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.REM\_

IDENTIFICATION

PRODUCT CODE: AC-E472A-MC  
PRODUCT NAME: CZTUJAO TMO2/TU45 BASIC FUNCTION TEST  
DATE CREATED: 25 MAY 1978  
MAINTAINER: COMPUTER SPECIAL SYSTEMS  
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1. ABSTRACT  
-----

THIS PROGRAM IS INTENDED TO TEST ALL OF THE BASIC FUNCTIONAL LEVEL OPERATIONS OF THE TMO2/TU45 MAG TAPE SYSTEM. ALL FUNCTIONS; WRITE, READ, SPACE, ERASE, REWIND, ETC; WILL BE TESTED. IN ADDITION TO THE TMO2/TU45 TESTS, THE RH WILL BE TESTED SEPARATELY IN SO FAR AS IT IS POSSIBLE TO SEPARATE THE RH FROM THE TMO2/TU45 ITSELF.

2. REQUIREMENTS (HARDWARE)  
-----

- A. ANY PDP-11 PROCESSOR
- B. 8K OF CORE
- C. CONSOLE TTY
- D. TMO2 MAGTAPE CONTROLLER
- E. MASS BUS CONTROLLER
- F. TU45 MAG TAPE TRANSPORT

3. LOADING PROCEEDURE  
-----

USE STANDARD BINARY LOADING PROCEEDURE

4. STARTING PROCEEDURE  
-----

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.

TMO2-TU45 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)

THIS EXAMPLE SLOWS THE PROGRAM START USING THE RH11 ADDRESS (CS1) OF 172440, AN INTERRUPT VECTOR OF 224.

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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.

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5. CONSOLE SWITCH SETTING  
-----

ALL SWITCHES EXCEPT 5-9 ARE USED AND THE NORMAL, OR DEFAULT, RUN IS DONE WITH ALL SWITCHES SET TO ZERO (0). ALL SWITCHES ARE DYNAMIC, AND MAY BE CHANGED AT ANY TIME, ASSUMING A CONSOLE SWITCH REGISTER IS PRESENT. IF A CONSOLE SWITCH REGISTER IS NOT PRESENT, THE SWITCHES ARE NOT DYNAMIC AND MUST BE SET BEFORE STARTING, USING THE FOLLOWING PROCEDURE:

- A) LOAD ADDRESS 636(8) LABELLED "SWR"
- B) DEPOSIT THE VALUE 176(8)
- C) LOAD ADDRESS 176(8)
- D) DEPOSIT THE DESIRED SWITCH VALUE.

SW15: 1=HALT ON ERROR  
0=CONTINUE  
SW14: 1=LOOP ON ERROR (SCOPE)  
0=CONTINUE  
SW13: 1=DO NOT PRINT ERRORS  
0=PRINT ALL ERRORS  
SW12: 1=INHIBIT ITERATION  
0=DO ALL ITERATIONS PER TEST  
SW11: 1=CONTINUOUS CYCLE  
0=HALT AT END OF PASS  
SW10: 1=HALT AT END OF CURRENT TEST  
0=CONTINUE  
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.

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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

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7. OPERATION

-----  
THE PROCEDURES 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
3. PRESS START
4. ENTER APPROPRIATE RESPONSES TO THE TTY REQUESTS

ALL CONSOLE 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.

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.

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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/TU45 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. \*\*\*\*



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B. TM02/TU45 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

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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 SPACF 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 WRITE).
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

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10. END

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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

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SEQ 00'4

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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

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-

```
485          .LIST  SEQ,LOC,BIN
486          .TITLE TM02/TU45 BASIC FUNCTION TEST
487          :CZTUJAO
488          :25 MAY 78
489          :R. BARNES/R. J. COLLINS
490
491          .ENABL  ABS
492
493
494          :CONSOLE SWITCHES*****
495          :
496          :SW15: 1=HALT ON ERROR
497          :         0=CONTINUE
498          :SW14: 1=LOOP ON ERROR (SCOPE)
499          :         0=CONTINUE
500          :SW13: 1=DO NOT PRINT ERRORS
501          :         0=PRINT ERRORS
502          :SW12: 1=INHIBIT ITERATIONS
503          :         0=DO ITERATIONS
504          :SW11: 1=CONTINUOUS CYCLE
505          :         0=HALT AT END OF PASS
506          :SW10: 1=HALT AT END OF EACH TEST
507          :         0=CONTINUE
508          :SW0-4: SELECT TEST NUMBER :: 00=ALL TESTS
```





```
555 ;REGISTER EQUIVS*****
556
557 000000 R0=X0
558 000001 R1=X1
559 000002 R2=X2
560 000003 R3=X3
561 000004 R4=X4
562 000005 R5=X5
563 000006 SP=X6
564 000007 PC=X7
565
566 ;TRAP CATCHERS*****
567
568 000000 .=0
569 000200 .REPT 200
570 .+2
571 HALT
572 .ENDR
573
574 ;TTY INTERRUPT VECTOR*****
575
576 000060 .=60
577 000060 012004 TTINT ;TTY INTERRUPT HEADER ADDRESS
578 000062 000000 0
579
580 ;START ADDRESS*****
581
582 000200 .=200
583 000200 005000 CLR R0
584 000202 000167 001372 JMP START ;PROGRAM START
585
586 000210 .=210
587 000210 000240 NOP
588 000212 012700 000001 MOV #1,R0 ;SET NO HEADER FLAG
589 000216 000167 001356 JMP START
590
591 ;TM02 INTERRUPT VECTOR*****
592
593 000224 .=224
594 000224 011770 MTINT ;TAPE INTERRUPT HANDLER ADDRESS
595 000226 000340 340
596
```

```
597
598          000600
599          .=600
600          ;MASS BUS REGISTER EQUIVS*****
601 000600 172440      C1:   172440
602 000602 172442      WC:   172442
603 000604 172444      BA:   172444
604 000606 172446      FC:   172446
605 000610 172450      CS:   172450
606 000612 172452      DS:   172452
607 000614 172454      ER:   172454
608 000616 172456      AS:   172456
609 000620 172460      CC:   172460
610 000622 172462      DB:   172462
611 000624 172464      MR:   172464
612 000626 172466      DT:   172466
613 000630 172470      SN:   172470
614 000632 172472      TC:   172472
615
616          ;CONSTANTS*****
617
618 000634 177776      PSW:  177776      ;PROCESSOR STATUS
619 000636 177570      SWR:  177570      ;SWITCH REGISTER
620 000640 177560      TKS:  177560      ;TTY READER STATUS
621 000642 177562      TKB:  177562      ;TTY READ BUFFER
622 000644 177564      TPS:  177564      ;TTY PUNCH STATUS
623 000646 177566      TPB:  177566      ;TTY PUNCH BUFFER
624 000650 177777      SERNUM: 177777    ;SERIAL NUMBER
625 000652 000011      DRVTP: 011        ;DRIVE TYPE
626 000654 000010      ITAMT: 10        ;ITERATION AMOUNT
627 000656 000224      VECT: 224        ;INTERRUPT VECTOR(RH)
628 000660 172440      REGS: 172440     ;STARTING REGISTER ADDRESS
629 000662 000004      BTRP: 4          ;BUS TRAP ADDRESS
630 000664 000006      BTRP2: 6         ;BUS TRAP PRIORITY LEVEL 7
```

631 :FLAGS AND COUNTERS\*\*\*\*\*

632			
633	000666	000000	TOB: 0
634	000670	000000	TIB: 0
635	000672	000000	RH17F: 0
636	000674	000000	HDRFL: 0
637	000676	000000	EMADDR: 0
638	000700	000000	DRVN: 0
639	000702	000000	SLVN: 0
640	000704	000000	BADDR: 0
641	000706	000000	FCNT: 0
642	000710	000000	WCNT: 0
643	000712	000000	RCNT: 0
644	000714	000000	ERRP: 0
645	000716	000000	ERRP1: 0
646	000720	000000	RRD: 0
647	000722	000000	RFD: 0
648	000724	000000	RDYDX: 0
649	000726	000000	OPDYX: 0
650	000730	000000	SCNT: 0
651	000732	000000	PFLG: 0
652	000734	000000	RTRN: 0
653	000736	000000	ERADD: 0
654	000740	000000	TEMP1: 0
655	000742	000000	TEMP2: 0
656	000744	000000	TEMP3: 0
657	000746	000000	STMSK: 0
658	000750	000000	ITCNT: 0
659	000752	000000	DSAV: 0
660	000754	000000	SAV1: 0
661	000756	000000	SAV2: 0
662	000760	000000	SAV3: 0
663	000762	000000	SCOLP: 0
664	000764	000000	ITRLP: 0
665	000766	000000	EXFL: 0
666	000770	000000	PEXFL: 0
667	000772	000000	STFLG: 0
668	000774	000000	LTADD: 0
669	000776	000000	FUN: 0
670	001000	000000	SERFL: 0
671	001002	000000	CRCNT: 0
672	001004	000000	UDES: 0
673	001006	000000	PATRN: 0
674	001010	000000	RHTF: 0
675	001012	000000	NRZOF: 0
676	001014	000000	RHOF: 0
677	001016	000000	PCNTR: 0

678  
679 :DATA PATTERN GENERATORS\*\*\*\*\*

680			
681	001020	000000	DATBL: 0
682	001022	011552	DATA0: DAT1 ;ALL ONE BITS
683	001024	011574	DATA1: DAT2 ;ALL ZERO BITS
684	001026	011602	DATA2: DAT3 ;ALTERNATING ONE/ZERO BITS
685	001030	011612	DATA3: DAT4 ;ALL BITS 0-377

```
686  
687  
688 ;LOGIC TEST ENTRY TABLE*****  
689 001032 000000 TSTTBL: 0  
690 001034 000000 0  
691 001036 002700 FT1  
692 001040 002700 FT1  
693 001042 003000 FT2  
694 001044 003000 FT2  
695 001046 003324 FT3  
696 001050 003324 FT3  
697 001052 003542 FT4  
698 001054 003542 FT4  
699 001056 003670 FT5  
700 001060 003670 FT5  
701 001062 004072 FT6  
702 001064 004072 FT6  
703 001066 004354 FT7  
704 001070 004354 FT7  
705 001072 004450 FT10  
706 001074 004450 FT10  
707 001076 004604 FT11  
708 001100 004604 FT11  
709 001102 004722 FT12  
710 001104 004722 FT12  
711 001106 005034 FT13  
712 001110 005034 FT13  
713 001112 005374 FT14  
714 001114 005374 FT14  
715 001116 006264 FT15  
716 001120 006264 FT15  
717 001122 006464 FT16  
718 001124 006464 FT16  
719 001126 006726 FT17  
720 001130 006726 FT17  
721 001132 007342 FT20  
722 001134 007342 FT20  
723 001136 007602 FT21  
724 001140 007602 FT21  
725 001142 010104 FT22  
726 001144 010104 FT22  
727 001146 010304 FT23  
728 001150 010304 FT23  
729 001152 010524 FT24  
730 001154 010524 FT24  
731 001156 000000 0  
732 001160 000000 0  
733 001162 000000 0  
734 001164 000000 0
```

```

735          001600          . =1600
736                                     ;PROGRAM START AND HOUSEKEEPING*****
737
738 001600 000240          START:  NOP
739 001602 012777 000340 177024  MOV    #340,@PSW          ;SET PRIORITY
740 001610 012706 000500          MOV    #500,SP          ;SET STACK POINTER
741 001614 005700          TST    RO          ;SEE IF PRINT HEADER
742 001616 001402          BEQ    STOA          ;IF SO: BR
743 001620 000167 000562          JMP    ST4          ;ELSE SKIP
744 001624 012704 013252          STOA:  MOV    #MSG3,R4
745 001630 004767 010532          JSR    PC,TTOUT          ;PRINT TITLE
746 001634 012704 013357          STOB:  MOV    #MSG4,R4
747 001640 004767 010522          JSR    PC,TTOUT          ;REQUEST REGISTER ADDRESS
748 001644 016703 177010          MOV    REGS,R3
749 001650 004767 010642          JSR    PC,OCTP          ;PRINT CURRENT ADDRESS
750 001654 012705 000660          MOV    #REGS,R5          ;SET ADDRESS SAVE LOC
751 001660 012701 000006          MOV    #6,R1          ;SET SIZE OF RESPONSE
752 001664 012702 177000          MOV    #177000,R2          ;SET UPPER LIMIT
753 001670 012703 160000          MOV    #160000,R3          ;SET LOWER LIMIT
754 001674 004767 010230          JSR    PC,TTR          ;GO GET RESPONSE
755 001700 012704 013402          MOV    #MSG5,R4
756 001704 004767 010456          JSR    PC,TTOUT          ;REQUEST VECTOR
757 001710 016703 176742          MOV    VECT,R3
758 001714 004767 010576          JSR    PC,OCTP          ;PRINT CURRENT VECTOR
759 001720 012705 000656          MOV    #VECT,R5          ;SET ADDRESS SAVE LOC
760 001724 012701 000003          MOV    #3,R1          ;SET SIZE OF RESPONSE
761 001730 012702 000224          MOV    #224,R2          ;SET UPPER LIMIT
762 001734 012703 000150          MOV    #150,R3          ;SET LOWER LIMIT
763 001740 004767 010164          JSR    PC,TTR          ;GO GET RESPONSE
764 001744 016700 176706          MOV    VECT,RO          ;GET VECTOR
765 001750 012720 011770          MOV    #MTINT,(RO)+          ;LOAD INTERRUPT ADDRESS IN VECTOR
766 001754 012710 000340          MOV    #340,(RO)          ;LOAD PRIORITY
767 001760 016700 176674          MOV    REGS,RO          ;GET START OF REGS
768 001764 012701 000016          MOV    #16,R1          ;SET NUMBER OF REGS
769 001770 012702 000600          MOV    #C1,R2          ;GET START OF TABLE
770 001774 010022          STO:  MOV    RO,(R2)+          ;BUILD TABLE
771 001776 062700 000002          ADD    #2,RO          ;BUMP ADDRESS
772 002002 005301          DEC    R1          ;SEE IF DONE
773 002004 001373          BNE    STO          ;IF NOT: BR
774 002006 012702 000666          MOV    #TOB,R2
775 002012 012700 000054          MOV    #54,RO
776 002016 005022          ST1:  CLR    (R2)+          ;CLEAR FLAGS + COUNTERS
777 002020 005300          DEC    RO
778 002022 001375          BNE    ST1
779 002024 012767 000001 176756  MOV    #1,RHTF          ;SET ADDRESS TEST FLAG
780 002032 000167 000376          JMP    TSRH          ;GO DO INITIAL ADDRESS TEST PASS
781 002036 012704 013463          ST1A: MOV    #MSG10,R4
782 002042 004767 010320          JSR    PC,TTOUT          ;REQUEST DRIVE NUMBER
783 002046 012705 000700          MOV    #DRVN,R5          ;SET ADDRESS OF DRIVE NUMBER SAVE
784 002052 012701 000001          MOV    #1,R1          ;SET SIZE OF RESPONSE
785 002056 012702 000007          MOV    #7,R2          ;SET UPPER LIMIT
786 002062 012703 000000          MOV    #0,R3          ;SET LOWER LIMIT
787 002066 004767 010036          JSR    PC,TTR          ;GO GET RESPONSE
788 002072 012777 000040 176510  MOV    #40,@CS          ;SET INIT
789 002100 056777 176574 176502  BIS    DRVN,@CS          ;SET DRIVE NUMBER
790 002106 005777 176466          TST    @C1          ;ACCESS DRIVE

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791 002112 032777 010000 176470 BIT #10000,@CS ;SEE IF NED
792 002120 001405 BEQ ST2 ;IF NOT: BR
793 002122 012704 014415 MOV #MSG41,R4
794 002126 004767 010234 JSR PC,TTOUT ;PRINT NOT AVAIL
795 002132 000741 BR ST1A ;REDO DRIVE REQUEST
796 002134 012704 013503 ST2: MOV #MSG11,R4
797 002140 004767 010222 JSR PC,TTOUT ;REQUEST SLAVE NUMBER
798 002144 012705 000702 MOV #SLVN,R5 ;SET ADDRESS OF SLAVE SAVE
799 002150 012701 000001 MOV #1,R1 ;SET SIZE OF RESPONSE
800 002154 012702 000007 MOV #7,R2 ;SET UPPER LIMIT
801 002160 012703 000000 MOV #0,R3 ;SET LOWER LIMIT
802 002164 004767 007740 JSR PC,TTR ;GO GET RESPONSE
803 002170 012777 000040 176412 MOV #40,@CS ;INIT
804 002176 056777 176476 176404 BIS DRVN,@CS ;SET DRIVE NUMBER
805 002204 016777 176472 176420 MOV SLVN,@TC ;LOAD SLAVE NUMBER
806 002212 032777 002000 176406 BIT #2000,@DT ;SEE IF SLAVE PRESENT
807 002220 001005 BNE ST3 ;IF SO: BR
808 002222 012704 014436 MOV #MSG42,R4
809 002226 004767 010134 JSR PC,TTOUT ;PRINT NON-EXIST SLAVE
810 002232 000740 BR ST2 ;REDO SLAVE REQUEST
811 002234 012704 014457 ST3: MOV #MSG43,R4
812 002240 004767 010122 JSR PC,TTOUT ;PRINT SERIAL NUMBER TAG
813 002244 017703 176360 MOV @SN,R3
814 002250 004767 010570 JSR PC,SNPT ;PRINT SERIAL NUMBER
815 002254 012704 015241 MOV #MSG61,R4
816 002260 004767 010102 JSR PC,TTOUT ;REQUEST RH11 OR RH70
817 002264 012705 000672 MOV #RH17F,R5 ;GET ADDRESS OF FLAG
818 002270 012701 000001 MOV #1,R1 ;SET SIZE OF RESPONSE
819 002274 012702 000001 MOV #1,R2 ;SET UPPER LIMIT
820 002300 012703 000000 MOV #0,R3 ;SET LOWER LIMIT
821 002304 004767 007620 JSR PC,TTR ;GET RESPONSE
822 002310 012704 015261 MOV #MSG62,R4
823 002314 004767 010046 JSR PC,TTOUT ;REQUEST RH11 ONLY RESPONSE
824 002320 012705 001014 MOV #RHOF,R5 ;SET FLAG ADDRESS
825 002324 012701 000001 MOV #1,R1 ;SET SIZE OF RESPONSE
826 002330 012702 000001 MOV #1,R2 ;SET UPPER LIMIT
827 002334 012703 000000 MOV #0,R3 ;SET LOWER LIMIT
828 002340 004767 007564 JSR PC,TTR ;GO GET RESPONSE
829 002344 005767 176444 TST RHOF ;SEE IF RH11 ONLY
830 002350 001016 BNE ST4 ;IF SO: BR
831 002352 012704 015132 MOV #MSG55,R4
832 002356 004767 010004 JSR PC,TTOUT ;REQUEST NRZ ONLY RESPONSE
833 002362 012705 001012 MOV #NRZOF,R5 ;SET FLAG ADDRESS
834 002366 012701 000001 MOV #1,R1 ;SET SIZE OF RESPONSE
835 002372 012702 000001 MOV #1,R2 ;SET UPPER LIMIT
836 002376 012703 000000 MOV #0,R3 ;SET LOWER LIMIT
837 002402 004767 007522 JSR PC,TTR ;GO GET RESPONSE
838 002406 005067 176404 ST4: CLR PCNTR ;CLEAR PASS COUNTER

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839                                     :TEST SCHEDULAR*****
840
841 002412 000240                       TSCD:  NOP
842 002414 005067 176352                CLR    STFLG           ;CLEAR SINGLE TEST FLAG
843 002420 017700 176212                MOV    @SWR,RO
844 002424 042700 177740                BIC    #177740,RO
845 002430 005700                       TST    RO
846 002432 001053                       BNE    STSCD           ;GO SELECT SINGLE TEST
847 002434 012767 001032 176332        TSRH:  MOV    #TSTTBL,LTADD
848 002442 062767 000004 176324        TSCD0: ADD    #4,LTADD
849 002450 016767 176320 176306        MOV    LTADD,ITRLP
850 002456 062767 000002 176300        ADD    #2,ITRLP       ;SET ITERATION ADDRESS
851 002464 005777 176304                TST    @LTADD
852 002470 001002                       BNE    TSCD1
853 002472 000167 000140                JMP    TEND            ;GO TO END ROUTINE
854 002476 000240                       TSCD1: NOP
855 002500 005067 176242                CLR    STMSK
856 002504 005067 176204                CLR    ERRP
857 002510 005067 176160                CLR    HDRFL          ;CLEAR PRINT HEADER FLAG
858 002514 017700 176254                MOV    @LTADD,RO      ;SET POINTER TO TEST
859 002520 000110                       JMP    (RO)           ;GO TO TEST
860 002522 000240                       TSCD2: NOP
861 002524 032777 002000 176104        BIT    #2000,@SWR     ;SEE IF HALT ON TEST
862 002532 001401                       BEQ    TSCD3          ;IF NOT: BR
863 002534 000000                       HALT
864 002536 000240                       TSCD3: NOP
865 002540 005767 176226                TST    STFLG          ;SE IF SINGLE TEST
866 002544 001736                       BEQ    TSCD0          ;IF NOT: BR
867 002546 017700 176064                MOV    @SWR,RO
868 002552 042700 177740                BIC    #177740,RO     ;MASK TEST NUMBER
869 002556 005700                       TST    RO             ;SEE IF RETURN TO ALL
870 002560 001714                       BEQ    TSCD           ;IF SO: BR
871 002562 000240                       STSCD: NOP
872 002564 012767 000001 176200        MOV    #1,STFLG      ;SET SINGLE TEST FLAG
873 002572 022700 000025                CMP    #25,RO        ;SEE IF EXCEEDED TESTS
874 002576 003417                       BLE    TEND           ;IF SO: BR
875 002600 000241                       CLC
876 002602 006100                       ROL    RO
877 002604 006100                       ROL    RO             ;SET TABLE MODIFIER
878 002606 012767 001032 176160        MOV    #TSTTBL,LTADD
879 002614 060067 176154                ADD    RO,LTADD       ;SET TEST POINTER
880 002620 016767 176150 176136        MOV    LTADD,ITRLP
881 002626 062767 000002 176130        ADD    #2,ITRLP      ;SET ITERATION POINTER
882 002634 000720                       BR     TSCD1
883 002636 012704 013415                TEND:  MOV    #MSG6,R4
884 002642 004767 007520                JSR    PC,TTOUT       ;PRINT END OF PASS
885 002646 016703 176144                MOV    PCNTR,R3
886 002652 004767 007640                JSR    PC,OCTP        ;PRINT PASS NUMBER
887 002656 032777 004000 175752        BIT    #4000,@SWR    ;SEE IF HALT ON PASS
888 002664 001001                       BNE    TENDX          ;IF NOT: BR
889 002666 000000                       HALT
890 002670 005267 176122                TENDX: INC    PCNTR    ;BUMP PASS COUNTER
891 002674 000167 177512                JMP    TSCD           ;RESTART

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892
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895 002700 012767 015274 175770 FT1:  MOV    #MSFT1,EMADDR ;SET HEADER
896 002706 012777 012014 175746      MOV    #TRAP,@BTRP ;SET TRAP HANDLER ADDRESS
897 002714 012777 000340 175742      MOV    #340,@BTRP2
898 002722 012700 000016          MOV    #16,R0 ;SET NUMBER OF REGISTER
899 002726 016701 175646          MOV    C1,R1 ;GET FIRST ADDRESS (CS1)
900 002732 005711          FT1A:  TST    (R1) ;REFERENCE REGISTER
901 002734 000240          NOP ;IF ADDRESS IS BAD, BUS TRAP WILL OCCUR
902 002736 005300          FT1B:  DEC    R0 ;SEE IF DONE ALL
903 002740 001403          BEQ    FT1X ;IF SO: BR
904 002742 062701 000002          ADD    #2,R1 ;BUMP ADDRESS POINTER
905 002746 000771          BR    FT1A ;CONTINUE
906 002750 012777 000006 175704 FT1X:  MOV    #6,@BTRP ;RESET TRAP CATCHER
907 002756 005767 176026          TST    RHTF ;SEE IF INITIAL ADDRESS TEST PASS
S08 002762 001404          BEQ    FT1XX ;IF NOT: BR
909 002764 005067 176020          CLR    RHTF ;CLEAR FLAG
910 002770 000167 177042          JMP    ST1A ;RETURN
911 002774 000167 177522          FT1XX: JMP    TSCD2 ;RETURN TO SCHEDULAR
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912
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915 003000 012767 015321 175670 FT2:  MOV    #MSFT2,EMADDR ;SET TEST HEADER
916 003006 012701 177777          MOV    #-1,R1      ;SET ALL ONES PATTERN
917 003012 004767 006724          FT2A: JSR    PC,INIT1  ;GO INIT
918 003016 016700 175560          MOV    WC,R0      ;GET ADDRESS OF WORD COUNT
919 003022 010102          MOV    R1,R2     ;SET EXPT REGISTER BIT PATTERN
920 003024 010110          MOV    R1,(R0)   ;LOAD PATTERN
921 003026 021002          CMP    (R0),R2   ;SEE IF EXPT=RCVD
922 003030 001410          BEQ    FT2B      ;IF SO: BR
923 003032 012767 013743 175676          MOV    #MSG25,ERADD ;SET CODE
924 003040 012767 003012 175714          MOV    #FT2A,SCOLP ;SET SCOPE
925 003046 004767 000116          JSR    PC,FT2ER  ;GO DO ERROR
926 003052 016700 175526          FT2B: MOV    BA,R0    ;GET ADDRESS OF BUS ADDRESS
927 003056 010102          MOV    R1,R2
928 003060 042702 000001          BIC    #1,R2     ;SET EXPT PATTERN
929 003064 010110          MOV    R1,(R0)  ;LOAD PATTERN
930 003066 020210          CMP    R2,(R0)  ;SEE IF EXPT=RCVD
931 003070 001410          BEQ    FT2C      ;IF SO:BR
932 003072 012767 013751 175636          MOV    #MSG26,ERADD ;SET ERROR CODE
933 003100 012767 003052 175654          MOV    #FT2B,SCOLP ;SET SCOPE ADDRESS
934 003106 004767 000056          JSR    PC,FT2ER  ;GO DO ERROR
935 003112 016700 175504          FT2C: MOV    DB,R0    ;GET ADDRESS OF DATA BUFFER
936 003116 010102          MOV    R1,R2
937 003120 010110          MOV    R1,(R0)  ;LOAD PATTERN
938 003122 012703 004000          MOV    #4000,R3
939 003126 005303          FT2D: DEC    R3      ;DELAY
940 003130 001376          BNE    FT2D
941 003132 020210          CMP    R2,(R0)  ;SEE IF EXPT=RCVD
942 003134 001410          BEQ    FT2E      ;IF SO: BR
943 003136 012767 013757 175572          MOV    #MSG27,ERADD ;SET ERROR CODE
944 003144 012767 003112 175610          MOV    #FT2C,SCOLP ;SET SCOPE ADDRESS
945 003152 004767 000012          JSR    PC,FT2ER  ;GO DO ERROR
946 003156 005701          FT2E: TST    R1      ;SEE IF DONE RESET
947 003160 001454          BEQ    FT2X      ;IF SO: BR
948 003162 005001          CLR    R1       ;SET ZERO PATTERN
949 003164 000167 177622          JMP    FT2A     ;DO ZERO BITS
950 003170 000240          FT2ER: NOP
951 003172 032777 020000 175436          BIT    #20000,ASWR ;SEE IF PRINT ERROR
952 003200 001034          BNE    FT2ERB   ;IF NOT: BR
953 003202 005767 175466          TST    HDRFL    ;SEE ID DONE HEADER
954 003206 001004          BNE    FT2ERA   ;IF SO: BR
955 003210 016704 175462          MOV    EMADDR,R4
956 003214 004767 007146          JSR    PC,TTOUT ;DO HEADER
957 003220 012767 000001 175446          FT2ERA: MOV   #1,HDRFL  ;SET FLAG
958 003226 016704 175504          MOV    ERADD,R4
959 003232 004767 007130          JSR    PC,TTOUT ;PRINT ERROR CODE
960 003236 012704 013707          MOV    #MSG22,R4
961 003242 004767 007120          JSR    PC,TTOUT ;PRINT EXPT TAG
962 003246 010103          MOV    R1,R3
963 003250 004767 007230          JSR    PC,OCTPE ;PRINT EXPT
964 003254 012704 013717          MOV    #MSG23,R4
965 003260 004767 007102          JSR    PC,TTOUT ;PRINT RCVD TAG
966 003264 011003          MOV    (R0),R3
967 003266 004767 007212          JSR    PC,OCTPE ;PRINT RCVD

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968	003272	005777	175340	FT2ERB:	TST	@SWR	:SEE IF HALT ON ERROR
969	003276	100001			BPL	FT2ERC	:IF NOT: BR
970	003300	000000			HALT		
971	003302	004767	006326	FT2ERC:	JSR	PC,SCOPE	:GO SEE IF SCOPE ON ERROR
972	003306	000240			NOP		
973	003310	000207			RTS	PC	:IF NO SCOPE: CONTINUE TEST
974	003312	000240		FT2X:	NOP		
975	003314	004767	006356		JSR	PC,ITER	:GO SEE IF ITERATIONS
976	003320	000167	177176		JMP	TSCD2	:RETURN TO SCHEDULAR

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977
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980 003324 012767 015356 175344 FT3:  MOV    #MSFT3,EMADDR ;SET TEST HEADER
981 003332 012767 003324 175422      MOV    #FT3,SCOLP
982 003340 004767 006376          JSR    PC,INIT1      ;GO INIT
983 003344 052777 020000 175236      BIS    #20000,@CS    ;FORCE UPE =1
984 003352 000240          NOP
985 003354 004767 006362          JSR    PC,INIT1      ;GO INIT
986 003360 005777 175214          TST    @C1           ;SEE IF SC IS RESET
987 003364 100005          BPL    FT3A          ;IF SO: BR
988 003366 012767 014015 175342      MOV    #MSG29,ERADD ;SET ERROR CODE
989 003374 004767 000060          JSR    PC,FT3ER      ;GO DO ERROR
990 003400 032777 040000 175172 FT3A:  BIT    #40000,@C1    ;SEE IF TRE IS RESET
991 003406 001405          BEQ    FT3B          ;IF SO: BR
992 003410 012767 014044 175320      MOV    #MSG30,ERADD ;SET ERROR CODE.
993 003416 004767 000036          JSR    PC,FT3ER      ;GO DO ERROR
994 003422 017701 175162          FT3B:  MOV    @CS,R1      ;GET CS2
995 003426 042701 000307          BIC    #307,R1      ;MARK IR/OR
996 003432 005701          TST    R1           ;SEE IF RESET
997 003434 001405          BEQ    FT3X          ;IF SO: BR
998 003436 012767 014074 175272      MOV    #MSG31,ERADD ;SET ERROR CODE
999 003444 004767 000010          JSR    PC,FT3ER      ;GO DO ERROR
1000 003450 004767 006222          FT3X:  JSR    PC,ITER      ;GO SEE IF ITERATION
1001 003454 000167 177042          JMP    TSCD2         ;RETURN TO SCHEDULAR
1002 003460 032777 020000 175150 FT3ER:  BIT    #20000,@SWR  ;SEE IF PRINT ERROR
1003 003466 001015          BNE    FT3ERB        ;IF NOT: BR
1004 003470 005767 175200          TST    HDRFL         ;SEE IF DONE HEADER
1005 003474 001006          BNE    FT3ERA        ;IF SO: BR
1006 003476 016704 175174          MOV    EMADDR,R4
1007 003502 004767 006660          JSR    PC,TTOUT      ;PRINT HEADER
1008 003506 005267 175162          INC    HDRFL
1009 003512 016704 175220          FT3ERA: MOV    ERADD,R4
1010 003516 004767 006644          JSR    PC,TTOUT      ;PRINT ERROR CODE
1011 003522 005777 175110          FT3ERB: TST    @SWR   ;SEE IF HALT ON ERROR
1012 003526 100001          BPL    FT3ERC        ;IF NOT: BR
1013 003530 000000          HALT
1014 003532 000240          FT3ERC: NOP
1015 003534 004767 006074          JSR    PC,SCOPE      ;GO SEE IF SCOPE
1016 003540 000207          RTS    PC            ;IF NOT: BR

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1017
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1020 003542 005767 175124 FT4: TST RH17F
1021 003546 001141 BNE FT5X ;IF RH70: BR
1022 003550 012767 015410 175120 MOV #MSFT4,EMADDR ;SET TEST TEST HEADER
1023 003556 012777 000040 175024 MOV #40,@CS ;INIT
1024 003564 017700 175032 MOV @DB,R0 ;READ DB
1025 003570 005777 175014 TST @CS ;SEE IF DLT IS SET
1026 003574 100013 BPL FT4ER ;IF NOT: BR
1027 003576 005777 174776 TST @C1 ;SEE IF SC IS SET
1028 003602 100014 BPL FT4ERA ;IF NOT: BR
1029 003604 032777 040000 174766 BIT #40000,@C1 ;SEE IF TRE IS SET
1030 003612 001414 BEQ FT4ERB ;IF NOT: BR
1031 003614 004767 006056 FT4X: JSR PC,ITER ;GO SEE IF ITERATION
1032 003620 000167 176676 JMP TSCD2 ;RETURN TO SCHEDULAR
1033 003624 012767 014124 175104 FT4ER: MOV #MSG32,ERADD ;SET ERROR CODE
1034 003632 000407 BR FT4ERC
1035 003634 012767 014142 175074 FT4ERA: MOV #MSG33,ERADD ;SET ERROR CODE
1036 003642 000403 BR FT4ERC
1037 003644 012767 014157 175064 FT4ERB: MOV #MSG34,ERADD ;SET ERROR CODE.
1038 003652 000240 FT4ERC: NOP
1039 003654 012767 003542 175100 MOV #FT4,SCOLP ;SET SCOPE ADDRESS
1040 003662 004767 177572 JSR PC,FT3ER ;GO PRINT ERROR
1041 003666 000752 BR FT4X
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1076
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1079 004072 005767 174574      FT6:  TST      RH17F
1080 004076 001052              BNE      FT6X      ;IF RH70: BR
1081 004100 012767 015470 174570  MOV      #MSFT6,EMADDR ;SET TEST HEADER
1082 004106 012767 004114 174646  MOV      #FT6A,SCOLP   ;SET SCOPE ADDRESS
1083 004114 004767 005622      FT6A:  JSR      PC,INIT1 ;GO INIT
1084 004120 005000              CLR      RO         ;PRESET DATA
1085 004122 010077 174474      FT6B:  MOV      RO,@DB   ;LOAD SILO
1086 004126 005200              INC      RO         ;BUMP DATA
1087 004130 022700 000102      CMP      #102,RO     ;SEE IF FILLED ALL
1088 004134 001372              BNE      FT6B      ;IF NOT: BR
1089 004136 032777 000100 174444  BIT      #100,@CS    ;SEE IF IR IS RESET.
1090 004144 001405              BEQ      FT6C      ;IF SO: BR
1091 004146 012767 014362 174562  MOV      #MSG40,ERADD ;SET ERROR CODE
1092 004154 004767 000054      JSR      PC,FT6ER   ;GO DO ERROR
1093 004160 032777 000200 174422  FT6C:  BIT      #200,@CS    ;SEE IF OR IS SET
1094 004166 001005              BNE      FT6D      ;IF SO: BR
1095 004170 012767 014310 174540  MOV      #MSG38,ERADD ;SET ERROR CODE
1096 004176 004767 000032      JSR      PC,FT6ER   ;GO DO ERROR
1097 004202 005000      FT6D:  CLR      RO         ;PRESET DATA
1098 004204 017701 174412      FT6E:  MOV      @DB,R1    ;READ SILO
1099 004210 020001              CMP      RO,R1      ;SEE IF EXPT=RCVD
1100 004212 001014              BNE      FT6DE     ;IF NOT: BR
1101 004214 005200              INC      RO         ;BUMP DATA
1102 004216 022700 000102      CMP      #102,RO     ;SEE IF DONE ALL
1103 004222 001370              BNE      FT6E      ;IF NOT: BR
1104 004224 004767 005446      FT6X:  JSR      PC,ITER ;GO SEE IF ITERATION
1105 004230 000167 176266      JMP      TSCD2     ;RETURN TO SCHEDULAR
1106 004234 000240      FT6ER:  NOP
1107 004236 004767 177216      JSR      PC,FT3ER   ;GO PRINT ERROR
1108 004242 000207              RTS      PC         ;RETURN
1109 004244 000240      FT6DE:  NOP
1110 004246 032777 020000 174362  BIT      #20000,@SWR ;SEE IF PRINT ERROR
1111 004254 001032              RNF      FT6DEB     ;IF NOT: BR
1112 004256 005767 174412      TST      HDRFL      ;SEF IF DONE HEADER
1113 004262 016701 174410      MOV      EMADDR,R1
1114 004266 004767 006074      JSR      PC,TTOUT   ;PRINT HEADER
1115 004272 005267 174376      INC      HDRFL      ;SET FLAG
1116 004276 012704 014342      FT6DEA: MOV      #MSG39,R4
1117 004302 004767 006060      JSR      PC,TTOUT   ;PRINT SILO READ ERROR
1118 004306 012704 013707      MOV      #MSG22,R4
1119 004312 004767 006050      JSR      PC,TTOUT   ;PRINT EXPT TAG
1120 004316 010003              MOV      RO,R3
1121 004320 004767 006172      JSR      PC,OCTP    ;PRINT EXPT
1122 004324 012704 013717      MOV      #MSG23,R4
1123 004330 004767 006032      JSR      PC,TTOUT   ;PRINT RCVD TAG
1124 004334 010103              MOV      R1,R3
1125 004336 004767 006154      JSR      PC,OCTP    ;PRINT RCVD
1126 004342 005777 174270      FT6DEB: TST      @SWR   ;SEE IF HALT ON ERROR
1127 004346 100001              BPL      FT6DEX     ;IF NOT: BR
1128 004350 000000              HALT
1129 004352 000207      FT6DEX: PTS      PC         ;RETURN TO TEST

```

```
1130
1131
1132
1133 004354 005767 174312          FT7:  TST    RH17F
1134 004360 001021                BNE    FT7X          ;IF RH70: BR
1135 004362 012767 015520 174306  MOV    #MSFT7,EMADDR ;SET TEST HEADER
1136 004370 012767 004354 174364  MOV    #FT7,SCOLP    ;SET SCOPE ADDRESS
1137 004376 004767 005340          JSR    PC,INIT1      ;GO INIT
1138 004402 012700 000103          MOV    #103,R0       ;SET SIZE OF SILO +1
1139 004406 010077 174210          FT7A:  MOV    R0,@DB     ;LOAD SILO
1140 004412 005300                DEC    R0             ;SEE IF DONE
1141 004414 001374                BNE    FT7A          ;IF NOT: BR
1142 004416 005777 174166          TST    @CS           ;SEE IF DLT IS SET
1143 004422 100004                BPL    FT7ER         ;IF NOT: BR
1144 004424 004767 005246          FT7X:  JSR    PC,ITER   ;GO SEE IF ITERATION
1145 004430 000167 176066          JMP    TSCD2         ;RETURN TO SCHEDULAR
1146 004434 012767 014124 174274  FT7ER:  MOV    #MSG32,ERADD ;SET ERROR CODE
1147 004442 004767 177012          JSR    PC,FT3ER     ;GO DO ERROR
1148 004446 000766                BR     FT7X
```



```

1149
1150                ;RH11 SILO TEST 5: SILO RESET*****
1151
1152 004450 005767 174216      FT10: TST    RH17F
1153 004454 001034            BNE    FT10X      ;IF RH70: BR
1154 004456 012767 015550 174212  MOV    #MSFT10,EMADDR ;SET TEST HEADER
1155 004464 012767 004450 174270  MOV    #FT10,SCOLP   ;SET SCOPE ADDRESS
1156 004472 012777 000040 174110  MOV    #40,@CS      ;INITIALIZE
1157 004500 012700 000004      MOV    #4,R0        ;SET NUMBER OF SILO WRITER
1158 004504 010077 174112      FT10A: MOV    R0,@DB    ;WRITE SILO
1159 004510 005300            DEC    R0           ;SEE IF DONE
1160 004512 001374            BNE    FT10A      ;IF NOT: BR
1161 004514 052777 000040 174066  BIS    #40,@CS     ;INITIALIZE
1162 004522 012777 177777 174072  MOV    #-1,@DB     ;WRITE SILO
1163 004530 017701 174066      MOV    @DB,R1      ;READ SILO 1
1164 004534 017701 174062      MOV    @DB,R1      ;READ SILO 2
1165 004540 005777 174044      TST    @CS         ;SEE IF DLT IS SET
1166 004544 100011            BPL    FT10ER     ;IF NOT: BR
1167 004546 004767 005124      FT10X: JSR    PC,ITER ;GO SEE IF ITERATION
1168 004552 005767 174236      TST    RH0F       ;SEE IF RH11 ONLY
1169 004556 001402            BEQ    FT10XX     ;IF NOT: BR
1170 004560 000167 176052      JMP    TEND       ;ELSE GO TO END
1171 004564 000167 175732      FT10XX: JMP   TSCD2     ;RETURN TO SCHEDULAR
1172 004570 012767 014124 174140 FT10ER: MOV    #MSG32,ERADD ;SET ERROR CODE
1173 004576 004767 176656      JSR    PC,FT3ER  ;GO DO ERROR
1174 004602 000761            BR     FT10X
  
```

```
1175 ;NOP TEST*****
1176
1177 004604 000240 FT11: NOP
1178 004606 012767 004604 174146 MOV #FT11,SCOLP ;SET SCOPE ADDRESS
1179 004614 004767 005122 JSR PC,INIT1
1180 004620 012767 000300 174156 MOV #300,UDES ;SET TC= ALL NRZ,NORM,ODD
1181 004626 012767 177777 174052 MOV #-1,FCNT ;SET FC= ALL OVER
1182 004634 012767 177777 174046 MOV #-1,WCNT ;SET WC= ALL OVER
1183 004642 012767 177777 174034 MOV #-1,BADDR ;SET BA= ALL OVER
1184 004650 012767 000001 174046 MOV #1,RDYDX ;SET DELAY
1185 004656 012767 000001 174042 MOV #1,OPDYX ;SET OP DELAY
1186 004664 012767 000001 174104 MOV #1,FUN ;SET NOP FUNCTIONS CODE
1187 004672 004767 003730 JSR PC,EXEC ;GO EXECUTE COMMAND
1188 004676 000240 NOP
1189 004700 012767 015601 173770 MOV #MSFT11,EMADDR
1190 004706 004767 004144 JSR PC,ERCHK ;GO CHECK REGISTER
1191 004712 004767 004760 JSR PC,ITER ;GO SEE IF ITERATIONS
1192 004716 000167 175600 JMP TSCD2 ;RETURN TO SCHEDULAR
```

```

1193                                     ;REWIND TEST*****
1194
1195 004722 000240                      FT12:  NOP
1196 004724 012767 004722 174030      MOV    #FT12,SCOLP
1197 004732 004767 005004              JSR    PC,INIT1          ;GO INITIALIZE
1198 004736 052777 001700 173666      BIS    #1700,@TC        ;SET TO NRZ,NORMAL
1199 004744 012767 177760 173734      MOV    #-20,FCNT       ;SET FC=20
1200 004752 012767 177770 173730      MOV    #-10,WCNT       ;SET WC=10
1201 004760 012767 016232 173716      MOV    #WDATA,BADDR    ;SET BA=WRITE BUFFER
1202 004766 012767 000007 174002      MOV    #7,FUN          ;SET REWIND OP CODE
1203 004774 004767 003626              JSR    PC,EXEC          ;GO EXECUTE COMMAND
1204 005000 000240                      NOP
1205 005002 032777 020000 173602      FT12A: BIT #20000,@DS
1206 005010 001374                      BNE    FT12A           ;AWAIT PIP
1207 005012 012767 015621 173656      MOV    #MSFT12,EMADDR
1208 005020 004767 004032              JSR    PC,ERCHK        ;GO CHECK FOR ERROR
1209 005024 004767 004646              JSR    PC,ITER         ;GO SEE IF ITERATION
1210 005030 000167 175466              JMP    TSCD2           ;RETURN TO SCHEDULAR
1211

```

```

1212                                     ;WRITE/READ TEST*****
1213
1214 005034 000240          FT13:  NOP
1215 005036 012767 102300 173702  MOV    #102300,STMSK  ;IGNORE DATA RELATED ERRORS
1216 005044 012767 000001 173652  MOV    #1,RDYDX
1217 005052 012767 000001 173646  MOV    #1,OPDYX
1218 005060 012767 000100 173624  MOV    #100,RCNT      ;SET RECORD COUNT
1219 005066 012767 015644 173602  MOV    #MSFT13,EMADDR ;SET TEST HEADER
1220 005074 012767 000001 173704  MOV    #1,PATRN
1221 005102 004767 004352          JSR    PC,DSUP        ;SET UP ALL ONES DATA PATTERN
1222 005106 012767 000300 173670  MOV    #300,UDES      ;REWIND TO BOT
1223 005114 004767 003640          FT13A: JSR    PC,RWND       ;SET 200 BPI, NORMAL
1224 005120 012767 177600 173560  MOV    #-200,FCNT     ;SET FC
1225 005126 012767 177700 173554  MOV    #-100,WCNT     ;SET WC
1226 005134 012767 016232 173542  MOV    #WDATA,BADDR   ;SET BA
1227 005142 012767 000061 173626  MOV    #61,FUN        ;SET WRITE OP-CODE
1228 005150 012767 013523 173536  MOV    #MSG12,ERRP
1229 005156 004767 003444          FT13B: JSR    PC,EXEC     ;GO EXECUTE COMMAND
1230 005162 005067 173574          CLR    SCOLP          ;NO SCOPE LOOP
1231 005166 004767 003664          JSR    PC,ERCHK       ;GO CHECK ERROR
1232 005172 005367 173514          DEC    RCNT           ;SEE IF DONE ALL
1233 005176 001367          BNE    FT13B         ;IF NOT: BR
1234 005200 012767 000100 173504  MOV    #100,RCNT     ;SET RECORD COUNT
1235 005206 012767 017744 173470  MOV    #RDATA,BADDR
1236 005214 062767 000200 173462  ADD    #200,BADDR     ;SET BA
1237 005222 012767 000077 173546  MOV    #77,FUN        ;SET READ REVERSE OP-CPDE
1238 005230 012767 013541 173456  MOV    #MSG13,ERRP
1239 005236 004767 003364          FT13C: JSR    PC,EXEC     ;GO EXECUTE COMMAND
1240 005242 004767 003610          JSR    PC,ERCHK       ;GO CHECK ERROR
1241 005246 005367 173440          DEC    RCNT           ;SEE IF READ ALL
1242 005252 001371          BNE    FT13C         ;IF NOT:BR
1243 005254 162767 000200 173422  SUB    #200,BADDR     ;SET BA
1244 005262 012767 000071 173506  MOV    #71,FUN        ;SET READ FORWARD OP-CODE
1245 005270 012767 013566 173416  MOV    #MSG14,ERRP
1246 005276 012767 000100 173406  MOV    #100,RCNT     ;SET RECORD COUNT
1247 005304 004767 003316          FT13D: JSR    PC,EXEC     ;GO EXECUTE COMMAND
1248 005310 004767 003542          JSR    PC,ERCHK       ;GO CHECK ERRORS
1249 005314 005367 173372          DEC    RCNT           ;SEE IF DONE ALL
1250 005320 001371          BNE    FT13D         ;IF NOT:BR
1251 005322 032767 002000 173454  BIT    #2000,UDES     ;SEE IF DONE PE
1252 005330 001017          BNE    FT13X         ;IF SO: BR
1253 005332 062767 000400 173444  ADD    #400,UDES      ;SELECT NEXT DENSITY
1254 005340 032767 002000 173436  BIT    #2000,UDES     ;SEE IF PE
1255 005346 001403          BEQ    FT13E         ;IF NOT: BR
1256 005350 005767 173436          TST    NRZOF         ;SEE IF NRZ ONLY
1257 005354 001005          BNE    FT13X         ;IF SO: BR
1258 005356 012767 000100 173326  FT13E: MOV    #100,RCNT ;RESET RECORD COUNT
1259 005364 000167 177524          JMP    FT13A         ;GO DO NEXT DENSITY
1260 005370 000167 175126          FT13X: JMP    TSCD2     ;RETURN TO SCHEDULAR

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1261                                     ;SPACE TEST*****
1262
1263 005374 000240 FT14:  NOP
1264 005376 012767 015673 173272  MOV      #MSFT14,EMADDR ;SET TEST HEADER
1265 005404 012767 001700 173372  MOV      #1700,UDES    ;SET NRZ,NORMAL
1266 005412 004767 003342 FT14A1: JSR      PC,RWND   ;GO INITIALIZE
1267 005416 012767 000100 173266  MOV      #100,RCNT    ;SET NUMBER OF RECORDER
1268 005424 012767 177777 010600  MOV      #-1,WDATA    ;SET DATA PATTERN
1269 005432 012767 177700 173246  MOV      #-100,FCNT   ;PRESET FRAME CNT
1270 005440 012767 177740 173242  MOV      #-40,WCNT    ;PRESET WORD CNT
1271 005446 004767 004270 FT14A:  JSR      PC,INIT1 ;GO REWIND
1272 005452 012767 001000 173246  MOV      #1000,OPDYX
1273 005460 012767 040000 173236  MOV      #40000,RDYDX
1274 005466 012767 000061 173302  MOV      #61,FUN      ;SET WRITE OP-CODE
1275 005474 012767 102300 173244  MOV      #102300,STMSK ;MASK DATA RELATED ERRORS
1276 005502 052777 000010 173100  BIS      #10,ACS      ;INHIBIT BUS ADDRESS INCREMENT
1277 005510 004767 003112  JSR      PC,EXEC      ;GO EXECUTE COMMAND
1278 005514 000240  NOP
1279 005516 012767 014576 173170  MOV      #MSG46,ERRP   ;SET ERROR CODE
1280 005524 004767 003326  JSR      PC,ERCHK     ;GO CHECK ERRORS
1281 005530 005767 173244  TST      SERFL        ;SEE IF ERROR
1282 005534 001402  BEQ      FT14A2      ;IF NOT: BR
1283 005536 000167 000466  JMP      FT14X        ;ELSE EXIT
1284 005542 162767 000001 173136 FT14A2: SUB      #1,FCNT    ;BUMP FC
1285 005550 032767 000001 173130  BIT      #1,FCNT      ;SEE IF SHOULD BUMP WC
1286 005556 001403  BEQ      FT14A3      ;IF NOT: BR
1287 005560 162767 000001 173122  SUB      #1,WCNT      ;BUMP WC
1288 005566 005367 173120 FT14A3: DEC      RCNT    ;SEE IF DONE ALL
1289 005572 001325  BNE      FT14A        ;WRITE ALL RECORDS
1290 005574 000240  NOP
1291 005576 012767 000100 173114  MOV      #100,RRD     ;PRESET RECORD POSITION
1292 005604 012767 000176 173110  MOV      #176,RFD
1293 005612 000240  NOP
1294 005614 012767 177701 173106  MOV      #-77,SCNT    ;SET SPACE AMOUNT
1295 005622 012767 000033 173146 FT14B:  MOV      #33,FUN   ;SET OP-CODE SPACE REVERSE
1296 005630 004767 002772  JSR      PC,EXEC      ;GO EXECUTE COMMAND
1297 005634 012767 014647 173052  MOV      #MSG48,ERRP   ;SET ERROR CODE
1298 005642 004767 003210  JSR      PC,ERCHK     ;GO CHECK ERRORS
1299 005646 005767 173126  TST      SERFL        ;SEE IF ERROR
1300 005652 001166  BNE      FT14X        ;IF SO: BR
1301 005654 004767 000070  JSR      PC,FT14RR    ;GO READ REVERSE + CHECK DATA
1302 005660 000240  NOP
1303 005662 012767 000031 173106  MOV      #31,FUN      ;SET SPACE FORWARD OP-CODE
1304 005670 005267 173034  INC      SCNT         ;SET SPACE AMOUNT
1305 005674 001555  BEQ      FT14X        ;IF DONE: BR
1306 005676 004767 002724  JSR      PC,EXEC      ;GO EXECUTE COMMAND
1307 005702 012767 014622 173004  MOV      #MSG47,ERRP   ;SET ERROR CODE
1308 005710 004767 003142  JSR      PC,ERCHK     ;GO CHECK ERROR
1309 005714 005767 173060  TST      SERFL        ;SEE IF ERROR FLAG
1310 005720 001143  BNE      FT14X        ;IF NO: BR
1311 005722 004767 000064  JSR      PC,FT14RF    ;GO READ FORWARD FOR POSITION CHECK
1312 005726 000240  NOP
1313 005730 005267 172774  INC      SCNT         ;DECREMENT SPACE AMOUNT
1314 005734 001535  BEQ      FT14X        ;IF DONE: BR
1315 005736 005267 172756  INC      RRD          ;BUMP DATA EXPT
1316 005742 005367 172754  DEC      RFD          ;BUMP DATA EXPT

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1317 005746 000725          BR          FT14B
1318 005750 000240          FT14RR: NOP
1319 005752 012767 017744 172724  MOV      #RDATA,BADDR      ;SET BA
1320 005760 012767 000077 173010  MOV      #77,FUN          ;SET READ REVERSE OP-CODE
1321 005766 004767 002634          JSR      PC,EXEC          ;GO EXECUTE COMMAND
1322 005772 000240          NOP
1323 005774 016705 172720          MOV      RRD,R5
1324 006000 020577 172602          CMP      R5,@FC          ;SEE IF CORRECT RECORD
1325 006004 001020          BNE     FT14RER          ;IF NOT: BR
1326 006006 000167 000026          JMP      FT14EC          ;GO CLEAR RH11 ERROR BIT
1327 006012 000240          FT14RF: NOP
1328 006014 012767 000071 172754  MOV      #71,FUN          ;SET READ FORWARD OP-CODE
1329 006022 004767 002600          JSR      PC,EXEC          ;GO EXECUTE COMMAND
1330 006026 016705 172670          MOV      RFD,R5
1331 006032 020577 172550          CMP      R5,@FC          ;SEE IF CORRECT RECORD
1332 006036 001003          BNE     FT14RER          ;IF NOT: BR
1333 006040 004767 003676          FT14EC: JSR      PC,INIT1   ;CLEAR RH
1334 006044 000207          RTS      PC              ;RETURN
1335 006046 000240          FT14RER: NOP
1336 006050 032777 020000 172560  BIT      #20000,@SWR      ;SEE IF PRINT INHIBITED
1337 006056 001060          BNE     FT14R3          ;IF SO: BR
1338 006060 012704 015673          MOV      #MSFT14,R4
1339 006064 004767 004276          JSR      PC,TTOUT        ;PRINT HEADER
1340 006070 012704 013441          MOV      #MSG9,R4
1341 006074 004767 004266          JSR      PC,TTOUT        ;PRINT ERROR TYPE
1342 006100 012704 013674          MOV      #MSG20,R4       ;SET NRZ TAG POINTER
1343 006104 032767 002000 172672  BIT      #2000,UDES      ;SEE IF PE
1344 006112 001402          BEQ     FT14R0          ;IF NOT: BR
1345 006114 012704 013702          MOV      #MSG21,R4       ;ELSE SET PE TAG POINTER
1346 006120 004767 004242          FT14R0: JSR      PC,TTOUT   ;PRINT TAG
1347 005124 032767 000002 172644  BIT      #2,FUN          ;SEE IF READ REVERSE
1348 006132 001003          BNE     FT14R1          ;IF SO: BR
1349 006134 012704 013654          MOV      #MSG17,R4
1350 006140 000402          BR      FT14R2          ;GO PRINT
1351 006142 012704 013634          FT14R1: MOV      #MSG16,R4
1352 006146 004767 004214          FT14R2: JSR      PC,TTOUT   ;PRINT FRWD/REV
1353 006152 012704 013707          MOV      #MSG22,R4
1354 006156 004767 004204          JSR      PC,TTOUT        ;PRINT EXPT TAG
1355 006162 010503          MOV      R5,R3
1356 006164 042703 177700          BIC     #177700,R3       ;MASK RECORD NUMBER
1357 006170 004767 004322          JSR      PC,OCTP        ;PRINT EXPT RECORD NUMBER
1358 006174 012704 013717          MOV      #MSG23,R4
1359 006200 004767 004162          JSR      PC,TTOUT        ;PRINT RCVD TAG
1360 006204 017703 172376          MOV      @FC,R3
1361 006210 042703 177700          BIC     #177700,R3       ;MASK RECORD NUMBER
1362 006214 004767 004276          JSR      PC,OCTP        ;PRINT ACTUAL RECORD NUMBER
1363 006220 005777 172412          FT14R3: TST      @SWR      ;SEE IF HALT ON ERROR
1364 006224 100001          BPL     FT14X          ;IF NOT: BR
1365 006226 000000          HALT
1366 006230 005767 172556          FT14X:  TST      NRZOF     ;SEE IF NRZ ONLY
1367 006234 001011          BNE     FT14XX          ;IF SO: BR
1368 006236 032767 002000 172540  BIT      #2000,UDES      ;SEE IF DONE PE
1369 006244 001005          BNE     FT14XX          ;IF SO: BR
1370 006246 012767 002300 172530  MOV      #2300,UDES      ;SET TO PE
1371 006254 000167 177132          JMP      FT14A1         ;DO IN PE
1372 006260 000167 174236          FT14XX: JMP      TSCD2     ;RETURN TO SCHEDULAR

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1373                                     :ERASE TEST*****
1374
1375 006264 000240          FT15:  NOP
1376 006266 005067 172454          CLR      STMSK
1377 006272 012767 000100 172424          MOV      #100,RDYDX
1378 006300 012767 000010 172420          MOV      #10,OPDYX
1379 006306 012767 015715 172362          MOV      #MSFT15,EMADDR ;SET TEST HEADER
1380 006314 004767 002440          JSR      PC,RWND ;REWIND
1381 006320 012767 017744 172356          MOV      #RDATA,BADDR ;SET BA
1382 006326 012767 001700 172450          MOV      #1700,UDES ;SET NRZ, NORMAL
1383 006334 012767 000025 172434 FT15A: MOV      #25,FUN ;SET ERASE OP-CODE
1384 006342 012767 000200 172342          MOV      #200,RCNT ;SET TO ERASE 128 TIMES
1385 006350 004767 002252          FT15B: JSR      PC,EXEC ;GO EXECUTE COMMAND
1386 006354 012767 014576 172332          MOV      #MSG46,ERRP ;SET ERROR CODE
1387 006362 004767 002470          JSR      PC,ERCHK ;GO CHECK ERRORS
1388 006366 005767 172406          TST      SERFL ;SEE IF ANY ERRORS
1389 006372 001032          BNE      FT15X ;IF SO EXIT
1390 006374 005367 172312          DEC      RCNT ;SEE IF DONE ERASING
1391 006400 001363          BNE      FT15B ;IF NOT: BR
1392 006402 000240          NOP
1393 006404 004767 002350          JSR      PC,RWND ;REWIND
1394 006410 012767 177600 172272          MOV      #-200,WCNT ;SET WC
1395 006416 012767 000071 172352          MOV      #71,FUN ;SET READ FORWARD OP-CODE
1396 006424 012767 000040 172272          MOV      #40,RDYDX ;SET DELAY
1397 006432 004767 002170          JSR      PC,EXEC ;GO EXECUTE COMMAND
1398 006436 000240          NOP
1399 006440 012767 015172 172246          MOV      #MSG60,ERRP ;SET ERROR CODE
1400 006446 012767 020000 172272          MOV      #20000,STMSK
1401 006454 004767 002376          JSR      PC,ERCHK ;GO CHECK ERRORS
1402 006460 000167 174036          FT15X: JMP      TSCD2 ;RETURN TO SCHEDULAR
    
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1403                                     ;TAPE MARK WRITE/READ TEST*****
1404
1405 006464 000240          FT16:  NOP
1406 006466 012767 000001 172230    MOV      #1,RDYDX
1407 006474 012767 001000 172224    MOV      #1000,OPDYX
1408 006502 012767 015737 172166    MOV      #MSFT16,EMADDR      ;SET HEADER
1409 006510 012767 001700 172266    MOV      #1700,UDES          ;SET TO NRZ,NORMAL,ODD
1410 006516 004767 002236          FT16A: JSR      PC,RWND        ;REWIND
1411 006522 012767 177760 172156    FT16B: MOV      #-20,FCNT      ;FC=20
1412 006530 012767 177770 172152    MOV      #-10,WCNT          ;WC=10
1413 006536 012767 000027 172232    MOV      #27,FUN            ;SET WRITE TAPE MARK OP-CODE
1414 006544 004767 002056          JSR      PC,EXEC             ;GO EXECUTE COMMAND
1415 006550 012767 001000 172170    MOV      #1000,STMSK        ;SET FOR FCE MASK
1416 006556 012767 013523 172130    MOV      #MSG12,ERRP        ;SET ERROR CODE
1417 006564 004767 002266          JSR      PC,ERCHK           ;GO CHECK ERROR
1418 006570 004767 002624          JSR      PC,TMCHK           ;GO SEE IF TM SET
1419 006574 012767 000077 172174    MOV      #77,FUN            ;SET USED REVERSE OP-CODE
1420 006602 004767 002020          JSR      PC,EXEC             ;GO EXECUTE COMMAND
1421 006606 012767 001000 172132    MOV      #1000,STMSK        ;SET FCE ERROR MASK
1422 006614 012767 013541 172072    MOV      #MSG13,ERRP        ;SET ERROR CODE
1423 006622 004767 002230          JSR      PC,ERCHK           ;GO CHECK ERRORS
1424 006628 004767 002566          JSR      PC,TMCHK           ;GO SEE IF TM SET
1425 006632 012767 000071 172136    MOV      #71,FUN            ;SET READ FORWARD OP-CODE
1426 006640 004767 001762          JSR      PC,EXEC             ;GO EXECUTE COMMAND
1427 006644 012767 013566 172042    MOV      #MSG14,ERRP        ;SET ERROR CODE
1428 006652 004767 002200          JSR      PC,ERCHK           ;TO CHECK ERRORS
1429 006656 004767 002536          JSR      PC,TMCHK           ;GO SEE IF TM SET
1430 006662 032767 002000 172114    BIT      #2000,UDES         ;SEE IF DONE PE
1431 006670 001012          BNE      FT16X              ;IF SO: BR
1432 006672 005767 172114          TST      NRZOF              ;SEE IF NRZ ONLY
1433 006676 001007          BNE      FT16X              ;IF SO: BR
1434 006700 012767 002300 172076    MOV      #2300,UDES         ;SET PE, NORMAL
1435 006706 004767 003030          JSR      PC,INIT1           ;INITIALIZE
1436 006712 000167 177604          JMP      FT16B              ;DO IN PE
1437 006716 004767 002754          FT16X: JSR      PC,ITER       ;DO ITERATIONS
1438 006722 000167 173574          JMP      TSCD2              ;RETURN TO SCHEDULAR
1439

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1440
1441
1442
1443 006726 005067 171760 FT17: CLR RCNT
1444 006732 012767 016000 171736 MOV #MSFT17,EMADDR ;SET HEADER
1445 006740 012767 001700 172036 MOV #1700,UDES ;SET TO NRZ
1446 006746 004767 002006 FT17A: JSR PC,RWND ;REWIND TAPE
1447 006752 012767 000027 172016 FT17B: MOV #27,FUN
1448 006760 012767 040000 171736 MOV #40000,RDYDX ;SET DRY DELAY
1449 006766 012767 040000 171732 MOV #40000,OPDYX ;SET OP DELAY
1450 006774 004767 001626 JSR PC,EXEC ;GO WRITE TM
1451 007000 012767 102300 171740 MOV #102300,STMSK ;MASK DATA RELATED ERRORS
1452 007006 012767 013613 171700 MOV #MSG15,ERRP ;SET ERROR TYPE
1453 007014 004767 002036 JSR PC,ERCHK ;GO CHECK ERROR
1454 007020 005767 171754 TST SERFL ;SEE IF ERROR
1455 007024 001144 BNE FT17X ;IF SO: BR
1456 007026 004767 002366 JSR PC,TMCHK ;GO SEE IF TM SET
1457 007032 000240 NOP
1458 007034 000240 NOP
1459 007036 032767 000100 171646 BIT #100,RCNT ;SEE IF DONE PATTERN
1460 007044 001046 BNE FT17D ;IF SO: BR
1461 007046 062767 000020 171636 ADD #20,RCNT ;ADD 20 TO RECORD COUNT
1462 007054 016767 171632 171656 MOV RCNT,TEMP1 ;SAVE RECORD COUNT
1463 007062 012767 177600 171620 MOV #-200,WCNT ;WC=128
1464 007070 012767 177400 171610 MOV #-400,FCNT ;FC=256
1465 007076 012767 016232 171600 MOV #WDATA,BADDR ;BA=WRITE BUFFER
1466 007104 012767 000061 171664 MOV #61,FUN ;SET WRITE OP CODE
1467 007112 000240 FT17C: NOP
1468 007114 000240 NOP
1469 007116 004767 001504 JSR PC,EXEC ;GO WRITE
1470 007122 012767 013523 171564 MOV #MSG12,ERRP ;SET ERROR CODE
1471 007130 012767 102300 171610 MOV #102300,STMSK ;MASK DATA RELATED ERRORS
1472 007136 004767 001714 JSR PC,ERCHK ;GO CHECK ERROR
1473 007142 005767 171632 TST SERFL ;SEE IF ERROR
1474 007146 001073 BNE FT17X ;IF SO: BR
1475 007150 005367 171564 DEC TEMP1 ;SEE IF DONE ALL
1476 007154 001356 BNE FT17C ;IF NOT: BR
1477 007156 000167 177570 JMP FT17B ;ELSE GO DO TM
1478 007162 000240 FT17D: NOP
1479 007164 012767 000033 171604 MOV #33,FUN ;SET SPACE REVERSE
1480 007172 012767 013634 171514 MOV #MSG16,ERRP ;SET ERROR CODE
1481 007200 012767 177600 171522 FT17D1: MOV #-200,SCNT ;SET TO 200 RECORDS
1482 007206 012767 000005 171476 MOV #5,RCNT ;SET NUMBER OF OPS TO DO
1483 007214 004767 002522 FT17E: JSR PC,INIT1 ;GO INIT
1484 007220 004767 001402 JSR PC,EXEC ;GO SPACE
1485 007224 012767 001000 171514 MOV #1000,STMSK ;SET ERROR MASK
1486 007232 004767 001620 JSR PC,ERCHK ;GO CHECK ERROR
1487 007236 005767 171536 TST SERFL ;SEE IF ERROR
1488 007242 001035 BNE FT17X ;IF SO: BR
1489 007244 004767 002150 JSR PC,TMCHK ;GO SEE IF TM SET
1490 007250 005367 171436 DEC RCNT ;SEE IF DONE SPACES
1491 007254 001357 BNE FT17E ;IF NOT: BR
1492 007256 022767 000031 171512 CMP #31,FUN ;SEE IF DONE FORWARD
1493 007264 001410 BEQ FT17F ;IF SO: BR
1494 007266 012767 013654 171420 MOV #MSG17,ERRP ;SET ERROR CODE
1495 007274 012767 000031 171474 MOV #31,FUN ;SET TO SPACE FORWARD

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1496	007302	000167	177672		JMP	FT17D1	:DO FORWARD
1497	007306	032767	002000	171470	FT17F:	BIT #2000, UDES	:SEE IF DONE PE
1498	007314	001010			BNE	FT17X	:IF SO: BR
1499	007316	005767	171470		TST	NRZOF	:SEE IF NRZ ONLT
1500	007322	001005			BNE	FT17X	:IF SO: BR
1501	007324	012767	002300	171452	MOV	#2300, UDES	:SET TO PE
1502	007332	000167	177410		JMP	FT17A	:GO PE
1503	007336	000167	173160		FT17X:	JMP TSCD2	:RETURN TO SCHEDULAR

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1504
1505                                     ;WRITE CHECK TEST*****
1506
1507 007342 000240                      FT20:  NOP
1508 007344 012767 016026 171324      MOV     #MSFT20,EMADDR ;SET HEADER
1509 007352 004767 001402                      JSR     PC,RWND        ;REWIND
1510 007356 012767 000003 171422      MOV     #3,PATRN
1511 007364 004767 002070                      JSR     PC,DSUP        ;GO SET PATTERN 3
1512 007370 012767 016232 171306      MOV     #WDATA,BADDR  ;SET BA
1513 007376 012767 177400 171302      MOV     #-400,FCNT    ;SET FC
1514 007404 012767 177600 171276      MOV     #-200,WCNT    ;SET WC
1515 007412 012767 001700 171364      MOV     #1700,UDES    ;SET NRZ NORMAL
1516 007420 012767 000061 171350      FT20A: MOV     #61,FUN    ;SET WRITE OP CODE
1517 007426 004767 001174                      JSR     PC,EXEC       ;GO WRITE RECORD
1518 007432 012767 014576 171254      MOV     #MSG46,ERRP   ;SET ERROR CODE
1519 007440 004767 001412                      JSR     PC,ERCHK      ;GO CHECK ERROR
1520 007444 005767 171330                      TST     SERFL         ;SEE IF ERORR
1521 007450 001050                      BNE     FT20X        ;IF SO: BR
1522 007452 012767 013634 171234      MOV     #MSG16,ERRP   ;SET REVERSE ERROR TAG
1523 007460 012767 000057 171310      MOV     #57,FUN      ;SET REVERSE WRITE CHECK OP-CODE
1524 007466 062767 000376 171210      ADD     #376,BADDR   ;SET BA FOR REVERSE CHECK
1525 007474 004767 001126                      JSR     PC,EXEC       ;GO DO REVERSE CHECK
1526 007500 004767 001352                      JSR     PC,ERCHK      ;GO CHECK ERROR
1527 007504 012767 013654 171202      FT20B: MOV     #MSG17,ERRP   ;SET FORWARD TAG
1528 007512 012767 000051 171256      MOV     #51,FUN      ;SET FORWARD CHECK OP CODE
1529 007520 162767 000376 171156      SUB     #376,BADDR   ;SET BA FOR FORWARD CHECK
1530 007526 004767 001074                      JSR     PC,EXEC       ;GO DO FORWARD CHECK
1531 007532 004767 001320                      JSR     PC,ERCHK      ;GO CHECK ERROR
1532 007536 032767 002000 171240      FT20C: BIT     #2000,UDES ;SEE IF DONE PE
1533 007544 001012                      BNE     FT20X        ;IF SO: BR
1534 007546 005767 171240                      TST     NRZOF        ;SEE IF NRZ ONLY
1535 007552 001007                      BNE     FT20X        ;IF SO: BR
1536 007554 012767 002300 171222      MOV     #2300,UDES   ;ELSE SET PE
1537 007562 004767 002154                      JSR     PC,INIT1     ;GO INIT
1538 007566 000167 177626                      JMP     FT20A        ;DO IN PE
1539 007572 004767 002100                      FT20X: JSR     PC,ITER  ;DO ITERATIONS
1540 007576 000167 172720                      JMP     TSCD2       ;RETURN TO SCHEDULAR

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1541
1542
1543
1544 007602 012767 016057 171066 FT21: MOV #MSFT21,EMADDR ;SET TEST HEADER
1545 007610 004767 001144 JSR PC,RWND ;GO REWIND
1546 007614 012767 000003 171164 MOV #3,PATRN
1547 007622 004767 001632 JSR PC,DSUP ;GO SET PATTERN 3
1548 007626 012767 016232 171050 MOV #WDATA,BADDR ;SET BA=WRITE BUFFER
1549 007634 012767 176340 171044 MOV #-1440,FCNT ;SET FC=800
1550 007642 012767 177160 171040 MOV #-620,WCNT ;SET WC=400
1551 007650 012767 001700 171126 MOV #1700,UDES ;SET NRZ, NORMAL
1552 007656 012767 000061 171112 MOV #61,FUN ;SET WRITE OP-CODE
1553 007664 004767 000736 JSR PC,EXEC ;GO DO WRITE 1
1554 007670 012767 013523 171016 MOV #MSG12,ERRP ;SET ERROR CODE
1555 007676 004767 001154 JSR PC,ERCHK ;GO CHECK FOR ERROR
1556 007702 004767 000720 JSR PC,EXEC ;YES DO WRITE 2
1557 007706 004767 001144 JSR PC,ERCHK ;YES CHECK FOR ERROR
1558 007712 000240 NOP
1559 007714 004767 001040 JSR PC,RWND ;GO REWIND
1560 007720 012767 177160 170760 MOV #-620,FCNT ;SET FC=400
1561 007726 012767 177470 170754 MOV #-310,WCNT ;SET WC=200
1562 007734 004767 000666 JSR PC,EXEC ;GO REWRITE RECORD 1-WH TO EH
1563 007740 000240 FT21A: NOP
1564 007742 004767 001012 JSR PC,RWND ;REWIND
1565 007746 012767 017744 170730 MOV #RDATA,BADDR ;SET BA=READ BUFFER
1566 007754 012767 177160 170724 MOV #-620,FCNT ;SET FC=400
1567 007762 012767 177470 170720 MOV #-310,WCNT ;SET WC=200
1568 007770 012767 000071 171000 MOV #71,FUN ;SET READ OP-CODE
1569 007776 004767 000624 JSR PC,EXEC ;GO READ RECORD 1
1570 010002 012767 013566 170704 MOV #MSG14,ERRP ;SET ERROR CODE
1571 010010 004767 001042 JSR PC,ERCHK ;GO CHECK FOR ERROR
1572 010014 000240 NOP
1573 010016 052777 000010 170564 BIS #10,@CS ;INHIBIT BA INCREMENT
1574 010024 012767 176340 170654 MOV #-1440,FCNT ;SET FC=800
1575 010032 012767 177160 170650 MOV #-620,WCNT ;SET WC=400
1576 010040 004767 000562 JSR PC,EXEC ;GO READ RECORD 2
1577 010044 022777 001440 170534 CMP #1440,@FC ;SEE IF READ RECORD 2
1578 010052 001410 BEQ FT21X ;IF SO: BR
1579 010054 012767 014474 170654 MOV #MSG44,ERADD ;SET ERROR CODE
1580 010062 012767 007740 170672 MOV #FT21A,SCOLP ;SET SCOPE ADDRESS
1581 010070 004767 173364 JSR PC,FT3ER ;GO PRINT ERROR
1582 010074 004767 001576 FT21X: JSR PC,ITER ;GO SEE IF ITERATION
1583 010100 000167 172416 JMP TSCD2 ;RETURN TO SCHEDLAR
1584
1585

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```
1586 ;BUFFERED COMMAND TEST*****
1587
1588 010104 012767 016106 170564 FT22: MOV #MSFT22,EMADDR ;SET TEST HEADER
1589 010112 004767 000642 JSR PC,RWIND ;GO REWIND
1590 010116 012700 000003 MOV #3,R0 ;SET NUMBER OF WRITES
1591 010122 012767 001700 170654 MOV #1700,UDES ;SET TO NRZ NORMAL
1592 010130 012767 016232 170546 MOV #WDATA,BADDR ;SET BA=WRITE BUFFER
1593 010136 012767 177000 170542 MOV #-1000,FCNT ;SET FC=1000
1594 010144 012767 177400 170536 MOV #-400,WCNT ;SET WC=400
1595 010152 012767 000061 170616 MOV #61,FUN ;SET WRITE OP-CODE
1596 010160 004767 000442 FT22A: JSR PC,EXEC ;GO DO WRITE
1597 010164 005300 DEC R0 ;SEE IF DONE ALL
1598 010166 001374 BNE FT22A ;IF NOT: BR
1599 010170 000240 NOP
1600 010172 012777 000007 170400 MOV #7,@C1 ;START REWIND
1601 010200 032777 000200 170404 FT22B: BIT #200,@DS
1602 010206 001774 BEQ FT22B
1603 010210 012767 000010 170506 MOV #10,RDYDX ;SET LONG READY DELAY
1604 010216 004767 000404 JSR PC,EXEC ;ISSUE BUFFERED WRITE
1605 010222 000240 NOP
1606 010224 012767 014674 170462 MOV #MSG49,ERRP ;SET ERROR CODE
1607 010232 012767 102300 170506 MOV #102300,STMSK ;MARK DATA ERROR
1608 010240 004767 000612 JSR PC,ERCHK ;GO CHECK ERROR
1609 010244 032777 000002 170340 BIT #2,@DS ;SEE IF BOT IS SET
1610 010252 001410 BEQ FT22X ;IF NOT: BR
1611 010254 012767 014722 170454 MOV #MSG50,ERADD ;SET ERROR CODE
1612 010262 012767 010104 170472 MOV #FT22,SCOLP
1613 010270 004767 173164 JSR PC,FT3ER ;GO DO ERROR
1614 010274 004767 001376 FT22X: JSR PC,ITER ;GO SEE IF ITERATION
1615 010300 000167 172216 JMP TSCD2 ;RETURN TO SCHEDULAR
1616
1617
```

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1618                                     ;READ-IN PRESET TEST*****
1619
1620 010304 005767 170372          FT23: TST     SLVN          ;SEE IF SLAVE SELECT=0
1621 010310 001103                BNE     FT23X        ;IF NOT:BR
1622 010312 012767 016143 170356  MOV     #MSFT23,EMADDR ;SET TEST HEADER
1623 010320 004767 001416                JSR     PC,INIT1     ;GO INIT
1624 010324 012767 001700 170452  MOV     #1700,UDES    ;SET TO NRZ NORMAL
1625 010332 012767 016232 170344  MOV     #WDATA,BADDR ;SET BA=WRITE BUFFER
1626 010340 012767 177400 170340  MOV     #-400,FCNT    ;SET FC=400
1627 010346 012767 177600 170334  MOV     #-200,WCNT    ;SET WC=200
1628 010354 012767 000061 170414  MOV     #61,FUN       ;SET WRITE OP-CODE
1629 010362 004767 000240                JSR     PC,EXEC      ;GO DO WRITE
1630 010366 000240                NOP
1631 010370 004767 001346                JSR     PC,INIT1     ;INITIALIZE
1632 010374 012767 000021 170374  MOV     #21,FUN       ;SET READ-IN PRESET OP CODE
1633 010402 004767 000220                JSR     PC,EXEC      ;GO DO COMMAND
1634 010406 005000                CLR     R0
1635 010410 012703 000004                MOV     #4,R3        ;SET MULT
1636 010414 032777 020000 170170  FT23A: BIT     #20000,ADS ;SEE IF PIP RESET
1637 010422 001404                BEQ     FT23B        ;IF SO: BR
1638 010424 005300                DEC     R0
1639 010426 001372                BNE     FT23A        ;AWAIT PIP RESET
1640 010430 005303                DEC     R3
1641 010432 001370                BNE     FT23A        ;DELAY
1642 010434 032777 000002 170150  FT23B: BIT     #2,ADS   ;SEE IF BOT
1643 010442 001010                BNE     FT23C        ;IF SO: BR
1644 010444 012767 014760 170264  MOV     #MSG51,ERADD  ;SET ERROR CODE
1645 010452 012767 010304 170302  MOV     #FT23,SCOLP
1646 010460 004767 172774                JSR     PC,FT3ER     ;GO DO ERROR
1647 010464 012701 141000          FT23C: MOV     #141000,R1 ;SET EXPT TC
1648 010470 016700 170136                MOV     TC,R0        ;SET TC ADDRESS
1649 010474 020110                CMP     R1,(R0)      ;SEE IF EXPT=RCVD
1650 010476 001410                BEQ     FT23X        ;IF SO: BR
1651 010500 012767 015014 170230  MOV     #MSG52,ERADD  ;SET ERROR CODE
1652 010506 012767 010304 170246  MOV     #FT23,SCOLP  ;CLEAR SCOPE ADDRESS
1653 010514 004767 172450                JSR     PC,FT2ER     ;GO DO ERROR
1654 010520 000167 171776          FT23X: JMP     TSCD2   ;RETURN TO SCHEDULAR
1655
1656

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```
1657                                     ;REWIND: OFF LINE TEST*****
1658
1659 010524 032777 004000 170104 FT24: BIT #4000,@SWR ;SEE IF IN CONTINUOUS MODE
1660 010532 001033 BNE FT24XX ;IF SO: BR
1661 010534 012767 016176 170134 MOV #MSFT24,EMADDR ;SET TEST HEADER
1662 010542 004767 001174 JSR PC,INIT1 ;GO INITIAIZE
1663 010546 012777 000003 170024 MOV #3,@C1 ;ISSUE REWIND: OFF LINE COMMAND
1664 010554 012700 004000 MOV #4000,R0
1665 010560 005300 FT24A: DEC R0 ;DELAY
1666 010562 001376 BNE FT24A
1667 010564 032777 010000 170020 BIT #10000,@DS ;SEE IF MOL IS RESET
1668 010572 001407 BEQ FT24X ;IF SO: BR
1669 010574 005067 170162 CLR SCOLP ;ASSURE NO SCOPE
1670 010600 012767 015033 170130 MOV #MSG53,ERADD ;SET ERROR CODE
1671 010606 004767 172646 JSR PC,FT3ER ;GO DO ERROR
1672 010612 012704 015057 FT24X: MOV #MSG54,R4
1673 010616 004767 001544 JSR PC,TTOUT ;PRINT ON LINE REQUEST
1674 010622 000167 171674 FT24XX: JMP TSCD2 ;RETURN TO SCHEDULAR
1675
1676
```

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1677                                     :COMMAND EXECUTE SUBROUTINE*****
1678
1679 010626 000240                      EXEC:  NOP
1680 010630 056777 170150 167774      BIS      UDES,@TC      ;LOAD TAPE CONT
1681 010636 016777 170046 167736      MOV      WCNT,@WC     ;LOAD WC
1682 010644 016777 170036 167734      MOV      FCNT,@FC     ;LOAD FC
1683 010652 016777 170026 167724      MOV      BADDR,@BA    ;LOAD BA
1684 010660 022767 000031 170110      CMP      #31,FUN      ;SEE IF SPACE FORWARD
1685 010666 001404                      BEQ      EXECA        ;IF SO: BR
1686 010670 022767 000033 170100      CMP      #33,FUN      ;SEE IF SPACE REVERSE
1687 010676 001003                      BNE      EXECB        ;IF NOT: BR
1688 010700 016777 170024 167700      EXECA:  MOV      SCNT,@FC ;SET SPACE COUNT
1689 010706 000240                      EXECB:  NOP
1690 010710 016777 170062 167662      EXECB:  MOV      FUN,@C1  ;LOAD OP-CODE + GO
1691 010716 000240                      NOP
1692 010720 016703 170000              MOV      RDYDX,R3     ;SET DELAY
1693 010724 005004                      CLR      R4
1694 010726 032777 000200 167656      EXECC:  BIT      #200,@DS ;SEE IF DRY
1  05 010734 001004                      BNE      EXECX        ;IF SO: BR
1696 010736 005304                      DEC      R4
1697 010740 001372                      RNE      EXECC
1698 010742 005303                      DEC      R3           ;DELAY FOR DRY
1699 010744 001370                      BNE      EXECC
1700 010746 016703 167754              EXECX:  MOV      OPDYX,R3
1701 010752 005303                      EXECXA:  DEC      R3           ;DELAY
1702 010754 001376                      BNE      EXECXA
1703 010756 000207                      EXECXX:  RTS      PC           ;RETURN TO CALLER
1704

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```

1705                                     :REWIND SUBROUTINE*****
1706
1707 010760 000240                               RWND:  NOP
1708 010762 004767 000754                       JSR    PC,INIT1           ;INIT
1709 010766 012777 000007 167604               MOV    #7,@C1           ;START REWIND
1710 010774 012700 040000                       MOV    #40000,R0
1711 011000 005300                               RWNDA:  DEC    R0
1712 011002 001376                               BNE    RWNDA           ;DELAY
1713 011004 032777 020000 167600               RWNDB:  BIT    #20000,@DS
1714 011012 001374                               BNE    RWNDB           ;AWAIT PIP
1715 011014 032777 000002 167570               BIT    #2,@DS          ;SEE IF BOT
1716 011022 001012                               BNE    RWNDX           ;IF SO: BR
1717 011024 016704 167646                       MOV    EMADDR,R4
1718 011030 004767 001332                       JSR    PC,TTOUT        ;PRINT HEADER
1719 011034 012704 013234                       MOV    #MSG2,R4
1720 011040 004767 001322                       JSR    PC,TTOUT        ;PRINT REWIND ERROR
1721 011044 000167 171452                       JMP    TSCD2           ;RETURN TO SECHEDULAR
1722 011050 004767 000666                               RWNDX:  JSR    PC,INIT1  ;INIT
1723 011054 000207                               RTS    PC              ;RETURN TO CALLER
1724

```

```

1725                                     ;ERROR CHECK SUBROUTINE*****
1726
1727 011056 005067 167716          ERCHK: CLR      SERFL      ;CLEAR FLAG
1728 011062 017767 167524 167662  MOV      @DS,DSAV    ;SAVE DRIVE STATUS REGISTER
1729 011070 032777 040000 167514  BIT      #40000,@DS  ;SEE IF ERROR
1730 011076 001001          BNE      ERPT        ;IF SO: BR
1731 011100 000207          RTS         PC         ;RETURN
1732 011102 017704 167506          ERPT:  MOV      @ER,R4    ;GET ERROR REGISTER
1733 011106 032767 002000 167670  BIT      #2000,UDES  ;SEE IF PE
1734 011114 001403          BEQ      ERPTA1       ;IF SO: BR
1735 011116 042767 000200 167622  BIC      #200,STMSK  ;RESET PEF MASK
1736 011124 046704 167616          ERPTA1: BIC      STMSK,R4  ;MASK DONT CARE BITS
1737 011130 001530          BEQ      ERPTX        ;IF NO UNEXPECTED ERRORS: BR
1738 011132 012767 000001 167640  ERPTG: MOV      #1,SERFL ;SET FLAG
1739 011140 032777 020000 167470  BIT      #20000,@SWR ;SEE IF SHOULD PRINT ERRORS
1740 011146 001115          BNE      ERPTD        ;IF NOT: BR
1741 011150 005767 167520          TST      HDRFL       ;SEE IF DONE HEADER
1742 011154 001006          BNE      ERPTA        ;IF SO: BR
1743 011156 005267 167512          INC      HDRFL       ;SET HEADER FLAG
1744 011162 016704 167510          MOV      EMADDR,R4
1745 011166 004767 001174          JSR      PC,TTOUT     ;PRINT HEADER
1746 011172 016704 167516          ERPTA: MOV      ERRP,R4  ;GET ERROR CODE
1747 011176 001414          BEQ      ERPTB        ;IF NONE: BR
1748 011200 004767 001162          JSR      PC,TTOUT     ;PRINT ERROR CODE
1749 011204 012704 013674          MOV      #MSG20,R4   ;SET NRZ TAG
1750 011210 032777 002000 167414  BIT      #2000,@TC   ;SEE IF PE
1751 011216 001402          BEQ      ERPT1A       ;IF NOT: BR
1752 011220 012704 013702          MOV      #MSG21,R4   ;ELSE SET PE TAG
1753 011224 004767 001136          ERPT1A: JSR      PC,TTOUT ;PRINT TAG
1754 011230 016704 167462          ERPTB: MOV      ERRP1,R4 ;SEE IF CODE 2
1755 011234 001402          BEQ      ERPTB1       ;IF NOT: BR
1756 011236 004767 001124          JSR      PC,TTOUT     ;PRINT CODE 2
1757 011242 032777 010000 167366  ERPTB1: BIT      #10000,@SWR ;SEE IF ITERATION
1758 011250 001010          BNE      ERPTC        ;IF NOT: BR
1759 011252 012704 015146          MOV      #MSG56,R4
1760 011256 004767 001104          JSR      PC,TTOUT     ;PRINT ITER TAG
1761 011262 016703 167462          MOV      ITCNT,R3
1762 011266 004767 001224          JSR      PC,OCTP      ;PRINT ITERATION
1763 011272 012704 013146          ERPTC: MOV      #MSG1,R4
1764 011276 004767 001064          JSR      PC,TTOUT     ;PRINT REGISTER TAG
1765 011302 017703 167272          MOV      @C1,R3
1766 011306 004767 001172          JSR      PC,OCTPE     ;PRINT CS1
1767 011312 017703 167264          MOV      @WC,R3
1768 011316 004767 001162          JSR      PC,OCTPE     ;PRINT WC
1769 011322 017703 167256          MOV      @BA,R3
1770 011326 004767 001152          JSR      PC,OCTPE     ;PRINT BA
1771 011332 017703 167250          MOV      @FC,R3
1772 011336 004767 001142          JSR      PC,OCTPE     ;PRINT FC
1773 011342 017703 167242          MOV      @CS,R3
1774 011346 004767 001132          JSR      PC,OCTPE     ;PRINT CS2
1775 011352 017703 167234          MOV      @DS,R3
1776 011356 004767 001122          JSR      PC,OCTPE     ;PRINT DS
1777 011362 017703 167226          MOV      @ER,R3
1778 011366 004767 001112          JSR      PC,OCTPE     ;PRINT ER
1779 011372 017703 167234          MOV      @TC,R3
1780 011376 004767 001102          JSR      PC,OCTPE     ;PRINT TC

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1781 011402 005777 167230  
1782 011406 100001  
1783 011410 000000  
1784 011412 004767 000324  
1785 011416 000207  
1786  
1787

ERPTD: TST @SWR ;SEE IF HALT ON ERROR  
BPL ERPTX ;IF NOT: BR  
HALT  
ERPTX: JSR PC,INIT1 ;INIT  
ERPTXX: RTS PC ;RETURN

```

1788                                     ;TAPF MARK STATUS CHECK*****
1789
1790 011420 032767 000004 167324 TMCHK: BIT #4,DSAV ;SEE IF TM SET
1791 011426 001401 BEQ TMCHK1 ;IF NOT. BR
1792 011430 000207 TMCHK0: RTS PC ;ELSE RETURN
1793 011432 005767 167342 TMCHK1: TST SERFL ;SEE IF HAD ERROR
1794 011436 001374 BNE TMCHK0 ;IF SO: BR
1795 011440 012767 015156 167250 MOV #MSG57,ERRP1 ;SET ERROR CODE 2
1796 011446 004767 177460 JSR PC,ERPTG ;GO PRINT TM ERROR
1797 011452 005067 167240 CLR ERRP1 ;CLEAR CODE 2 FLAG
1798 011456 000207 RTS PC ;RETURN
1799
1800                                     ;DATA SETUP ROUTINE*****
1801
1802 011460 000240 DSUP: NOP
1803 011462 012703 016232 DS0: MOV #WDATA,R3 ;R3 = ADDRS OF WRITE BUFFER
1804 011466 016701 167314 MOV PATRN,R1 ;R1 = PATTERN SELECTOR
1805 011472 000241 CLC
1806 011474 006101 ROL R1 ;MAKE PATTERN SELECTOR EVEN
1807 011476 000171 001020 JMP @DATBL(R1) ;GO GENERATE PATTERN
1808 011502 032777 010000 167116 DS1: BIT #10000,@DT ;SEE IF SEVEN TRACK
1809 011510 001410 BEQ DS3 ;IF NOT: BR
1810 011512 012702 000640 MOV #640,R2 ;SET BUFFER SIZE
1811 011516 012701 016232 MOV #WDATA,R1 ;SET START OF BUFFER
1812 011522 042721 140300 DS2: BIC #140300,(R1)+ ;MASK FOR 7 CH
1813 011526 005302 DEC R2 ;SEE IF DONE
1814 011530 001374 BNE DS2 ;IF NOT: BR
1815 011532 012702 000640 DS3: MOV #640,R2 ;R2=BUFFER SIZE +2
1816 011536 012701 017744 MOV #RDATA,R1 ;R1=READ DATA START
1817 011542 005021 DS4: CLR (R1)+ ;CLEAR BUFFER
1818 011544 005302 DEC R2 ;SEE IF DONE ALL
1819 011546 001375 BNE DS4 ;IF NOT: BR
1820 011550 000207 RTS PC ;EXIT
1821
1822                                     ;ALL ONES*****
1823
1824 011552 012701 177777 DAT1: MOV #-1,R1 ;R1=DATA
1825 011556 012702 000640 DAT1A: MOV #640,R2 ;R2=WORD COUNT +2
1826 011562 010123 DAT1B: MOV R1,(R3)+ ;LOAD BUFFER
1827 011564 005302 DEC R2 ;SEE IF DONE
1828 011566 001375 BNE DAT1B ;IF NOT: BR
1829 011570 000167 177706 JMP DS1 ;RETURN
1830
1831                                     ;ALL ZEROS*****
1832
1833 011574 005001 DAT2: CLR R1 ;R1=DATA
1834 011576 000167 177754 JMP DAT1A ;LOAD BUFFER
1835

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1836                                     ;ONE/ZERO IN ALTERNATING CHARACTERS*****
1837
1838 011602 012701 125125   DAT3:  MOV    #125125,R1      ;R1=DATA
1839 011606 000167 177744   JMP     DAT1A          ;LOAD BUFFER
1840
1841                                     ;ALL BITS 0-377*****
1842
1843 011612 005001           DAT4:  CLR     R1          ;R1=STARTING DATA
1844 011614 012702 001500   MOV    #1500,R2      ;R2=CHARACTER COUNT
1845 011620 110123           DAT4A: MOVB   R1,(R3)+    ;LOAD BUFFER
1846 011622 105201           INCB   R1            ;BUMP DATA
1847 011624 005302           DEC    R2            ;SEE IF DONE
1848 011626 001374           BNE   DAT4A         ;IF NOT: BR
1849 011630 000167 177646   JMP    DS1          ;RETURN
1850
1851
1852                                     ;SCOPE LOOP ON ERROR SUBROUTINE*****
1853
1854 011634 000240           SCOPE: NOP
1855 011636 032777 040000 166772 BIT    #40000,@SWR   ;SEE IF LOOP ON ERROR
1856 011644 001001           BNE   SCOPE1        ;IF SO: BR
1857 011646 000207           RTS    PC           ;ELSE EXIT
1858 011650 000240           SCOPE1: NOP
1859 011652 005767 167104   TST   SCOLP         ;SEE IF SCOPE ADDRESS
1860 011656 001001           BNE   SCOPE2        ;IF NOT: BR
1861 011660 000207           RTS    PC           ;ELSE EXIT
1862 011662 005726           SCOPE2: TST  (SP)+   ;RESET STACK
1863 011664 005726           TST  (SP)+         ;BUMP STACK
1864 011666 000240           NOP
1865 011670 000240           NOP
1866 011672 000177 167064   JMP    @SCOLP       ;LOOP ON ERROR
1867
1868                                     ;TEST ITERATION SUBROUTINE*****
1869
1870 011676 000240           ITER:  NOP
1871 011700 032777 010000 166730 BIT    #10000,@SWR  ;SEE IF ITERATIONS
1872 011706 001403           BEQ   ITER1         ;IF SO: BR
1873 011710 005067 167034   ITER0: CLR    ITCNT   ;CLEAR ITERATION COUNTER
1874 011714 000207           RTS    PC           ;ELSE EXIT
1875 011716 005267 167026   ITER1: INC    ITCNT   ;BUMP COUNTER
1876 011722 026767 167022 166724 CMP    ITCNT,ITAMT  ;SEE IF DONE ALL
1877 011730 001767           BEQ   ITER0         ;IF SO: BR
1878 011732 005726           TST  (SP)+         ;RESET STACK
1879 011734 017700 167024   MOV   @ITRLP,R0    ;SET ITERATION POINTER
1880 011740 000110           JMP   (R0)         ;GO ITERATE
1881
1882                                     ;INITIALIZE SUBROUTINE*****
1883
1884 011742 000240           INIT1: NOP
1885 011744 012777 000040 166636 MOV    #40,@CS      ;INIT
1886 011752 016777 166722 166630 INIT2: MOV   DRVN,@CS ;SELECT DRIVE
1887 011760 016777 166716 166644 MOV   SLVN,@TC     ;SELECT SLAVE
1888 011766 000207           RTS    PC          ;RETURN
1889

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1890                                     ;MAG TAPE INTERRUPT HANDLER*****
1891
1892 011770 000240          MTINT:  NOP
1893 011772 022626          CMP      (SP)+,(SP)+      ;RESET STACK POINTER
1894 011774 000240          NOP
1895 011776 000240          NOP
1896 012000 000177 166730  JMP      @RTRN          ;RETURN TO CALLER
1897
1898                                     ;TTY INTERRUPT HANDLER*****
1899
1900 012004 000240          TTINT:  NOP
1901 012006 000240          NOP
1902 012010 000240          NOP
1903 012012 000002          RTI
1904
1905                                     ;BUS ADDRESS TRAP HANDLER*****
1906
1907 012014 000240          TRAP:  NOP
1908 012016 032777 020000 166612  BIT      #20000,@SWR      ;SEE IF SHOULD PRINT ERRORS
1909 012024 001020          TRAP2  ;IF NOT: BR
1910 012026 005767 166642  BNE      HDRFL          ;SEE IF DONE HEADER
1911 012032 001006          TRAP1  ;IF SO: BR
1912 012034 005267 166634  INC      HDRFL          ;ELSE SET HEADER FLAG
1913 012040 016704 166632  MOV      EMADDR,R4
1914 012044 004767 000316  JSR      PC,TTOUT        ;PRINT HEADER
1915 012050 012704 013727  TRAP1:  MOV      #MSG24,R4
1916 012054 004767 000306  JSR      PC,TTOUT        ;PRINT ERROR
1917 012060 010103          MOV      R1,R3
1918 012062 004767 000430  JSR      PC,OCTP        ;PRINT ADDRESS OF TRAP
1919 012066 005777 166544  TRAP2:  TST      @SWR          ;SEE IF HALT ON ERROR
1920 012072 100001          BPL      TRAPX          ;IF NOT: BR
1921 012074 000000          HALT
1922 012076 022626          TRAPX:  CMP      (SP)+,(SP)+      ;RESET STACK
1923 012100 012767 002732 166654  MOV      #FT1A,SCOLP     ;SET SCOPE ADDRESS
1924 012106 004767 177522  JSR      PC,SCOPE       ;GO SEE IF SCOPE LOOP
1925 012112 005767 166672  TST      RMTF          ;SEE IF INITIAL ADDRESS TEST
1926 012116 001402          BEQ      TRAPXX        ;IF NOT: BR
1927 012120 000167 167510  JMP      STOB          ;ELSE REDO ADDRESS REQUEST
1928 012124 000167 170606  TRAPXX: JMP      FT1B          ;RETURN TO TEST 1
1929

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1930 ;*****
1931 ;TTY ENTRY SUBROUTINE:
1932 ;
1933 ;THIS SUBROUTINE IS USED BY THE TEST CONDITION
1934 ;ENTRY ROUTINE TO READ THE RESPONSE ENTERED
1935 ;AT THE TTY AND CHECK THEM FOR LEGALITY AND
1936 ;LIMITS. ALL RESPONSE MUST BE TYPED IN OCTAL
1937 ; (0-7) AND MUST FALL WITHIN THE LIMITS SET BY
1938 ;THE CALLING ROUTINE.
1939 ;IF AN ENTRY IS ILLEGAL OR OUTSIDE THE LIMITS,
1940 ;A QUESTION MARK IS TYPED (?) AND THE RESPONSE
1941 ;MAY BE REENTERED.
1942 ;ENTRIES MAY NOT EXCEED SIX (6) CHARACTERS AND
1943 ;MAY BE TERMINATED AT LESS THAN SIX BY TYPING A
1944 ;CARRIAGE RETURN
1945 ;*****
1946
1947 012130 005067 166604 TTR: CLR TEMP1 ;CLEAR FIRST CHARACTER FLAG
1948 012134 005000 CLR RO
1949 012136 004767 000152 TTR0: JSR PC,TIN ;GO READ CHARACTER
1950 012142 122767 000215 166520 CMPB #215,TIB ;SEE IF CR
1951 012150 001005 BNE TTR1 ;IF NOT: BR
1952 012152 005767 166562 TST TEMP1 ;SEE IF FIRST CHARACTER
1953 012156 001446 BEQ TTR5 ;IF SO: BR
1954 012160 000167 000066 JMP TTR2 ;ELSE GO LOAD VALUE
1955 012164 122767 000260 166476 TTR1: CMPB #260,TIB ;SEE IF CHAR IS LESS THAN 0
1956 012172 101402 BLOS TTR1A ;IF NOT: BR
1957 012174 000167 000076 JMP TINER ;ELSE GO TO ERROR
1958 012200 122767 000270 166462 TTR1A: CMPB #270,TIB ;SEE IF CHAR IS GREATER THAN 7
1959 012206 101002 BHI TTR1B ;IF NOT: BR
1960 012210 000167 000062 JMP TINER ;ELSE GO TO ERROR
1961 012214 005267 166520 TTR1B: INC TEMP1 ;SET FIRST CHARACTER FLAG
1962 012220 000241 CLC
1963 012222 006100 ROL RO
1964 012224 000241 CLC
1965 012226 006100 ROL RO ;SHIFT 3 LEFT
1966 012230 000241 CLC
1967 012232 006100 ROL RO
1968 012234 042767 177770 166426 BIC #177770,TIB ;STRIP ASCII
1969 012242 056700 166422 BIS TIB,RO ;LOAD CHARACTER
1970 012246 005301 DEC R1 ;SEE IF DONE
1971 012250 001332 BNE TTR0 ;IF NOT: BR
1972 012252 020002 TTR2: CMP RO,R2 ;SEE IF EXCEEDED MAXIMUM LIMIT
1973 012254 101402 BLOS TTR3 ;IF NOT: BR
1974 012256 000167 000014 JMP TINER ;ELSE GO TO ERROR
1975 012262 020300 TTR3: CMP R3,RO ;SEE IF BELOW MINIMUM LIMIT
1976 012264 101402 BLOS TTR4 ;IF NOT: BR
1977 012266 000167 000004 JMP TINER ;ELSE GO TO ERROR
1978 012272 010015 TTR4: MOV RO,(R5) ;LOAD VALUE
1979 012274 000207 TTR5: RTS PC ;EXIT
1980

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1981                                     ;TTY ENTRY ERROR SUBROUTINE*****
1982
1983 012276 012704 013433          T1NER: MOV   #MSG7,R4
1984 012302 004767 000060          JSR   PC,TTOUT          ;PRINT?
1985 012306 162716 000020          SUB   #20,(SP)         ;RESET SP TO START OF VALUE ROUTINE
1986 012312 000207                  RTS    PC              ;REDO VALUE ENTRY
1987
1988                                     ;TTY READ SUBROUTINE*****
1989
1990 012314 005077 166320          TTIN:  CLR   @TKS
1991 012320 005077 166316          CLR   @TKB
1992 012324 005067 166340          CLR   TIB
1993 012330 005277 166304          INC   @TKS
1994 012334 105777 166300          TTIN1: TSTB  @TKS
1995 012340 100375                  BPL   TTIN1
1996 012342 017767 166274 166320  MOV   @TKB,TIB
1997 012350 105777 166270          TTIN2: TSTB  @TPS
1998 012354 100375                  BPL   TTIN2
1999 012356 116777 166306 166262  MOVB  TIB,@TPB
2000 012364 000207                  RTS    PC
2001
2002                                     ;TTY OUTPUT SUBROUTINE*****
2003
2004 012366 112467 166274          TTOUT: MOVB  (R4)+,TOB
2005 012372 122767 000043 166266  CMPB  #43,TOB
2006 012400 001440                  BEQ   TEX
2007 012402 122767 000045 166256  CMPB  #45,TOB
2008 012410 001403                  BEQ   TCRLF
2009 012412 004767 000050          JSR   PC,TOG
2010 012416 000763                  BR    TTOUT
2011 012420 112767 000015 166240  TCRLF: MOVB  #15,TOB
2012 012426 004767 000034          JSR   PC,TOG
2013 012432 012703 000004          MOV   #4,R3
2014 012436 005067 166224          TCRLFA: CLR   TOB
2015 012442 004767 000020          JSR   PC,TOG
2016 012446 005303                  DEC   R3
2017 012450 001372                  BNE   TCRLFA          ;DO FILLERS
2018 012452 112767 000012 166206  MOVB  #12,TOB
2019 012460 004767 000002          JSR   PC,TOG
2020 012464 000740                  BR    TTOUT
2021 012466 105777 166152          TOG:  TSTB  @TPS
2022 012472 100375                  BPL   TOG
2023 012474 116777 166166 166144  MOVB  TOB,@TPB
2024 012502 000207                  TEX:  RTS    PC
2025
2026

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2027                                     ;OCTAL OUTPUT SUBROUTINE*****
2028
2029 012504 012767 000001 000222 OCTPE: MOV #1,OFL
2030 012512 010304          MOV R3,R4
2031 012514 000410          BR OCTP0
2032 012516 005067 000212 OCTP: CLR OFL ;CLEAR FLAG FOR LEADING ZERO
2033 012522 010304          OCTPE1: MOV R3,R4 ;SEE IF NUMBER IS ZERO
2034 012524 001004          BNE OCTP0 ;IF NOT ZERO: BR
2035 012526 004767 000162 JSR PC,OCTPG1 ;ELSE PRINT ZERO
2036 012532 000167 000120 JMP OCTP3 ;SPACE AND EXIT
2037 012536 032704 100000 OCTP0: BIT #100000,R4 ;SEE IF MSD = 1
2038 012542 001406          BEQ OCTP1 ;IF NOT: BR
2039 012544 012704 000001 MOV #1,R4
2040 012550 004767 000116 JSR PC,OCTPG ;PRINT 1
2041 012554 000167 000006 JMP OCTP2
2042 012560 005004          OCTP1: CLR R4
2043 012562 004767 000104 JSR PC,OCTPG ;PRINT 0
2044 012566 010304          OCTP2: MOV R3,R4
2045 012570 006004          ROR R4
2046 012572 006004          ROR R4
2047 012574 006004          ROR R4 ;POSITION DIGIT
2048 012576 006004          ROR R4
2049 012600 000304          SWAB R4
2050 012602 004767 000064 JSR PC,OCTPG ;PRINT DIGIT 2
2051 012606 010304          MOV R3,R4
2052 012610 006004          ROR R4
2053 012612 000304          SWAB R4
2054 012614 004767 000052 JSR PC,OCTPG ;PRINT DIGIT 3
2055 012620 010304          MOV R3,R4
2056 012622 006104          ROL R4
2057 012624 006104          ROL R4
2058 012626 000304          SWAB R4
2059 012630 004767 000036 JSR PC,OCTPG ;PRINT DIGIT 4
2060 012634 010304          MOV R3,R4
2061 012636 006004          ROR R4
2062 012640 006004          ROR R4
2063 012642 006004          ROR R4
2064 012644 004767 000022 JSR PC,OCTPG
2065 012650 010304          MOV R3,R4
2066 012652 004767 000014 JSR PC,OCTPG ;PRINT DIGIT 5
2067 012656 012767 000240 166002 OCTP3: MOV #240,TOB
2068 012664 004767 177576 JSR PC,TOG ;PRINT SPACE
2069 012670 000207          RTS PC ;EXIT
2070 012672 042704 177770 OCTPG: BIC #177770,R4
2071 012676 001004          BNE OCTPG0
2072 012700 005767 000030 TST OFL
2073 012704 001001          BNE OCTPG0
2074 012706 000207          RTS PC
2075 012710 005267 000020 OCTPG0: INC OFL
2076 012714 052704 000260 OCTPG1: BIS #260,R4
2077 012720 010467 165742 MOV R4,TOB
2078 012724 004767 177536 JSR PC,TOG
2079 012730 010304          MOV R3,R4
2080 012732 000207          RTS PC
2081 012734 000000          OFL: 0 ;FIRST CHAR FLAG
2082

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2083                                     ;DATA CHARACTER OUTPUT SUBROUTINE*****
2084
2085 012736 005067 165724      DOUT:  CLR      TOB
2086 012742 012704 000010      MOV      #10,R4      ;SET NUMBER TO PRINT
2087 012746 110367 165714      MOVB     R3,TOB
2088 012752 105777 165666      DOUT1:  TSTB     @TPS
2089 012756 100375              BPL      DOUT1
2090 012760 132767 000200 165700 BITB     #200,TOB
2091 012766 001404              BEQ      DOUT2
2092 012770 012777 000061 165650 MOV      #061,@TPB
2093 012776 000403              BR       DOUT3
2094 013000 012777 000060 165640 DOUT2:  MOV      #060,@TPB
2095 013006 006167 165654      DOUT3:  ROL      TOB
2096 013012 005304              DEC      R4
2097 013014 001356              BNE     DOUT1
2098 013016 000207              RTS      PC
2099 013020 016703 165720      DOUTD:  MOV      TEMP3,R3
2100 013024 000303              SWAB    R3
2101 013026 004767 177704      JSR     PC,DOUT
2102 013032 016703 165706      MOV     TEMP3,R3
2103 013036 004767 177674      JSR     PC,DOUT
2104 013042 000207              RTS      PC
2105
2106                                     ;TU45 SERIAL NUMBER PRINT SUBROUTINE*****
2107
2108 013044 010304      SNPT:  MOV      R3,R4
2109 013046 000304      SWAB    R4
2110 013050 006004      ROR     R4
2111 013052 006004      ROR     R4
2112 013054 006004      ROR     R4
2113 013056 006004      ROR     R4
2114 013060 004767 000036      JSR     PC,SNPG      ;GET FIRST DIGIT
2115 013064 010304      MOV     R3,R4      ;GO PRINT
2116 013066 000304      SWAB    R4      ;GET SECOND DIGIT
2117 013070 004767 000026      JSR     PC,SNPG      ;GO PRINT
2118 013074 010304      MOV     R3,R4
2119 013076 006004      ROR     R4
2120 013100 006004      ROR     R4
2121 013102 006004      ROR     R4
2122 013104 006004      ROR     R4      ;GET THIRD DIGIT
2123 013106 004767 000010      JSR     PC,SNPG      ;GO PRINT
2124 013112 010304      MOV     R3,R4      ;GET FOURTH DIGIT
2125 013114 004767 000002      JSR     PC,SNPG      ;GO PRINT
2126 013120 000207      RTS      PC      ;EXIT
2127 013122 012767 000260 165536 SNPG:  MOV     #260,TOB      ;SET BASE = 0
2128 013130 042704 177760      BIC     #177760,R4    ;MASK DIGIT
2129 013134 050467 165526      BIS     R4,TOB      ;SET ASCII
2130 013140 004767 177322      JSR     PC,TOG      ;TYPE DIGIT
2131 013144 000207      RTS      PC      ;RETURN
2132

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```
2133 ;MESSAGE TABLE*****
2134
2135 013146 041445 030523 020040 MSG1: .ASCII /%CS1 WC BA FC CS2 /
2136 013154 020040 041527 020040
2137 013162 020040 041040 020101
2138 013170 020040 020040 041506
2139 013176 020040 020040 041440
2140 013204 031123 020040 020040
2141 013212 051504 020040 020040 .ASCII /DS ER TC%/
2142 013220 042440 020122 020040
2143 013226 020040 041524 021445
2144 013234 051045 053505 047111 MSG2: .ASCII /%REWIND ERROR#/
2145 013242 020104 051105 047522
2146 013250 021522
2147 013252 022445 046524 031060 MSG3: .ASCII /%TM02-TU45 BASIC FUNCTION TEST (CZTUJA0)%/
2148 013260 052055 032125 020065
2149 013266 040502 044523 020103
2150 013274 052506 041516 044524
2151 013302 047117 052040 051505
2152 013310 020124 041450 052132
2153 013316 045125 030101 022451
2154 013324 047105 042524 020122 .ASCII /ENTER CONDITIONS IN OCTAL%/
2155 013332 047503 042116 052111
2156 013340 047511 051516 044440
2157 013346 020116 041517 040524
2158 013354 022514 043
2159 013357 045 042522 044507 MSG4: .ASCII /%REGISTER START = #/
2160 013364 052123 051105 051440
2161 013372 040524 052122 036440
2162 013400 021440
2163 013402 053045 041505 047524 MSG5: .ASCII /%VECTOR = #/
2164 013410 020122 020075 043
2165 013415 045 047105 020104 MSG6: .ASCII /%END OF PASS #/
2166 013422 043117 050040 051501
2167 013430 020123 043
2168 013433 040 020077 043 MSG7: .ASCII / ? #/
2169 013437 045 043 MSG8: .ASCII /%#/
2170 013441 045 047520 044523 MSG9: .ASCII /%POSITION ERROR: #/
2171 013446 044524 047117 042440
2172 013454 051122 051117 020072
2173 013462 043
2174 013463 045 051104 053111 MSG10: .ASCII /%DRIVE NUMBER: #/
2175 013470 020105 052516 041115
2176 013476 051105 020072 043
2177 013503 045 046123 053101 MSG11: .ASCII /%SLAVE NUMBER: #/
2178 013510 020105 052516 041115
2179 013516 051105 020072 043
2180 013523 045 051127 052111 MSG12: .ASCII /%WRITE ERROR #/
2181 013530 020105 051105 047522
2182 013536 020122 043
2183 013541 045 042522 042101 MSG13: .ASCII /%READ REVERSE ERROR #/
2184 013546 051040 053105 051105
2185 013554 042523 042440 051122
2186 013562 051117 021440
2187 013566 051045 040505 020104 MSG14: .ASCII /%READ FORWARD ERROR #/
2188 013574 047506 053522 051101
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2189	013602	020104	051105	047522					
2190	013610	020122	043						
2191	013613	045	051127	052111	MSG15:	.ASCII	/WRITE TM ERROR #/		
2192	013620	020105	046524	042440					
2193	013626	051122	051117	021440					
2194	013634	051045	053105	051105	MSG16:	.ASCII	/REVERSE ERROR #/		
2195	013642	042523	042440	051122					
2196	013650	051117	021440						
2197	013654	043045	051117	040527	MSG17:	.ASCII	/FORWARD ERROR #/		
2198	013662	042122	042440	051122					
2199	013670	051117	021440						
2200	013674	047040	055122	021440	MSG20:	.ASCII	/NRZ #/		
2201	013702	050040	020105	043	MSG21:	.ASCII	/PE #/		
2202	013707	040	054105	052120	MSG22:	.ASCII	/EXPT: #/		
2203	013714	020072	043						
2204	013717	040	041522	042126	MSG23:	.ASCII	/RCVD: #/		
2205	013724	020072	043						
2206	013727	045	052502	020123	MSG24:	.ASCII	/BUS TRAP: #/		
2207	013734	051124	050101	020072					
2208	013742	043							
2209	013743	045	041527	020072	MSG25:	.ASCII	/WC: #/		
2210	013750	043							
2211	013751	045	040502	020072	MSG26:	.ASCII	/BA: #/		
2212	013756	043							
2213	013757	045	041104	020072	MSG27:	.ASCII	/DB: #/		
2214	013764	043							
2215	013765	045	047111	052111	MSG28:	.ASCII	/INIT DID NOT CLEAR RH #/		
2216	013772	042040	042111	047040					
2217	014000	052117	041440	042514					
2218	014006	051101	051040	020110					
2219	014014	043							
2220	014015	045	041523	047040	MSG29:	.ASCII	/SC NOT RESET BY INIT #/		
2221	014022	052117	051040	051505					
2222	014030	052105	041040	020131					
2223	014036	047111	052111	021440					
2224	014044	052045	042522	047040	MSG30:	.ASCII	/TRE NOT RESET BY INIT #/		
2225	014052	052117	051040	051505					
2226	014060	052105	041040	020131					
2227	014066	047111	052111	021440					
2228	014074	041445	031123	047040	MSG31:	.ASCII	/CS2 NOT RESET BY INIT #/		
2229	014102	052117	051040	051505					
2230	014110	052105	041040	020131					
2231	014116	047111	052111	021440					
2232	014124	042045	052114	047040	MSG32:	.ASCII	/DLT NOT SET #/		
2233	014132	052117	051440	052105					
2234	014140	021440							
2235	014142	051445	020103	047516	MSG33:	.ASCII	/SC NOT SET #/		
2236	014150	020124	042523	020124					
2237	014156	043							
2238	014157	045	051124	020105	MSG34:	.ASCII	/TRE NOT SET #/		
2239	014164	047516	020124	042523					
2240	014172	020124	043						
2241	014175	045	051111	047040	MSG35:	.ASCII	/IR NOT SET BY INIT #/		
2242	014202	052117	051440	052105					
2243	014210	041040	020131	047111					
2244	014216	052111	021440						

2245	014222	047445	020122	047516	MSG36:	.ASCII	/XOR NOT RESET BY INIT #/
2246	014230	020124	042522	042523			
2247	014236	020124	054502	044440			
2248	014244	044516	020124	043			
2249	014251	045	051117	047040	MSG37:	.ASCII	/XOR NOT RESET BY 1 SILO ENTRY #/
2250	014256	052117	051040	051505			
2251	014254	052105	041040	020131			
2252	014272	020061	044523	047514			
2253	014300	042440	052116	054522			
2254	014306	021440					
2255	014310	047445	020122	047516	MSG38:	.ASCII	/XOR NOT SET BY SILO FULL #/
2256	014316	020124	042523	020124			
2257	014324	054502	051440	046111			
2258	014332	020117	052506	046114			
2259	014340	021440					
2260	014342	041045	042101	051440	MSG39:	.ASCII	/%BAD SILO READ #/
2261	014350	046111	020117	042522			
2262	014356	042101	021440				
2263	014362	044445	020122	047516	MSG40:	.ASCII	/%IR NOT RESET BY SILO FULL#/
2264	014370	020124	042522	042523			
2265	014376	020124	054502	051440			
2266	014404	046111	020117	052506			
2267	014412	046114	043				
2268	014415	040	047516	026516	MSG41:	.ASCII	/ NON-EXIST DRIVE#/
2269	014422	054105	051511	020124			
2270	014430	051104	053111	021505			
2271	014436	047040	047117	042455	MSG42:	.ASCII	/ NON-EXIST SLAVE#/
2272	014444	044530	052123	051440			
2273	014452	040514	042526	043			
2274	014457	040	042523	044522	MSG43:	.ASCII	/ SERIAL NO: #/
2275	014464	046101	047040	035117			
2276	014472	021440					
2277	014474	042445	040522	042523	MSG44:	.ASCII	/ZERASE HEAD INOPERATIVE/
2278	014502	044040	040505	020104			
2279	014510	047111	050117	051105			
2280	014516	052101	053111	105			
2281	014523	045	044103	041505		.ASCII	/%CHECK POLARITY#/
2282	014530	020113	047520	040514			
2283	014536	044522	054524	043			
2284	014543	045	051105	051501	MSG45:	.ASCII	/ZERASE HEAD POLARITY WRONG#/
2285	014550	020105	042510	042101			
2286	014556	050040	046117	051101			
2287	014564	052111	020131	051127			
2288	014572	047117	021507				
2289	014576	051445	052105	052455	MSG46:	.ASCII	/%SET-UP WRITE ERROR#/
2290	014604	020120	051127	052111			
2291	014612	020105	051105	047522			
2292	014620	021522					
2293	014622	051445	040520	042503	MSG47:	.ASCII	/%SPACE FORWARD ERROR#/
2294	014630	043040	051117	040527			
2295	014636	042122	042440	051122			
2296	014644	051117	043				
2297	014647	045	050123	041501	MSG48:	.ASCII	/%SPACE REVERSE ERROR#/
2298	014654	020105	042522	042526			
2299	014662	051522	020105	051105			
2300	014670	047522	021522				

2301	014674	041045	043125	042506	MSG49:	.ASCII	/XBUFFERED WRITE ERROR#/
2302	014702	042522	020104	051127			
2303	014710	052111	020105	051105			
2304	014716	047522	021522				
2305	014722	041045	052117	051440	MSG50:	.ASCII	/XBOT SET AFTER BUFFERED WRITE#/
2306	014730	052105	040440	052106			
2307	014736	051105	041040	043125			
2308	014744	042506	042522	020104			
2309	014752	051127	052111	021505			
2310	014760	047045	020117	047502	MSG51:	.ASCII	/XNO BOT FROM READ IN PRESET#/
2311	014766	020124	051106	046517			
2312	014774	051040	040505	020104			
2313	015002	047111	050040	042522			
2314	015010	042523	021524				
2315	015014	052045	020103	047111	MSG52:	.ASCII	/XTC INCORRECT #/
2316	015022	047503	051122	041505			
2317	015030	020124	043				
2318	015033	045	046123	053101	MSG53:	.ASCII	/XSLAVE NOT OFF LINE#/
2319	015040	020105	047516	020124			
2320	015046	043117	020106	044514			
2321	015054	042516	043				
2322	015057	045	051045	051505	MSG54:	.ASCII	/X%RESET SLAVE TO ON LINE BEFORE CONTINUING#/
2323	015064	052105	051440	040514			
2324	015072	042526	052040	020117			
2325	015100	047117	046040	047111			
2326	015106	020105	042502	047506			
2327	015114	042522	041440	047117			
2328	015122	044524	052516	047111			
2329	015130	021507					
2330	015132	047045	055122	047440	MSG55:	.ASCII	/XNRZ ONLY: #/
2331	015140	046116	035131	021440			
2332	015146	044440	042524	035122	MSG56:	.ASCII	/ ITER: #/
2333	015154	021440					
2334	015156	052045	020115	047516	MSG57:	.ASCII	/XTM NOT SET#/
2335	015164	020124	042523	021524			
2336	015172	042445	052111	042510	MSG60:	.ASCII	/XEITHER TAPE NOT ERASED OR OPI PROBLEM#/
2337	015200	020122	040524	042520			
2338	015206	047040	052117	042440			
2339	015214	040522	042523	020104			
2340	015222	051117	047440	044520			
2341	015230	050040	047522	046102			
2342	015236	046505	043				
2343	015241	045	044122	030461	MSG61:	.ASCII	/XRH11 OR RH70: #/
2344	015246	047440	020122	044122			
2345	015254	030067	020072	043			
2346	015261	045	044122	047440	MSG62:	.ASCII	/XRH ONLY: #/
2347	015266	046116	035131	021440			
2348							

```
2349                                     ;TEST HEADERS*****
2350
2351 015274 022445 052106 035061 MSFT1: .ASCII /%FT1:RH ADDRESSING #/
2352 015302 044122 040440 042104
2353 015310 042522 051523 047111
2354 015316 020107 043
2355 015321 045 043045 031124 MSFT2: .ASCII /%FT2:RH REGISTER BITS TEST #/
2356 015326 051072 020110 042522
2357 015334 044507 052123 051105
2358 015342 041040 052111 020123
2359 015350 042524 052123 021440
2360 015356 022445 052106 035063 MSFT3: .ASCII /%FT3:RH INITIALIZE TEST #/
2361 015364 044122 044440 044516
2362 015372 044524 046101 055111
2363 015400 020105 042524 052123
2364 015406 021440
2365 015410 022445 052106 035064 MSFT4: .ASCII /%FT4:RH11 SILO TEST 1 #/
2366 015416 044122 030461 051440
2367 015424 046111 020117 042524
2368 015432 052123 030440 021440
2369 015440 022445 052106 035065 MSFT5: .ASCII /%FT5:RH11 SILO TEST 2 #/
2370 015446 044122 030461 051440
2371 015454 046111 020117 042524
2372 015462 052123 031040 021440
2373 015470 022445 052106 035066 MSFT6: .ASCII /%FT6:RH11 SILO TEST 3 #/
2374 015476 044122 030461 051440
2375 015504 046111 020117 042524
2376 015512 052123 031440 021440
2377 015520 022445 052106 035067 MSFT7: .ASCII /%FT7:RH11 SILO TEST 4 #/
2378 015526 044122 030461 051440
2379 015534 046111 020117 042524
2380 015542 052123 032040 021440
2381 015550 022445 052106 030061 MSFT10: .ASCII /%FT10:RH11 SILO TEST 5 #/
2382 015556 051072 030510 020061
2383 015564 044523 047514 052040
2384 015572 051505 020124 020065
2385 015600 043
2386 015601 045 043045 030524 MSFT11: .ASCII /%FT11:NOP TEST#/
2387 015606 035061 047516 020120
2388 015614 042524 052123 043
2389 015621 045 043045 030524 MSFT12: .ASCII /%FT12:REWIND TEST#/
2390 015626 035062 042522 044527
2391 015634 042116 052040 051505
2392 015642 021524
2393 015644 022445 052106 031461 MSFT13: .ASCII /%FT13:WRITE-READ TEST#/
2394 015652 053472 044522 042524
2395 015660 051055 040505 020104
2396 015666 042524 052123 043
2397 015673 045 043045 030524 MSFT14: .ASCII /%FT14:SPACE TEST#/
2398 015700 035064 050123 041501
2399 015706 020105 042524 052123
2400 015714 043
2401 015715 045 043045 030524 MSFT15: .ASCII /%FT15:ERASE TEST#/
2402 015722 035065 051105 051501
2403 015730 020105 042524 052123
2404 015736 043
```

2405	015737	045	043045	030524	MSFT16: .ASCII /%FT16:TAPE MARK WRITE-READ TEST#/
2406	015744	035066	040524	042520	
2407	015752	046440	051101	020113	
2408	015760	051127	052111	026505	
2409	015766	042522	042101	052040	
2410	015774	051505	021524		
2411	016000	022445	052106	033461	MSFT17: .ASCII /%FT17:TM SPACE TEST #/
2412	016006	052072	020115	050123	
2413	016014	041501	020105	042524	
2414	016022	052123	021440		
2415	016026	022445	052106	030062	MSFT20: .ASCII /%FT20:WRITE CHECK TEST #/
2416	016034	053472	044522	042524	
2417	016042	041440	042510	045503	
2418	016050	052040	051505	020124	
2419	016056	043			
2420	016057	045	043045	031124	MSFT21: .ASCII /%FT21:ERASE HEAD TEST#/
2421	016064	035061	051105	051501	
2422	016072	020105	042510	042101	
2423	016100	052040	051505	021524	
2424	016106	022445	052106	031062	MSFT22: .ASCII /%FT22:BUFFERED COMMAND TEST#/
2425	016114	041072	043125	042506	
2426	016122	042522	020104	047503	
2427	016130	046515	047101	020104	
2428	016136	042524	052123	043	
2429	016143	045	043045	031124	MSFT23: .ASCII /%FT23:READ IN PRESET TEST#/
2430	016150	035063	042522	042101	
2431	016156	044440	020116	051120	
2432	016164	051505	052105	052040	
2433	016172	051505	021524		
2434	016176	022445	052106	032062	MSFT24: .ASCII /%FT24:REWIND-OFF LINE TEST#/
2435	016204	051072	053505	047111	
2436	016212	026504	043117	020106	
2437	016220	044514	042516	052040	
2438	016226	051505	021524		
2439					
2440					
2441					
2442	017732	000000			WDATA: 0
2443		017744			.=.+1510
2444	017744	000000			RDATA: 0
2445					
2446		000001			.END



AS	000616	ERRP	000714	FT16A	006516	FT4ER	003624	MSFT22	016106
BA	000604	ERRP1	000716	FT16B	006522	FT4ERA	003634	MSFT23	016143
BADDR	000704	EXEC	010626	FT16X	006716	FT4ERB	003644	MSFT24	016176
BTRP	000662	EXECA	010700	FT17	006726	FT4ERC	003652	MSFT3	015356
BTRP2	000664	EXECB	010706	FT17A	006746	FT4X	003614	MSFT4	015410
CC	000620	EXECC	010726	FT17B	006752	FT5	003670	MSFT5	015440
CRCNT	001002	EXECX	010746	FT17C	007112	FT5A	003712	MSFT6	015470
CS	000610	EXECXA	010752	FT17D	007162	FT5B	003740	MSFT7	015520
C1	000600	EXECXX	010756	FT17D1	007200	FT5C	003762	MSG1	013146
DATA0	001022	EXFL	000766	FT17E	007214	FT5D	004012	MSG10	013463
DATA1	001024	FC	000606	FT17F	007306	FT5E	004024	MSG11	013503
DATA2	001026	FCNT	000706	FT17X	007336	FT5ER	004062	MSG12	013523
DATA3	001030	FT1	002700	FT2	003000	FT5X	004052	MSG13	013541
DATBL	001020	FT1A	002732	FT2A	003012	FT6	004072	MSG14	013566
DAT1	011552	FT1B	002736	FT2B	003052	FT6A	004114	MSG15	013613
DAT1A	011556	FT1X	002750	FT2C	003112	FT6B	004122	MSG16	013634
DAT1B	011562	FT1XX	002774	FT2D	003126	FT6C	004160	MSG17	013654
DAT2	011574	FT10	004450	FT2E	003156	FT6D	004202	MSG2	013234
DAT3	011602	FT10A	004504	FT2ER	003170	FT6DE	004244	MSG20	013674
DAT4	011612	FT10ER	004570	FT2ERA	003220	FT6DEA	004276	MSG21	013702
DAT4A	011620	FT10X	004546	FT2ERB	003272	FT6DEB	004342	MSG22	013707
DB	000622	FT10XX	004564	FT2ERC	003302	FT6DEX	004352	MSG23	013717
DOUT	012736	FT11	004604	FT2X	003312	FT6E	004204	MSG24	013727
DOUTD	013020	FT12	004722	FT20	007342	FT6ER	004234	MSG25	013743
DOUT1	012752	FT12A	005002	FT20A	007420	FT6X	004224	MSG26	013751
DOUT2	013000	FT13	005034	FT20B	007504	FT7	004354	MSG27	013757
DOUT3	013006	FT13A	005114	FT20C	007536	FT7A	004406	MSG28	013765
DRVN	000700	FT13B	005156	FT20X	007572	FT7ER	004434	MSG29	014015
DRVTP	000652	FT13C	005236	FT21	007602	FT7X	004424	MSG3	013252
DS	000612	FT13D	005304	FT21A	007740	FUN	000776	MSG30	014044
DSAV	000752	FT13E	005356	FT21X	010074	HDRFL	000674	MSG31	014074
DSUP	011460	FT13X	005370	FT22	010104	INIT1	011742	MSG32	014124
DS0	011462	FT14	005374	FT22A	010160	INIT2	011752	MSG33	014142
DS1	011502	FT14A	005446	FT22B	010200	ITAMT	000654	MSG34	014157
DS2	011522	FT14A1	005412	FT22X	010274	ITCNT	000750	MSG35	014175
DS3	011532	FT14A2	005542	FT23	010304	ITER	011676	MSG36	014222
DS4	011542	FT14A3	005566	FT23A	010414	ITER0	011710	MSG37	014251
DT	000626	FT14B	005622	FT23B	010434	ITER1	011716	MSG38	014310
EMADDR	000676	FT14EC	006040	FT23C	010464	ITRLP	000764	MSG39	014342
ER	000614	FT14RE	006046	FT23X	010520	LTADD	000774	MSG4	013357
ERADD	000736	FT14RF	006012	FT24	010524	MR	000624	MSG40	014362
ERCHK	011056	FT14RR	005750	FT24A	010560	MSFT1	015274	MSG41	014415
ERPT	011102	FT14R0	006120	FT24X	010612	MSFT10	015550	MSG42	014436
ERPTA	011172	FT14R1	006142	FT24XX	010622	MSFT11	015601	MSG43	014457
ERPTA1	011124	FT14R2	006146	FT3	003324	MSFT12	015621	MSG44	014474
ERPTB	011230	FT14R3	006220	FT3A	003400	MSFT13	015644	MSG45	014543
ERPTB1	011242	FT14X	006230	FT3B	003422	MSFT14	015673	MSG46	014576
ERPTC	011272	FT14XX	006260	FT3ER	003460	MSFT15	015715	MSG47	014622
ERPTD	011402	FT15	006264	FT3ERA	003512	MSFT16	015737	MSG48	014647
ERPTG	011132	FT15A	006334	FT3ERB	003522	MSFT17	016000	MSG49	014674
ERPTX	011412	FT15B	006350	FT3ERC	003532	MSFT2	015321	MSG5	013402
ERPTXX	011416	FT15X	006460	FT3X	003450	MSFT20	016026	MSG50	014722
ERPT1A	011224	FT16	006464	FT4	003542	MSFT21	016057	MSG51	014760

MSG52	015014	OFL	012734	SCOLP	000762	TCRLFA	012436	TSCD1	002476
MSG53	015033	OPDYX	000726	SCOPE	011634	TEMP1	000740	TSCD2	002522
MSG54	015057	PATRN	001006	SCOPE1	011650	TEMP2	000742	TSCD3	002536
MSG55	015132	PCNTR	001016	SCOPE2	011662	TEMP3	000744	TSRH	002434
MSG56	015146	PEXFL	000770	SERFL	001000	TEND	002636	TSTTBL	001032
MSG57	015156	PFLG	000732	SERNUM	000650	TENDX	002670	TTIN	012314
MSG6	013415	PSW	000634	SLVN	000702	TEX	012502	TTINT	012004
MSG60	015172	RCNT	000712	SN	000630	TIB	000670	TTIN1	012334
MSG61	015241	RDATA	017744	SNPG	013122	TINER	012276	TTIN2	012350
MSG62	015261	RDYDX	000724	SNPT	013044	TKB	000642	TTOUT	012366
MSG67	013433	REGS	000660	START	001600	TKS	000640	TTR	012130
MSG68	013437	RFD	000722	STFLG	000772	TMCHK	011420	TTR0	012136
MSG9	013441	RHOF	001014	STMSK	000746	TMCHK0	011430	TTR1	012164
MTINT	011770	RHTF	001010	STSCD	002562	TMCHK1	011432	TTR1A	012200
NRZOF	001012	RH17F	000672	ST0	001774	TOB	000666	TTR1B	012214
OCTP	012516	RRD	000720	ST0A	001624	TOG	012466	TTR2	012252
OCTPE	012504	RTRN	000734	ST0B	001634	TPB	000646	TTR3	012262
OCTPE1	012522	RWND	010760	ST1	002016	TPS	000644	TTR4	012272
OCTPG	012672	RWDA	011000	ST1A	002036	TRAP	012014	TTR5	012274
OCTPG0	012710	RWDB	011004	ST2	002134	TRAPX	012076	UDES	001004
OCTPG1	012714	RWDX	011050	ST3	002234	TRAPXX	012124	VECT	000656
OCTP0	012536	SAV1	000754	ST4	002406	TRAP1	012050	WC	000602
OCTP1	012560	SAV2	000756	SWR	000636	TRAP2	012066	WCNT	000710
OCTP2	012566	SAV3	000760	TC	000632	TSCD	002412	WDATA	016232
OCTP3	012656	SCNT	000730	TCRLF	012420	TSCD0	002442	.	= 017746

. ABS. 017746 000

ERRORS DETECTED: 0

.CZTUJA.SEQ/SOL\_CZTUJA.P11  
RUN-TIME: 14 28 2 SECONDS  
RUN-TIME RATIO: 167/45=3.6  
CORE USED: 5K (10 PAGES)