15X   006556   938     951#
FT16    006562   249     250     954#
FT16A   006614   959#
FT16B   006620   960#    985
FT16X   007014   980     982     986#
FT17    007024   251     252     992#
FT17A   007044   995#   1051
FT17B   007050   996#   1026
FT17C   007210  1016#   1025
FT17D   007260  1009    1027#
FT17D1  007276  1030#   1045
FT17E   007312  1032#   1040
FT17F   007404  1042    1046#
FT17X   007434  1004    1023    1037    1047    1049    1052#
FT2     003074   225     226     463#
FT2A    003106   465#    472     497
FT2B    003146   470     474#    481
FT2C    003206   479     483#    492
FT2D    003222   487#    488
FT2E    003252   490     494#
FT2ER   003264   473     482     493     498#    1208
FT2ERA  003314   502     505#
FT2ERB  003366   500     516#
FT2ERC  003376   517     519#
FT2X    003406   495     522#
FT20    007440   253     254     1056#
FT20A   007516  1065#   1087
FT20B   007602  1076#
FT20C   007634  1081#
FT20X   007670  1070    1082    1084    1088#
FT21    007700   255     256     1093#
FT21A   010036  1112#   1134
FT21X   010220  1127    1129    1136#
FT22    010230   257     258     1142#   1167
FT22A   010304  1150#   1152
FT22B   010324  1155#   1156
FT22X   010424  1165    1169#
FT23    010434   259     260     1175#   1200    1207
FT23A   010544  1191#   1194    1196
FT23B   010564  1192    1197#
FT23C   010614  1198    1202#
FT23X   010650  1176    1205    1209#
FT24    010654   261     262     1214#
FT24A   010710  1220#   1221
FT24X   010742  1223    1227#
FT24XX  010752  1215    1229#
FT3     003420   227     228     528#    529
FT3A    003474   535     538#
FT3B    003516   539     542#
FT3ER   003554   537     541     547     550#    588     621     655     696     722     1135    1168    1201    1226
FT3ERA  003606   553     557#
```

```
FT3ERB  003616            551     559#
FT3ERC  003626            560     562#
FT3X    003544            545     548#
FT4     003636            229     230     568#    587
FT4ER   003720            574     581#
FT4ERA  003730            576     583#
FT4ERB  003740            578     585#
FT4ERC  003746            582     584     586#
FT4X    003710            579#    589
FT5     003764            231     232     593#
FT5A    004006            596     597#
FT5B    004034            599     602#
FT5C    004056            603     606#
FT5D    004106            608     611#
FT5E    004120            613#    616
FT5ER   004156            601     605     610     618     621#
FT5X    004146            569     594     614     619#
FT6     004166            233     234     627#
FT6A    004210            630     631#
FT6B    004216            633#    636
FT6C    004254            638     641#
FT6D    004276            642     645#
FT6DE   004340            648     657#
FT6DEA  004372            664#
FT6DEB  004436            659     674#
FT6DEX  004446            675     677#
FT6E    004300            646#    651
FT6ER   004330            640     644     654#
FT6X    004320            628     652#
FT7     004454            235     236     682#    685
FT7A    004506            688#    690
FT7ER   004534            692     695#
FT7X    004524            683     693#    697
FUN     000776            198#    735#    751#    775#    785#    792#    822#    843#    851#    868#    875#    895     932#
                          944#    962#    968#    974#    996#    1015#   1028#   1041    1044#   1065#   1072#   1077#   1101#
                          1117#   1149#   1183#   1187#   1239    1241    1245
HDRFL   000674            165#    403#    501     505#    552     556#    660     663#    1296    1298#   1466    1468#
INIT1   012102            465     530     533     597     631     686     728     746     819     881     984     1032    1086
                          1157    1178    1186    1217    1263    1277    1340    1440#
INIT2   012112            1442#
ITAMT   000654            155#    1432
ITCNT   000750            187#    1316    1429#   1431#   1432
ITER    012032            523     548     579     619     652     693     716     740     758     986     1088    1136    1169
                          1425#
ITER0   012050            1429#   1433
ITER1   012056            1428    1431#
ITRLP   000764            193#    395#    396#    427#    428#    1435
LTADD   000774            197#    393#    394#    395     397     404     425#    426#    427
MR      000624            140#
MSFT1   015773            443     1969#
MSFT10  016247            703     2003#
MSFT11  016300            738     2008#
MSFT12  016320            756     2011#
MSFT13  016343            767     2015#
MSFT14  016372            812     886     2019#
MSFT15  016414            928     2022#
```

```
MSFT16  016436   957  2025#
MSFT17  016477   993  2031#
MSFT2   016020   463  1973#
MSFT20  016525  1057  2035#
MSFT21  016556  1093  2040#
MSFT22  016605  1142  2044#
MSFT23  016642  1177  2049#
MSFT24  016675  1216  2054#
MSFT3   016055   528  1978#
MSFT4   016107   570  1983#
MSFT5   016137   595  1988#
MSFT6   016167   629  1993#
MSFT7   016217   684  1998#
MSG1    013640  1318  1752#
MSG10   014162   327  1791#
MSG11   014202   342  1794#
MSG12   014222   776   965  1019  1103  1797#
MSG13   014240   786   971  1800#
MSG14   014265   793   976  1119  1804#
MSG15   014312  1001  1808#
MSG16   014333   899  1029  1071  1811#
MSG17   014353   897  1043  1076  1814#
MSG2    013726  1274  1761#
MSG20   014373   890  1304  1817#
MSG21   014401   893  1307  1819#
MSG22   014406   508   666   901  1820#
MSG23   014416   512   670   906  1822#
MSG24   014426  1471  1824#
MSG25   014442   471  1826#
MSG26   014450   480  1827#
MSG27   014456   491  1828#
MSG28   014464  1829#
MSG29   014514   536  1833#
MSG3    013744   290  1764#
MSG30   014543   540  1837#
MSG31   014573   546  1842#
MSG32   014623   581   695   721  1847#
MSG33   014641   583  1850#
MSG34   014656   585  1853#
MSG35   014674   600  1856#
MSG36   014721   604  1860#
MSG37   014750   609   617  1864#
MSG38   015007   643  1870#
MSG39   015041   664  1875#
MSG4    014056   292  1777#
MSG40   015061   639  1878#
MSG41   015114   339  1883#
MSG42   015135   354  1886#
MSG43   015156   357  1889#
MSG44   015173  1133  1892#
MSG45   015242  1130  1899#
MSG46   015275   827   935  1067  1904#
MSG47   015321   855  1908#
MSG48   015346   845  1912#
MSG49   015373  1161  1916#
MSG5    014101   301  1781#
```

```
MSG50   015421          1166    1920#
MSG51   015457          1199    1926#
MSG52   015513          1206    1931#
MSG53   015532          1225    1934#
MSG54   015556          1227    1938#
MSG55   015631           377    1946#
MSG56   015645          1314    1949#
MSG57   015655          1351    1951#
MSG6    014114           430    1783#
MSG60   015671           948    1954#
MSG61   015740           361    1961#
MSG62   015760           368    1964#
MSG7    014132          1540    1786#
MSG8    014136          1787#
MSG9    014140           888    1788#
MTINT   012130           123     311    1448#
NRZOF   001012           204#    379     804     915     981    1048    1083
OCTP    012674           295     304     433     669     673     905     910    1317    1474    1592#
OCTPE   012662           511     515    1321    1323    1325    1327    1329    1331    1333    1335    1589#   1709
OCTPE1  012700          1593#
OCTPG   013050          1600    1603    1610    1614    1619    1624    1626    1630#
OCTPG0  013066          1631    1633    1635#
OCTPG1  013072          1595    1636#
OCTP0   012714          1591    1594    1597#
OCTP1   012736          1598    1602#
OCTP2   012744          1601    1604#
OCTP3   013034          1596    1627#
OFL     013112          1589*   1592*   1632    1635*   1641#
OPDYX   000726           178#    734*    765*    820*    927*    956*    998*   1255
OUT     013436          1697    1699    1703    1714#   1731
PATRN   001006           202#    768*   1059*   1095*   1360
PCNTR   001016           206#    384*    432     438*
PEXFL   000770           195#
PFLG    000732           180#
PSW     000634           147#    271*
RCNT    000712           172#    766*    780*    782*    789*    794*    797*    806*    815*    836*    933*    939*    992*
                        1008    1010*   1011    1031*   1039*
RDATA   020472           783     867     930    1114    1372    2070#
RDSW    001024           209#   1576    1579*   1726*
RDYDX   000724           177#    733*    764*    821*    926*    945*    955*    997*   1158*   1247
REGS    000660           157#    294     296     313
RFD     000722           176#    840*    864*    878
RHOF    001014           205#    370     375     717
RHTF    001010           203#    325*    455     457*   1482
RH17F   000672           164#    363     568     593     627     682     701
RRD     000720           175#    839*    863*    871
RTRN    000734           181#   1452
RWND    011110           771     814     929     942     959     995    1058    1094    1108    1113    1143    1262#
RWNDA   011130          1266#   1267
RWNDB   011134          1268#   1269
RWNDX   011200          1271    1277#
SAV1    000754           189#
SAV2    000756           190#
SAV3    000760           191#
SCNT    000730           179#    842*    852*    861*   1030*   1243
SCOLP   000762           192#    472*    481*    492*    529*    587*    596*    630*    685*    704*    727*    745*    778*
```

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                    1134*  1167*  1200*  1207*  1224*  1416   1421   1480*
SCOPE   011770       519    563   1410#  1481
SCOPE1  012010      1413   1415#
SCOPE2  012022      1417   1419#
SERFL   001000       199#   829    847    857    937   1003   1022   1036   1069   1282*  1293*  1349
SERNUM  000650       153#
SLVN    000702       168#   344    351   1175   1443
SN      000630       142#   359
SNPG    013300      1674   1677   1683   1685   1687#
SNPT    013222       360   1668#
START   001600       113    118    270#
STFLG   000772       196#   388*   412    419*
STMSK   000746       186#   401*   823*   925*   949*   964*   970*  1000*  1020*  1034*  1162*  1290*  1291
STSCD   002652       392    418#
STO     002060       316#   319
STOA    001710       288    290#
STOB    001720       292#  1484
ST1     002102       322#   324
ST1A    002122       327#   341    458
ST2     002220       338    342#   356
ST3     002320       353    357#
ST4     002472       289    376    384#
SUSWR   001614       274#
SWR     000636       148#   277    281*   284    389    407    414    434    499    516    550    559    658
                     674    884    911   1214   1294   1312   1336   1412   1427   1464   1475   1696   1708
                    1747*
SWREG   000176       100#   281    284   1696
TC      000632       143#   351*   747*  1203   1235*  1305   1334   1443*
TCRLF   012562      1564   156 #  1727
TCRLFA  012600      1570#  1573
TEMPST  001020       207#  1712*  1716*  1739*  1740*  1741*  1743*  1747
TEMP1   000740       183#  1011*  1024*  1504*  1509   1518*
TEMP2   000742       184#
TEMP3   000744       185#  1659   1662
TEND    002726       399    421    430#   719
TENDX   002760       435    437#
TEX     012660      1562   1580   1584#
TIB     000670       163#  1507   1512   1515   1525*  1526   1551*  1552*  1555   1700*  1701*  1702   1719*
                    1720   1724   1732   1734   1742*  1743
TIMER   012442      1514   1517   1531   1534   1540#
TKB     000642       150#  1548*  1551   1700
TKS     000640       149#  1547*  1549   1698
TMCHK   011554       967    973    978   1005   1038   1346#
TMCHKO  011564      1348#  1350
TMCHK1  011566      1347   1349#
TOB     000666       162#   320   1560*  1561   1563   1567*  1570*  1574*  1583   1627*  1637*  1645*  1647*
                    1650   1655*  1687*  1689*
TOG     012644      1565   1568   1571   1575   1581#  1582   1628   1638   1690
TPB     000646       152#  1555*  1583*  1652*  1654*
TPS     000644       151#  1553   1581   1648
TRAP    012154       444   1463#
TRAPX   012236      1476   1478#
TRAPXX  012270      1483   1485#
TRAP1   012210      1467   1471#
TRAP2   012226      1465   1475#
TSCD    002476       387#   417    439
```

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TSCD0   002526            394*   413
TSCD1   002562            398    400*   429
TSCD2   002606            406*   459    524    549    580    620    653    694    720    741    759    808    921
                          951    987   1052   1089   1137   1170   1209   1229   1276
TSCD3   002622            408    410*
TSRH    002520            326    393*
TSTTBL  001040            221*   393    425
TTIN    012460           1506   1547*  1718
TTINT   012144             94   1456*
TTIN2   012512           1553*  1554
TTOUT   012530            291    293    302    328    340    343    355    358    362    369    378    431    504
                          507    509    513    555    558    662    665    667    671    887    889    894    900
                          902    907   1228   1273   1275   1300   1303   1308   1311   1315   1319   1470   1472
                         1541   1560*  1566   1578   1705   1707   1711   1737
TTR     012274            300    309    333    348    367    374    383   1504*
TTRO    012302           1506*  1528
TTR1    012330           1508   1512*
TTR1A   012344           1513   1515*
TTR1B   012360           1516   1518*
TTR2    012416           1511   1529*
TTR3    012426           1530   1532*
TTR4    012436           1533   1535*
TTR5    012440           1510   1536*
UDES    001004            201*   729*   770*   799    801*   802    813*   891    917    919*   931*   958*   979
                          983*   994*  1046   1050*  1064*  1081   1085*  1100*  1145*  1179*  1235   1288
VECT    000656            156*   303    305    310
WC      000602            131*   466   1236*  1322
WCNT    000710            171*   731*   749*   773*   818*   835*   943*   961*  1012*  1063*  1099*  1110*  1116*
                         1124*  1148*  1182*  1236
WDATA   016760            750    774    816*  1014   1061   1097   1146   1180   1359   1367   2068*
$CNTG   016731           1704   2059*
$MNEW   016744           1710   2062*
$MSWR   016735           1706   2060*
$QUEST  016754           1736   2064*
$READ   013440           1713   1716*
.     = 020474             85*    90     93*    99*   111*   115*   122*   127*   267*  1550   2067*  2069*

. ABS.  020474      000

 ERRORS DETECTED:  0

 DZTUBF.BIN,DZTUBF.LST/CRF/SOL/NL:TOC=DZTUBF.P11
 RUN-TIME:  2  4  .8 SECONDS
 RUN-TIME RATIO: 63/7=8.5
 CORE USED:  9K  (17 PAGES)
```