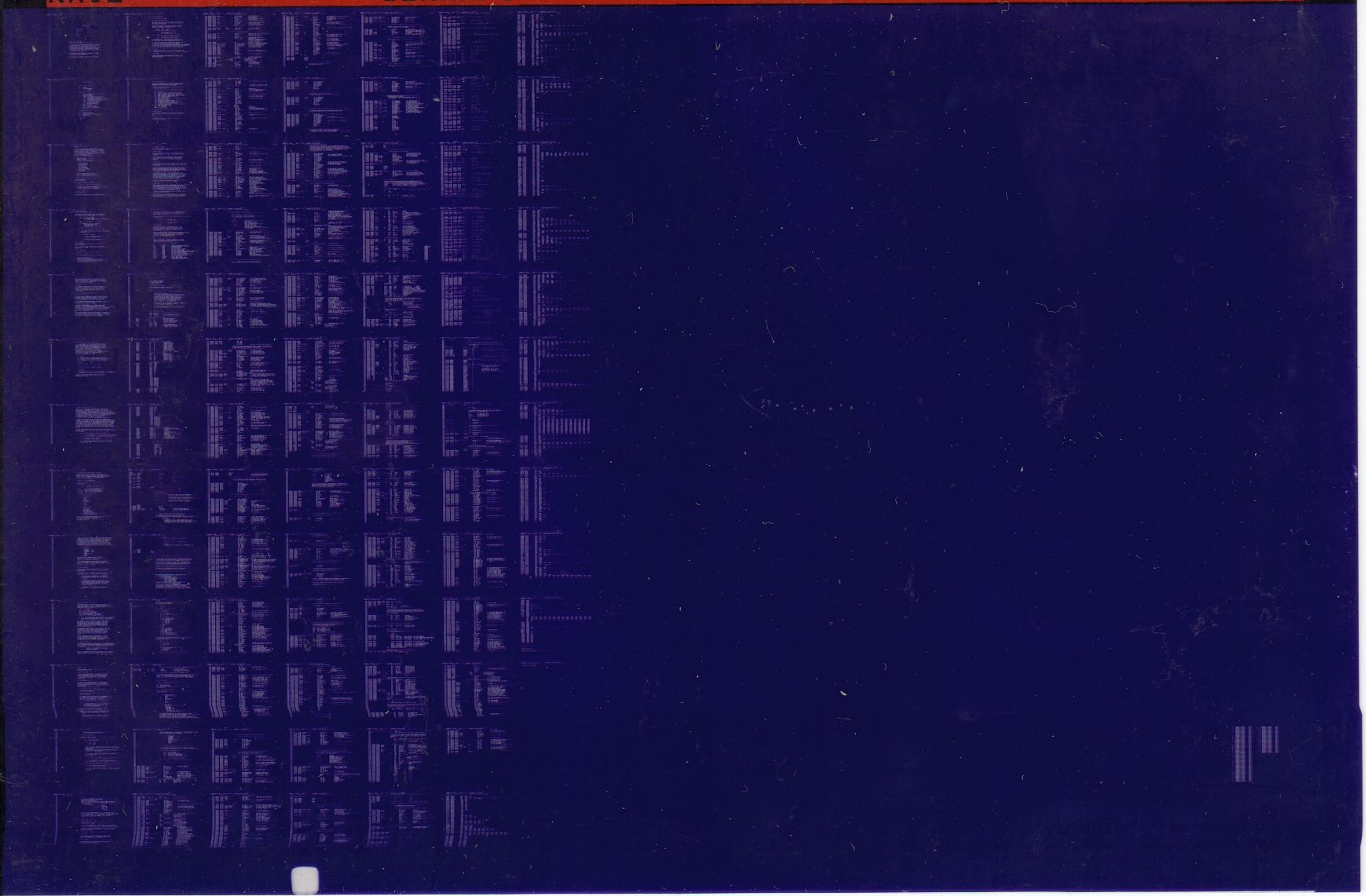
RX11,RX01
RX02

RX11 SYS RELIAB
CZRXAF0

AH-9336F-MC
FICHE 1 OF 1

SEP 1982
COPYRIGHT© 75-82
MADE IN USA



```
                        .REM    &



                                        IDENTIFICATION
                                        --------------

                                PRODUCT CODE:       AC-9334F-MC
                                PRODUCT NAME:       CZRXAF0 SYS RELIAB
                                DATE:               29-MAR-82
                                MAINTAINER:         S.S.S.T.A.
                                AUTHOR:             DAVID L. ADAMS


```

COPYRIGHT (C) 1975,1982
DIGITAL EQUIPMENT CORPORTION, MAYNARD, MASS.

THIS SOFTWARE IS FURNISHED UNDER A LICENSE FOR USE ONLY
ON A SINGLE COMPUTER SYSTEM AND MAY BE COPIED ONLY WITH
THE INCLUSION OF THE ABOVE COPYRIGHT NOTICE. THIS
SOFTWARE, OR ANY OTHER COPIES THEREOF, MAY NOT BE PROVIDED
OR OTHERWISE MADE AVAILABLE TO ANY OTHER PERSON EXCEPT
FOR USE ON SUCH SYSTEM AND TO ONE WHO AGREES TO THESE
LICENSE TERMS. TITLE TO AND OWNERSHIP OF THE SOFTWARE SHALL
AT ALL TIMES REMAIN IN DEC.

THE INFOMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE
WITHOUT NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT
BY DIGITAL EQUIPMENT CORPORATION.

DEC ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY
OF ITS SOFRWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY
DEC.

TABLE OF CONTENTS

1.0 GENERAL PROGRAM INFORMATION

1.1 ABSTRACT
1.2 SYSTEM REQUIREMENTS
1.2.1 HARDWARE
1.2.2 SOFTWARE

2.0 OPERATING INSTRUCTIONS

2.0.1 OUTLINE OF OPERATING PROCEDURE
2.1 LOADING PROCEDURE
2.2 STARTING ADDRESSES
2.3 OPERATOR ACTION BEFORE STARTING PROGRAM
2.3.1 DEVICE ADDRESS SELECTION
2.3.2 NON-STANDARD DISKETTE ADDRESS SELECTION
2.3.3 SOFTWARE SWITCH REGISTER (LOC. 176)
2.3.4 TEST PARAMETER SELECTION ("DTESTP" LOC. 1212)
2.4 OPERATOR ACTION TO RUN THE PROGRAM
2.4.1 STARTING THE PROGRAM
2.4.2 OPERATING CONDITIONS
2.4.3 ACT11 AND XXDP HOOKS
2.5 PROGRAM OPTIONS
2.5.1 PSEUDO SCOPE LOOP
2.5.2 DISKETTE COMPATABILITY
2.5.3 RX11 TO RX8 COMPATABILITY
2.6 RUN TIME

3.0 ERROR DETECTION

3.1 ERROR DEFINITIONS
3.2 DEFINITIVE ERROR CODES
3.3 UNEXPECTED OR MISSING ERROR CONDITIONS
3.4 POWER FAILURE
3.5 PROGRAM HUNG

4.0 ERROR REPORTING

5.0 HALTS

```
                                1.0     GENERAL PROGRAM INFORMATION
                                1.1     ABSTRACT

                                        THE RX11 SYSTEM RELIABILITY PROGRAM CONSISTS OF SELECTABLE
                                        TESTS THAT CHECK THE OPERATION OF THE RX11 SYSTEM, BY
                                        WRITING, READING AND VERIFYING VARIOUS DATA PATTERNS,
                                        UNDER VARIOUS (SELECTABLE) HEAD MOVEMENTS.  IT CAN TRANS-
                                        FER DATA AND CHECK FOR ERRORS OVER THE ENTIRE DISKETTE,
                                        ALL TRACKS AND SECTORS, OR BETWEEN SEPARATELY SELECTABLE
                                        TRACK AND SECTOR ADDRESS LIMITS.
                                        AS WELL AS TRANSFERRING DATA THE PROGRAM ACCUMULATES
                                        STATICTICAL DATA ON THE FOLLOWING:

                                        A.  COMPLETED PASSES OF THE PROGRAM
                                        B.  NUMBER OF RESTARTS
                                        C.  NUMBER OF SECTORS WRITTEN/READ
                                        D.  RECOVERABLE AND UNRECOVERABLE FAULTS AS FOLLOWS:

                                            1.  PARITY ERRORS
                                            2.  ERROR FLAG ERRORS
                                            3.  INTERRUPT ERRORS
                                            4.  SEEK ERRORS
                                            5.  DATA CRC ERRORS
                                            6.  CRC NO DATA ERRORS
                                            7.  DATA NO CRC ERRORS
                                            8.  DELETED DATA MARK ERRORS
                                            9.  WRITE ERRORS
                                           10.  READ ERRORS

                                        E.  TOTAL OF EACH ERROR CODE DETECTED
                                        F.  TOTAL OF TIMES EACH TRACK WAS ACCESSED
                                        G.  TOTAL OF TIMES HEAD MOVED TO A TRACK.
                                        H.  TOTAL OF ERRORS DETECTED PER TRACK PER DRIVE.

                                        THE ABOVE IS REPORTED BY THE ERROR DUMP PROGRAM.

                                1.2     SYSTEM REQUIREMENTS
                                1.2.1   HARDWARE REQUIREMENTS

                                        THE FOLLOWING EQUIPMENT IS REQUIRED.

                                        A.  PDP-11 SERIES OF COMPUTER WITH MIN 8K MEMORY

                                        B.  RX11 FLOPPY DISK SYSTEM INCLUDING DUAL OR SINGLE DRIVE
                                            RX01 AND PDP-11 INTERFACE.  (SEE SECTION 2.3  FOR SELECTION
                                            OF REGISTER ADDRESSES AND VECTOR ADDRESS)
                                                NOTE: A DISKETTE MUST BE INCLUDED WITH EACH DRIVE TESTED.

                                        C.  CONSOLE TELEPRINTER

                                1.2.1   SOFTWARE REQUIREMENTS

                                        THIS PROGRAM ASSUMES THAT THE RX11 INTERFACE DIAGNOSTIC
                                        ( MAINDEC - 11 - DZRXB-* ) HAS BEEN SUCCESSFULLY RUN ON THIS SYSTEM.
```

```
                                2.0     OPERATING INSTRUCTIONS
                                2.0.1   OUTLINE OF OPREATING PROCEDURE

                                        THE STANDARD OPERATING PROCEDURE FOR THE RX11 RELIABILITY
                                        TEST (TO RUN ALL TESTS ON BOTH DRIVES WITH NO OPERATOR
                                        INTERVENTION VIA THE SWITCH REGISTER) IS AS FOLLOWS:

                                        A.      LOAD THE PROGRAM INTO MEMORY
                                                1.      IF IT'S BEING LOADED FROM A DISKETTE,REPLACE
                                                        THE "LIBRARY DISKETTE" WITH A "SCRATCH DISKETTE"

                                        B.      START THE PROGRAM RUNNING AT  LOCATION 200

                                        C.      THE PROGRAM WILL TYPE OUT THE FOLLOWING:
                                                1.      PROGRAM NAME AND REVISION
                                                2.      RX11 REGISTER AND VECTOR ADDRESSES
                                                3.      UNITS BEING TESTED
                                                4.      "P"ATTERN, "T"EST, AND "S"EQUENCE

                                                IT THEN STARTS RUNNING UNDER THOSE CONDITIONS

                                        D.      IF THERE ARE NO ERRORS, AT THE END OF THE COMPLETED PASS
                                                A "D" AND "BELL" IS TYPED,AND THE PROGRAM WILL CONTINUE
                                                ON FOR ANOTHER PASS.

                                        E.      HALT THE PROGRAM AS FOLLOWS:

                                                1.      IF THERE IS A HARDWARE SWITCH REGISTER, PUT SW 14
                                                        UP TO HALT AT THE END OF PASS.

                                                2.      IF THERE IS NO SWITCH REGISTER, OR TO HALT
                                                        AT ANY TIME, HALT THE PROCESSOR.

                                2.1     LOADING PROCEDURE

                                        LOAD THE PROGRAM INTO MEMORY USING STANDARD PROCEDURE FOR
                                        BINARY PAPER TAPES.

                                        MAKE SURE THAT THE TOTAL SYSTEM IS READY FOR OPERATION,
                                        DISKETTE INSERTED CORRECTLY, DOORS CLOSED ON DRIVES TO BE
                                        TESTED, ETC.

                                2.2     STARTING ADDRESSES

                                        THE PROGRAM HAS THREE (3) STARTING LOCATIONS.

                                2.2.1   INITIAL START  (LOC. 200)

                                        THIS STARTING LOCATION INITIALIZES THE PROGRAM AS FOLLOWS:

                                        A.  CLEARS ALL ERROR LOGS
                                        B.  RESETS COUNTERS AND CONSTANTS
                                        C.  TYPES OUT RX11 REGISTER AND VECTOR ADDRESSES BEING USED.
                                        D.  TYPES THE DRIVE AND TEST SELECTION IN "DTESTP"
                                        E.  INITIATES THE COLLECTION OF STATISTICAL DATA PERTAINING
                                            TO THE OPERATION OF THE RX11 SYSTEM.
```

2.2.2 RESTART (LOC. 202)

THIS STARTING LOCATION DIRECTS THE PROGRAM TO CONTINUE RUNNING USING DRIVE AND TEST SELECTIONS SPECIFIED IN THE PREVIOUS INITIAL START. IT ALSO CONTINUES TO ACCUMULATE STATICTICAL INFORMATION, AMMENDING IT TO THE DATA ALREADY COLLECTED PRIOR TO THIS RESTART.

2.2.3 ERROR DUMP (LOC. 204)

THIS STARTING ADDRESS DIRECTS THE PROGRAM TO PRINT OUT ON THE CONSOLE TELEPRINTER ALL THE DATA ACCUMULATED FROM THE LAST "INITIAL START" TO THE TIME OF THE PRINTOUT. TYPING OUT THIS INFORMATION DOES NOT DESTROY IT, SO A RESTART CAN BE INITIATED AND INFORMATION WILL CONTINUE TO BE COLLECTED.

2.3 OPERATOR ACTION BEFORE STARTING PROGRAM

2.3.1 DEVICE ADDRESS SELECTION

LIKE MOST OPTIONS ON THE PDP11 THE RX11 INTERFACE CARD HAS JUMPERABLE REGISTER AND VECTOR ADDRESSES. THIS ALLOWS FOR DEVICES WITH THE SAME STANDARD ADDRESSES TO BE JUMPERED TO AN OTHER ADDRESS SO THEY WILL RUN WITHOUT CONFLICT.

THE PROGRAM MUST KNOW WHAT ADDRESSES ARE BEING USED, AS IT IS THROUGH THESE REGISTERS AND VECTOR THAT ALL COMMUNICATION BETWEEN THE PDP11 AND RX11 IS HANDLED.

IF THE RX11 SYSTEM UNDER TEST IS JUMPERED FOR REGISTER ADDRESS OTHER THAN STANDARD, WHICH IS RXCS=177170 AND RXDB=177172. PLACE IN THE MEMORY LOCATION CALLED "RXCS" (LOC. 1206) ITS NEW ADDRESS, AND IN LOCATION "RXDB" (LOC. 1210) ITS NEW ADDRESS. IF THERE AS A NONSTANDARD INTERRUPT VECTOR ADDRESS (STANDARD IS LOC 264) THEN PLACE IN MEMORY LOCATION CALLED "INTVEC" (LOC. 1204) ITS NEW ADDRESS.

IF THESE THREE MEMORY LOCATIONS DO NOT CONTAIN THE ADDRESSES THAT THE INTERFACE BOARD IS WIRED TO THE PROGRAM WILL REPORT "TEST HUNG" AND HALT, OR HALT AT THE VECTOR ADDRESS THAT IS JUMPERED IN. (NOTE: THE VECTOR ADDRESSES CAN NOT BE JUMPERED FOR LOCATIONS 200 THROUGH 220 AS THESE ARE USED BY THE PROGRAM)

```
                        2.3.2   NON-STANDARD DISKETTE ADDRESS SELECTION

                                IF IT IS DESIREABLE TO TEST THE DISKETTES BETWEEN TRACK
                                AND SECTOR ADDRESS LIMITS OTHER THAN BETWEEN THE NORMAL
                                OUTER DIAMETER (OD) AND INNER DIAMETER (ID) TRACK ADD-
                                RESSES, AND/OR MINIMUM (FIRST) AND MAXIMUM (LAST) SECTOR
                                ADDRESS.  THIS IS DONE BY THE OPERATOR MAKING CHANGES TO
                                TWO (2) MEMORY LOCATIONS BEFORE THE PROGRAM IS STARTED.
                                ONE LOCATION IS CALLED OD WHICH CONTAINS TWO
                                BYTES ONE FOR OD AND THE OTHER ID TRACK ADDRESSES.  THE
                                OTHER LOCATION IS CALLED FIRST AND IT TOO CONTAINS TWO BYTES
                                ONE FOR FIRST THE OTHER FOR LAST SECTOR ADDRESS.  (IF
                                THESE TWO LOCATIONS ARE LEFT CLEARED THE MAX AND MIN
                                VALUES FOR THE ADDRESSES ARE ASSUMED.)

                                A.  DEFINITIONS:

                                    OD = ADDRESS OF TRACK AT OUTER DIAMETER (MIN VALUE=0)
                                    ID = ADDRESS OF TRACK AT INNER DIAMETER (MAX VALUE=114 [OCTAL])
                                    FIRST = ADDRESS OF FIRST SECTOR OF TRACK (MIN VALUE=1)
                                    LAST = ADDRESS OF LAST SECTOR OF TRACK (MAX VALUE=32 [OCTAL])

                                B.  LOCATIONS:

                                    TRACKS LOC. 1200 BITS   14------8  6------0
                                                              ID        OD

                                    SECTORS LOC. 1202 BITS  12------8  4------0
                                                             LAST      FIRST

                                C.  RESTRICTIONS:

                                    THE CONTENTS OF "OD" MUST BE LESS THAN OR EQUAL TO THE CONTENTS OF "ID"
                                    THE CONTENTS OF FIRST MUST BE LESS THAN OR EQUAL TO THE CONTENTS OF "LAST"

                                IF THESE LOCATIONS ARE CHANGED TO NEW LIMITS, THEN THE
                                PROGRAM WILL ACCESS ONLY THOSE ADDRESSES INCLUSIVE OF
                                AND BETWEEN THESE LIMITS.
```

2.3.3 SOFTWARE SWITCH REGISTER (LOC. 176)

FOR THE PDP 11 PROCESSORS THAT DO NOT HAVE A HARDWARE SWITCH REGISTER, OR IF THE OPERATOR WISHES TO SELECT THE SOFTWARE SWITCH REGISTER,BY PUTTING ALL THE SWITCHES UP TO A "1",(THIS MUST BE DONE EACH TIME THE PROGRAM IS STARTED AT LOCATION 200, OTHER WISE THE PROGRAM WILL USE THE HARDWARE SWR.) LOCATION 176 IS ASSIGNED AS THE SWITCH REGISTER. BITS SET TO A "1" IN THIS LOCATION HAVE THE SAME FUNCTION AS THE CORRISPONDING SWITCH IN THE HARDWARE SWITCH REGISTER. ALL REFERENCES TO THE SWR ARE INDIRECT AND THE PROGRAM ASSIGNS THE CORRECT ADDRESS OF THE SWR AT "INITIAL START".
SEE SECTION 2.4.2 FOR THE SELECTION OF OPERATING CONDITIONS.

TO CHANGE THE SOFTWARE SWR. WHILE THE PROGRAM IS RUNNING, TYPE "CONTROL G". EACH TIME THE SWR. IS TO BE TESTED THE PROGRAM WILL CHECK TO SEE IF THE SOFTWARE SWR IS SELECTED,AND THE PROGRAM IS NOT RUNNING IN AUTO MODE OF RXDP/ACT11. IF BOTH CONDITIONS EXIST THEN THE PROGRAM CHECKS FOR THE CTRL G IN THE KEYBOARD BUFFER. IF THE CTRL G IS THERE THE CONTENTS OF THE SOFTWARE SWR. ARE PRINTED AND A "NEW =" IS ASKED FOR. THE OPERATOR MAY NOW TYPE IN THE NEW SWITCH REGISTER CONTENTS, TERMINATED BY A CARRIAGE RETURN (CR), OR IF HE DOESN'T WANT TO CHANGE THE SWR. JUST TERMINATE WITH THE (CR). NOTE SEE THE CHARACTER RESTRICTIONS BELOW.

WHEN THE PROGRAM DETECTS THE (CR) IT WILL REPLACE THE CONTENTS OF THE SOFTWARE SWR.,IF A NEW ONE HAS BEEN TYPED IN, AND RETURN TO THE FLOW OF THE PROGRAM.

NOTE: CHARACTER RESTRICTIONS FOR CHANGING THE SOFTWARE SWR.

1. ONLY OCTAL NUMBERS 0 - 7 ARE ACCEPTED. ANY OTHER CHARACTER TYPED WILL BE PRINTED AS A ? AND THE WHOLE SWR MUST BE RETYPED.

2. TO WIPE OUT A "NEW" CONTENTS JUST TYPED IN, TYPE CTRL U. NOW A NEW CONTENTS CAN BE RETYPED.

3. ONLY 6 OCTAL CHARACTERS WILL BE PUT INTO THE SWR. IF MORE THAN 6 CHARACTERS ARE TYPED IN ONLY THE LAST 6 WILL BE PUT INTO THE SWR.

```
                        2.3.4   TEST PARAMETER SELECTION ("DTESTP" LOC. 1212)

                        THE DRIVE AND TEST SELECTION MUST BE DONE BEFORE THE
                        PROGRAM STARTS. "DTESTP" (LOCATION 1212) IS WHERE THE BITS
                        ARE SET TO TELL THE PROGRAM WHAT DRIVES ARE WANTED AND WHAT TEST
                        TO RUN, AS INDICATED BELOW. WHEN THE PROGRAM STARTS IT WILL
                        TYPE OUT THE TEST CONDITIONS IT IS RUNNING UNDER.

                            BIT 15 (1)  SELECT DRIVE UNIT 1
                            BIT 14 (1)  SELECT DRIVE UNIT 0

                        THEN SET THE TEST CONDITIONS IN BITS 8 THROUGH 0
                        AS SHOWN BELOW.

                     "DTESTP" BITS 15 14   13 12 11 10   9  8 7 6 5 4 3 2 1 0
                              U1 U0      NOT USED   D  P P P T T T S S S

                           BIT 9        IF BIT 9 IS ON, ALL WRITE/READ FUNCTIONS WILL
                                        BE IN THE DELETED DATA MODE.
                           BIT 8,7,6    SELECTS A DATA PATTERN TO BE USED.
                           BIT 5,4,3    SELECTS A TEST TO BE PERFORMED.
                           BIT 2,1,0    SELECTS A HEAD MOVEMENT SEQUENCE.

                        THE SELECTIONS ARE DEFINED AS FOLLOWS:

                            P = DATA PATTERN SELECTION

                                0    DEFAULT TO 7
                                1    ZEROS
                                2    ONES
                                3    FLOATING ZERO
                                4    FLOATING ONE
                                5    125
                                6    314
                                7    RANDOM

                           T = FUNCTIONAL TESTS

                                0    DEFAULT TO 7
                                1    WRITE ONLY
                                2    WRITE/READ
                                3    WRITE/READ CHECK
                                4    READ CHECK ONLY
                                5    READ ONLY (CRC CHECK)
                                6    WRITE/READ CHECK ON ALTERNATING DRIVES *
                                7    WRITE/READ/READ CHECK **

                        * NOTE: TEST 6 WRITES THEN READ CHECKS ANY SELECTED DATA PATTERN
                        USING ANY TRACK SEQUENCE, BUT ONE TRACK AT A TIME.
                        FIRST ON UNIT 0 THEN UNIT 1. WHEN BOTH
                        UNITS HAVE ACCESSED THAT TRACK,IT GOES BACK TO UNIT 0
                        FOR THE NEXT TRACK,ETC.
```

```
                        ** NOTE: THE FIRST HALF OF TEST 7 FORCES THE TRACK SEQUENCE TO
                        INCREMENT UP THROUGH ALL TRACKS DOING WRITE/READ CHECK FUNCTIONS.
                        THIS VERIFIES THAT ALL TRACKS ARE ACCESSABLE. THE SECOND HALF
                        OF THE PASS WILL USE THE SEQUENCE SELECTED BY THE OPERATOR AS
                        INDICATED BELOW,AND ONLY READ CHECK THE DATA JUST WRITEN.
                        THIS VERIFIES THAT THE DATA CAN BE READ FROM A TRACK AFTER THE
                        HEAD HAS BEEN MOVED AWAY FROM AND BACK TO THAT TRACK. AT THE
                        COMPLETION OF THE PASS THE DELETED DATA BIT IN TEST CONDITIONS IS
                        COMPLEMENTED AND THE NEXT PASS WILL BE RUN UNDER THIS NEW CONDITION.

                            S = TRACK SEQUENCING

                                0    DEFAULT TO 7
                                1    INCREMENT
                                2    DECREMENT
                                3    INCREMENT/DECREMENT
                                4    BOUNCE
                                5    DECREASING BOUNCE
                                6    STROBE
                                7    RANDOM

                        IF NO BITS ARE SET (ZEROED 'DTESTP:) THEN THE
                        PROGRAM WILL SELECT ALL DRIVE UNITS THAT ARE READY AND
                        DEFAULT TO TEST CONDITIONS AS INDICATED.

                        THE PROGRAM NEXT PRINTS THE REGISTER AND VECTOR ADDRESSES
                        IT WILL USE IN COMMUNICATING WITH THE RX11 SYSTEM. AS
                        EXPLAINED IN SECTION 2.3.1 THE OPERATOR MUST VERIFY THAT THESE
                        ADDRESSES ARE THE ONES JUMPERED ON THE RX11 INTERFACE BOARD.

                2.4     OPERATOR ACTION TO RUN THE PROGRAM

                2.4.1   STARTING THE PROGRAM

                        SET THE DESIRED STARTING ADDRESS INTO THE SWITCH REGISTER,
                        DEPENDING UPON THE TYPE OF CONSOLE AVAILABLE, LOAD ADDRESS,
                        AND PRESS START.

                        THE PROGRAM WILL TYPE ITS "MAINDEC" NUMBER AND REVISION,
                        AND DEPENDING UPON THE STARTING ADDRESS DO THE FOLLOWING:

                        SA200 - THE PROGRAM WILL TYPE DRIVE AND TEST PARAMETERS,
                                THE TWO REGISTER ADDRESSES, AND VECTOR ADDRESS.
                                IT WILL THEN BEGIN FUNCTIONAL TESTING, AND INFORMATION
                                COLLECTION.

                        SA202 - THE PROGRAM WILL CONFIGURE TO CONDITIONS SET IN
                                PREVIOUS "INITIAL START", PRINT OUT THESE CONDITIONS
                                AND CONTINUE FUNCTIONAL TESTING AND DATA COLLECTING.
                                THE ONLY OPERATOR ACTION REQUIRED IS THE DYNAMIC
                                SELECTION OF OPERATING CONDITIONS IN THE SWITCH
                                REGISTER AS REQUIRED.

                        SA204 - THIS PROGRAM WILL REPORT VIA THE TELEPRINTER ALL
                                DATA COLLECTED.  NO OTHER OPERATOR ACTION IS RE-
                                QUIRED.
```

```
                                2.4.2   OPERATING CONDITIONS

                                        THE PROGRAM CHECKS FOR OPERATING CONDITIONS AT VARIOUS
                                        POINTS WHILE RUNNING. IF THERE IS A HARDWARE SWR THESE CONDITIONS
                                        CAN BE CHANGED AND SET WHILE THE PROGRAM IS RUNNING. IF THE
                                        SOFTWARE SWR IS IN USE, THEN THESE CONDITIONS MUST BE SET IN LOCATION
                                        176 BEFORE THE PORGRAM STARTS.

                                            SW15 = HALT ON ERROR
                                            SW14 = HALT AT END OF PASS
                                            SW13 = DON'T PRINT ERROR MESSAGE
                                            SW12 = TYPE ONLY 10 DATA ERRORS
                                            SW11 = NO RETRY ON ERROR.  LOG HARD ERROR
                                            SW08 = NO RECALIBRATION ON SEEK ERRORS
                                            SW15-SW0 (1) = SELECT SOFTWARE SWITCH REGISTER

                                            NOTE:  IF THERE IS A HARDWARE SWITCH REGISTER, AND THE OPERATOR
                                                WANTS THE SOFTWARE SWITCH REGISTER. PUT ALL SWITCHES UP (1)
                                                BEFORE STARTING THE PROGRAM AT THE INITIAL START ADDRESS.

                                        THE PROGRAM WILL PRINT A "DRIVE(S)" SELECTED CONFIRMATION
                                        MESSAGE THAT IT WAS SUCCESSFUL IN FINDING AT LEAST ONE
                                        DRIVE READY (DRY) CONDITION ON AN OPERATOR SELECTED DRIVE
                                        OR EITHER OR BOTH IF NO SELECTION WAS MADE.  THE DRIVES
                                        CONFIRMED AS BEING SELECTED BY THE PROGRAM MAY DIFFER
                                        FROM THAT SELECTED BY THE OPERATOR IF THE PROGRAM DETECTED
                                        A DRIVE TO BE NOT READY.

                                        IF HOWEVER THERE ARE NO DRIVES IN THE DRIVE READY CONDITION
                                        THE PROGRAM WILL TYPE "NO DRIVES READY" AND HALT, AS IT CAN'T
                                        FUNCTION WITH NO DRIVES READY.  WHEN THE REASON FOR ALL
                                        DRIVES TO BE NOT READY IS FOUND AND CORRECTED, THE OPER-
                                        ATOR MAY PRESS CONTINUE AND THE PROGRAM WILL GO BACK TO
                                        "INITIAL START" OR HE MAY RELOAD THE STARTING ADDRESS
                                        HIMSELF.

                                        AS WELL AS "DRIVE(S)" SELECTED THE PROGRAM WILL TYPE OUT
                                        THE TEST PARAMETERS SELECTED OR DEFAULTED TO.  IF NON-
                                        STANDARD TRACK AND/OR SECTOR ADDRESS LIMITS WERE SELECTED
                                        (SEE SECTION 2.3.2 OF THIS DOCUMENT) THESE LIMITS WILL ALSO
                                        BE PRINTED OUT FOR VARIFICATION BY THE OPERATOR.

                                2.4.3   ACT11 AND XXDP HOOKS

                                        THE PROGRAM HAS THE NECESSARY LOCATIONS SET UP FOR OPERATION UNDER
                                        ACT11 AND XXDP OPERATION. THE PROGRAM LOOKS AT THE LOADING MEDIA LOCATION
                                        AND IF IT CONTAINS THE NUMBER 10, INDICATING THE FLOPPY DISK LOADED
                                        THE PROGRAM, WILL TYPE THE FOLLOWING PROMPT MESSAGE AND WAIT FOR
                                        A USER RESONSE:
                                                        "CAUTION - IF YOU DESIRE TO TEST UNIT 0
                                                        REPLACE LOAD MEDIUM WITH A SCRATCH DISKETTE
                                                        THEN PRESS CONTINUE"

                                        THUS, IF THE OPERATOR WISHES TO TEST DRIVE UNIT 0, AFTER LOADING THE
                                        PROGRAM, HE REMOVES THE LIBRARY DISKETTE FROM DRIVE 0, INSERTS A
                                        SCRATCH DISKETTE INTO DRIVE 0, AND PRESSES THE 'CONTINUE' SWITCH
```

```
                        2.5     PROGRAM OPTIONS

                        THERE ARE A COUPLE OF WAYS THE PROGRAM CAN BE SET UP TO
                        RUN FOR OPTIONAL TESTING.

                        2.5.1   PSEUDO - SCOPE LOOP

                        BY SETTING THE ADDRESS LIMITS IN OD AND OR FIRST TO ONE
                        OF TWO TRACKS AND OR SECTORS IT IS POSSIBLE TO PRODUCE
                        A FAIRLY TIGHT PSEUDO - SCOPE LOOP.  BY RUNNING ONLY A
                        TEST THAT DOES WRITE ONLY OR READ ONLY ITS POSSIBLE
                        TO SCOPE SPECIFIC FUNCTIONS, I.E. FILL BUFFER, WRITE, READ,
                        EMPTY BUFFER.

                        2.5.2   DISKETTE COMPATABILITY

                        TO CHECK FOR DATA TRANSFER COMPATABILITY BETWEEN DRIVE
                        UNITS USE THE FOLLOWING PROCEDURE.  (IT IS ASSUMED THE
                        SYSTEM HAS DUAL DRIVE RX01, IF NOT YOU MAY TEST COMPAT-
                        ABILITY BETWEEN DIFFERENT RX11 SYSTEMS BY RUNNING THE SAME
                        TESTS ON BOTH.)
                        THIS TEST INSURES PROPER HEAD ALIGNMENT.

                        A.  HAVE DISKETTES IN BOTH DRIVES AND DRIVES READY.

                        B.  CLEAR THE OD/ID AND FIRST/LAST MEMORY LOCATION, FOR
                            TOTAL DISKETTE TRANSFERS.

                        C.  LOAD THE INITIAL START ADDRESS (LOC 200) AND START
                            THE PROGRAM RUNNING.

                        D.  SET LOCATION ''DTESTP'' FOR ''DRIVE AND TEST CONDITIONS'' ON
                            BOTH DRIVES, ANY ''P''ATTERN OF DATA, ''S''EQUENCE #1
                            (INCRIMENT TRACKS,TO INSURE ALL HEAD POSITIONS ARE ALIGNED)
                            AND ''T''EST 3 (WRITE/READ CHECK).  THIS WILL
                            WRITE THEN READ AND VERIFY THE DATA ON BOTH DISKETTES.

                        E.  ALLOW THE PROGRAM TO RUN FOR AT LEAST 1 COMPLETE PASS.

                            NOTE:  IF RANDOM PATTERN (0 OR 7) IS SELCTED YOU MUST HALT
                                   AT THE END OF THE FIRST PASS, AS ADDITIONAL
                                   PASSES CHANGES THE DATA AND YOU
                                   WILL GET DATA ERRORS WHEN YOU TRY TO REREAD.

                            TO HALT AT THE END OF PASS PUT SW14 UP (1) WHEN
                            ''OPERATING CONDITIONS'' ARE REQUESTED BY THE PROGRAM.

                        F.  AFTER COMPLETION OF THE PASS, PROGRAM HALTED.  SWAP
                            DISKETTES, AND AS YOU ONLY WANT TO READ VERIFY THE
                            DATA, START THE PROGRAM AGAIN AT LOC 200 (INITIAL
                            START).

                        G.  WHEN REQUESTED SELECT THE SAME DRIVES, PATTERN, AND
                            SEQUENCE, BUT SELECT TEST 4 (READ CHECK ONLY).

                        H.  ALLOW THE PROGRAM TO RUN AS LONG AS YOU WISH TO VERIFY
```

```
                        THAT DATA WRITTEN AND CHECKED ON ONE DRIVE CAN BE
                        READ AND VERIFIED ON THE OTHER DRIVE.

                2.5.3   RX11 TO RX8 COMPATABILITY

                        TO WRITE A DISKETTE ON THE RX11 AND READ/VERIFY THE SAME DATA ON A
                        RX8 REQUIRES THE FOLLOWING:

                            A.      SET UP LOCATION "DTESTP" (1212) WITH ONE OF THE
                            FOLLOWING DATA PATTERNS

                                    P=1   (0'S)
                                    P=2   (1'S)
                                    P-5   (125)  *
                                    P=6   (314)  *

                            * NOTE:  IF ONE OF THESE PATTERNS IS SELECTED A MODIFICATION
                            TO THE PROGRAM MUST BE MADE TO ALLOW THIS DATA TO BE READ ON
                            A RX8 SYSTEM.
                            THE MODIFICATION IS IN THE "PAT125" ROUTEEN, THE TWO (2) LOCATIONS
                            CONTAINING THE "COMB DATABYTE" INSTRUCTION MUST BE CHANGED
                            TO TWO (2) NOP'S (OCTAL 000240)

                            B.      SET IN "DTESTP" TEST 3 WHICH WILL WRITE AND READ CHECK
                            THE DATA THEREBY VERIFYING THE QUALITY OF THE DATA PRIOR
                            TO THE DISKETTE SWAP.

                            SET THE SEQUENCE TO 1 TO INSURE THAT ALL TRACKS HAVE BEEN WRITTEN ON.

                            C.      HALT THE PROGRAM AT THE COMPLETION OF ONE PASS.

                            D.      THE DISKETTE IS NOW READY TO BE READ ON THE RX8
                            SYSTEM. SEE MD-8-DIRX8-* FOR THE PROCEDURE TO READ THIS DISKETTE.

                TO READ A DISKETTE THAT WAS WRITTEN ON A RX8 SYSTEM SET UP AS FOLLOWS:

                            E.      SET IN "DTESTP" THE DATA PATTERN THAT WAS USED BY THE
                            RX8 SYSTEM. (SEE NOTE UNDER SECTION A.)

                            F.      SET "DTESTP" FOR TEST 4 (READ CHECK ONLY) AND SEQUENCE 1
                            TO CHECK ALL TRACKS. START THE PROGRAM, IT SHOULD RUN WITHOUT
                            DATA ERRORS.
```

```
                        2.6     RUN TIME

                                RUN TIME PER PASS DEPENDS UPON NUMBER OF A FUNCTIONS IN
                                THE TEST SELECTED AND THE TRACK SEQUENCE.
                                EXAMPLES OF RUN TIMES FOLLOW.
                                (THESE TIMES ARE FOR 1 DRIVE AND COMPLETE DISKETTE,MAXIMUM ID/OD,
                                FIRST/LAST LIMITS.IF OPERATING ON 2 DRIVES DOUBLE THE TIME.)
                                THESE TIMES ARE FOR A PDP 11/05 PROCESSOR AND MAY CHANGE SLIGHTLY FOR
                                A FASTER PROCESSOR.
                                        TEST SELECTION  P   T   S   TIME/PASS
                                                        7   6   5   3 MIN.30 SEC.
                                                        7   7   4   2 MIN.47 SEC.
                                                        7   7   7   2 MIN.23 SEC.
                                                        6   3   4   1 MIN.46 SEC.
                                                        7   3   1   1 MIN.30 SEC.
                                                        7   1   1         51 SEC.

                                NOTE:   DUE TO THE SLOW SPEED OF THE LSI 11 PROCESSOR, THE
                                RUN TIME IS ABOUT DOUBLE THAT LISTED ABOVE. TO SPEED UP THE RUNNING
                                OF THIS PROGRAM IN THE LSI 11 YOU CAN CHANGE THE INTERLEAVE FACTOR,
                                OF THE SECTORS, USED IN THE PROGRAM. TO DO THIS CHANGE THE
                                CONTENTS OF LOCATION "THREE" FROM OCTAL 3 TO OCTAL 5.


                        3.0     ERROR DETECTION

                        3.1     PROGRAM DEFINITIONS

                                ON MOST ERRORS THE PROGRAM WILL TYPE OUT THE CONTENTS OF
                                "STATUS A" AND "STATUS B".

                                STATUS A IS THE CONTENTS OF THE RXES (ERROR AND STATUS REGISTER)
                                AT THE TIME THE ERROR IS DETECTED. IT SHOWS THE CRC,PAR,ETC. ERRORS.

                                STATUS B IS THE "DEFINITIVE ERROR CODES" THAT THE RX01 DETECTED,
                                THAT MAY HAVE CAUSED THE ERROR CONDITION. THESE ERROR CODES ARE
                                DEFINED IN SECTION 3.2.

                                THE PROGRAM HAS DEFINED THE FOLLOWING AS ERRORS.

                        3.1.1   WRITE ERROR

                                A WRITE ERROR IS A RETRIED READ ERROR IF THE DATA BEING
                                READ IS OF UNKNOWN QUALITY (THE DATA READ IS BEING READ
                                FOR THE FIRST TIME AFTER A WRITE FUNCTION)

                        3.1.2   READ (CRC) ERROR

                                A READ ERROR IS A RETRIED READ ERROR WHERE THE QUALITY OF
                                THE DATA BEING READ IS KNOWN GOOD.  (THE DATA HAS BEEN
                                READ CORRECTLY SOME TIME PREVIOUSLY.)
```

3.1.3 CRC AND DATA ERROR

3.1.4 NO CRC ERROR BUT DATA ERROR

3.1.5 CRC ERROR BUT NO DATA ERROR

THE ABOVE THREE ERRORS ARE DETECTED WHEN THE PROGRAM IS
VERIFYING THE DATA READ OFF THE DISKETTE AGAINST THE DATA
THAT SHOULD HAVE BEEN READ.

UPON A NON-COMPARISON THE PROGRAM TYPES OUT THE "BYTE"
NUMBER IN THE SECTOR, THE DATA READ FROM THE DISKETTE
"BAD" AND THE EXPECTED DATA "GOOD".

BYTE# BAD GOOD
(THE DATA PATTERNS ARE FORMATTED AS SHOWN)

0 (TRACK ADDRESS; BITS 6 - 0)
1 (SECTOR ADDRESS; BITS 4 - 0)

BYTES 2 THROUGH 125 CONTAIN THE SELECTED "P"ATTERN.

126 (THE SUM OF ALL BYTES 0 - 125)
127 (THE NEGATIVE OF 2 TIMES BYTE 126)

THE PROGRAM DETECTS A CHECKSUM ERROR BY SUMMING ALL THE
DATA READ FROM THE DISKETTE AND COMPARING THAT SUM TO 0.

AT THE END OF THE DATA ERROR TYPEOUT THE PROGRAM TYPES OUT IF
THE CHECK SUM ACCUMULATED IS "GOOD" OR HAD "ERRORS".
IF BYTES 0 OR 1 HAVE DATA ERRORS THE OPERATOR MUST CHECK THE RESULTS
OF THE CHECK SUM. IF IT IS ALSO BAD,THEN THERE WAS A TRUE DATA ERROR.
IF THE CEHCK SUM IS GOOD,THEN IT MIGHT BE THAT THE HEAD IS NOT
OVER THE TRACK EXPECTED,AND THERE IS A POSITIONING ERROR.

3.1.6 SEEK ERROR

A SEEK ERROR IS DEFINED AS NOT A CRC AND NOT A PARITY ERROR.
A PROGRAMED RECALIBRATE IS ISSUED TO TRY TO CORRECT EACH SEEK ERROR.

3.1.7 PARITY ERROR

A PARITY ERROR RESULTS FROM AN INCORRECT TRANSFER OF A
COMMAND WORD FROM THE RX11 INTERFACE TO THE RX01 MICRO-
PROCESSOR CONTROLLER.

706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748

3.2 DEFINITIVE ERROR CODES

THE RX01 MICROCONTROLLER HAS DEFINED THE ERROR CODES AND MEANINGS WHICH ARE AVAILABLE TO THE PROGRAM BY ISSUING COMMAND #7 'READ THE B-CODE STATUS REGISTER''.

A DEFINITIVE ERROR CODE REPRESENTS [WHERE] WITHIN A FUNCTION AN ERROR WAS DETECTED.

THE FOLLOWING ARE THE DEFINITIVE ERROR CODES AND MEANINGS:

- 00 - NO ERROR
- 10 - DRIVE 0 FAILED TO SEE HOME FROM INITIALIZE
- 20 - DRIVE 1 FAILED TO SEE HOME FROM INITIALIZE
- 30 - HOME FOUND WHEN STEPPING OUT 10 TRACKS FROM INIT
- 40 - TRIED TO ACCESS A TRACK GREATER THAN /7(DECIMAL)
- 50 - HOME WAS FOUND BEFORE DESIRED TRACK
- 60 - SELF DIAGNOSTIC ERROR
- 70 - DESIRED SECTOR NOT FOUND AFTER SAMPLING 52 HEADERS
- 100 - WRITE PROTECT ERROR
- 110 - MORE THAN 40US AND NO SEP CLOCK DETECTED
- 120 - A PREAMBLE COULD NOT BE FOUND
- 130 - PREAMBLE FOUND BUT NO ID MARO FOUND IN TIME
- 140 - CRC ERROR ON SUPPOSIDLY GOOD HEADER
- 150 - GOOD HEADER (NO CRC ERROR) BUT TRACK COMPARE ERROR
- 160 - IDAM NOT FOUND IN TOME
- 170 - DATA AM NOT FOUND IN TIME
- 200 - DATA CRC ERROR
- 210 - ALL PARITY ERRORS

3.3 UNEXPECTED OR MISSING ERROR CONDITIONS

3.3.1 MISSING DD MARK

AN ERROR WHEN THE PROGRAM WROTE DELETED DATA INFORMATION BUT NO DELETED DATA MARK WAS DETECTED WHEN THE DATA WAS READ.

3.3.2 UNEXPECTED DD MARK

AN ERROR WHEN A DELETED DATA MARK IS DETECTED BUT NO DELETED DATA WAS WRITTEN.

3.3.3 NO INTERRUPT ON DONE

THE INTERRUPT ENABLE BIT WAS SET AND THE DONE FLAG WAS SET BUT NO INTERRUPT OCCURRED.

3.3.4 UNKNOWN INTERRUPT

IF AN INTERRUPT OCCURS FROM ANY OTHER DEVICE WHILE THIS PROGRAM IS RUNNING IT WILL HALT AT THE INTERRUPT VECTOR LOCATION.

IF AN INTERRUPT OCCURS ON INTERRUPT VECTOR LOCATION 264 (RX11), AND THERE IS NO ERROR, DONE, OR ERROR STATUS CONDITION SET, THEN IT WILL BE TAGGED AS AN UNKNOWN INTERRUPT.

3.4 POWER FAILURE

THE PROGRAM TESTS FOR TWO TYPES OF POWER FAILURE, TOTAL SYSTEM POWER LOSS AND RX11 POWER LOSS RESULTING IN A RECALIBRATION OF THE DRIVES.

THE TOTAL SYSTEM POWER FAILURE IS DETECTED BY THE "SYSMAC" SUBROUTINE .$POWER. WHEN THE POWER IS DETECTED TO BE GOING DOWN, THE REGISTERS ARE SANED. WHEN THE POWER COMES BACK UP THE REGISTERS ARE RESTORED AND THE MESSAGE "POWER" IS PRINTED. THE PROGRAM THEN AUTOMATICALLY DOES A RESTART.

LOSS OF POWER IN THE RX11 CAUSES A RECALIBRATION OF ALL DRIVES. WHEN THIS HAPPENS, THE "INIT DONE" BIT IS SET IN THE THE RXES REGISTER ALONG WITH THE NORMAL "DONE" FLAG. AT EACH INTERRUPT THE PROGRAM TESTS FOR INIT DONE. IF IT IS FOUND TRUE, THE FUNCTION WAS NOT COMPLETED AND A POWER LOSS MUST HAVE BEEN DETECTED. WHEN THIS HAPPENS THE PROGRAM TYPES OUT "RX11 POWER" AND DOES AN AUTOMATIC RESTART.

IF THERE ARE REPEATED, NOTHING ELSE HAPPENS BUT, RX11 POWER MESSAGES THE INIT DONE FLAG MIGHT BE STUCK ON.

3.5 PROGRAM HUNG

THERE ARE MANY PLACES WHERE THE PROGRAM MUST WAIT FOR AN OPERATION TO BE COMPLETED IN THE RX01. THESE ARE WAITING FOR THE "DONE" FLAG TO INDICATE A FUNCTION IS COMPLETED, OR WAITING FOR A TRANSFER REQUEST "TR" FLAG TO SEND OR RECEIVE THE NEXT BYTE OF INFORMATION. IF THE RX11 DOES NOT COME BACK WITH EITHER OR BOTH OF THESE FLAGS THE PROGRAM WOULD HANG UP.

TO INHIBIT THIS FROM HAPPENING THERE ARE TWO SUBROUTINES USED TO CHECK FOR THESE TWO FLAGS.

THE "DONECK" LOOKS FOR THE DONE FLAG AND IF IT IS NOT SEEN WITHIN A SPECIFIC TIME THE "TEST HUNG" MESSAGE IS PRINTED AND THE PROGRAM HALTS. IN REGISTER 3 (177703) IS THE RETURN ADDRESS OF THE TEST THAT IS WAITING FOR THE DONE FLAG.

```
                        "TRCK" LOOKS FOR THE "TR" FLAG. IF IT IS NOT SEEN WITHIN A
                        SPECIFIC TIME IT ALSO PRINTS THE "TEST HUNG" MESSAGE AND
                        HALTS. IN THE SP (177706) IS THE RETURN ADDRESS OF THE
                        TEST WAITING FOR THE TR FLAG.

                        THE WAITING TIME FOR THE TWO FLAGS DEPENDS UPON THE HOST PROCESSOR AS
                        INDICATED BELOW:

                                "DONE" WAIT     11/45 BIPOL 14 SEC.
                                                11/05 CORE 62 SEC.

                                "TR" WAIT       11/45 BIPOL .44 SEC.
                                                11/05 CORE 2 SEC.

                4.0     ERROR REPORTING

                        ALL ERRORS DETECTED WILL BE REPORTED IF SW13 = 0 FOR
                        OPERATING CONDITIONS.  IF SW12 = 1 THEN ONLY 10 DATA
                        ERRORS FOR 1 SECTOR WILL BE REPORTED, AND A TOTAL OF
                        DATA ERRORS FOR THAT SECTOR WILL BE REPORTED AT THE END
                        OF THE SECTOR.

                        THE END OF PASS INDICATOR TYPED,ALSO INDICATES WEITHER ANY ERRORS
                        OCCURED DURRING THAT PASS. IF THERE WERE NO ERRORS THEN A "*"
                        IS PRINTED. IF THERE WERE ERRORS THEN A "-" IS PRINTED.
                        THE TOTAL ACCUMULATED ERRORS AND SYSTEMS OPERATION IS
                        REPORTED BY THE "ERROR DUMP" PROGRAM.

                5.0     HALTS

                        THERE ARE VARIOUS HALT LOCATIONS THROUGHOUT THE PROGRAM.
                        SOME ARE THE RESULTS OF "HARD" ERRORS OTHERS ARE WAITING FOR
                        INTERVENTION. THEY ARE LISTED BELOW:

                        HALT #          TYPE            DEFINITION

                        HLT1:           NO ERROR        ;CAUTION - LOAD MEDIUM ON UNIT 0
                        HLT3:           ERROR           ;ERRORS FOUND ON RECAL FUNCTIONS
                        HLT4:           ERROR           ;HARD PARITY ERRORS
                        HLT5:           ERROR           ;NO DRIVES READY
                        HLT6:           ERROR           ;SW15 SET ON PARITY ERROR
                        HLT7:           ERROR           ;SW15 SET ON SEEK ERROR
                        HLT10:          ERROR           ;SW15 SET ON CRC GENERATOR ERROR (NO DATES ERROR
                        HLT11:          ERROR           ;HARD CRC GENERATOR ERROR (NO DATA ERRORS)
                        HLT12:          ERROR           ;SW15 SET ON DATA CRC ERROR
                        HLT13:          ERROR           ;SW15 SET ON MISSING DETECTED DATA ERROR
                        HLT14:          ERROR           ;SW15 SET ON DATA NO CRC ERROR
                        HLT15:          ERROR           ;SW15 SET ON MISSING INTERRUPT AT DONE
                        HLT16:          NO ERROR        ;HALT AT END OF PASS
                        HLT17:          NO ERROR        ;HALT AT END OF ERROR DUMP
                        HLT20:          ERROR           ;PROGRAM HUNG WAITING FOR DONE
                        HLT21:          ERROR           ;PROGRAM HUNG WAITING FOR TR FLAG
                &

                        .NLIST CND,MD,MC
                        .LIST ME
```

```
                                        .ENABL ABS,AMA



                        .TITLE  MAINDEC-11-CZRXA-F
                        ;*COPYRIGHT (C) 09-APR-82
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY DAVID L ADAMS
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C) FEB 1982.
                        ;*
000001                  $TN=1
160000                  $SWR=160000     ;;HALT ON ERROR, LOOP ON TEST, INHIBIT ERROR TYPOUT


                                ;COPYRIGHT (C) 1975,1982
                                ;THIS SOFTWARE IS FURNISHED UNDER A LICENSE FOR USE ONLY
                                ;ON A SINGLE COMPUTER SYSTEM AND MAY BE COPIED ONLY WITH
                                ;THE INCLUSION OF THE ABOVE COPYRIGHT NOTICE. THIS
                                ;SOFTWARE, OR ANY OTHER COPIES THEREOF, MAY NOT BE PROVIDED
                                ;OR OTHERWISE MADE AVAILABLE TO ANY OTHER PERSON
                                ;EXCEPT FOR USE ON SUCH SYSTEM AND TO ONE WHO AGREES TO
                                ;THESE LICENSE TERMS. TITLE TO OWNERSHIP OF THE
                                ;SOFTWARE SHALL AT ALL TIMES REMAIN IN DEC.
                                ;
                                ;THE INFOMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE
                                ;WITHOUT NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT
                                ;BY DIGITAL EQUIPMENT CORPORATION.
                                ;
                                ;DEC ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY
                                ;OF ITS SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY
                                ;DEC.


                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1200 ***
001200                  STACK=  1200
                        .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                        .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                        ;*MISCELLANEOUS DEFINITIONS
000011                  HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                  LF=     12              ;;CODE FOR LINE FEED
000015                  CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                  CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                  PS=     177776          ;;PROCESSOR STATUS WORD
                        .EQUIV  PS,PSW
177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                  DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

```

```
                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
000003                  R3=     %3              ;;GENERAL REGISTER
000004                  R4=     %4              ;;GENERAL REGISTER
000005                  R5=     %5              ;;GENERAL REGISTER
000006                  R6=     %6              ;;GENERAL REGISTER
000007                  R7=     %7              ;;GENERAL REGISTER
000006                  SP=     %6              ;;STACK POINTER
000007                  PC=     %7              ;;PROGRAM COUNTER

                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0=    0               ;;PRIORITY LEVEL 0
000040                  PR1=    40              ;;PRIORITY LEVEL 1
000100                  PR2=    100             ;;PRIORITY LEVEL 2
000140                  PR3=    140             ;;PRIORITY LEVEL 3
000200                  PR4=    200             ;;PRIORITY LEVEL 4
000240                  PR5=    240             ;;PRIORITY LEVEL 5
000300                  PR6=    300             ;;PRIORITY LEVEL 6
000340                  PR7=    340             ;;PRIORITY LEVEL 7

                        ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0

                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
010000                  BIT12=  10000
004000                  BIT11=  4000
```

```
                        002000          BIT10=  2000
                        001000          BIT09=  1000
                        000400          BIT08=  400
                        000200          BIT07=  200
                        000100          BIT06=  100
                        000040          BIT05=  40
                        000020          BIT04=  20
                        000010          BIT03=  10
                        000004          BIT02=  4
                        000002          BIT01=  2
                        000001          BIT00=  1
                                        .EQUIV  BIT09,BIT9
                                        .EQUIV  BIT08,BIT8
                                        .EQUIV  BIT07,BIT7
                                        .EQUIV  BIT06,BIT6
                                        .EQUIV  BIT05,BIT5
                                        .EQUIV  BIT04,BIT4
                                        .EQUIV  BIT03,BIT3
                                        .EQUIV  BIT02,BIT2
                                        .EQUIV  BIT01,BIT1
                                        .EQUIV  BIT00,BIT0

                                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
                        000004          ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
                        000010          RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
                        000014          TBITVEC=14              ;;"T" BIT
                        000014          TRTVEC= 14              ;;TRACE TRAP
                        000014          BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
                        000020          IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
                        000024          PWRVEC= 24              ;;POWER FAIL
                        000030          EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
                        000034          TRAPVEC=34              ;;"TRAP" TRAP
                        000060          TKVEC=  60              ;;TTY KEYBOARD VECTOR
                        000064          TPVEC=  64              ;;TTY PRINTER VECTOR
                        000240          PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR


                                        ;SPECIAL EQUATES


                        000013          RDOSTAT =13
                        000033          RD1STAT =33
                        000017          RDER    =17
                        000040          DONEBIT =40
                        000101          FBIE    =101
                        000103          EBIE    =103
                        000105          WRTIE   =105
                        000107          RDIE    =107
                        000115          WTDDIE  =115
                        040001          RECAL   =40001
                        000200          PR4     =200
                        000340          PR7     =340
                        000000          OPEN    =0

                        000000          .=0
000000  000000  000000                          .WORD 0,0
```

```
                        000024                  .=24
000024  014062                                  $PWRDN
000026  000340                                  340

                        000034                  .=34
000034  014000                                  $TRAP                   ;ADDRESS OF TRAP SERVICE
000036  000340                                  340

                        000046                  .=46
000046  011130                                  LOGICAL                 ;ACT11 EOP HOOK

                        000052                  .=52
000052  000000                                  .WORD 0

                        000174                  .=174
000174  000000          DISPREG:                0
000176  000000          SWREG:                  0


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

                                                ;STARTING ADDRESSES
                                                ;
                                                ;INITIAL START  =200    /CLEARS ALL ERROR LOGS,RESETS COUNTERS,AND ALLOWS FOR
                                                ;                       /SELECTION OF DRIVES AND TEST CONDITIONS
                                                ;
                                                ;RESTART        =202    /USES PREVIOUS INITIAL START DRIVES AND TEST
                                                ;                       /SELECTION AND CONTINUES TO ACCUMULATE STATISTICAL DATA
                                                ;
                                                ;ERROR REPORT   =204    /PRINTS OUT ALL RUN AND ERROR CONDITIONS
                                                ;                       /ACUMULATED OVER THE RUN OF THE PROGRAM.
                                                ;


                        000200                  .=200
000200  000402                                          BR 1$
000202  000403                                          BR 2$
000204  000404                                          BR 3$
000206  000137  001220          1$:                     JMP SA200               ;OPERATOR SELECTED CONDITIONS
000212  000137  002700          2$:                     JMP RESTART             ;RESTART PROGRAM WITH PREVIOUS CONDITIONS
000216  000137  021160          3$:                     JMP ERDUMP              ;STATISTICAL ERROR PRINT OUT


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

                                                ;THE FOLLOWING LOCATIONS "OD","ID","FIRST",AND "LAST"
                                                ;MAY BE CHANGED BY THE OPERATOR MANUALLY HOWEVER FOLLOWING THESE RESTRICTIONS.
                                                ;(IF THESE LOCATIONS ARE LEFT CLEARED,MAX AND MIN VALUES ARE ASSUMED)
                                                ;
                                                ;       1. DEFINITATIONS:
                                                ;               OD=ADDRESS OF TRACK AT OUTTER DIAMETER (MIN VALUE=0)
                                                ;               ID=ADDRESS OF TRACK AT INNER DIAMETER (MAX VALUE=114 [OCTAL])
                                                ;               FIRST=ADDRESS OF FIRST SECTOR OF TRACK (MIN VALUE=1)
                                                ;               LAST=ADDRESS OF LAST SECTOR OF TRACK (MAX VALUE=32 [OCTAL])
                                                ;
```

```
                                        ;       2. LOCATIONS:
                                        ;            TRACKS  LOC. 1200 BITS 14-----8 6-----0
                                        ;                                    ID      OD
                                        ;
                                        ;            SECTORS LOC. 1202 BITS 12-----8 4-----0
                                        ;                                   LAST    FIRST
                                        ;
                                        ;       3. RESTRICTIONS:
                                        ;            THE CONTENTS OF "OD" MUST BE <= THE CONTENTS OF "ID"
                                        ;            THE CONTENTS OF FIRST MUST BE <= THE CONTENTS OF "LAST"

            001200                              .=1200
001200      000000                  OD:             0
            001201                  ID=OD+1
001202      000000                  FIRST:          0
            001203                  LAST=FIRST+1

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

                                            ;THE NEXT WORD IS THE LOCATION OF THE "INTERRUPT VECTOR" ADDRESS
                                            ;IF THE HARDWARE IS JUMPERED FOR OTHER THAN STANDARD (264) VECTOR
                                            ;ADDRESS, THEN LOAD INTO THIS LOCATION THE NEW VECTOR ADDRESS.
                                            ;
                                            ;IF THIS ADDRESS IS INCORRECT (DOES NOT MATCH THE HARDWARE) THE
                                            ;PROGRAM WILL HALT AT THE VECTOR ADDRESS THE HARDWARE IS JUMPERED
                                            ;TO, AS ALL OTHER VECTOR ADDRESSES WILL HAVE HALTS IN THEM.
                                            ;
                                            ;*******************************NOTE*******************************
                                            ;
                                            ;THE INTERRUPT VECTOR ADDRESS CAN NOT BE SET FOR ADDRESSES 200
                                            ;THRU 243, AS THESE ADDRESS ARE USED BY THE PROGRAM
                                            ;
                                            ;**************************************************************************

001204      000264                  INTVEC: 264

                                    ;;**************************************************************************
                                            ;THE FOLLOWING TWO WORDS CONTAIN THE DEVICE CODES FOR
                                            ;THE RX11 INTERFACE REGISTERS
                                            ;       RXCS = COMMAND STATUS REGISTER
                                            ;       RXDB = DATA BUFFER REGISTER (USED AT VARIOUS TIMES FOR:)
                                            ;                (RXTA = TRACK ADDRESS)
                                            ;                (RXSA = SECTOR ADDRESS)
                                            ;                (RXES = ERROR STATUS)
                                            ;IF THE RX11 SYSTEM UNDER TEST IS JUMPERED FOR REGISTER
                                            ;ADDRESSES OTHER THAN STANDARD: RXCS = 177170
                                            ;                               RXDB = 177172
                                            ;PLACE IN THESE TWO WORDS THE CORRESPONDING NEW ADDRESSES FOR
                                            ;THE REGISTERS.  THE PROGRAM WILL TYPE OUT THE REGISTER
                                            ;ADDRESSES FOR VERIFICATION BY THE OPERATOR.  IF THE ADDRESSES
                                            ;ARE INCORRECT (I.E. - DON'T MATCH THE HARDWARE) AND THE PROGRAM
                                            ;IS RUN WITH THE INCORRECT ADDRESSES, A 'HUNG' CONDITION WILL BE
```

```
                                        ;RE[PORTED AND THE PROGRAM WILL 'HALT' AS THE RX11 WILL NOT BE
                                        ;ABLE TO RESPOND TO COMMANDS.
                                    ;;**********************************************************************

001206  177170                      RXCS:           177170
001210  177172                      RXDB:           177172

                                        ;BIT ASSIGNMENT IN THE RXCS REGISTER.
                                        ;
                                        ;KEY: R - READ ONLY BIT
                                        ;     W - WRITE ONLY BIT
                                        ;
                                        ;       15 - R - ERROR FLAG
                                        ;       14 - W - INITIALIZE (RECALIBRATE)
                                        ;       13 -
                                        ;       TO      NOT USED
                                        ;        8 -
                                        ;        7 - R - TRANSFER REQUEST (TR) FLAG
                                        ;        6 - R/W - INTERUPT ENABLE
                                        ;        5 - R - DONE FLAG
                                        ;        4 - W - UNIT SELECT
                                        ;        3 - W - FUNCTION
                                        ;        2 - W - FUNCTION
                                        ;        1 - W - FUNCTION
                                        ;        0 - W - GO
                                        ;
                                        ;FUNCTION CODES:
                                        ;
                                        ;       0 + GO = FILL BUFFER
                                        ;       2 + GO = EMPTY BUFFER
                                        ;       4 + GO = WRITE SECTOR
                                        ;       6 + GO = READ SECTOR
                                        ;       10 (NOT USED)
                                        ;       12 + GO = READ STATUS "A"
                                        ;       14 + GO = WRITE DELETED DATA
                                        ;       16 + GO = READ STATUS "B" (CODES)
                                        ;
                                        ;
                                        ;THE FOLLOWING BIT ASSIGNMENTS REPRESENTES THE STATUS AT THE END OF A
                                        ;FUNCTION (EXCEPT FUNCTION "READ STATUS B") DISPLAYED IN THE
                                        ;RX DATA BUFFER (RXDB).
                                        ;
                                        ;       15 -
                                        ;       TO    NOT USED
                                        ;       8 -
                                        ;       7 - SELECTED DRIVE READY *
                                        ;       6 - DELETED DATA
                                        ;       5 -
                                        ;       4 -
                                        ;       3 - WRITE PROTECT ERROR (WHEN AVAILABLE)
                                        ;       2 - INITIALIZE DONE **
                                        ;       1 - PARITY ERROR
                                        ;       0 - CRC ERROR
                                        ;
                                        ;*  VISIBLE ONLY IF THE FUNCTION WAS A #12 "READ STATUS A"
                                        ;
```

```
                        ;**  VISIBLE ONLY AFTER AN INITIALIZE [KEY] OR [PROGRAMMED] WAS ISSUED.

001212  000000          DTESTP:     .WORD 0             ;TEST SELECTION WORD
001214  177570          SWR:        .WORD DSWR          ;ADDRESS OF SWITCH REGISTER
001216  177570          DISPLAY:    .WORD DDISP         ; ADDRESS OF DISPLAY REGISTER

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

                        ;START OF OPERATOR SELECTABLE TEST,DATA PATTERNS,AND DRIVE UNIT CONDITIONS
                        ;SET THE TEST CONDITIONS WANTED (OR LEAVE 0) IN LOCATION CALLED
                        ;"DTESTP" (LOC. 1212), BEFORE STARTING THE PROGRAM. WHEN THE PROGRAM
                        ;STARTS IT WILL TYPE OUT THE TEST CONDITIONS IT IS OPERATING UNDER.
                        ;

                        ;SWITCH REGISTER BITS
                        ;
                        ; 15  14  13  12  11  10  9  8  7  6  5  4  3  2  1  0
                        ; U1  U0      NOT USED    D  P  P  P  T  T  T  S  S  S
                        ;
                        ; U1    SELECT DRIVE UNIT 1
                        ; U0    SELECT DRIVE UNIT 0
                        ;IF NEITHER DRIVE IS SPECIFIED,PROGRAM WILL SELECT ALL DRIVES
                        ;THAT ARE READY
                        ;
                        ; D =     DELETED DATA FUNCTIONS
                        ;
                        ;IF THIS SWITCH IS ON ALL READ AND WRITE FUNCTIONS WILL BE IN THE
                        ;DELETED DATA MODE
                        ;
                        ;
                        ; P =     DATA PATTERN SELECTION
                        ;       0       DO PATTERN 7 (RANDOM)
                        ;       1       ZEROS
                        ;       2       ONES
                        ;       3       FLOATING ZERO
                        ;       4       FLOATING ONE
                        ;       5       125
                        ;       6       314
                        ;       7       RANDOM
                        ;
                        ; T =     FUNCTIONAL TESTS
                        ;       0       DO TEST 7 (WRITE/READ/READ CHECK)
                        ;       1       WRITE ONLY
                        ;       2       WRITE/READ
                        ;       3       WRITE/READ CHECK
                        ;       4       READ CHECK ONLY
                        ;       5       READ ONLY
                        ;       6       WRITE/READ CHECK ON ALTERNATE DRIVES
                        ;       7       WRITE/READ/READ CHECK *

                        ; * NOTE: THE FIRST HALF OF TEST 7 FORCES THE TRACK SEQUENCE
                        ;TO INCRIMENT UP THROUGH ALL THE TRACKS DOING WRITE / READ CHECK FUNCTIONS.
                        ;THIS VERIFIES THAT ALL THE TRACKS ARE ACCESSABLE.
                        ;THE SECOND HALF OF THE PASS WILL USE THE SEQUENCE SELECTED BY THE
                        ;OPERATOR AS INDICATED BELOW,AND ONLY READ CHECK THE DATA JUST WRITTEN.
                        ;THIS VERIFIES THAT THE DATA CAN BE READ FROM A TRACK,AFTER THE HEAD HAS BEEN
```

```
                        ;MOVED AWAY FROM AND BACK TO THAT TRACK. AT THE COMPLETION OF THE PASS
                        ;THE DELETED DATA BIT IN TEST CONDITIONS IS COMPLEMENTED AND THE NEXT
                        ;PASS WILL BE RUN UNDER THIS NEW CONDITION.
                        ;
                        ; S =     TRACK SEQUENCING
                        ;       0       DO SEQUENCE 7 (RANDOM)
                        ;       1       INCREMENT
                        ;       2       DECREMENT
                        ;       3       INCREMENT/DECREMENT
                        ;       4       BOUNCE
                        ;       5       DECREASING BOUNCE
                        ;       6       STROBE
                        ;       7       RANDOM


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

                        ;SET THE OPERATING CONDITIONS IN THE SWITCH REGISTER (HARDWARE).
                        ;OR THE SOFTWARE SWITCH REGISTER (LOC. 176) BEFORE STARTING THE PROGRAM.
                        ;
                        ;SWITCHES DO THE FOLLOWING WHEN SET TO "1".
                        ;
                        ;       SW 15   =HALT ON ERROR
                        ;       SW 14   =HALT AT END OF TEST
                        ;       SW 13   =DON'T PRINT ERROR MESSAGE
                        ;       SW 12   =TYPE ONLY 10 DATA ERRORS
                        ;       SW 11   =NO RETRY ON ERROR. LOG HARD ERROR
                        ;
                        ;       SW  8   =NO RECALIBRATION ON SEEK ERRORS
                        ;
                        ;       SW15 - SW0      =SELECT SOFTWARE SWITCH REGISTER


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


001220  000005      SA200:      RESET                   ;INITIALIZE THE RX01
001222  012737  177570  001214        MOV #177570,SWR         ;RESET TO HARDWARE SWR.
001230  012706  001200              MOV #STACK,SP
001234  012746  000340              MOV #PR7,-(SP)
001240  012746  001246              MOV #2$,-(SP)
001244  000002                      RTI
001246  104401  016652    2$:       TYPE ,MREV              ;PRINT NAME AND REVISION
001252  012737  001272  000004      MOV #3$,4               ;SET TIME OUT VECTOR
001260  022777  177777  177726      CMP #177777,@SWR        ;IS SOFTWARE SWR SELECTED
001266  001402                      BEQ 4$                  ;YES, INSERT IT'S ADDRESS
001270  000423                      BR 5$                   ;BRANCH IF NO TIMEOUT TRAP OCCURS
001272  022626    3$:               CMP (SP)+,(SP)+         ;RESTORE STACK AFTER TRAP
001274  012737  000176  001214  4$: MOV #SWREG,SWR          ;POINT TO SOFTWARE SWITCH REG.
001302  012737  000174  001216      MOV #DISPREG,DISPLAY    ;POINT TO SOFTWARE DISP. REG.
                    .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
001310  005737  000042          TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
001314  001006                  BNE     64$             ;;BRANCH IF YES
001316  023727  001214  000176  CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
001324  001005                  BNE     65$             ;;BRANCH IF NO
```

```
1309  001326  104405                        GTSWR                   ;;GET SOFT-SWR SETTINGS
1310  001330  000403                        BR      65$
1311  001332  112737  000001  013776  64$:  MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
1312  001340                        65$:
1313  001340  012737  000006  000004  5$:           MOV #6,4                ;RESTORE ERROR VECTOR
1314  001346  013703  001204                       MOV INTVEC,R3           ;SET INTERUPT VECTOR LOCATIONS
1315  001352  012723  007250                       MOV #INTSERV,(R3)+
1316  001356  012713  000340                       MOV #340,(R3)
1317  001362  012737  001234  012210               MOV #001234,RAN1        ;INITIALIZE CONSTANTS IN RANDOM NUMBER GENERATOR
1318  001370  012737  000765  012212               MOV #000765,RAN2
1319  001376  012705  017122                       MOV #PARLOG,R5          ;SET UP TO CLEAR ALL COUNTERS
1320  001402  005025                1$:            CLR (R5)+               ;OF ERRORS,ACCESSES,AND PASSES
1321  001404  022705  021142                       CMP #PASCNTR+2,R5       ;HAVE ALL COUNTERS BEEN CLEARED
1322  001410  001374                               BNE 1$
1323  001412  012705  017102        START1:        MOV #RDRETRY,R5         ;SET ALL RETRY COUNTERS TO 10
1324  001416  012725  000012        3$:            MOV #10.,(R5)+
1325  001422  022705  017122                       CMP #SRETRY+2,R5
1326  001426  001373                               BNE 3$
1327  001430  104401  015265                       TYPE ,MRXCS             ;TYPE OUT DEVICE REGISTER ADDRESSES
1328  001434  013746  001206                MOV    RXCS,-(SP)      ;;SAVE RXCS FOR TYPEOUT
1329  001440  104403                        TYPOS                  ;;GO TYPE--OCTAL ASCII
1330  001442     006                        .BYTE  6               ;;TYPE 6 DIGITS
1331  001443     000                        .BYTE  0               ;;SUPPRESS LEADING ZEROS
1332  001444  104401  015275                TYPE ,MRXDB
1333  001450  013746  001210                MOV    RXDB,-(SP)      ;;SAVE RXDB FOR TYPEOUT
1334  001454  104403                        TYPOS                  ;;GO TYPE--OCTAL ASCII
1335  001456     006                        .BYTE  6               ;;TYPE 6 DIGITS
1336  001457     000                        .BYTE  0               ;;SUPPRESS LEADING ZEROS
1337  001460  104401  015246                TYPE ,MINTVEC                  ;AND VECTOR ADDRESS
1338  001464  013746  001204                MOV    INTVEC,-(SP)    ;;SAVE INTVEC FOR TYPEOUT
1339  001470  104403                        TYPOS                  ;;GO TYPE--OCTAL ASCII
1340  001472     003                        .BYTE  3               ;;TYPE 3 DIGIT(S)
1341  001473     000                        .BYTE  0               ;;SUPPRESS LEADING ZEROS
1342  001474  004737  007122                JSR PC,DONECK                  ;WAIT FOR DONE BIT AFTER RECAL
1343  001500  032777  000004  177502        BIT #BIT2,@RXDB                ;IS INIT DONE SET
1344  001506  001002                        BNE 1$                         ;YES SKIP NEXT INSTRUCTION
1345  001510  104401  015633                TYPE ,MINIT1                   ;NO,PRINT NO INIT DONE ERROR
1346  001514  005777  177466        1$:     TST @RXCS                      ;WAS THERE AN ERROR ON START RECAL
1347  001520  100002                        BPL TESTDR                     ;IF NOT CONTINUE
1348  001522  004737  002550                JSR PC,HOME                    ;YES,DO RECAL AGAIN
1349  001526  012737  000012  017112  TESTDR: MOV #10.,P2RETRY             ;SET THE PARITY RETRY COUNTER
1350  001534  005037  010704                CLR UNITSEL                    ;CLEAR UNIT SELECTION WORD
1351  001540  105777  177444                TSTB @RXDB                     ;IS DRY BIT SET FOR UNIT 0 AFTER RECAL
1352  001544  100003                        BPL 2$                         ;IF NOT SKIP NEXT INSTRUCTION
1353  001546  052737  000200  010704        BIS #BIT7,UNITSEL              ;YES,SET UNIT 0 READY BIT
1354  001554  032737  140000  001212  2$:   BIT #140000,DTESTP            ;WERE ANY DRIVES SPECIFIED
1355  001562  001445                        BEQ NOSEL                      ;NO,SEE IF UNIT 1 IS READY
1356  001564  005737  001212                TST DTESTP                     ;WAS UNIT 1 SELECTED
1357  001570  100044                        BPL OPCOND                     ;NO,IT MUST BE UNIT 0
1358  001572  004737  001614                JSR PC,DRY1                    ;SEE IF UNIT 1 IS READY
1359  001576  032737  040000  001212        BIT #40000,DTESTP              ;WAS UNIT 0 SELECTED
1360  001604  001036                        BNE OPCOND                     ;YES,CONTINUE
1361  001606  105037  010704                CLRB UNITSEL                   ;NO,CLEAR UNIT 0 READY BIT
1362  001612  000433                        BR OPCOND
1363
1364  001614  012777  000033  177364  DRY1:  MOV #RD1STAT,@RXCS           ;READ STATUS OF UNIT 1
```

```
1365  001622  004737  007122                        JSR PC,DONECK           ;WAIT FOR DONE BIT
1366  001626  132777  000002  177354                BITB #2,@RXDB           ;IS PARITY ERROR BIT SET
1367  001634  001411                                BEQ 2$                  ;NO,CONTINUE
1368  001636  004737  002046                        JSR PC,STATER           ;YES,GO HANDLE PARITY ERROR
1369  001642  000764                                BR DRY1                 ;REISSUE FUNCTION
1370  001644  032777  000004  177336                BIT #BIT2,@RXDB         ;INIT DONE SHOULD NOT BE SET
1371  001652  001402                                BEQ 2$
1372  001654  104401  015665                        TYPE ,MINIT2            ;INIT DONE WAS SET PRINT ERROR
1373  001660  105777  177324          2$:           TSTB @RXDB              ;IS UNIT 1 DRY BIT SET
1374  001664  100003                                BPL 3$                  ;IF NOT SKIP NEXT INSTRUCTION
1375  001666  052737  100000  010704                BIS #BIT15,UNITSEL      ;YES,SET UNIT 1 READY BIT
1376  001674  000207                    3$:         RTS PC
1377
1378  001676  004737  001614          NOSEL:        JSR PC,DRY1             ;TEST UNIT 1 FOR DRY SET
1379  001702  105737  010704          OPCOND:       TSTB UNITSEL            ;IS UNIT 0 SELECTED
1380  001706  100016                                BPL 1$                  ;NO
1381
1382                                  ;TEST ACT11 LOAD MEDIA INDICATOR
1383
1384  001710  123727  000041  000010                CMPB @#41,#10           ;DOES LOCATION 41 CONTAIN THE NUMBER 10?
1385  001716  001012                                BNE 1$                  ;BRANCH IF NOT
1386  001720  005737  000042                        TST @#42                ;CHECK FOR RXDP OPERATION
1387  001724  001404                                BEQ 2$
1388  001726  042737  000200  010704                BIC #200,UNITSEL        ;IN CHAIN MODE, DESELECT UNIT 0
1389  001734  000403                                BR 1$                   ;AND DO NOT HALT
1390  001736  104401  014741          2$:           TYPE,   DOLOAD          ;INFORM USER TO REMOVE LOAD MEDIUM
1391                                                                        ;FROM UNIT 0 AND REPLACE WITH
1392                                                                        ;A 'SCRATCH' DISKETTE IF HE
1393  001742  000000                                HALT                    ;WISHES TO TEST UNIT 0
1394  001744  000241                    1$:         CLC                     ;CLEAR C BIT FOR ROR'S THAT FOLLOW
1395  001746  013737  001212  011370                MOV DTESTP,SEQUEN       ;PUT INITIAL CONDITIONS IN SEQUENCE
1396  001754  042737  177770  011370                BIC #177770,SEQUEN      ;CLEAR ALL BUT SEQUENCE BITS
1397  001762  013737  001212  002140                MOV DTESTP,TEST         ;PUT INITIAL CONDITIONS IN TEST
1398  001770  042737  177707  002140                BIC #177707,TEST        ;CLEAR ALL BUT TEST BITS
1399  001776  006037  002140                        ROR TEST                ;RIGHT JUSTIFY TEST BITS
1400  002002  006037  002140                        ROR TEST
1401  002006  006037  002140                        ROR TEST
1402  002012  013737  001212  010420                MOV DTESTP,PAT          ;PUT INITIAL CONDITIONS IN PATTERN
1403  002020  006137  010420                        ROL PAT                 ;RIGHT JUSTIFY PATTERN BITS
1404  002024  006137  010420                        ROL PAT
1405  002030  000337  010420                        SWAB PAT
1406  002034  042737  177770  010420                BIC #177770,PAT         ;CLEAR ALL BUT PATTERN BITS
1407  002042  000137  002722                        JMP XSTART
1408
1409  002046  005237  017122          STATER:       INC PARLOG              ;INC PARITY ERROR COUNTER
1410  002052  104401  015265                        TYPE ,MRXCS             ;PRINT THE RXCS CONTENTS
1411  002056  017746  177124                MOV     @RXCS,-(SP)     ;;SAVE @RXCS FOR TYPEOUT
1412  002062  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
1413  002064     003                        .BYTE   3               ;;TYPE 3 DIGIT(S)
1414  002065     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
1415  002066  005337  017112                        DEC P2RETRY             ;HAVE 10 ERRORS OCCURED
1416  002072  001405                                BEQ 1$                  ;YES,LOG HARD ERROR
1417  002074  104401  016115                        TYPE ,MPAR              ;NO,TYPE PARITY ERROR
1418  002100  104401  015150                        TYPE ,MCRLF
1419  002104  000207                                RTS PC                  ;RETURN
1420  002106  005237  017124          1$:           INC HPARLOG             ;INC HARD PARITY ERROR LOG
```

```
1421  002112  104401  016053                    TYPE ,MUNREC          ;PRINT UNRECOVERABLE PARITY ERROR
1422  002116  104401  016115                    TYPE ,MPAR
1423  002122  104401  015150                    TYPE ,MCRLF
1424  002126  104401  016000                    TYPE ,MHALT4
1425  002132  000000                HLT4:       HALT                  ;HALT BECAUSE OF HARD PARITY ERROR
1426  002134  000137  001220                    JMP SA200             ;IF CONTINUE IS PRESSED GO TO START
1427  002140  000000                TEST:       0
1428
1429  002142  005002                TSTLIMITS:  CLR R2                ;MESSAGE FLAG
1430  002144  005737  001200                    TST OD                ;TEST FOR NO SELECTION OF TRACKS
1431  002150  001441                            BEQ 1$                ;IT WILL BE STANDARD LIMITS
1432  002152  123727  001201  000114            CMPB ID,#114          ;TEST FOR MAXIMUM ID LIMIT
1433  002160  101112                            BHI 14$
1434  002162  001431                            BEQ 2$
1435  002164  123737  001200  001201  3$:       CMPB OD,ID            ;OD MUST BE EQUAL OR LESS THAN ID
1436  002172  101105                            BHI 14$
1437  002174  004737  002432                    JSR PC,TSTMSG         ;HAS INITIAL MESSAGE BEEN TYPED
1438  002200  104401  015606                    TYPE ,MOD             ;TYPE BOTH ID AND OD LIMITS
1439  002204  113737  001200  002216            MOVB OD,7$
1440  002212  004537  014544                    JSR R5,SGLDEC         ;TYPE SINGLE DECIMAL WORD
1441  002216  000000                7$:         OPEN
1442  002220  104401  015145                    TYPE ,DBLSP
1443  002224  104401  015612                    TYPE ,MID
1444  002230  113737  001201  002242            MOVB ID,10$
1445  002236  004537  014544                    JSR R5,SGLDEC
1446  002242  000000                10$:        OPEN
1447  002244  000403                            BR 1$
1448  002246  105737  001200          2$:       TSTB OD               ;IS OD = 0
1449  002252  001344                            BNE 3$                ;NO,GO PRINT IT
1450  002254  005737  001202          1$:       TST FIRST             ;TEST FOR NO SELECTION OF SECTORS
1451  002260  001451                            BEQ 13$               ;IT WILL BE STANDARD LIMITS
1452  002262  123727  001203  000032            CMPB LAST,#32         ;TEST FOR NORMAL LAST SECTOR LIMIT
1453  002270  101053                            BHI 15$
1454  002272  001440                            BEQ 4$
1455  002274  105737  001202          5$:       TSTB FIRST            ;THERE IS NO 0 SECTOR
1456  002300  001447                            BEQ 15$
1457  002302  123737  001202  001203            CMPB FIRST,LAST       ;FIRST MUST BE EQUAL TO OR LESS
1458  002310  101043                            BHI 15$               ;THAN LAST
1459  002312  004737  002432                    JSR PC,TSTMSG
1460  002316  104401  015145                    TYPE ,DBLSP
1461  002322  104401  015616                    TYPE ,MFIRST          ;TYPE BOTH FIRST AND LAST LIMITS
1462  002326  113737  001202  002340            MOVB FIRST,11$
1463  002334  004537  014544                    JSR R5,SGLDEC
1464  002340  000000                11$:        OPEN
1465  002342  104401  015145                    TYPE ,DBLSP
1466  002346  104401  015625                    TYPE ,MLAST
1467  002352  113737  001203  002364            MOVB LAST,12$
1468  002360  004537  014544                    JSR R5,SGLDEC
1469  002364  000000                12$:        OPEN
1470  002366  104401  015336                    TYPE ,DBLLF
1471  002372  000404                            BR 13$
1472  002374  123727  001202  000001  4$:       CMPB FIRST,#1         ;IS FIRST SET TO 1
1473  002402  001334                            BNE 5$                ;NO, GO PRINT IT
1474  002404  000207                13$:        RTS PC
1475
1476  002406  104401  016461          14$:      TYPE ,OD2BIG          ;PRINT TRACK LIMITS OUT OF RANGE
```

```
1477  002412  005037  001200                    CLR OD
1478  002416  000716                            BR 1$
1479  002420  104401  016553          15$:      TYPE ,S2BIG             ;PRINT SECTOR LIMITS OUT OF RANGE
1480  002424  005037  001202                    CLR FIRST
1481  002430  000765                            BR 13$
1482
1483  002432  005702          TSTMSG:           TST R2                  ;TEST MESSAGE FLAG
1484  002434  001005                            BNE 1$
1485  002436  104401  015544                    TYPE ,MNONSTD           ;MESSAGE HEADING HAD NOT BEEN TYPED
1486  002442  104401  015150                    TYPE ,MCRLF
1487  002446  005202                            INC R2                  ;SET THE MESSAGE FLAG
1488  002450  000207          1$:               RTS PC
1489
1490  002452  104401  015150  ICOND:           TYPE ,MCRLF
1491  002456  104401  015515                    TYPE ,MICON             ;TYPE INITIAL CONDITIONS
1492  002462  105737  010704                    TSTB UNITSEL            ;TEST FOR DRIVE SELECTION
1493  002466  100002                            BPL 1$
1494  002470  104401  015204                    TYPE ,MUNIT0            ;TYPE UNIT 0 SELECTED
1495  002474  005737  010704          1$:       TST UNITSEL
1496  002500  100002                            BPL 2$
1497  002502  104401  015214                    TYPE ,MUNIT1            ;TYPE UNIT 1 SELECTED
1498  002506  104401  015136          2$:       TYPE ,TAB
1499  002512  004737  010012                    JSR PC,TYPSEL           ;TYPE TEST SELECTIONS
1500  002516  104401  015150                    TYPE ,MCRLF
1501  002522  005737  010704                    TST UNITSEL             ;WERE ANY DRIVES READY
1502  002526  001005                            BNE CONT12              ;YES,CONTINUE
1503  002530  104401  015114                    TYPE ,MNODRY            ;NO,TYPE NO DRIVES MESSAGE
1504  002534  000000          HLT5:             HALT                    ;NO DRIVES CAN'T CONTINUE
1505  002536  000137  001220                    JMP SA200               ;IF CONTINUE IS PRESSED RESTART
1506  002542  004737  002142          CONT12:   JSR PC,TSTLIMITS        ;TYPE NONSTANDARD TRK AND SEC LIMITS
1507  002546  000207                            RTS PC
1508
1509  002550  104406                  HOME:     CKSWR
1510  002552  032777  000400  176434            BIT #SW8,@SWR           ;TEST THE NO RECAL SWITCH
1511  002560  001046                            BNE RTN                 ;RETURN IF THE SWITCH IS SET
1512  002562  012737  000012  017112            MOV #10.,P2RETRY        ;SET UP THE PARITY RETRY COUNTER
1513  002570  012737  000012  017106            MOV #10.,DDRETRY        ;USE THE DD RETRY COUNTER FOR RECAL RETRIES
1514  002576  012777  040001  176402  2$:       MOV #RECAL,@RXCS        ;ISSUE RECAL FUNCTION
1515  002604  004737  007122                    JSR PC,DONECK           ;WAIT FOR DONE FLAG
1516  002610  032777  000002  176372            BIT #2,@RXDB            ;WAS THERE A PARITY ERROR
1517  002616  001403                            BEQ 1$                  ;NO,CHECK FOR ANY OTHER ERROR
1518  002620  004737  002046                    JSR PC,STATER           ;YES,GO REPORT IT
1519  002624  000764                            BR 2$                   ;RETRY RECAL
1520  002626  005777  176354          1$:       TST @RXCS               ;IS THE ERROR FLAG SET
1521  002632  100016                            BPL XHOME               ;IF NOT RETURN
1522  002634  004737  010200                    JSR PC,RDCODE           ;YES,PRINT STATUS REGISTERS
1523  002640  123727  010072  000040            CMPB BSTAT,#40          ;IS THE B CODE LESS THAN CODE 40
1524                                            ;(RECAL CODES ARE 10,20,AND 30)
1525  002646  002010                            BGE XHOME               ;IF NOT RETURN
1526  002650  005337  017106                    DEC DDRETRY             ;HAVE 10 ERRORS OCCURED
1527  002654  001350                            BNE 2$                  ;NO,RETRY
1528  002656  104401  016011                    TYPE ,MHALT3            ;YES,CAN'T CONTINUE AS RX11 WILL NOT RECAL
1529  002662  000000          HLT3:             HALT
1530  002664  000137  001220                    JMP SA200               ;IF CONT. SWITCH IS PRESSED GO TO START
1531  002670  012737  000001  011362  XHOME:    MOV #1,PRESTRK          ;RESET THE PRESENT TRACK TO TRACK 1
1532  002676  000207          RTN:              RTS PC                  ;RETURN
```

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

                                ;DECODE TEST BITS OF INITIAL CONDITIONS
                                ;
                                ;BITS 3,4,AND 5 OF THE INITIAL SWR SELECTED THE TEST WHICH
                                ;IS TO BE PREFORMED. THEY ARE AS FOLLOWS:
                                ;
                                ;   BITS                    TESTS
                                ; 5  4  3
                                ; 0  0  0                  NO TEST SELECTED (DEFAULT TO TEST 7)
                                ; 0  0  1                  WRITE ONLY
                                ; 0  1  0                  WRITE FOLLOWED BY READ
                                ; 0  1  1                  WRITE FOLLOWED BY READ AND VERIFY
                                ; 1  0  0                  READ AND VERIFY ONLY
                                ; 1  0  1                  READ ONLY (CRC CHECK)
                                ; 1  1  0                  READ AND VERIFY DELETED DATA
                                ; 1  1  1                  WRITE FOLLOWED BY READ FOLLOWED BY ANOTHER
                                ;                          READ AND VERIFY

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

002700  012706  001200  RESTART:        MOV #STACK,SP           ;RESET THE STACK POINTER
002704  012746  000340                   MOV #PR7,-(SP)          ;AND INTERUPT LEVEL
002710  012746  002716                   MOV #1$,-(SP)
002714  000002                          RTI
002716  005237  021136          1$:     INC RESTCNTR            ;INC RESTART COUNTER
002722  004737  002452          XSTART: JSR PC,ICOND            ;TYPE OUT INITIAL CONDITIONS
002726  005037  011142          TESTSEL: CLR CHARCT             ;CLEAR EOP CHARACTER COUNTER
002732  012737  000012  017102          MOV #10.,RDRETRY        ;SET UP READ AND WRITE RETRY COUNTERS
002740  012737  000012  017104          MOV #10.,WTRETRY
002746  005037  004124                  CLR ERWRT               ;CLEAR WRITE CAUSED BY ERROR FLAG
002752  005037  004122                  CLR RDAFTWT             ;CLEAR READ AFTER WRITE FLAG
002756  142737  000377  003014          BICB #377,@#BRONTEST    ;CLEAR OUT BRANCH OFFSET
002764  005737  002140                  TST TEST                ;IF NO TEST SPECIFIED FORCE TEST 7
002770  001003                          BNE 1$
002772  012737  000007  002140          MOV #7,TEST
003000  013704  002140          1$:     MOV TEST,R4
003004  005304                          DEC R4                  ;ADJUST TEST BITS FOR CORRECT
003006  006304                          ASL R4                  ;BRANCH OFFSET
003010  150437  003014                  BISB R4,@#BRONTEST      ;INSERT OFFSET TO BRANCH INST.
003014  000777          BRONTEST:       BR .                    ;BRANCH BY TEST OFFSET
003016  000137  003052                  JMP WRTONLY             ;WRITE ONLY FUNCTION
003022  000137  004130                  JMP WRTRD               ;WRITE THEN READ FUNCTION
003026  000137  005456                  JMP WTRDCK              ;WRITE THEN READ VERIFY
003032  000137  006444                  JMP RDCHK               ;READ VERIFY
003036  000137  006504                  JMP RDONLY              ;READ ONLY FUNCTION
003042  000137  006544                  JMP DRVSWP              ;WRITE,AND READ VERIFY ON ALTERNATING DRIVES
003046  000137  006630                  JMP TEST7               ;WRITE,READ,FOLLOWED BY READ VERIFY


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

                                ;THIS IS A WRITE ONLY FUNCTION USING DATA PATTERN AND
                                ;TRACK SEQUENCE SPECIFIED BY INITIAL SWR SETTINGS
```

```
1589                                            ;  T = 1
1590
1591  003052  004737  010312          WRTONLY:    JSR PC,GETPATTERN       ;SET UP SOFTWARE DATA BUFFER
1592  003056  004737  011144          XWRTONLY:   JSR PC,INITTRACKS       ;SET UP ID,OD,AND TRACK COUNTER
1593  003062  004737  010614                      JSR PC,GETUNIT          ;SET UP DRIVE UNIT SELECTION
1594  003066  004737  011254          1$:         JSR PC,GETTRACK         ;PICK UP NEXT TRACK
1595  003072  004737  003112                      JSR PC,WRITE            ;DO THE WRITE FUNCTION
1596  003076  005337  011356                      DEC TRKCNTR             ;TEST TRACK COUNTER
1597  003102  001371                             BNE 1$
1598  003104  004737  010732                      JSR PC,STOP             ;CHECK FOR LAST DRIVE AND EOP
1599  003110  000762                             BR XWRTONLY             ;NEXT PASS
1600
1601  003112  004737  012216          WRITE:      JSR PC,INITSECTOR       ;SET UP FIRST,LAST,AND SECTOR COUNTER
1602  003116  004737  012316          XWRITE:     JSR PC,GETSECTOR        ;PICK UP NEXT SECTOR
1603  003122  012737  000012  017120              MOV #10.,SRETRY
1604  003130  012737  000012  017114  ONEWRT:     MOV #10.,PRETRY         ;SET RETRY COUNTER
1605  003136  004737  005656          FILLBUF:    JSR PC,ADJSUM           ;ADJUST DATA BUFFER AND CHECK SUM FOR ADDRESSES
1606  003142  012746  003372                      MOV #FILLDONE,-(SP)     ;PUT GOOD RETURNON STACK
1607  003146  012746  003214                      MOV #FILLER,-(SP)       ;PUT ERROR RETURN ON STACK
1608  003152  005037  006434                      CLR BYTECNTR
1609  003156  012746  000200                      MOV #PR4,-(SP)
1610  003162  012746  003170                      MOV #1$,-(SP)
1611  003166  000002                             RTI
1612  003170  012777  000101  176010  1$:         MOV #FBIE,@RXCS         ;EXICUTE FILLBUFER COMMAND
1613  003176  004737  007014          FILLFLAG:   JSR PC,TRCK             ;TEST FOR TRANSFER REQUEST FLAG
1614  003202  112077  176002          XFRBYTE:    MOVB (R0)+,@RXDB        ;TRANSFER DATA BYTE
1615  003206  005237  006434                      INC BYTECNTR
1616  003212  000771                             BR FILLFLAG             ;WAIT FOR NEXT TR FLAG
1617
1618  003214  005726                  FILLER:     TST (SP)+               ;REMOVE THE DONE RETURN FROM THE STACK
1619  003216  012737  015464  003264              MOV #MFIL,PTYP1+2       ;PUT ADDR OF FILLBUF MESSAGE IN PAR ERR TYPOUT 1
1620  003224  012737  015464  003354              MOV #MFIL,PTYP2+2       ;PUT ADDR OF FILLBUF MESSAGE IN PAR ERR TYPOUT 2
1621  003232  012737  003136  003334              MOV #FILLBUF,PCONT+2    ;IF NOT HARD ERR RETURN THROUGH PCONT TO FILLBUF
1622  003240  000137  003244                      JMP PARTEST             ;PRINT OUT PAR ERR AND TEST CONDITIONS FOR RETRY
1623
1624
1625  003244  005237  017122          PARTEST:    INC PARLOG              ;INCREMENT PARITY ERROR
1626  003250  104406                             CKSWR
1627  003252  032777  020000  175734              BIT #SW13,@SWR          ;TEST DON'T PRINT ERROR SWITCH
1628  003260  001006                             BNE CONT4
1629  003262  104401  000000          PTYP1:      TYPE ,OPEN              ;PRINT THE PARITY ERROR MESSAGE
1630  003266  104401  016115                      TYPE ,MPAR
1631  003272  104401  015150                      TYPE ,MCRLF
1632  003276  104406                  CONT4:      CKSWR
1633  003300  005777  175710                      TST @SWR                ;TEST HALT ON ERROR SWITCH
1634  003304  100001                             BPL CONT13
1635  003306  000000                  HLT6:       HALT                    ;HALT ON ERROR
1636  003310  032777  004000  175676  CONT13:     BIT #SW11,@SWR          ;TEST NO RETRY SWITCH
1637  003316  001007                             BNE CONT5               ;IF SET LOG HARD ERROR
1638  003320  005337  017114                      DEC PRETRY              ;DECREMENT RETRY COUNTER
1639  003324  005737  017114                      TST PRETRY              ;HAVE 10 ERRORS OCCURED
1640  003330  001402                             BEQ CONT5               ;IF CLEARED LOG HARD ERROR
1641  003332  000137  003136          PCONT:      JMP FILLBUF             ;RETURN TO RETRY TEST THROUGH HERE
1642  003336  005237  017124          CONT5:      INC HPARLOG             ;INC.HARD PARITY ERROR  COUNTER
1643  003342  104401  015336                      TYPE ,DBLLF
1644  003346  104401  016053                      TYPE ,MUNREC            ;TYPE HARD PARITY ERROR
```

```
1645  003352  104401  000000          PTYP2:          TYPE ,OPEN
1646  003356  104401  016115                          TYPE ,MPAR
1647  003362  104401  015150                          TYPE ,MCRLF
1648  003366  000137  010074                          JMP DELUNIT             ;GO DELETE THE UNIT,CAN NOT CONTINUE
1649
1650                                  ;SWITCH 9 OF INITIAL TEST CONDITIONS SWITCH SETTINGS IS THE DELETED DATA
1651                                  ;FUNCTION INDICATOR. WHEN THIS BIT IS SET ALL WRITE / READ FUNCTIONS WILL
1652                                  ;SET AND CHECK THE DELETED DATA BIT ON THE DISKETTE.
1653                                  ;;**********************************************************************
1654
1655  003372  012737  000012  017114  FILLDONE:      MOV #10.,PRETRY         ;SET UP RETRY COUNTER
1656  003400  012746  003462          REWRITE:       MOV #WRTDONE,-(SP)      ;SET GOOD RETURN ON STACK
1657  003404  012746  003510                         MOV #WRTER,-(SP)        ;SET ERROR RETURN ON STACK
1658  003410  112737  000105  004120                MOVB #WRTIE,FUNCTION    ;SET FUNCTION WORD TO WRITE
1659  003416  032737  001000  001212                BIT #BIT9,DTESTP        ;TEST FOR WRITE DELETED DATA
1660  003424  001403                                BEQ 1$
1661  003426  112737  000115  004120                MOVB #WTDDIE,FUNCTION
1662  003434  062737  000001  021126  1$:           ADD #1,WTCNTR           ;INC TOTAL WRITE FUNCTIONS COUNTER
1663  003442  005537  021130                        ADC WTCNTR+2            ;DOUBLE PRECISION COUNTER
1664  003446  004737  004022                        JSR PC,COMMWORD         ;TRANSFER COMMAND TO DRIVE
1665  003452  004737  007122                        JSR PC,DONECK           ;TEST FOR DONE FLAG
1666  003456  000137  007204                        JMP NOINTER             ;NO INTERUPT ERROR
1667
1668  003462  005737  004124          WRTDONE:      TST ERWRT               ;IS THIS A REWRITE FROM A DATA ERROR
1669  003466  001004                                BNE 1$                  ;YES GO REREAD THIS SECTOR
1670  003470  005337  012306                        DEC SECCNTR             ;NO,TEST SECTOR COUNTER
1671  003474  001003                                BNE 2$                  ;NOT LAST SECTOR GO TO NEXT ONE
1672  003476  000207                                RTS PC
1673  003500  000137  004246          1$:           JMP REREAD              ;REREAD THE SECTOR
1674  003504  000137  003116          2$:           JMP XWRITE
1675
1676  003510  005726                  WRTER:        TST (SP)+               ;REMOVE THE DONE RETURN FROM THE STACK
1677  003512  032737  000002  010070                BIT #BIT1,ASTAT         ;IS THIS A PARITY ERROR
1678  003520  001413                                BEQ WRTSEK              ;NO, IT MUST BE A SEEK ERROR
1679                                  ;PARITY ERROR DURING A WRITE FUNCTION
1680  003522  012737  016106  003264                MOV #MWRITE,PTYP1+2     ;PUT ADDR OF WRITE MESSAGE IN PAR ER TYPOUT 1
1681  003530  012737  016106  003354                MOV #MWRITE,PTYP2+2     ;PUT ADDR OF WRITE MESSAGE IN PAR ER TYPOUT 2
1682  003536  012737  003400  003334                MOV #REWRITE,PCONT+2    ;IF NOT HARD ERR RETURN THROUGH PCONT TO REWRITE
1683  003544  000137  003244                        JMP PARTEST             ;GO INC LOG AND TEST FOR RETRY
1684
1685                                  ;SEEK ERROR DURING A WRITE FUNCTION
1686  003550  012737  003130  003674  WRTSEK:       MOV #ONEWRT,SEKRTY+2    ;SETUP FOR WRT RETRY ON SEEK ERROR
1687                                                                        ;(AFTER A RECAL. THE CONTENTS OF SECTOR 1,
1688                                                                        ;TRACK 1 ARE LOADED INTO THE SECTOR BUFFER.
1689                                                                        ;TO REWRITE THE CORRECT DATA THE PROGRAM
1690                                                                        ;MUST REFILL THE SECTOR BUFFER.
1691  003556  012737  016106  003630                MOV #MWRITE,STYP1+2     ;PUT ADDR OF WRITE MESSAGE IN SEEK ER TYPEOUT 1
1692  003564  012737  016106  003722                MOV #MWRITE,STYP2+2     ;PUT ADDR OF WRITE MESSAGE IN SEEK ER TYPEOUT 2
1693  003572  004737  003576                        JSR PC,SEEKER           ;RECORD SEEK ERROR
1694
1695  003576  012703  017134          SEEKER:       MOV #ZSEKLOG,R3         ;SETUP INC INSTRUCTION FOR UNIT 0 LOG
1696  003602  004737  021142                        JSR PC,U1LOG            ;TEST FOR UNIT 1 LOG
1697  003606  005213                                INC (R3)                ;INCREMENT SEEK ERROR LOG
1698  003610  004737  003770                        JSR PC,TRKERR           ;INC ERROR PER TRACK COUNTERS
1699  003614  104406                                CKSWR
1700  003616  032777  020000  175370                BIT #SW13,@SWR          ;CHECK DON'T PRINT ERROR SWITCH
```

```
1701  003624  001004                        BNE SWHLT1
1702  003626  104401  016106        STYP1:  TYPE ,MWRITE          ;PRINT WRITE (READ) SEEK ERROR
1703  003632  004737  003736                JSR PC,SEKTYP
1704  003636  104406                SWHLT1: CKSWR
1705  003640  005777  175350                TST @SWR              ;TEST THE HALT ON ERROR SWITCH
1706  003644  100001                        BPL CONT14
1707  003646  000000                HLT7:   HALT                  ;HALT ON THE ERROR
1708  003650  032777  004000  175336 CONT14: BIT #SW11,@SWR       ;CHECK THE NO RETRY SWITCH
1709  003656  001007                        BNE HARDSK            ;IF SET LOG HARD SEEK ERROR
1710  003660  005337  017120                DEC SRETRY            ;HAVE 10 ERRORS BEEN LOGED
1711  003664  001404                        BEQ HARDSK            ;YES LOG HARD ERROR
1712  003666  004737  002550                JSR PC,HOME           ;RECALIBRATE DRIVES ON SEEK ERROR
1713  003672  000137  003130        SEKRTY: JMP ONEWRT            ;NO,RETRY WRITE COMMAND (READ COMAND)
1714  003676  012703  017174        HARDSK: MOV #ZHSEKLOG,R3      ;SET INC. INST.FOR UNIT 0 ERR LOG
1715  003702  004737  021142                JSR PC,U1LOG          ;TEST FOR UNIT 1 ERROR LOG
1716  003706  005213                        INC (R3)              ;HARD SEEK ERROR
1717  003710  104401  015336                TYPE ,DBLLF
1718  003714  104401  016053                TYPE ,MUNREC          ;TYPE UNRECOVERABLE SEEK ERROR
1719  003720  104401  016106        STYP2:  TYPE ,MWRITE          ;ON WRITE (READ) COMMAND
1720  003724  004737  003736                JSR PC,SEKTYP
1721  003730  062706  000002                ADD #2,SP             ;REMOVE SEEK ERROR FROM STACK POINTER
1722  003734  000207                        RTS PC                ;RETURN TO NEXT SECTOR BY DONE RETURN ON STACK
1723
1724  003736  104401  016073        SEKTYP: TYPE ,MSEEK           ;TYPE SEEK ERROR
1725  003742  104401  014665                TYPE ,MPRES           ;TYPE ADDRESS OF TRACK MOVED FROM
1726  003746  013737  011362  003760        MOV PRESTRK,1$
1727  003754  004537  014544                JSR R5,SGLDEC
1728  003760  000000                1$:     OPEN
1729  003762  104401  015150                TYPE ,MCRLF
1730  003766  000207                        RTS PC
1731
1732  003770  013705  011360        TRKERR: MOV TARGET,R5         ;SET UP TO INC ERROR PER TRACK COUNTER
1733  003774  006305                        ASL R5                ;ADJUST FOR EVEN ADDRESS
1734  003776  062705  020442                ADD #U0TRK,R5         ;ADDIN ADDERSS OF UNIT 0 LOG
1735  004002  032737  000020  010704        BIT #BIT4,UNITSEL     ;CHECK THE UNIT SELECTION BIT
1736  004010  001402                        BEQ 1$                ;IF CLEARED UNIT 0 IS ACTIVE
1737  004012  062705  000232                ADD #232,R5           ;ADJUST FOR UNIT 1 LOG
1738  004016  005215                1$:     INC (R5)              ;INC THE CORRECT COUNTER
1739  004020  000207                        RTS PC
1740
1741  004022  013705  011360        COMMWORD: MOV TARGET,R5       ;GET TRACK NUMBER
1742  004026  006305                        ASL R5                ;MULTIPLY BY 4 TO DOUBLE PRECISION
1743  004030  006305                        ASL R5                ;INTERLEAVE COUNTER LOCATIONS
1744  004032  062705  017272                ADD #TKACC,R5         ;ADD ON ADDRESS OF TRACK ACCESS COUNTER
1745  004036  062715  000001                ADD #1,(R5)           ;INCREMENT THE COUNTER
1746  004042  005565  000002                ADC 2(R5)             ;ADD CARRY TO HIGH ORDER WORD
1747  004046  153737  010704  004120        BISB UNITSEL,FUNCTION ;SET UNIT SELECTION BIT IN COMMAND WORD
1748  004054  013777  004120  175124        MOV FUNCTION,@RXCS    ;SEND OUT COMMAND TO DRIVE
1749  004062  004737  007014                JSR PC,TRCK           ;WAIT FOR TR FLAG
1750  004066  113777  012310  175114        MOVB TSECTOR,@RXDB    ;SEND OUT TARGET SECTOR
1751  004074  004737  007014                JSR PC,TRCK           ;WAIT FOR TR FLAG
1752  004100  113777  011360  175102        MOVB TARGET,@RXDB     ;SEND OUT TARGET TEACK
1753  004106  005046                        CLR -(SP)             ;LOWER INTERUPT LEVEL TO ALLOW AN INTERUPT
1754  004110  012746  004116                MOV #1$,-(SP)
1755  004114  000002                        RTI
1756  004116  000207                1$:     RTS PC
```

```
1757
1758  004120  000000                  FUNCTION:       0
1759  004122  000000                  RDAFTWT:        0                       ;READ AFTER WRITE FUNCTION FLAG
1760  004124  000000                  ERWRT:          0                       ;WRITE CAUSED BY DATA ERROR FLAG
1761  004126  000000                  DATACK:         0                       ;DATA CHECK ON CRC ERROR FLAG
1762
1763                                  ;;**********************************************************************
1764
1765                                          ;THIS IS A WRITE ALL SECTORS FOLLOWED BY A READ ALL SECTORS
1766                                          ;WITH DATA PATTERNS AND HEAD SEQUENCING SET BY INITIAL SWR
1767                                          ;   T = 2
1768
1769  004130  005137  004122          WRTRD:          COM RDAFTWT             ;SET READ AFTER WRITE FLAG
1770  004134  004737  010312                          JSR PC,GETPATTERN
1771  004140  004737  011144          XWRTRD:         JSR PC,INITTRACKS
1772  004144  004737  010614                          JSR PC,GETUNIT
1773  004150  004737  011254          1$:             JSR PC,GETTRACK
1774  004154  004737  003112                          JSR PC,WRITE
1775  004160  004737  004200                          JSR PC,READ
1776  004164  005337  011356                          DEC TRKCNTR
1777  004170  001367                                  BNE 1$
1778  004172  004737  010732                          JSR PC,STOP
1779  004176  000760                                  BR XWRTRD
1780
1781                                  ;;**********************************************************************
1782
1783                                          ;READ DATA FROM THE DISKETTE
1784
1785
1786  004200  004737  012216          READ:           JSR PC,INITSECTOR
1787  004204  004737  012316          XREAD:          JSR PC,GETSECTOR
1788  004210  012737  000012  017106                  MOV #10.,DDRETRY        ;SET UP RETRY COUNTERS FOR DELETED DATA
1789  004216  012737  000012  017110                  MOV #10.,DATARETRY      ;DATA ERROR
1790  004224  012737  000012  017114                  MOV #10.,PRETRY         ;PARITY
1791  004232  012737  000012  017120                  MOV #10.,SRETRY         ;SEEK
1792  004240  012737  000012  017116                  MOV #10.,CRETRY         ;AND CRC ERRORS
1793  004246  005037  004126          REREAD:         CLR DATACK              ;CLEAR CRC DATA CHECK FLAG
1794  004252  012746  004316                          MOV #RDDONE,-(SP)       ;SET GOOD RETURN ON STACK
1795  004256  012746  004460                          MOV #RDERR,-(SP)        ;SET READ ERROR RETURN ON STACK
1796  004262  112737  000107  004120                  MOVB #RDIE,FUNCTION
1797  004270  062737  000001  021132                  ADD #1,RDCNTR           ;INC TOTAL READ FUNCTIONS COUNTER
1798  004276  005537  021134                          ADC RDCNTR+2            ;DOUBLE PRECISION COUNTER
1799  004302  004737  004022                          JSR PC,COMMWORD
1800  004306  004737  007122                          JSR PC,DONECK           ;TEST FOR DONE
1801  004312  000137  007204                          JMP NOINTER             ;NO INTERUPT ON DONE
1802
1803
1804
1805  004316  022737  000012  017102  RDDONE:         CMP #10.,RDRETRY        ;IS READ RETRY EQUAL TO 10
1806  004324  001420                                  BEQ CONT1               ;YES,NO ERRORS OCCURED
1807  004326  012703  017150                          MOV #ZRDLOG,R3          ;SET INC. INST. FOR UNIT 0 ERROR LOG
1808  004332  004737  021142                          JSR PC,U1LOG            ;TEST FOR UNIT 1 ERROR LOG
1809  004336  005213                                  INC (R3)                ;INC RECOVERABLE READ LOG
1810  004340  012737  000012  017102                  MOV #10.,RDRETRY        ;RESET READ RETRY COUNTER
1811  004346  104401  015336                          TYPE ,DBLLF
1812  004352  104401  015725                          TYPE ,MREC              ;TYPE RECOVERABLE READ ERROR
```

```
1813  004356  104401  015772                        TYPE ,MREAD
1814  004362  104401  015150                        TYPE ,MCRLF
1815  004366  022737  000012  017104  CONT1:        CMP #10.,WTRETRY        ;IS WRITE RETRY EQUAL TO 10
1816  004374  001420                                BEQ CONT2               ;YES,NO ERRORS OCCURED
1817  004376  012703  017154                        MOV #ZWRTLOG,R3         ;SET INC.INST.FOR UNIT 0 ERROR LOG
1818  004402  004737  021142                        JSR PC,U1LOG            ;TEST FOR UNIT 1 LOG
1819  004406  005213                                INC (R3)                ;INC RECOVERABLE WRITE LOG
1820  004410  012737  000012  017104                MOV #10.,WTRETRY        ;RESET THE WRITE RETRY COUNTER
1821  004416  104401  015336                        TYPE ,DBLLF
1822  004422  104401  015725                        TYPE ,MREC              ;TYPE RECOVERABLE WRITE ERROR
1823  004426  104401  016106                        TYPE ,MWRITE
1824  004432  104401  015150                        TYPE ,MCRLF
1825  004436  004737  005204  CONT2:                JSR PC,DDCHK            ;CHECK FOR DELETED DATA INDICATOR
1826  004442  005701                                TST R1                  ;BIT 15 OF R1 IS READ 1 SECTOR FLAG
1827  004444  100001                                BPL NEXTRD
1828  004446  000207                                RTS PC                  ;IF SET,GO VERIFY DATA JUST READ
1829  004450  005337  012306  NEXTRD:               DEC SECCNTR
1830  004454  001253                                BNE XREAD
1831  004456  000207                                RTS PC                  ;READ FUNCTION IS DONE
1832
1833  004460  005726  RDERR:                        TST (SP)+               ;REMOVE THE DONE RETURN FROM THE STACK
1834  004462  032737  000002  010070                BIT #BIT1,ASTAT         ;IS THIS A PARITY ERROR
1835  004470  001413                                BEQ 1$                  ;NO, SEE IF ITS A CRC ERROR
1836                                ;PARITY ERROR DURING A READ FUNCTION
1837  004472  012737  015772  003264                MOV #MREAD,PTYP1+2      ;PUT ADDR OF READ MESSAGE IN PAR ERR TYPEOUT 1
1838  004500  012737  015772  003354                MOV #MREAD,PTYP2+2      ;PUT ADDR OF READ MESSAGE IN PAR ER TYPEOUT 2
1839  004506  012737  004246  003334                MOV #REREAD,PCONT+2     ;IF HARD ERR RETURN THROUGH PCONT TO REREAD
1840  004514  000137  003244                        JMP PARTEST             ;RECORD PARITY ERROR AND RETRY FUNCTION
1841  004520  032737  000001  010070  1$:           BIT #BIT0,ASTAT         ;IS THIS A CRC ERROR
1842  004526  001014                                BNE CRCER               ;YES GO TEST AND LOG IT
1843                                ;SEEK ERROR DURING A READ FUNCTION
1844  004530  012737  004246  003674                MOV #REREAD,SEKRTY+2    ;SET SEEK CONTINUE FOR READ RETRY
1845  004536  012737  015772  003630                MOV #MREAD,STYP1+2      ;SET ADDR OF READ MESSAGE IN SEEK ER TYPEOUT 1
1846  004544  012737  015772  003722                MOV #MREAD,STYP2+2      ;SET ADDR OF READ MESSAGE IN SEEK ER TYPEOUT 2
1847  004552  004737  003576                        JSR PC,SEEKER           ;RECORD SEEK ERROR
1848  004556  000734                                BR NEXTRD               ;GO TO NEXT SECTOR,CAN'T READ THIS ONE
1849                                ;CRC ERROR DETECTED WHILE READING
1850  004560  004737  003770  CRCER:                JSR PC,TRKERR           ;INC ERROR PER TRACK COUNTER
1851  004564  005701                                TST R1                  ;IF READ ONLY, REPORT DATA CRC ERROR
1852  004566  100061                                BPL DATACRC
1853  004570  005237  004126                        INC DATACK              ;SET DATA CHECK FLAG
1854  004574  004737  005536                        JSR PC,EMPBUFF          ;CHECK FOR A DATA ERROR
1855  004600  005737  006442                        TST ERCNTR              ;WAS THERE A DATA ERROR
1856  004604  001052                                BNE DATACRC             ;YES,REREAD AND/OR REWRITE THE DATA
1857  004606  012703  017144                        MOV #ZCRCBAD,R3         ;SET INC.INST.FOR UNIT 0 ERROR LOG
1858  004612  004737  021142                        JSR PC,U1LOG            ;TEST FOR UNIT 1 ERROR LOGS
1859  004616  005213                                INC (R3)                ;NO,INC BAD CRC GENERATOR ERROR
1860  004620  104406                                CKSWR
1861  004622  032777  020000  174364                BIT #SW13,@SWR          ;TEST DON'T SWITCH
1862  004630  001004                                BNE 2$
1863  004632  104401  015742                        TYPE ,MBADCRC           ;TYPE CRC GENERATOR ERROR
1864  004636  104401  015150                        TYPE ,MCRLF
1865  004642  104406            2$:                 CKSWR
1866  004644  005777  174344                        TST @SWR                ;TEST HALT ON ERROR SWITCH
1867  004650  100001                                BPL CONT15
1868  004652  000000  HLT10:                       HALT                    ;HALT ON ERROR
```

```
1869  004654  032777  004000  174332  CONT15:   BIT #SW11,@SWR        ;CHECK NO RETRY SIWTCH
1870  004662  001005                            BNE 3$               ;IF SET LOG HARD ERROR
1871  004664  005337  017116                    DEC CRETRY           ;HAVE 10 ERRORS BEEN LOGED
1872  004670  001402                            BEQ 3$               ;YES,LOG HARD ERROR
1873  004672  000137  004246                    JMP REREAD           ;NO,GO REREAD DATA
1874  004676  012703  017204            3$:     MOV #ZHCRCBAD,R3     ;SET INC.INST.FOR UNIT 0 ERROR LOG
1875  004702  004737  021142                    JSR PC,U1LOG         ;TEST FOR UNIT 1 ERROR LOGS
1876  004706  005213                            INC (R3)
1877  004710  104401  015336                    TYPE ,DBLLF
1878  004714  104401  015742                    TYPE ,MBADCRC        ;TYPE HARD CRC GENERATOR ERROR
1879  004720  104401  015150                    TYPE ,MCRLF
1880  004724  104401  016022                    TYPE ,MHALT11        ;AND HALT AS THE CRC GENERATOR DOESN'T WORK
1881  004730  000000                    HLT11:  HALT
1882                          ;DATA CRC ERROR REREAD AND/OR REWRITE TO GET GOOD DATA
1883  004732  012703  017140            DATACRC:MOV #ZCRCLOG,R3      ;SET INC.INST.FOR UNIT 0 ERROR LOG
1884  004736  004737  021142                    JSR PC,U1LOG         ;TEST FOR UNIT 1 ERROR LOGS
1885  004742  005213                            INC (R3)             ;TRUE DATA CRC ERROR
1886  004744  104406                            CKSWR
1887  004746  032777  020000  174240            BIT #SW13,@SWR       ;TEST DON'T PRINT ERROR SWITCH
1888  004754  001004                            BNE 4$
1889  004756  104401  016034                    TYPE ,MCRC           ;TYPE DATA CRC ERROR
1890  004762  104401  015150                    TYPE ,MCRLF
1891  004766  104406                    4$:     CKSWR
1892  004770  005777  174220                    TST @SWR             ;TEST HALT ON ERROR SWITCH
1893  004774  100001                            BPL CONT16
1894  004776  000000                    HLT12:  HALT                 ;HALT ON ERROR
1895  005000  032777  004000  174206  CONT16:   BIT #SW11,@SWR       ;TEST NO RETRY SWITCH
1896  005006  001005                            BNE 5$               ;IF SET LOG HARD ERROR
1897  005010  005337  017102                    DEC RDRETRY          ;HAVE 10 ERRORS OCCURED
1898  005014  001402                            BEQ 5$               ;YES LOG HARD ERROR OR REWRITE DATA
1899  005016  000137  004246                    JMP REREAD           ;NO,GO REREAD THIS SECTOR
1900  005022  012703  017200            5$:     MOV #ZHCRCLOG,R3     ;SET INC.INST.FOR UNIT 0 ERROR LOG
1901  005026  004737  021142                    JSR PC,U1LOG         ;TEST FOR UNIY 1 ERROR LOGS
1902  005032  005213                            INC (R3)             ;INC HARD CRC ERROR LOG
1903  005034  012737  000012  017102            MOV #10.,RDRETRY     ;RESET READ RETRY COUNTER
1904  005042  005737  004122                    TST RDAFTWT          ;IS THIS A READ AFTER WRITE FUNCTION
1905  005046  001021                            BNE CONT6            ;YES,GO REWRITE IT
1906  005050  012703  017210                    MOV #ZHRDLOG,R3      ;NO,SET INC.INST.FOR UNIT 0 ERROR LOG
1907  005054  004737  021142                    JSR PC,U1LOG         ;TEST FOR UNIT 1 ERROR LOGS
1908  005060  005213                            INC (R3)             ;READ ONLY, HARD READ ERROR
1909  005062  104401  015336                    TYPE ,DBLLF
1910  005066  104401  016053                    TYPE ,MUNREC         ;TYPE UNRECOVERABLE READ ERROR
1911  005072  104401  015772                    TYPE ,MREAD
1912  005076  104401  015150            CONT7:  TYPE ,MCRLF
1913  005102  062706  000002                    ADD #2,SP            ;REMMOVE READ DONE ADDRESS FROM STACK
1914  005106  000137  004450                    JMP NEXTRD           ;READ NEXT SECTOR CAN'T READ THIS ONE
1915  005112  104406                    CONT6:  CKSWR
1916  005114  032777  004000  174072            BIT #SW11,@SWR       ;TEST NO RETRY SWITCH
1917  005122  001011                            BNE 7$               ;IF SET LOG HARD ERROR
1918  005124  005337  017104                    DEC WTRETRY          ;HAVE 10 REWRITES BEEN DONE
1919  005130  001406                            BEQ 7$               ;YES,LOG HARD WRITE ERROR
1920  005132  005137  004124                    COM ERWRT            ;NO,SET THE WRITE CAUSED BY ERROR FLAG
1921  005136  062706  000002                    ADD#2,SP             ;REMOVE RDDONE ADDRESS FROM STACK
1922  005142  000137  003130                    JMP ONEWRT           ;REWRITE SECTOR THEN REREAD TO CHECK FOR ERROR
1923  005146  012703  017214            7$:     MOV #ZHWRTLOG,R3     ;SET INC.INST.FOR UNIT 0 ERROR LOG
1924  005152  004737  021142                    JSR PC,U1LOG         ;TEST FOR UNIT 1 ERROR LOGS
```

```
1925  005156  005213                          INC (R3)                ;HARD WRITE ERROR
1926  005160  012737  000012  017104          MOV #10.,WTRETRY        ;RESET WRITE RETRY COUNTER
1927  005166  104401  015336                  TYPE ,DBLLF
1928  005172  104401  016053                  TYPE ,MUNREC            ;TYPE UNRECOVERABLE WRITE ERROR
1929  005176  104401  016106                  TYPE ,MWRITE
1930  005202  000735                          BR CONT7
1931
1932
1933
1934  005204  032737  001000  001212  DDCHK:  BIT #BIT9,DTESTP        ;TEST BIT 9 AS TO DELETED DATA TRANSFER
1935  005212  001472                          BEQ CONT10
1936  005214  132737  000100  010070          BITB #BIT6,ASTAT        ;THIS IS A DELETED DATA FUNCTION
1937  005222  001114                          BNE RETURN              ;DD BIT SHOULD BE SET
1938  005224  012703  017164                  MOV #ZDDMIS,R3          ;SET INC INST FOR UNIT 0 ERROR LOG
1939  005230  004737  021142                  JSR PC,U1LOG            ;TEST FOR UNIT 1 ERROR LOGS
1940  005234  005213                          INC (R3)                ;INC MISSING DELETED DATA LOG
1941  005236  004737  003770                  JSR PC,TRKERR           ;INC ERROR PER TRACK COUNTER
1942  005242  104406                          CKSWR
1943  005244  032777  020000  173742          BIT #SW13,@SWR          ;TEST DON'T PRINT ERROR SWITCH
1944  005252  001011                          BNE CONT11
1945  005254  104401  014604                  TYPE ,MDDMIS            ;TYPE MISSING DELETED DATA BIT
1946  005260  052737  000400  010704  DDERR:  BIS #BIT8,UNITSEL        ;SET HAD ERROR FLAG
1947  005266  004737  007716                  JSR PC,TYPADR           ;TYPE ADDRESS OF ERROR
1948  005272  104401  015150                  TYPE ,MCRLF
1949  005276  104406          CONT11:         CKSWR
1950  005300  005777  173710                  TST @SWR                ;TEST HALT ON ERROR SWITCH
1951  005304  100001                          BPL CONT17
1952  005306  000000          HLT13:          HALT                    ;HALT ON DELETED DATA ERROR
1953  005310  032777  004000  173676  CONT17: BIT #SW11,@SWR          ;TEST NO RETRY SWITCH
1954  005316  001005                          BNE 4$                  ;IF SET LOG HARD ERROR
1955  005320  005337  017106                  DEC DDRETRY             ;HAVE 10 ERRORS BEEN LOGED
1956  005324  001402                          BEQ 4$                  ;YES LOG HARD ERROR
1957  005326  000137  004246                  JMP REREAD              ;NO, REREAD SECTOR
1958  005332  012703  017224          4$:     MOV #ZHDDLOG,R3         ;SET INC INST.FOR UNIT 0 ERROR LOG
1959  005336  004737  021142                  JSR PC,U1LOG            ;TEST FOR UNIT 1 ERROR LOGS
1960  005342  005213                          INC (R3)
1961  005344  104401  015336                  TYPE ,DBLLF
1962  005350  104401  016053                  TYPE ,MUNREC            ;TYPE UNRECOVERABLE DELETED DATA ERROR
1963  005354  104401  015713                  TYPE ,MDDER
1964  005360  104401  015150                  TYPE ,MCRLF
1965  005364  004737  007716                  JSR PC,TYPADR
1966  005370  104401  015150                  TYPE ,MCRLF
1967  005374  000137  004450                  JMP NEXTRD              ;READ NEXT SECTOR
1968  005400  032737  000100  010070  CONT10: BIT #BIT6,ASTAT         ;THIS IS NOT A DELETED DATA TRANSFER
1969  005406  001422                          BEQ RETURN
1970  005410  012703  017170                  MOV #ZUNXDD,R3          ;SET INC INST.FOR UNIT 0 ERROR LOG
1971  005414  004737  021142                  JSR PC,U1LOG            ;TEST FOR UNIT 1 ERROR LOGS
1972  005420  005213                          INC (R3)                ;UNEXPECTED DD BIT SET
1973  005422  052737  000400  010704          BIS #BIT8,UNITSEL       ;SET HAD ERROR FLAG
1974  005430  004737  003770                  JSR PC,TRKERR           ;INC ERROR PER TRACK COUNTER
1975  005434  104406                          CKSWR
1976  005436  032777  020000  173550          BIT #SW13,@SWR          ;TEST DON'T PRINT ERROR SWITCH
1977  005444  001314                          BNE CONT11
1978  005446  104401  014560                  TYPE ,MUNXDD            ;TYPE UNEXPECTED DELETED DATA BIT
1979  005452  000702                          BR DDERR
1980  005454  000207          RETURN:         RTS PC
```

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

                                        ;WRITE ALL SECTORS,READ AND VERIFY ALL SECTORS
                                        ;   T = 3

005456  005137  004122        WTRDCK:         COM RDAFTWT             ;SET READ AFTER WRITE FLAG
005462  004737  010312                        JSR PC,GETPATTERN
005466  004737  011144        XWTRDCK:        JSR PC,INITTRACKS
005472  004737  010614                        JSR PC,GETUNIT
005476  004737  011254        1$:             JSR PC,GETTRACK
005502  004737  003112                        JSR PC,WRITE
005506  004737  005526                        JSR PC,READCHK
005512  005337  011356                        DEC TRKCNTR
005516  001367                              BNE 1$
005520  004737  010732                        JSR PC,STOP
005524  000760                              BR XWTRDCK

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

                                        ;READ A SECTOR,EMPTY THE SECTOR BUFFER AND VERIFY
                                        ;THE DATA READ AGAINST CORE DATA BUFFER

005526  052701  100000        READCHK:        BIS #BIT15,R1           ;SET READ ONE SECTOR FLAG
005532  004737  004200                        JSR PC,READ             ;GO READ ONE SECTOR
005536  005737  012306        EMPBUFF:        TST SECCNTR             ;IF CLEARED NO SECTOR WAS FOUND
005542  001002                              BNE 2$
005544  000137  006432                      JMP EXIT                ;GO TO NEXT TRACK CAN'T READ THIS ONE
005550  005037  006434        2$:             CLR BYTECNTR            ;CLEAR THE BYTE AND ERROR COUNTERS
005554  005037  006442                      CLR ERCNTR
005560  052701  000200                      BIS #BIT7,R1            ;R1 BIT 7 IS USED AS FIRST ERROR FLAG
005564  004737  005656                      JSR PC,ADJSUM           ;ADJUST DATA AND CK SUM FOR ADDRESSES
005570  005037  005746                      CLR CKSUM               ;SET UP FOR CHECK SUM ACCUMULATION
005574  012746  006212                      MOV #EMPDONE,-(SP)      ;SET UP RETURN ADDRESSES
005600  012746  005750                      MOV #EMPER,-(SP)
005604  005046                              CLR -(SP)               ;LOWER INTERUPT LEVEL
005606  012746  005614                      MOV #1$,-(SP)
005612  000002                              RTI
005614  012777  000103  173364  1$:         MOV #EBIE,@RXCS         ;LOAD EMPTY BUFFER FUNCTION
005622  004737  007014        EMPFLAG:        JSR PC,TRCK             ;TEST FOR TR FLAG

005626  117737  173356  006436  CKBYTE:       MOVB @RXDB,BADBYTE      ;SAVE BYTE FROM DISKETTE
005634  063737  006436  005746                ADD BADBYTE,CKSUM       ;ACCUMULATE CHECK SUM
005642  123720  006436                        CMPB BADBYTE,(R0)+      ;COMPARE AGAINST GOOD BYTE
005646  001054                              BNE DATAER              ;IF NOT EQUAL GO TO DATAER
005650  005237  006434                      INC BYTECNTR
005654  000762                              BR EMPFLAG              ;GET NEXT BYTE

005656  113737  011360  016702  ADJSUM:       MOVB TARGET,BUFADR      ;SET FIRST AND SECOND BYTES WITH ADDRESSES
005664  113737  012310  016703                MOVB TSECTOR,BUFADR+1
005672  013737  010612  005746                MOV SUM,CKSUM           ;GET THE PATTERN SUM
005700  063737  011360  005746                ADD TARGET,CKSUM        ;ADD TRACK ADDRESS TO CHECK SUM
005706  063737  012310  005746                ADD TSECTOR,CKSUM       ;ADD SECTOR ADDRESS TO CHECK SUM
```

```
2037  005714  113737  005746  017100          MOVB CKSUM,BUFADR+176   ;INSERT CHECK SUM TO DATA BUFFER
2038  005722  106337  005746                  ASLB CKSUM              ;GENERATE NEGITIVE CHECK SUM
2039  005726  105437  005746                  NEGB CKSUM
2040  005732  113737  005746  017101          MOVB CKSUM,BUFADR+177   ;INSERT NEG,SUM INTO DATA BUFFER
2041  005740  012700  016702                  MOV #BUFADR,R0          ;SET ADDRESS OF BYTE IN R0
2042  005744  000207                          RTS PC                  ;RETURN
2043
2044  005746  000000          CKSUM:          0
2045
2046  005750  005726          EMPER:          TST (SP)+               ;REMOVE THE DONE RETURN FROM THE STACK
2047  005752  012737  015500  003264          MOV #MEMPTY,PTYP1+2     ;PUT ADDR OF EMPTYBUF MESSAGE IN PAR ER TYPOUT 1
2048  005760  012737  015500  003354          MOV #MEMPTY,PTYP2+2     ;PUT ADDR OF EMPTYBUF MESSAGE IN PAR ER TYPOUT 2
2049  005766  012737  005536  003334          MOV #EMPBUFF,PCONT+2    ;NOT HARD ERR RETURN THROUGH PCONT TO EMPTYBUF
2050  005774  000137  003244                  JMP PARTEST             ;REPORT PARITY ERROR
2051
2052  006000  052737  000400  010704  DATAER:  BIS #BIT8,UNITSEL      ;SET THE HAD ERROR FLAG
2053  006006  005237  006442                  INC ERCNTR              ;INC THE BYTE ERROR COUNTER
2054  006012  104406                          CKSWR
2055  006014  032777  020000  173172          BIT #SW13,@SWR          ;TEST PRINT ERROR SW IN SWR
2056  006022  001062                          BNE NOERTYP             ;DON'T PRINT THE ERROR
2057  006024  032777  010000  173162          BIT #SW12,@SWR          ;TEST PRINT 10 ERRORS SWITCH
2058  006032  001404                          BEQ 1$                  ;PRINT ALL ERRORS
2059  006034  023727  006442  000012          CMP ERCNTR,#10.         ;HAVE 10 ERRORS BEEN TYPED
2060  006042  003052                          BGT NOERTYP             ;YES,DON'T PRINT ANY MORE
2061  006044  005737  004126          1$:     TST DATACK              ;WAS THIS A READ CHECK DUE TO CRC ERROR
2062  006050  001403                          BEQ 2$                  ;NO,REPORT DATA ERRORS
2063  006052  105701                          TSTB R1                 ;YES,TEST FIRST ERROR FLAG
2064  006054  100017                          BPL TYPERR              ;TYPE THE DATA CRC ERROR
2065  006056  000412                          BR 3$
2066  006060  105701          2$:             TSTB R1                 ;TEST FIRST ERROR FLAG
2067  006062  100014                          BPL TYPERR
2068  006064  104401  015150                  TYPE ,MCRLF
2069  006070  104401  014625                  TYPE ,MDERHDR           ;PRINT ERROR HEADER
2070  006074  104401  015150                  TYPE ,MCRLF
2071  006100  004737  007716                  JSR PC,TYPADR           ;PRINT TRACK AND SECTOR LOCATIONS
2072  006104  104401  014714          3$:     TYPE ,MCOLMUN           ;SET UP COLMUN HEADINGS
2073  006110  042701  000200                  BIC #BIT7,R1            ;CLEAR FIRST ERROR FLAG
2074  006114  013737  006434  006126  TYPERR: MOV BYTECNTR,1$         ;PRINT BYTE NUMBER
2075  006122  004537  014544                  JSR R5,SGLDEC
2076  006126  000000          1$:             OPEN
2077  006130  104401  015145                  TYPE ,DBLSP
2078  006134  013746  006436                  MOV BADBYTE,-(SP)       ;PRINT BYTE READ FROM DISKETTE
2079  006140  104403                          TYPOS
2080  006142  000003                          .WORD 3
2081  006144  104401  015145                  TYPE ,DBLSP
2082  006150  114037  006440                  MOVB -(R0),GOODBYTE     ;GET GOOD BYTE
2083  006154  005200                          INC R0                  ;RETURN R0 TO NEXT BYTE IN BUFFER
2084  006156  013746  006440                  MOV GOODBYTE,-(SP)
2085  006162  104404                          TYPON                   ;PRINT GOOD DATA
2086  006164  104401  015150                  TYPE ,MCRLF
2087  006170  104406          NOERTYP:        CKSWR
2088  006172  005777  173016                  TST @SWR                ;TEST HALT ON ERROR SWITCH
2089  006176  100001                          BPL CONT20
2090  006200  000000          HLT14:          HALT
2091  006202  005237  006434  CONT20:         INC BYTECNTR
2092  006206  000137  005622                  JMP EMPFLAG
```

```
2093
2094  006212  005737  004126          EMPDONE:    TST DATACK          ;WAS THIS READCHECK CAUSED BY CRC ERROR
2095  006216  001401                              BEQ 1$              ;NO,CONTINUE
2096  006220  000207                              RTS PC              ;YES,RETURN TO CRC ERROR HANDLER
2097  006222  005737  006442          1$:         TST ERCNTR          ;WAS THERE ERRORS
2098  006226  001471                              BEQ CONT3           ;NO ERRORS
2099  006230  104406                              CKSWR
2100  006232  032777  020000  172754              BIT #SW13,@SWR      ;YES,TEST DON'T PRINT SWITCH
2101  006240  001024                              BNE 2$              ;DON'T PRINT THE ERROR
2102  006242  104401  015431                      TYPE ,MERCT         ;PRINT THE TOTAL DATA ERROR COUNT
2103  006246  013737  006442  006260            MOV ERCNTR,3$
2104  006254  004537  014544                    JSR R5,SGLDEC
2105  006260  000000                      3$:     OPEN
2106  006262  104401  016425                      TYPE ,MSUM          ;INDICATE IF CHECK SUM WAS GOOD OR HAD ERRORS
2107  006266  105737  005746                      TSTB CKSUM
2108  006272  001403                              BEQ 4$
2109  006274  104401  016165                      TYPE ,MERS
2110  006300  000402                              BR 5$
2111  006302  104401  016420          4$:         TYPE,MGOOD
2112  006306  104401  015150          5$:         TYPE ,MCRLF
2113  006312  012703  017160          2$:         MOV #ZDATALOG,R3    ;SET INC.INST.FOR UNIT 0 ERROR LOG
2114  006316  004737  021142                      JSR PC,U1LOG        ;TEST FOR UNIT 1 ERROR LOGS
2115  006322  005213                              INC (R3)            ;INC DATA ERROR LOG
2116  006324  004737  003770                      JSR PC,TRKERR       ;INC ERROR PER TRACK COUNTER
2117  006330  104406                              CKSWR
2118  006332  032777  004000  172654              BIT #SW11,@SWR      ;TEST NO RETRY SWITCH
2119  006340  001007                              BNE 6$              ;IF SET LOG HARD ERROR
2120  006342  005337  017110                      DEC DATARETRY       ;HAVE 10 ERRORS BEEN LOGED
2121  006346  001404                              BEQ 6$
2122  006350  004737  004246                      JSR PC,REREAD       ;NO,GO REREAD THE DATA
2123  006354  000137  005536                      JMP EMPBUFF         ;GO RECHECK THE DATA
2124  006360  012703  017220          6$:         MOV #ZHDATALOG,R3   ;YES,SET INC.INST.FOR UNIT 0 ERROR LOG
2125  006364  004737  021142                      JSR PC,U1LOG        ;TEST FOR UNIT 1 ERROR LOGS
2126  006370  005213                              INC (R3)            ;INC HARD DATA NO STATUS ERROR
2127  006372  104401  015336                      TYPE ,DBLLF
2128  006376  104401  016053                      TYPE ,MUNREC        ;TYPE UNRECOVERABLE DATA NO
2129  006402  104401  014625                      TYPE ,MDERHDR       ;STATUS ERROR
2130  006406  104401  015150                      TYPE ,MCRLF
2131  006412  005337  012306          CONT3:      DEC SECCNTR
2132  006416  001405                              BEQ EXIT
2133  006420  004737  004204                      JSR PC,XREAD        ;READ THE NEXT SECTOR
2134  006424  000137  005536                      JMP EMPBUFF
2135  006430  005001                      3$:     CLR R1              ;CLEAR THE ONE READ FLAG
2136  006432  000207                      EXIT:   RTS PC
2137
2138  006434  000000                      BYTECNTR:   0
2139  006436  000000                      BADBYTE:    0
2140  006440  000000                      GOODBYTE:   0
2141  006442  000000                      ERCNTR:     0
2142
2143                                      ;;**********************************************************************
2144
2145                                              ;READ AND VERIFY ALL SECTORS WRITTEN BY
2146                                              ;PREVIOUS WRITE FUNCTION
2147
2148                                              ;   T = 4
```

```
2149
2150  006444  004737  010312          RDCHK:          JSR PC,GETPATTERN
2151  006450  004737  011144          XRDCHK:         JSR PC,INITTRACKS
2152  006454  004737  010614                          JSR PC,GETUNIT
2153  006460  004737  011254          1$:             JSR PC,GETTRACK
2154  006464  004737  005526                          JSR PC,READCHK
2155  006470  005337  011356                          DEC TRKCNTR
2156  006474  001371                                  BNE 1$
2157  006476  004737  010732                          JSR PC,STOP
2158  006502  000762                                  BR XRDCHK
2159
2160
2161                                  ;;*****************************************************************
2162
2163                                          ;DO A READ ONLY FUNCTION ON ALL SECTORS
2164                                          ;THIS DOES NOT VERIFY THE DATA, ONLY TESTS FOR CRC ERRORS
2165                                          ;   T = 5
2166
2167  006504  004737  010312          RDONLY:         JSR PC,GETPATTERN
2168  006510  004737  011144          XRDONLY:        JSR PC,INITTRACKS
2169  006514  004737  010614                          JSR PC,GETUNIT
2170  006520  004737  011254          1$:             JSR PC,GETTRACK
2171  006524  004737  004200                          JSR PC,READ
2172  006530  005337  011356                          DEC TRKCNTR
2173  006534  001371                                  BNE 1$
2174  006536  004737  010732                          JSR PC,STOP
2175  006542  000762                                  BR XRDONLY
2176
2177
2178
2179                                  ;;*****************************************************************
2180
2181                                          ;WRITE AND READ CHECK ANY DATA PATTERN,AND ANY TRACK SEQUENCE
2182                                          ;BUT ALTERNATE BETWEEN DRIVE UNITS ON EACH TRACK SELECTED.
2183                                          ;   T = 6
2184
2185  006544  005137  004122          DRVSWP:         COM RDAFTWT             ;SET THE READ AFTER WRITE FLAG
2186  006550  004737  010312                          JSR PC,GETPATTERN
2187  006554  004737  011144          2$:             JSR PC,INITTRACKS
2188  006560  004737  010614          1$:             JSR PC,GETUNIT          ;SET UP FOR UNIT 0
2189  006564  004737  011254                          JSR PC,GETTRACK         ;GET THE TRACK TO BE ACCESSED
2190  006570  004737  003112                          JSR PC,WRITE
2191  006574  004737  005526                          JSR PC,READCHK
2192  006600  004737  010614                          JSR PC,GETUNIT          ;NOW GO TO UNIT 1 ON THE SAME TRACK
2193  006604  004737  003112                          JSR PC,WRITE
2194  006610  004737  005526                          JSR PC,READCHK
2195  006614  005337  011356                          DEC TRKCNTR
2196  006620  001357                                  BNE 1$
2197  006622  004737  010732                          JSR PC,STOP
2198  006626  000752                                  BR 2$
2199
2200
2201                                  ;;*****************************************************************
2202                                          ;THE FIRST HALF OF TEST 7 FORCES THE TRACK SEQUENCE
2203                                          ;TO INCRIMENT UP THROUGH ALL THE TRACKS DOING WRITE / READ CHECK FUNCTIONS.
2204                                          ;THIS VERIFIES THAT ALL THE TRACKS ARE ACCESSABLE.
```

```
                                        ;THE SECOND HALF OF THE PASS WILL USE THE SEQUENCE SELECTED BY THE
                                        ;OPERATOR AS INDICATED BELOW,AND ONLY READ CHECK THE DATA JUST WRITTEN.
                                        ;THIS VERIFIES THAT THE DATA CAN BE READ FROM A TRACK,AFTER THE HEAD HAS BEEN
                                        ;MOVED AWAY FROM AND BACK TO THAT TRACK. AT THE COMPLETION OF THE PASS
                                        ;THE DELETED DATA BIT IN TEST CONDITIONS IS COMPLEMENTED AND THE NEXT
                                        ;PASS WILL BE RUN UNDER THIS NEW CONDITION.
                                        ;    T = 0 OR 7

006630  004737  010312          TEST7:        JSR PC,GETPATTERN
006634  013737  011370  007012                MOV SEQUEN,SEQSAV      ;SAVE THE SELECTED SEQUENCE
006642  012737  000001  011370  TEST7X:       MOV #1,SEQUEN          ;FORCE INCREMENT SEQUENCE
006650  005137  004122                        COM RDAFTWT            ;SET READ AFTER WRITE FLAG FOR ERROR TESTING
006654  004737  011144                        JSR PC,INITTRACKS
006660  004737  010614                        JSR PC,GETUNIT
006664  004737  011254          1$:           JSR PC,GETTRACK
006670  004737  003112                        JSR PC,WRITE
006674  004737  005526                        JSR PC,READCHK
006700  005337  011356                        DEC TRKCNTR            ;IS THE FIRST HALF OF THE PASS DONE
006704  001367                                BNE 1$                 ;NO,CONTINUE WRITTING AND READING
006706  005037  004122                        CLR RDAFTWT            ;YES,NOW DO A READ ONLY
006712  013737  007012  011370                MOV SEQSAV,SEQUEN      ;USING SELECTED SEQUENCE
006720  004737  011144                        JSR PC,INITTRACKS
006724  004737  011254          2$:           JSR PC,GETTRACK
006730  004737  005526                        JSR PC,READCHK
006734  005337  011356                        DEC TRKCNTR            ;IS THIS HALF OF THE PASS DONE
006740  001371                                BNE 2$                 ;NO,CONTINUE READ CHECKING
006742  004737  010732                        JSR PC,STOP            ;YES,TEST FOR END OF PASS CONDITIONS
006746  032737  040100  010704                BIT #40100,UNITSEL     ;HAVE ALL SELECTED UNITS BEEN USED
006754  001332                                BNE TEST7X             ;IF A USED BIT IS STILL SET GO TO NEXT DRIVE
006756  012706  001200                        MOV #1200,SP           ;RESET STACK ADDRESS FOR ACT11 EOP
006762  032737  001000  001212                BIT #BIT9,DTESTP       ;NEXT PASS,COMPLEMENT D D BIT
006770  001404                                BEQ 3$
006772  042737  001000  001212                BIC #BIT9,DTESTP       ;IT WAS ON CLEAR IT
007000  000720                                BR TEST7X
007002  052737  001000  001212  3$:           BIS #BIT9,DTESTP       ;IT WAS OFF SET IT
007010  000714                                BR TEST7X

007012  000000                  SEQSAV:       0
                                ;;*****************************************************************

                                        ;TEST FOR TRANSFER FLAG AND PROGRAM NOT HUNG

007014  005037  007200          TRCK:         CLR HCNTR1             ;CLEAR HUNG COUNTER
007020  012746  000340                        MOV #PR7,-(SP)         ;RAISE INTERUPT LEVEL TO INHIBIT INTERUPTS
007024  012746  007032                        MOV #3$,-(SP)
007030  000002                                RTI
007032  105777  172150          3$:           TSTB @RXCS             ;TEST FOR TR FLAG
007036  100001                                BPL 1$                 ;SKIP NEXT INST.IF NOT SET
007040  000207                                RTS PC                 ;RETURN TO TRANSFER DATA
007042  023727  006434  000200  1$:           CMP BYTECNTR,#128.     ;HAVE 128 BYTES BEEN TRANSFERED
007050  001403                                BEQ 2$                 ;ALLOW AN INTERUPR IF EQUAL
007052  005237  007200                        INC HCNTR1             ;IF THE HUNG COUNTER OVERFLOWES EITHER
                                                                     ;THERE WAS NO TR FLAG OR NO INTERUPT OCCURED
                                                                     ;AFTER 128 BYTES TRANSFERED
007056  001365                                BNE 3$                 ;NO OVERFLOW RETEST FOR TR FLAG
007060  132777  000040  172120  2$:           BITB #DONEBIT,@RXCS    ;TEST FOR A DONE FLAG WHICH WOULD INDICATE A
```

```
                                                        ;POSSABLE ERROR CONDITION EXISTS WHILE
                                                        ;TRANSFERING COMMANDS OR DATA
007066  001407                      BEQ 4$              ;IF DONE NOT SET,TYPE HUNG
007070  005037  006434              CLR BYTECNTR        ;CLEAR BYTE COUNTER SO IT  WON'T INTERFERE
                                                        ;WITH TESTING FOR DONE.
007074  005726                      TST (SP)+           ;REMOVE THIS RETURN ADDRESS FROM STACK
007076  005046                      CLR -(SP)           ;LOWER INTERUPT LEVEL TO ACCEPT AN INTERUPT
007100  012746  007106              MOV #4$,-(SP)       ;THE INTERUPT WILL RETURN THROUGH PREVIOUSLY
007104  000002                      RTI                 ;SET ADDRESSES
007106  005237  007200      4$:     INC HCNTR1          ;ALLOW SOME TIME FOR FLAG TO SET
007112  001362                      BNE 2$
007114  104401  015530              TYPE ,MHUNG
007120  000000              HLT21:  HALT                ;PROGRAM HUNG, SP (177706) CONTAINS RETURN
                                                        ;ADDRESS OF WAITING LOOP

                          ;TEST FOR DONE FLAG AND PROGRAM HUNG
007122  012603              DONECK: MOV (SP)+,R3        ;TAKE THE RETURN ADDRESS OF THE STACK INCASE
                                                        ;THE PROGRAM IS EXPECTING AN INTERUPT AT DONE
007124  005037  007200              CLR HCNTR1          ;CLEAR THE LOWER HUNG COUNTER
007130  012737  177740  007202      MOV #177740,HCNTR2  ;SET UPER COUNTER FOR 31 FULL LOOPS
007136  032777  000040  172042  2$: BIT #DONEBIT,@RXCS ;TEST FOR DONE FLAG
007144  001402                      BEQ 1$              ;IF NOT SET SKIP RETURN
007146  010346                      MOV R3,-(SP)        ;PUT RETURN ADDRESS BACK ON THE STACK
007150  000207                      RTS PC              ;RETURN
007152  062737  000001  007200  1$: ADD #1,HCNTR1       ;WHEN THE DOUBLE WORD COUNTER OVERFLOWES
007160  005537  007202              ADC HCNTR2          ;THE PROGRAM MUST BE HUNG
007164  005737  007202              TST HCNTR2
007170  001362                      BNE 2$              ;IF NO OVERFLOW RETEST FOR DONE
007172  104401  015530              TYPE ,MHUNG
007176  000000              HLT20:  HALT                ;PROGRAM HUNG,CONTENTS OF R3 (177703) HOLDES
                                                        ;ADDRESS OF WAITING TEST.

007200  000000              HCNTR1: 0
007202  177740              HCNTR2: 177740

                          ;AN INTERUPT DID NOT OCCURE AT A FUNCTION DONE FLAG.

007204  005237  017132      NOINTER:INC INTER           ;INC INTERUPT ERROR COUNTER
007210  104406                      CKSWR
007212  032777  020000  171774      BIT #SW13,@SWR      ;TEST DON'T PRINT ERROR SWITCH
007220  001004                      BNE 1$
007222  104401  015356              TYPE ,MINTER        ;TYPE NO INTERUPT ON DONE ERRCR
007226  104401  015150              TYPE ,MCRLF
007232  104406              1$:     CKSWR
007234  005777  171754              TST @SWR            ;TEST HALT ON ERROR SWITCH
007240  100001                      BPL CONT21
007242  000000              HLT15:  HALT                ;HALT ON ERROR
007244  004737  007250      CONT21: JSR PC,INTSERV      ;JSR TO INTSERV AS IF IT WAS AN INTERUPT

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

                          ;INTERUPT SERVICE

007250  117737  171734  010070  INTSERV:MOVB @RXDB,ASTAT    ;SAVE THE ERROR AND STATUS WORD
007256  005777  171724              TST @RXCS           ;TEST THE ERROR FLAG
007262  100450                      BMI RXERROR         ;THERE WAS AN ERROR GO REPORT IT
```

```
2317  007264  032737  000004  010070          BIT #BIT2,ASTAT         ;IS INIT DONE SET
2318  007272  001402                          BEQ 2$                  ;NO,CONTINUE
2319  007274  000137  007702                  JMP RXPWR               ;YES,REPORT POWER FAILED AND RESTART
2320  007300  032737  000003  010070  2$:     BIT #3,ASTAT            ;ARE PAR OR CRC BITS SET
2321  007306  001023                          BNE 1$                  ;YES GO LOG ERROR
2322  007310  132777  000040  171670          BITB #DONEBIT,@RXCS     ;IS DONE SET
2323  007316  001014                          BNE 3$                  ;IF SET RETURN TO TEST
2324  007320  005237  017130                  INC UKNINT              ;INC UNKNOWN INTERUPT ERROR LOG
2325  007324  104406                          CKSWR
2326  007326  032777  020000  171660          BIT #SW13,@SWR          ;TEST DON'T PRINT ERROR SWITCH
2327  007334  001004                          BNE 4$                  ;DON'T PRINT
2328  007336  104401  015410                  TYPE ,MUKNINT           ;TYPE UNKNOWN INTERUPT
2329  007342  104401  015150                  TYPE ,MCRLF
2330  007346  000002          4$:             RTI                     ;RETURN FROM THE INTERUPT
2331  007350  062706  000006          3$:     ADD #6,SP               ;BYPASS INTERUPT POINTERS ON STACK
2332  007354  000207                          RTS PC                  ;RETURN TO PROGRAM
2333  007356  005237  017126          1$:     INC NOERLOG             ;NO STATUS ERROR FLAG ERROR
2334  007362  104406                          CKSWR
2335  007364  032777  020000  171622          BIT #SW13,@SWR          ;TEST DON'T PRINT ERROR SWITCH
2336  007372  001004                          BNE RXERROR
2337  007374  104401  016132                  TYPE ,MNOFLAG           ;TYPE NO STATUS ERROR ERROR
2338  007400  104401  015150                  TYPE ,MCRLF
2339
2340  007404  052737  000400  010704  RXERROR: BIS #BIT8,UNITSEL       ;SET HAD ERROR FLAG
2341  007412  012737  000012  017112          MOV #10.,P2RETRY        ;SET RETRY COUNTER
2342  007420  012777  000017  171560  2$:     MOV #RDER,@RXCS         ;GET THE ERROR CODE
2343  007426  004737  007122                  JSR PC,DONECK           ;TEST FOR DONE FLAG
2344  007432  032777  000002  171550          BIT #2,@RXDB            ;WAS THERE A PARITY ERROR
2345  007440  001403                          BEQ 1$                  ;NO,CONTINUE
2346  007442  004737  002046                  JSR PC,STATER           ;YES,GO REPORT THE PARITY ERROR
2347  007446  000764                          BR 2$                   ;REISSUE THE FUNCTION
2348  007450  117737  171534  010072  1$:     MOVB @RXDB,BSTAT        ;SAVE THE ERROR CODE IN B STATUS
2349  007456  005737  010072                  TST BSTAT               ;IS THERE A DEFINITE CODE
2350  007462  001407                          BEQ NOPRNT              ;NO , CONTINUE
2351  007464  013705  010072                  MOV BSTAT,R5            ;ADJUST ERROR CODE TO PRODUCE AN EVEN ADDR
2352  007470  006005                          ROR R5                  ;OF THE CORRESPONDING COUNTER
2353  007472  006005                          ROR R5
2354  007474  062705  017226                  ADD #ERCODE-2,R5        ;ADD ON ADDR OF ERROR LOG -2,AS THERE IS NO 0
2355                                                                  ;ERROR CODE. THE CONTENTS OF R5 WILL READJUST
2356                                                                  ;ADDRESS TO CORRECT LOG.
2357  007500  005215                          INC (R5)                ;INC THE CORRECT ERROR CODE COUNTER
2358  007502  104406          NOPRNT:         CKSWR
2359  007504  032777  020000  171502          BIT #SW13,@SWR          ;TEST PRINT ERROR SWITCH IN SWR
2360  007512  001032                          BNE 2$
2361  007514  104401  015150                  TYPE ,MCRLF
2362  007520  104401  015161                  TYPE ,MERHEADER         ;TYPE ERROR HEADER
2363  007524  104401  016240                  TYPE ,MPASS             ;TYPE PASSES COMPLETED AT ERROR
2364  007530  013737  021140  007542          MOV PASCNTR,1$
2365  007536  004537  014544                  JSR R5,SGLDEC
2366  007542  000000          1$:             OPEN
2367  007544  104401  015150                  TYPE ,MCRLF
2368  007550  104401  015265                  TYPE ,MRXCS             ;TYPE COMMAND STATUS REGISTER
2369  007554  013746  004120          MOV     FUNCTION,-(SP)  ;;SAVE FUNCTION FOR TYPEOUT
2370  007560  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
2371  007562     003                  .BYTE   3               ;;TYPE 3 DIGIT(S)
2372  007563     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
```

```
2373  007564  004737  007716                      JSR PC,TYPADR           ;TYPE ADDRESSES AND RUN CONDITIONS
2374  007570  104401  015150                      TYPE ,MCRLF
2375  007574  004737  010250                      JSR PC,TYPCODE          ;PRINT THE STATUS REGISTERS
2376  007600  032737  000020  004120  2$:         BIT #BIT4,FUNCTION      ;WHAT DRIVE IS BEING USED
2377  007606  001006                              BNE 6$
2378  007610  012777  000013  171370              MOV #RD0STAT,@RXCS      ;DRIVE 0 BEING USED
2379  007616  004737  007122          5$:         JSR PC,DONECK           ;TEST FOR DONE FLAG
2380  007622  000404                              BR 7$
2381  007624  012777  000033  171354  6$:         MOV #RD1STAT,@RXCS      ;DRIVE 1 BEING USED
2382  007632  000771                              BR 5$
2383  007634  032777  000002  171346  7$:         BIT #2,@RXDB            ;WAS THERE A PARITY ERROR
2384  007642  001403                              BEQ 3$                  ;NO,CONTINUE
2385  007644  004737  002046                      JSR PC,STATER           ;YES,REPORT THE ERROR
2386  007650  000753                              BR 2$                   ;REISSUE THE COMMAND
2387  007652  105777  171332          3$:         TSTB @RXDB              ;WAS DRIVE READY SET
2388  007656  100406                              BMI 4$                  ;YES RETURN
2389  007660  104401  015114                      TYPE ,MNODRY
2390  007664  104401  015150                      TYPE ,MCRLF
2391  007670  004737  010074                      JSR PC,DELUNIT          ;NO GO DELETE THAT UNIT
2392  007674  062706  000004          4$:         ADD #4,SP               ;MOVE ERROR RETURN TO TOP OF STACK
2393  007700  000207                              RTS PC
2394
2395  007702  104401  016442          RXPWR:      TYPE ,MRX11             ;ONLY THE RX11 POWER HAS FAILED
2396  007706  104401  014234                      TYPE ,$POWER            ;PRINT POWER FAILED
2397  007712  000137  002700                      JMP RESTART             ;GO TO RESTART
2398
2399
2400  007716  104401  014653          TYPADR:     TYPE ,MTRK              ;TYPE TRACK ADDRESS
2401  007722  013737  011360  007734              MOV TARGET,3$
2402  007730  004537  014544                      JSR R5,SGLDEC
2403  007734  000000                  3$:         OPEN
2404  007736  104401  014702                      TYPE ,MSECT             ;TYPE SECTOR ADDRESS
2405  007742  013737  012310  007762              MOV TSECTOR,2$
2406  007750  042737  177740  007762              BIC #177740,2$          ;CLEAR ALL BUT SECTOR ADDRESS
2407  007756  004537  014544                      JSR R5,SGLDEC
2408  007762  000000                  2$:         OPEN
2409  007764  104401  015145                      TYPE ,DBLSP
2410  007770  032737  000020  010704              BIT #BIT4,UNITSEL       ;WHITCH DRIVE IS BEING USED
2411  007776  001003                              BNE 1$
2412  010000  104401  015204                      TYPE ,MUNIT0            ;TYPE UNIT 0
2413  010004  000402                              BR TYPSEL
2414  010006  104401  015214          1$:         TYPE ,MUNIT1            ;TYPE UNIT 1
2415  010012  104401  015342          TYPSEL:     TYPE ,MPAT              ;TYPE PATTERN CODE
2416  010016  013746  010420                  MOV     PAT,-(SP)       ;;SAVE PAT FOR TYPEOUT
2417  010022  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
2418  010024     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
2419  010025     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
2420  010026  104401  015145                      TYPE ,DBLSP
2421  010032  104401  015346                      TYPE ,MTEST             ;TYPE TEST CODE
2422  010036  013746  002140                  MOV     TEST,-(SP)      ;;SAVE TEST FOR TYPEOUT
2423  010042  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
2424  010044     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
2425  010045     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
2426  010046  104401  015145                      TYPE ,DBLSP
2427  010052  104401  015352                      TYPE ,MSEQ              ;TYPE SEQUENCE CODE
2428  010056  013746  011370                  MOV     SEQUEN,-(SP)    ;;SAVE SEQUEN FOR TYPEOUT
```

```
2429  010062  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
2430  010064     001                    .BYTE   1               ;;TYPE 1 DIGIT(S)
2431  010065     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
2432  010066  000207                    RTS PC
2433
2434  010070  000000            ASTAT:  0
2435  010072  000000            BSTAT:  0
2436
2437  010074  132737  000020  004120  DELUNIT:  BITB #BIT4,FUNCTION  ;TEST FOR PRESENTLY USED UNIT
2438  010102  001016                    BNE 3$
2439  010104  104401  015204            TYPE ,MUNIT0            ;UNIT 0 HAS BEEN DELETED FROM USE
2440  010110  104401  015224            TYPE ,MDELET
2441  010114  104401  015336            TYPE ,DBLLF
2442  010120  042737  000200  010704    BIC #BIT7,UNITSEL       ;CLEAR UNIT 0 SELECTION BIT
2443  010126  005737  010704            TST UNITSEL             ;WAS UNIT 1 SELECTED FOR USE
2444  010132  100020                    BPL 1$                  ;UNIT 1 NOT SELECTED GO DUMP ERROR REPORT
2445  010134  000137  002726      2$:   JMP TESTSEL             ;CONTINUE ON OTHER UNIT AT BEGINING OF TEST
2446  010140  104401  015214      3$:   TYPE ,MUNIT1            ;UNIT 1 HAS BEEN DELETED FROM USE
2447  010144  104401  015224            TYPE,MDELET
2448  010150  104401  015336            TYPE ,DBLLF
2449  010154  042737  100000  010704    BIC #BIT15,UNITSEL      ;CLEAR UNIT 1 SELECTION BIT
2450  010162  105737  010704            TSTB UNITSEL            ;WAS UNIT 0 SELECTED FOR USE
2451  010166  100762                    BMI 2$                  ;YES CONTINUE ON UNIT 0
2452  010170  005137  022612            COM SHORTRPT            ;SET SHORT REPORT FLAG
2453  010174  000137  021160      1$:   JMP ERDUMP              ;CAN'T CONTINUE TYPE OUT STATISTICAL REPORT
2454
2455
2456  010200  117737  171004  010070  RDCODE:  MOVB @RXDB,ASTAT      ;SAVE THE A STATUS
2457  010206  012777  000017  170772  2$:      MOV #RDER,@RXCS        ;READ THE B STATUS REGISTER
2458  010214  004737  007122            JSR PC,DONECK           ;WAIT FOR DONE FLAG
2459  010220  032777  000002  170762    BIT #2,@RXDB            ;WAS THERE A PARITY ERROR
2460  010226  001403                    BEQ 1$                  ;NO,CONTINUE
2461  010230  004737  002046            JSR PC,STATER           ;YES,REPORT THE PARITY ERROR
2462  010234  000764                    BR 2$                   ;RETRY READING STATUS B
2463  010236  117737  170746  010072  1$:      MOVB @RXDB,BSTAT       ;SAVE THE B STATUS CODES
2464  010244  104401  015150            TYPE ,MCRLF
2465  010250  104401  015306            TYPE ,MASTAT            ;TYPE THE CONTENTS OF THE TWO STATUS REGISTERS
2466  010254  013746  010070    TYPCODE:  MOV     ASTAT,-(SP)   ;;SAVE ASTAT FOR TYPEOUT
2467  010260  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
2468  010262     003                    .BYTE   3               ;;TYPE 3 DIGIT(S)
2469  010263     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
2470  010264  104401  015136            TYPE ,TAB
2471  010270  104401  015322            TYPE ,MBSTAT
2472  010274  013746  010072            MOV     BSTAT,-(SP)   ;;SAVE BSTAT FOR TYPEOUT
2473  010300  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
2474  010302     003                    .BYTE   3               ;;TYPE 3 DIGIT(S)
2475  010303     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
2476  010304  104401  015150            TYPE ,MCRLF
2477  010310  000207                    RTS PC
2478
2479
2480                              ;;**************************************************************
2481
2482                                      ;DECODES THE DATA PATERN SELECTED IN THE SWR
2483                                      ;
2484                                      ;BITS 6,7,AND 8 OF THE INITIAL SWR SELECTED THE DATA PATTERN
```

```
                                        ;TO BE USED AS FOLLOWS:
                                        ;
                                        ;   BITS                    DATA PATTERN
                                        ; 8  7  6
                                        ; 0  0  0                   NO PATTERN SPECIFIED (FORCE RANDOM DATA)
                                        ; 0  0  1                   ALL ZEROS
                                        ; 0  1  0                   ALL ONES
                                        ; 0  1  1                   FLOATING ZERO
                                        ; 1  0  0                   FLOATING ONE
                                        ; 1  0  1                   ALTERNATING BITS
                                        ; 1  1  0                   ALTERNATING PAIRS OF BITS
                                        ; 1  1  1                   RANDOM
                                        ;
                                        ;NOTE: ALL DATA PATTERNS WILL BE MODIFIED SO THE FIRST BYTE WILL
                                        ;CONTAIN THE TRACK ADDRESS. THE SECOND BYTE WILL CONTAIN THE UNIT
                                        ;NUMBER AND SECTOR ADDRESS IN WHICH THE DATA IS WRITTEN. THE LAST
                                        ;TWO BYTES CONTAIN THE CHECK SUM NUMBERS.
                                    ;;**************************************************************************


010312  142737  000377  010360  GETPATTERN:   BICB #377,@#BRONPAT     ;CLEAR BRANCH OFFSET
010320  005037  010612                        CLR SUM                 ;SET UP FOR ACCUMULATION OF CHECK SUM
010324  005737  010420                        TST PAT                 ;IF NO PATTERN SPECIFIED FORCE PATTERN 7
010330  001003                                BNE 1$
010332  012737  000007  010420                MOV #7,PAT
010340  013704  010420          1$:           MOV PAT,R4              ;GET PATTERN BITS
010344  005304                                DEC R4                  ;ADJUST FOR CORRECT OFFSET
010346  006304                                ASL R4
010350  150437  010360                        BISB R4,@#BRONPAT       ;INSERT OFFSET
010354  012704  016704                        MOV #BUFADR+2,R4        ;SET UP ADDRESS OF FIRST BYTE
010360  000777          BRONPAT:              BR .                    ;BRANCH BY OFFSET SELECTED
010362  000137  010422                        JMP DATA0               ;000 DATA BYTE
010366  000137  010434                        JMP DATA1               ;377 DATA BYTE
010372  000137  010444                        JMP FLOAT0              ;FLOAT A 0 THROUGH ALL 1'S
010376  000137  010506                        JMP FLOAT1              ;FLOAT A 1 THROUGH ALL 0'S
010402  000137  010514                        JMP PAT125              ;125/052 DATA WORD
010406  000137  010534                        JMP PAT314              ;314/063 DATA WORD
010412  000137  010544                        JMP RANDATA             ;RANDOM DATA BYTE


010416  000000          DATABYTE:             0
010420  000000          PAT:                  0


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

                                        ;LOAD SOFTWARE BUFFER WITH ALL ZEROS
                                        ;   P = 1

010422  005037  010416  DATA0:              CLR DATABYTE
010426  004737  010564  PATGEN:             JSR PC,LOAD             ;GO LOAD THE DATA BUFFER
010432  000775                              BR PATGEN

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

```
                                        ;LOAD SOFTWARE BUFFER WITH ALL ONES
                                        ;   P = 2

010434  112737  000377  010416  DATA1:        MOVB #377,DATABYTE
010442  000771                                BR PATGEN

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

                                        ;FLOAT A 0 THROUGH ONES IN SOFTWARE BUFFER
                                        ;   P = 3

010444  112737  000376  010416  FLOAT0:       MOVB #376,DATABYTE      ;SET UP A ONES FIELD
010452  000261                  XPATGEN:      SEC                     ;SET THE C BIT TO ROTATE THROUGH THE DATA
010454  012702  000000          1$:           MOV #0,R2               ;CLR R2 (CAN'T USE "CLR" AS IT CLEARS "C" BIT)
010460  103001                                BCC 2$                  ;BR IF THE "C" BIT IS CLEARED
010462  005202                                INC R2                  ;SET R2 IF NOT
010464  004737  010564          2$:           JSR PC,LOAD             ;GO LOAD THE DATA BUFFER
010470  000241                                CLC
010472  005702                                TST R2                  ;IS R2 NONZERO
010474  001401                                BEQ 3$
010476  000261                                SEC                     ;YES, SET THE "C" BIT
010500  106137  010416          3$:           ROLB DATABYTE
010504  000763                                BR 1$

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

                                        ;FLOAT A 1 THROUGH ALL ZEROS IN SOFTWARE BUFFER
                                        ;   P = 4

010506  005037  010416          FLOAT1:       CLR DATABYTE
010512  000757                                BR XPATGEN

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

                                        ;LOAD SOFTWARE BUFFER WITH ALTERNATING 1 AND 0 FOR
                                        ;ONE BYTE AND THE COMPLIMENT INTO THE NEXT
                                        ;   P = 5

010514  112737  000125  010416  PAT125:       MOVB #125,DATABYTE
010522  004737  010564          XXPATGEN:     JSR PC,LOAD
010526  105137  010416                        COMB DATABYTE           ; * (SEE NOTE BELOW )
010532  000773                                BR XXPATGEN

                                        ; * NOTE:   TO MAKE PATTERN 5 AND 6 COMPATABLE WITH THE RX8 PATTERNS
                                        ;NOP THIS INSTRUCTION. (CHANGE THESE 2 LOCATIONS TO 000240)
                                        ;THIS CHANGE IS FOR INTERPROCESSOR RX** COMPATABILITY TESTING ONLY.

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

                                        ;LOAD SOFTWARE BUFFER WITH ALTERNATING PAIRS OF 1 AND 0 AND
                                        ;COMPLIMENT INTO THE NEXT
                                        ;   P = 6

010534  112737  000314  010416  PAT314:       MOVB #314,DATABYTE
```

```
                        BR XXPATGEN

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

                        ;LOAD SOFTWARE BUFFER WITH RANDOM DATA PATTERN
                        ;   P = 0 OR 7

010544  004737  012122  RANDATA:        JSR PC,RANGEN           ;GET RANDOM NUMBER
010550  113737  012214  010416          MOVB RANUM,DATABYTE
010556  004737  010564                  JSR PC,LOAD
010562  000770                          BR RANDATA

010564  063737  010416  010612  LOAD:   ADD DATABYTE,SUM        ;ACCUMULATE THE PATTERN CHECK SUM
010572  113724  010416                  MOVB DATABYTE,(R4)+     ;LOAD THE DATA BUFFER
010576  022704  017100                  CMP #BUFADR+176,R4      ;HAVE 124 BYTES BEEN GENERATED
010602  001401                          BEQ 1$                  ;IF YES,RETURN TO TEST
010604  000207                          RTS PC                  ;IF NO,RETURN TO PATTERN GENERATOR
010606  005726                  1$:     TST (SP)+               ;TAKE PATTERN RETURN ADDRESS OF STACK
010610  000207                          RTS PC                  ;RETURN TO TEST

010612  000000                  SUM:    0

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

                        ;TEST FOR SELECTED UNITS,DRIVE READY,AND USED CONDITIONS
                        ;ALSO CONTAINS A "HAD ERROR" FLAG TO BE TESTED AT EOP.
                        ;THE BITS IN UNITSEL ARE USED AS FOLLOWS
                        ;
                        ;BIT15  =UNIT 1 SELECTED VIA SWR
                        ;BIT14  =UNIT 1 USED BIT
                        ;BIT8   =THIS PASS HAD AN ERROR
                        ;BIT7   =UNIT 0 SELECTED VIA SWR
                        ;BIT6   =UNIT 0 USED BIT
                        ;BIT4   =UNIT SELECTION FOR FUNCTION WORD

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

010614  032737  000100  010704  GETUNIT:       BIT #BIT6,UNITSEL       ;WAS UNIT 0 JUST USED
010622  001012                          BNE 1$                  ;UNIT 0 USED CHECK UNIT 1
010624  105737  010704                  TSTB UNITSEL            ;WAS UNIT 0 SELECTED
010630  100007                          BPL 1$                  ;NO GO TO UNIT 1
010632  042737  040020  010704          BIC #40020,UNITSEL      ;CLEAR UNIT 1 USED BIT AND FUNCTION UNIT BIT
010640  052737  000100  010704          BIS #BIT6,UNITSEL       ;SET UNIT 0 USED BIT
010646  000207                          RTS PC
010650  005737  010704          1$:     TST UNITSEL             ;WAS UNIT 1 SELECTED
010654  100012                          BPL 2$                  ;NO RETURN
010656  032737  040000  010704          BIT #BIT14,UNITSEL      ;HAS UNIT 1 BEEN USED
010664  001006                          BNE 2$                  ;YES RETURN
010666  042737  000100  010704          BIC #BIT6,UNITSEL       ;CLEAR UNIT 0 USED BIT
010674  052737  040020  010704          BIS #40020,UNITSEL      ;SET UNIT 1 USED BIT AND FUNCTION UNIT BIT
010702  000207                  2$:     RTS PC


010704  000000                  UNITSEL:        0
```

```
                                        ;TEST THAT ALL UNITS HAVE BEEN ACCESSED
                                
010706  005737  010704        DONE:     TST UNITSEL             ;IS UNIT 1 SELECTED
010712  100006                          BPL 1$                  ;NO RETURN
010714  032737  040000  010704          BIT #BIT14,UNITSEL      ;YES HAS IT BEEN USED
010722  001002                          BNE 1$                  ;YES RETURN
010724  062706  000002                  ADD #2,SP               ;BYPASS NOT DONE RETURE ON STACK
010730  000207              1$:         RTS PC
                                
                                
010732  004737  010706        STOP:     JSR PC,DONE             ;HAVE ALL DRIVES BEEN USED
010736  005037  007200                  CLR HCNTR1
010742  005237  021140                  INC PASCNTR             ;KEEP TOTAL NUMBER OF PASSES
010746  005737  011142                  TST CHARCT              ;HAVE 72 EOP INDICATORS BEEN TYPED
010752  001005                          BNE 3$
010754  104401  015150                  TYPE ,MCRLF             ;YES DO A CRLF
010760  012737  177670  011142          MOV #-72.,CHARCT        ;RESET CHARACTER COUNTER
010766  005237  011142        3$:       INC CHARCT
010772  032737  000400  010704          BIT #BIT8,UNITSEL       ;TEST HAD ERROR FLAG
011000  001403                          BEQ 2$                  ;NO ERROR PRINT D
011002  104401  015155                  TYPE ,MEREOP            ;HAD ERROR PRINT ?
011006  000404                          BR 1$
011010  104401  015153        2$:       TYPE ,MEOP              ;PRINT EOP INDICATOR
011014  104401  015157                  TYPE ,MABELL
011020  104406              1$:         CKSWR
011022  032777  040000  170164          BIT #SW14,@SWR          ;TEST EOP HALT SWITCH
011030  001417                          BEQ CONT22
011032  104401  015150                  TYPE ,MCRLF
011036  104401  016240                  TYPE ,MPASS             ;AT HALT ON PASS PRINT NUMBER OF PASSES COMPLETE
011042  013737  021140  011054          MOV PASCNTR,6$
011050  004537  014544                  JSR R5,SGLDEC
011054  000000              6$:         OPEN
011056  104401  015150                  TYPE ,MCRLF
011062  000000              HLT16:      HALT
011064  005037  011142                  CLR CHARCT              ;THIS CAUSES A CRLF AFTER HALT AT E.O.P.
011070  042737  040500  010704  CONT22: BIC #40500,UNITSEL      ;CLEAR USED BITS, AND "HAD ERROR" BIT
011076  022737  000007  010420          CMP #7,PAT              ;IF RANDOM DATA GET NEW DATA FOR BUFFER
011104  001002                          BNE 2$
011106  004737  010312                  JSR PC,GETPATTERN
011112  005237  007200        2$:       INC HCNTR1              ;WAIT FOR THE EOP INDICATOR TO BE PRINTED
011116  001375                          BNE 2$
011120  013705  000042                  MOV @#42,R5             ;ACT11 END OF PASS HOOKS
011124  001405                          BEQ HERE
011126  000005                          RESET
011130  004715              LOGICAL:    JSR PC,(R5)
011132  000240                          NOP
011134  000240                          NOP
011136  000240                          NOP
011140  000207              HERE:       RTS PC
                                
011142  000000              CHARCT:     0
                                
                                ;;*****************************************************************
                                
                                        ;INITIALIZE TRACK SEQUENCE
                                
```

```
2709
2710  011144  042737  100200  001200  INITTRACK:      BIC #100200,OD          ;CLEAR FIRST USED BITS
2711  011152  005737  001200                          TST OD                  ;TEST CONTENTS OF ID,OD FOR 0
2712  011156  001005                                  BNE 1$                  ;ID,OD SPECIFIED USE THEM
2713  011160  112737  000114  001201                  MOVB #114,ID            ;NONE SPECIFIED SET ID TO MAXIMUM
2714  011166  105037  001200                          CLRB OD                 ;SET OD TO MINIMUM
2715  011172  113737  001200  011360  1$:             MOVB OD,TARGET          ;INIT OD AS PRESENT TRACK
2716  011200  005037  011366                          CLR XID                 ;INIT WORKING ID AND OD LOCATIONS
2717  011204  113737  001201  011366                  MOVB ID,XID
2718  011212  005037  011364                          CLR XOD
2719  011216  113737  001200  011364                  MOVB OD,XOD
2720  011224  013737  011366  011356                  MOV XID,TRKCNTR         ;SET UP NUMBER OF TRACK MOVEMENTS
2721  011232  163737  011364  011356                  SUB XOD,TRKCNTR
2722  011240  005237  011356                          INC TRKCNTR
2723  011244  052737  100200  001200                  BIS #100200,OD          ;SET FIRST TIME BITS IN ID,OD
2724  011252  000207                                  RTS PC
2725
2726
2727
2728                                  ;;*************************************************************************
2729
2730                                          ;TEST FOR HEAD SEQUENCE SELECTED BY INITIAL SWR SETTING
2731                                          ;
2732                                          ;BITS 0,1,AND 2 OF THE INITIAL SWR SELECTED THE TRACK SEQUENCING
2733                                          ;TO BE FOLLOWED AS INITICATED BELOW
2734                                          ;
2735                                          ;   BITS                    SEQUENCE
2736                                          ; 0  0  0                   NO SEQUENCE SPECIFIED (DEFAULT TO SEQ 7)
2737                                          ; 0  0  1                   INCREMENT FROM OD TO ID
2738                                          ; 0  1  0                   DECREMENT FROM ID TO OD
2739                                          ; 0  1  1                   DO PREVIOUS 2 SEQUENCES
2740                                          ; 1  0  0                   BOUNCE BETWEEN ID AND OD
2741                                          ; 1  0  1                   DECREASING BOUNCE
2742                                          ; 1  1  0                   STROBE BETWEEN OD AND DECREMENTING ID
2743                                          ; 1  1  1                   RANDOM TRACK SELECTION
2744
2745                                  ;;*************************************************************************
2746
2747  011254  113737  011360  011362  GETTRACK:      MOVB TARGET,PRESTRK     ;RESET TO PRESENT TRACK
2748  011262  142737  000377  011320                  BICB #377,@#BRONTRK     ;CLEAR OUT BRANCH OFFSET
2749  011270  005737  011370                          TST SEQUEN              ;IF NO SEQUENCE SPECIFIED FORCE SEQUENCE 7
2750  011274  001003                                  BNE 1$
2751  011276  012737  000007  011370                  MOV #7,SEQUEN
2752  011304  013704  011370          1$:             MOV SEQUEN,R4           ;GET SEQUENCE BITS
2753  011310  005304                                  DEC R4                  ;ADJUST FOR CORRECT OFFSET
2754  011312  006304                                  ASL R4
2755  011314  150437  011320                          BISB R4,@#BRONTRK       ;THIS BR INST.IS MODIFIED BY THE TEST CONDITIONS
2756                                                                          ;SELECTED ,TO BRANCH TO ONE OF THE SEQ. BELOW
2757
2758  011320  000777          BRONTRK:        BR .                            ;BRANCH BY OFFSET SELECTED
2759  011322  000137  011372                  JMP SEQ1                        ;INCREMENT
2760  011326  000137  011426                  JMP SEQ2                        ;DECREMENT
2761  011332  000137  011460                  JMP SEQ3                        ;INCREMENT/DECREMENT
2762  011336  000137  011524                  JMP SEQ4                        ;BOUNCE ID TO OD
2763  011342  000137  011610                  JMP SEQ5                        ;DECREASING BOUNCE
2764  011346  000137  011742                  JMP SEQ6                        ;STROBE
```

```
2765  011352  000137  012022                    JMP SEQ7                ;RANDOM
2766
2767  011356  000000                TRKCNTR:    0
2768  011360  000000                TARGET:     0
2769  011362  000000                PRESTRK:    0
2770  011364  000000                XOD:        0
2771  011366  000000                XID:        0
2772  011370  000000                SEQUEN:     0
2773
2774                                ;;**************************************************************************
2775
2776                                        ;INCREMENT FROM OD+1 TO ID AND RETURN TO OD
2777                                        ;   S = 1
2778
2779  011372  042737  100200  001200  SEQ1:       BIC #100200,OD          ;CLEAR FIRST TIME BITS
2780  011400  123737  011366  011362              CMPB XID,PRESTRK        ;PRESENT TRACK EQUAL TO ID
2781  011406  001004                              BNE 1$                  ;NO GET NEW TRACK
2782  011410  113737  001200  011360              MOVB OD,TARGET          ;YES RETURN TO OD
2783  011416  000461                              BR NEWTRK               ;NEWTRK INCREMENTS THE TRACK MOVED TO COUNTER
2784                                                                      ;AND RETURNS TO NEXT TRACK
2785  011420  005237  011360          1$:         INC TARGET              ;ADD 1 TO TARGET TRACK
2786  011424  000456                              BR NEWTRK
2787
2788                                ;;**************************************************************************
2789
2790                                        ;DECREMENT FROM ID TO OD
2791                                        ;   S = 2
2792
2793  011426  105737  001201          SEQ2:       TSTB ID                 ;FIRST TIME BIT SET
2794  011432  100007                              BPL 1$                  ;NO GET NEXT TRACK
2795  011434  042737  100200  001200              BIC #100200,OD          ;YES CLEAR FIRST TIME BITS
2796  011442  113737  011366  011360              MOVB XID,TARGET         ;GO TO ID
2797  011450  000444                              BR NEWTRK
2798  011452  005337  011360          1$:         DEC TARGET              ;MOVE TO NEXT TRACK
2799  011456  000441                              BR NEWTRK
2800
2801                                ;;**************************************************************************
2802
2803                                        ;INCREMENT THEN DECREMENT TRACKS
2804                                        ;   S = 3
2805
2806  011460  105737  001200          SEQ3:       TSTB OD                 ;CHECK FIRST TIME BIT
2807  011464  100007                              BPL 1$                  ;NOT FIRST TIME THROUGH
2808  011466  042737  100200  001200              BIC #100200,OD          ;CLEAR FIRST TIME BITS
2809  011474  005337  011356                      DEC TRKCNTR
2810  011500  006337  011356                      ASL TRKCNTR             ;RESET TRACK COUNTER TO DOUBLE THE COUNT
2811  011504  013700  011366          1$:         MOV XID,R0
2812  011510  163700  011364                      SUB XOD,R0              ;GET DIFFERENCE BETWEEN ID AND OD
2813  011514  163700  011356                      SUB TRKCNTR,R0          ;IS TRACK COUNTER HALF DONE
2814  011520  002342                              BGE SEQ2                ;YES GO DECREMENT TRACKS
2815  011522  000723                              BR SEQ1                 ;NO CONTINUE INCREMENTING TRACKS
2816
2817
2818                                ;;**************************************************************************
2819
2820                                        ;BOUNCE BETWEEN ID AND OD ONLY
```

```
                                        ;   S = 4
                                        ;
011524  042737  100200  001200  SEQ4:         BIC #100200,OD          ;CLEAR THE FIRST TIME BITS
011532  123737  011362  001200               CMPB PRESTRK,OD         ;DID IT JUST DO OD
011540  001404                               BEQ IDNEXT              ;YES
011542  113737  001200  011360               MOVB OD,TARGET          ;NO GO TO OD TRACK
011550  000404                               BR NEWTRK
011552  113737  001201  011360  IDNEXT:      MOVB ID,TARGET          ;GO DO ID TRACK
011560  000400                               BR NEWTRK
                                        ;
                                        ;;*************************************************************************
                                        ;
                                        ;INCREMENT THE "HEAD MOVED TO" COUNTERS AND RETURN
                                        ;THROUGH HERE FROM ALL TRACK SEQUENCES
                                        ;
011562  013705  011360  NEWTRK:         MOV TARGET,R5           ;GET TRACK ADDRESS
011566  006305                         ASL R5                  ;MULTIPLY BY 4 TO DOUBLE PRECISION
011570  006305                         ASL R5                  ;INTERLEAVE COUNTER ADDRESSES
011572  062705  017756                 ADD #HDMOVE,R5          ;ADD ON ADDRESS OF HEAD MOVE COUNTER
011576  062715  000001                 ADD #1,(R5)             ;INC COUNTER
011602  005565  000002                 ADC 2(R5)               ;ADD CARRY TO HIGH ORDER WORD
011606  000207                         RTS PC                  ;RETURN TO ACCESS NEXT TRACK
                                        ;
                                        ;;*************************************************************************
                                        ;
                                        ;BOUNCE BETWEEN DECREASING ID AND INCREASING OD
                                        ;   S = 5
                                        ;
011610  105737  001201  SEQ5:           TSTB ID                 ;TEST FIRST TIME BIT OF ID
011614  100011                         BPL 1$
011616  005237  011356                 INC TRKCNTR             ;ADJUST FOR ONE EXTRA MOVEMENT TO TRK 00
011622  142737  000200  001201         BICB #200,ID            ;CLEAR FIRST TIME BIT OF ID
011630  113737  011366  011360         MOVB XID,TARGET         ;MOVE TO ID
011636  000751                         BR NEWTRK
011640  105737  001200  1$:            TSTB OD                 ;TEST FIRST TIME BIT OF OD
011644  100007                         BPL 2$
011646  142737  000200  001200         BICB #200,OD            ;CLEAR FIRST TIME BIT OF OD
011654  113737  011364  011360         MOVB XOD,TARGET         ;MOVE TO OD
011662  000737                         BR NEWTRK
011664  132737  000001  011356  2$:    BITB #1,TRKCNTR         ;TEST COUNTER FOR ODD OR EVEN
011672  001006                         BNE 3$                  ;ODD MOVE TO NEW ID
011674  005237  011364                 INC XOD                 ;EVEN ADD 1 TO OD
011700  113737  011364  011360         MOVB XOD,TARGET
011706  000405                         BR LASTTRK              ;SEE IF LAST TRACK IS BEING ACCESSED
011710  005337  011366  3$:            DEC XID                 ;SUBTRACT 1 FROM ID
011714  113737  011366  011360         MOVB XID,TARGET
011722  123727  011356  000001  LASTTRK:    CMPB TRKCNTR,#1
011730  001003                         BNE XRETURN
011732  113737  001200  011360         MOVB OD,TARGET          ;THIS IS LAST TRACK RETURN TO OD
011740  000710          XRETURN:       BR NEWTRK
                                        ;
                                        ;;*************************************************************************
                                        ;
                                        ;STROBE BETWEEN OD AND DECREASING ID
                                        ;   S = 6
```

```
2877
2878  011742  105737  001200          SEQ6:       TSTB OD                 ;CHECK FIRST TIME BIT
2879  011746  100007                              BPL 1$                  ;NOT FIRST TIME
2880  011750  042737  100200  001200              BIC #100200,OD          ;WAS FIRST TIME,CLEAR THE BITS
2881  011756  005337  011356                      DEC TRKCNTR             ;RESET COUNTER TO DOUBLE THE NUMBER OF TRACKS
2882  011762  006337  011356                      ASL TRKCNTR
2883  011766  123737  011362  001200  1$:         CMPB PRESTRK,OD         ;WAS OD JUST ACCESSED
2884  011774  001006                              BNE ODNEXT              ;NO GO TO OD
2885  011776  113737  011366  011360              MOVB XID,TARGET         ;DECREASING ID IS NEXT TRACK
2886  012004  005337  011366                      DEC XID
2887  012010  000664                              BR NEWTRK
2888  012012  113737  001200  011360  ODNEXT:     MOVB OD,TARGET          ;OD IS NEXT TRACK
2889  012020  000660                              BR NEWTRK
2890
2891
2892
2893                                  ;;**********************************************************************
2894                                          ;RANDOM SEQUENCING OF TRACKS
2895                                          ;FOR PROPER USE OF RANDOM TRACK SEQUENCING, THE OD/ID LIMITS
2896                                          ;SHOULD NOT BE SET FOR LESS THAN HALF THE TRACKS.
2897                                          ;   S = 0 OR 7
2898
2899  012022  042737  100200  001200  SEQ7:       BIC #100200,OD          ;CLEAR THE FIRST TIME BITS
2900  012030  004737  012122                      JSR PC,RANGEN           ;GET A RANDOM NUMBER
2901  012034  042737  177600  012214              BIC #177600,RANUM       ;CLEAR ALL BUT LOW 7 BITS
2902  012042  123737  012214  011366  IDCOMP:     CMPB RANUM,XID          ;IS RANUM LARGER THAN ID ADDRESS
2903  012050  003404                              BLE ODCOMP              ;NO,RANUM IS LESS OR EQUAL TO ID
2904  012052  163737  011366  012214              SUB XID,RANUM           ;YES,SUBTRACT ID FROM IT
2905  012060  000770                              BR IDCOMP               ;SEE IF RANUM IS NOW OK
2906  012062  123737  012214  011364  ODCOMP:     CMPB RANUM,XOD          ;IS RANUM SMALLER THAN OD ADDRESS
2907  012070  002004                              BGE PRESCHK             ;NO,RANUM IS GREATER OR EQUAL TO OD
2908  012072  063737  011364  012214              ADD XOD,RANUM           ;YES,ADD OD TO RANUM
2909  012100  000770                              BR ODCOMP               ;SEE IF RANUM IS NOW OK
2910  012102  123737  012214  011362  PRESCHK:    CMPB RANUM,PRESTRK      ;IF RANUM EQUALS PRESENT TRACK
2911  012110  001744                              BEQ SEQ7                ;GET ANOTHER RANDOM NUMBER
2912  012112  013737  012214  011360              MOV RANUM,TARGET        ;RANUM OK PUT IT IN TARGET TRACK
2913  012120  000620                              BR NEWTRK
2914
2915  012122  012700  000001          RANGEN:     MOV #1,R0
2916  012126  063700  012210                      ADD RAN1,R0
2917  012132  063700  012212                      ADD RAN2,R0
2918  012136  042700  170000                      BIC #170000,R0
2919  012142  000241                              CLC
2920  012144  006100                              ROL R0
2921  012146  006100                              ROL R0
2922  012150  010037  012210                      MOV R0,RAN1
2923  012154  005000                              CLR R0
2924  012156  013700  012212                      MOV RAN2,R0
2925  012162  006000                              ROR R0
2926  012164  006000                              ROR R0
2927  012166  063700  012210                      ADD RAN1,R0
2928  012172  042700  170000                      BIC #170000,R0
2929  012176  010037  012212                      MOV R0,RAN2
2930  012202  010037  012214                      MOV R0,RANUM
2931  012206  000207                              RTS PC
2932
```

```
2933  012210  000000                  RAN1:           0
2934  012212  000000                  RAN2:           0
2935  012214  000000                  RANUM:          0
2936
2937                                  ;;**********************************************************************
2938
2939                                          ;SECTOR INITIALIZATION AND SELECTION
2940
2941  012216  005737  001202          INITSECTOR:     TST FIRST               ;TEST FIRST AND LAST FOR 0
2942  012222  001005                                  BNE 1$                  ;SECTORS SPECIFIED USE THEM
2943  012224  005237  001202                          INC FIRST               ;NONE SPECIFIED SET FIRST TO 1
2944  012230  112737  000032  001203                  MOVB #32,LAST           ;SET LAST TO MAXIMUM
2945  012236  113737  001203  012306  1$:             MOVB LAST,SECCNTR       ;SET UP SECTOR COUNTER
2946  012244  163737  001202  012306                  SUB FIRST,SECCNTR
2947  012252  005237  012306                          INC SECCNTR
2948  012256  105037  012307                          CLRB SECCNTR+1
2949  012262  113737  001202  012310                  MOVB FIRST,TSECTOR      ;PUT FIRST SECTOR IN TARGET SECTOR
2950  012270  163737  012314  012310                  SUB THREE,TSECTOR       ;SUB 3 FROM TSECTOR AS FIRST TIME THROUGH
2951                                                  ;IT GETS ADDED BACK ON.
2952  012276  012737  000001  012312                  MOV #1,INTLEAV          ;SET INTERLEAVE OFFSET
2953  012304  000207                                  RTS PC
2954
2955  012306  000000                  SECCNTR:        0
2956  012310  000000                  TSECTOR:        0
2957  012312  000000                  INTLEAV:        0
2958  012314  000003                  THREE:          3
2959
2960  012316  063737  012314  012310  GETSECTOR:     ADD THREE,TSECTOR       ;ADD 3 FOR INTERLEAVING
2961  012324  123737  001203  012310                  CMPB LAST,TSECTOR
2962  012332  002010                                  BGE 1$                  ;NEW SECTOR IS WITHIN LIMITS
2963  012334  113737  001202  012310                  MOVB FIRST,TSECTOR      ;RESET TARGET SECTOR TO INTERLEAVE
2964  012342  063737  012312  012310                  ADD INTLEAV,TSECTOR     ;ADD ON INTERLEAVE OFFSET VALUE
2965  012350  005237  012312                          INC INTLEAV             ;UP DATE THE OFFSET VALUE
2966  012354  000207                  1$:             RTS PC
2967
2968
2969                                  .SBTTL  TYPE ROUTINE
2970
2971                                  ;;**********************************************************************
2972                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
2973                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
2974                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
2975                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
2976                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
2977                                  ;*
2978                                  ;*CALL:
2979                                  ;*1) USING A TRAP INSTRUCTION
2980                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
2981                                  ;*OR
2982                                  ;*      TYPE
2983                                  ;*      MESADR
2984                                  ;*
2985
2986  012356  105737  012663          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
2987  012362  100002                          BPL     1$              ;;BR IF YES
2988  012364  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
```

```
2989  012366  000407                    BR      3$              ;;LEAVE
2990  012370  010046              1$:   MOV     R0,-(SP)        ;;SAVE R0
2991  012372  017600  000002            MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
2992  012376  112046              2$:   MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
2993  012400  001005                    BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
2994  012402  005726                    TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
2995  012404  012600              60$:  MOV     (SP)+,R0        ;;RESTORE R0
2996  012406  062716  000002      3$:   ADD     #2,(SP)         ;;ADJUST RETURN PC
2997  012412  000002                    RTI                     ;;RETURN
2998  012414  122716  000011      4$:   CMPB    #HT,(SP)        ;;BRANCH IF <HT>
2999  012420  001430                    BEQ     8$
3000  012422  122716  000200            CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
3001  012426  001006                    BNE     5$
3002  012430  005726                    TST     (SP)+           ;;POP  <CR><LF> EQUIV
3003  012432  104401                    TYPE                    ;;TYPE A CR AND LF
3004  012434  012665                    $CRLF
3005  012436  105037  012644           CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
3006  012442  000755                    BR      2$              ;;GET NEXT CHARACTER
3007  012444  004737  012526      5$:   JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
3008  012450  123726  012662      6$:   CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
3009  012454  001350                    BNE     2$              ;;IF NO GO GET NEXT CHAR.
3010  012456  013746  012660           MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
3011                                                            ;;AND THE NULL CHAR.
3012  012462  105366  000001      7$:   DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
3013  012466  002770                    BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
3014  012470  004737  012526           JSR     PC,$TYPEC       ;;GO TYPE A NULL
3015  012474  105337  012644           DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
3016  012500  000770                    BR      7$              ;;LOOP
3017
3018                                  ;HORIZONTAL TAB PROCESSOR
3019
3020  012502  112716  000040      8$:   MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
3021  012506  004737  012526      9$:   JSR     PC,$TYPEC       ;;TYPE A SPACE
3022  012512  132737  000007  012644   BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
3023  012520  001372                    BNE     9$              ;;TAB STOP
3024  012522  005726                    TST     (SP)+           ;;POP SPACE OFF STACK
3025  012524  000724                    BR      2$              ;;GET NEXT CHARACTER
3026  012526                      $TYPEC:
3027  012526  105777  000116           TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?          ;MJD001
3028  012532  100022                    BPL     10$             ;;BR IF NOT                     ;MJD001
3029  012534  017746  000112           MOV     @$TKB,-(SP)     ;;GET CHAR                      ;MJD001
3030  012540  042716  177600           BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS         ;MJD001
3031  012544  122716  000023           CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF                 ;MJD001
3032  012550  001012                    BNE     102$            ;;BR IF NOT                     ;MJD001
3033  012552                      101$:                                                         ;MJD001
3034  012552  105777  000072           TSTB    @$TKS           ;;WAIT FOR CHAR                 ;MJD001
3035  012556  100375                    BPL     101$                                            ;MJD001
3036  012560  117716  000066           MOVB    @$TKB,(SP)      ;;GET CHAR                      ;MJD001
3037  012564  042716  177600           BIC     #177600,(SP)    ;;STRIP IT                      ;MJD001
3038  012570  122716  000021           CMPB    #$XON,(SP)      ;;WAS IT XON?                   ;MJD001
3039  012574  001366                    BNE     101$            ;;BR IF NOT                     ;MJD001
3040  012576                      102$:                                                         ;MJD001
3041  012576  005726                    TST     (SP)+           ;;FIX STACK                     ;MJD001
3042  012600                      10$:                                                          ;MJD001
3043  012600  105777  000050           TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
3044  012604  100375                    BPL     10$                                             ;MJD001
```

```
3045  012606  116677  000002  000042          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
3046  012614  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
3047  012622  001003                          BNE     1$              ;;BRANCH IF NO
3048  012624  105037  012644                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
3049  012630  000406                          BR      $TYPEX          ;;EXIT
3050  012632  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
3051  012640  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
3052  012642  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
3053  012644  000000                  $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
3054  012646  000207                  $TYPEX: RTS     PC
3055
3056  012650  177560                  $TKS:   .WORD   177560          ;;TTY KDB STATUS        ;MJD001
3057  012652  177562                  $TKB:   .WORD   177562          ;;TTY KBD BUFFER        ;MJD001
3058  012654  177564                  $TPS:   .WORD   177564          ;;TTY PRINTER STATUS REG. ADDRESS
3059  012656  177566                  $TPB:   .WORD   177566          ;;TTY PRINTER BUFFER REG. ADDRESS
3060  012660     000                  $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
3061  012661     002                  $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
3062  012662     012                  $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
3063  012663     000                  $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
3064  012664     077                  $QUES:  .ASCII  "?"             ;;QUESTION MARK
3065  012665     015                  $CRLF:  .ASCII  <15>            ;;CARRAIGE RETURN
3066  012666  000012                  $LF:    .ASCIZ  <12>            ;;LINEFEED
3067                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
3068
3069                                  ;;**************************************************************************
3070                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
3071                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
3072                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
3073                                  ;*CALL:
3074                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3075                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
3076                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
3077                                  ;*      .BYTE   M               ;;M=1 OR 0
3078                                  ;*                                      ;;1=TYPE LEADING ZEROS
3079                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
3080                                  ;*
3081                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
3082                                  ;*$TYPOS OR $TYPOC
3083                                  ;*CALL:
3084                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3085                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
3086                                  ;*
3087                                  ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
3088                                  ;*CALL:
3089                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3090                                  ;*      TYPOC                   ;;CALL FOR TYPEOUT
3091
3092  012670  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
3093  012674  116637  000001  013113          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
3094  012702  112637  013115                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
3095  012706  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
3096  012712  000406                          BR      $TYPON
3097  012714  112737  000001  013113  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
3098  012722  112737  000006  013115          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
3099  012730  112737  000005  013112  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
3100  012736  010346                          MOV     R3,-(SP)        ;;SAVE R3
```

```
3101  012740  010446                        MOV     R4,-(SP)        ;;SAVE R4
3102  012742  010546                        MOV     R5,-(SP)        ;;SAVE R5
3103  012744  113704  013115                MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
3104  012750  005404                        NEG     R4
3105  012752  062704  000006                ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
3106  012756  110437  013114                MOVB    R4,$OMODE       ;;SAVE IT FOR USE
3107  012762  113704  013113                MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
3108  012766  016605  000012                MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
3109  012772  005003                        CLR     R3              ;;CLEAR THE OUTPUT WORD
3110  012774  006105                1$:     ROL     R5              ;;ROTATE MSB INTO "C"
3111  012776  000404                        BR      3$              ;;GO DO MSB
3112  013000  006105                2$:     ROL     R5              ;;FORM THIS DIGIT
3113  013002  006105                        ROL     R5
3114  013004  006105                        ROL     R5
3115  013006  010503                        MOV     R5,R3
3116  013010  006103                3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
3117  013012  105337  013114                DECB    $OMODE          ;;TYPE THIS DIGIT?
3118  013016  100016                        BPL     7$              ;;BR IF NO
3119  013020  042703  177770                BIC     #177770,R3      ;;GET RID OF JUNK
3120  013024  001002                        BNE     4$              ;;TEST FOR 0
3121  013026  005704                        TST     R4              ;;SUPPRESS THIS 0?
3122  013030  001403                        BEQ     5$              ;;BR IF YES
3123  013032  005204                4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
3124  013034  052703  000060                BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
3125  013040  052703  000040        5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
3126  013044  110337  013110                MOVB    R3,8$           ;;SAVE FOR TYPING
3127  013050  104401  013110                TYPE    ,8$             ;;GO TYPE THIS DIGIT
3128  013054  105337  013112        7$:     DECB    $OCNT           ;;COUNT BY 1
3129  013060  003347                        BGT     2$              ;;BR IF MORE TO DO
3130  013062  002402                        BLT     6$              ;;BR IF DONE
3131  013064  005204                        INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
3132  013066  000744                        BR      2$              ;;GO DO THE LAST DIGIT
3133  013070  012605                6$:     MOV     (SP)+,R5        ;;RESTORE R5
3134  013072  012604                        MOV     (SP)+,R4        ;;RESTORE R4
3135  013074  012603                        MOV     (SP)+,R3        ;;RESTORE R3
3136  013076  016666  000002  000004        MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
3137  013104  012616                        MOV     (SP)+,(SP)
3138  013106  000002                        RTI                     ;;RETURN
3139  013110     000                8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
3140  013111     000                        .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
3141  013112     000                $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
3142  013113     000                $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
3143  013114  000000                $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
3144                                .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
3145
3146                                ;;******************************************************************************
3147                                ;*SAVE R0-R5
3148                                ;*CALL:
3149                                ;*      SAVREG
3150                                ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
3151                                ;*
3152                                ;*TOP---(+16)
3153                                ;* +2---(+18)
3154                                ;* +4---R5
3155                                ;* +6---R4
3156                                ;* +8---R3
```

```
                                        ;**10---R2
                                        ;**12---R1
                                        ;**14---R0
                                        
                                        $SAVREG:
013116                                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
013116  010046                                 MOV     R1,-(SP)        ;;PUSH R1 ON STACK
013120  010146                                 MOV     R2,-(SP)        ;;PUSH R2 ON STACK
013122  010246                                 MOV     R3,-(SP)        ;;PUSH R3 ON STACK
013124  010346                                 MOV     R4,-(SP)        ;;PUSH R4 ON STACK
013126  010446                                 MOV     R5,-(SP)        ;;PUSH R5 ON STACK
013130  010546                                 MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
013132  016646  000022                        MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
013136  016646  000022                        MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
013142  016646  000022                        MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
013146  016646  000022                        RTI
013152  000002
                                        ;*RESTORE R0-R5
                                        ;*CALL:
                                        ;*      RESREG
013154                                  $RESREG:
013154  012666  000022                          MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
013160  012666  000022                          MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
013164  012666  000022                          MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
013170  012666  000022                          MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
013174  012605                                  MOV     (SP)+,R5        ;;POP STACK INTO R5
013176  012604                                  MOV     (SP)+,R4        ;;POP STACK INTO R4
013200  012603                                  MOV     (SP)+,R3        ;;POP STACK INTO R3
013202  012602                                  MOV     (SP)+,R2        ;;POP STACK INTO R2
013204  012601                                  MOV     (SP)+,R1        ;;POP STACK INTO R1
013206  012600                                  MOV     (SP)+,R0        ;;POP STACK INTO R0
013210  000002                                  RTI
                                        .SBTTL  TTY INPUT ROUTINE
                                        
                                        ;;**************************************************************************
                                        .ENABL  LSB
                                        
                                        ;;**************************************************************************
                                        ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
                                        ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
                                        ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
                                        ;*WHEN OPERATING IN TTY FLAG MODE.
013212  022737  000176  001214          $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
013220  001074                                  BNE     15$             ;;BRANCH IF NO
013222  105777  177422                          TSTB    @$TKS           ;;CHAR THERE?
013226  100071                                  BPL     15$             ;;IF NO, DON'T WAIT AROUND
013230  117746  177416                          MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
013234  042716  177600                          BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
013240  022726  000007                          CMP     #7,(SP)+        ;;IS IT A CONTROL G?
013244  001062                                  BNE     15$             ;;NO, RETURN TO USER
013246  123727  013776  000001                  CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
013254  001456                                  BEQ     15$             ;;BRANCH IF YES
                                        
013256  104401  013747                          TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
013262  104401  013754                  $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
013266  013746  000176                          MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
```

```
3213  013272  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3214  013274  104401  013765          TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
3215  013300  005046          19$:    CLR     -(SP)           ;;CLEAR COUNTER
3216  013302  005046                  CLR     -(SP)           ;;THE NEW SWR
3217  013304  105777  177340  7$:     TSTB    @$TKS           ;;CHAR THERE?
3218  013310  100375                  BPL     7$              ;;IF NOT TRY AGAIN
3219
3220  013312  117746  177334          MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
3221  013316  042716  177600          BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
3222
3223
3224
3225  013322  021627  000025  9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
3226  013326  001005                  BNE     10$             ;;BRANCH IF NOT
3227  013330  104401  013742          TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
3228  013334  062706  000006  20$:     ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
3229  013340  000757                  BR      19$             ;;LET'S TRY IT AGAIN
3230
3231
3232  013342  021627  000015  10$:     CMP     (SP),#15        ;;IS IT A <CR>?
3233  013346  001022                  BNE     16$             ;;BRANCH IF NO
3234  013350  005766  000004          TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
3235  013354  001403                  BEQ     11$             ;;BRANCH IF YES
3236  013356  016677  000002  165630  MOV     2(SP),@SWR      ;;SAVE NEW SWR
3237  013364  062706  000006  11$:     ADD     #6,SP           ;;CLEAR UP STACK
3238  013370  104401  012665  14$:     TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
3239  013374  123727  013777  000001  CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
3240  013402  001003                  BNE     15$             ;;BRANCH IF NOT
3241  013404  012777  000100  177236  MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
3242  013412  000002          15$:     RTI                     ;;RETURN
3243  013414  004737  012526  16$:     JSR     PC,$TYPEC       ;;ECHO CHAR
3244  013420  021627  000060          CMP     (SP),#60        ;;CHAR < 0?
3245  013424  002420                  BLT     18$             ;;BRANCH IF YES
3246  013426  021627  000067          CMP     (SP),#67        ;;CHAR > 7?
3247  013432  003015                  BGT     18$             ;;BRANCH IF YES
3248  013434  042726  000060          BIC     #60,(SP)+       ;;STRIP-OFF ASCII
3249  013440  005766  000002          TST     2(SP)           ;;IS THIS THE FIRST CHAR
3250  013444  001403                  BEQ     17$             ;;BRANCH IF YES
3251  013446  006316                  ASL     (SP)            ;;NO, SHIFT PRESENT
3252  013450  006316                  ASL     (SP)            ;;    CHAR OVER TO MAKE
3253  013452  006316                  ASL     (SP)            ;;    ROOM FOR NEW ONE.
3254  013454  005266  000002  17$:     INC     2(SP)           ;;KEEP COUNT OF CHAR
3255  013460  056616  177776          BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
3256  013464  000707                  BR      7$              ;;GET THE NEXT ONE
3257  013466  104401  012664  18$:     TYPE    ,$QUES          ;;TYPE ?<CR><LF>
3258  013472  000720                  BR      20$             ;;SIMULATE CONTROL-U
3259                        .DSABL  LSB
3260
3261
3262                        ;;**************************************************************************
3263                        ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
3264                        ;*CALL:
3265                        ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
3266                        ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
3267                        ;*                              ;;WITH PARITY BIT STRIPPED OFF
3268                        ;
```

```
                                ;RDCHR - READ A CHARACTER FROM THE TTY
013474  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
013476  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
013504  105777  177140          1$:     TSTB    @$TKS           ;;WAIT FOR
013510  100375                          BPL     1$              ;;A CHARACTER
013512  117766  177134  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
013520  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
013526  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
013534  001013                          BNE     3$              ;;BRANCH IF NO
013536  105777  177106          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
013542  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
013544  117746  177102                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
013550  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
013554  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
013560  001366                          BNE     2$              ;;IF NOT DISCARD IT
013562  000750                          BR      1$              ;;YES, RESUME
013564  026627  000004  000021  3$:     CMP     4(SP),#$XON     ;;IS IT A RANDOM XON?                   ;RAN001
013572  001744                          BEQ     1$              ;;BRANCH IF YES                         ;RAN001
013574  026627  000004  000140          CMP     4(SP),#140      ;;IS IT UPPER CASE?
013602  002407                          BLT     4$              ;;BRANCH IF YES
013604  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
013612  003003                          BGT     4$              ;;BRANCH IF YES
013614  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
013622  000002                  4$:     RTI                     ;;GO BACK TO USER
                                ;;**********************************************************************
                                ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                ;*CALL:
                                ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
                                ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S

013624  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
013626  012703  013732          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
013632  022703  013742          2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
013636  101405                          BLOS    4$              ;;BR IF YES
013640  104407                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
013642  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
013644  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
013650  001003                          BNE     3$              ;;SKIP IF NOT
013652  104401  012664          4$:     TYPE    ,$QUES          ;;TYPE A '?'
013656  000763                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
013660  111337  013730          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
013664  104401  013730                  TYPE    ,9$
013670  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
013674  001356                          BNE     2$              ;;LOOP IF NOT RETURN
013676  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
013702  104401  012666                  TYPE    ,$LF            ;;TYPE A LINE FEED
013706  012603                          MOV     (SP)+,R3        ;;RESTORE R3
013710  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
013712  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
013720  012766  013732  000004          MOV     #$TTYIN,4(SP)
013726  000002                          RTI                     ;;RETURN
013730     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
013731     000                          .BYTE   0               ;;TERMINATOR
013732  000010                  $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
013742  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
```

```
3325  013747  136     006507  000012  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
3326  013754  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
3327  013762  020075  000
3328  013765  040     047040  053505  $MNEW:  .ASCIZ  /  NEW = /
3329  013772  036440  000040
3330  013776  000                     $AUTOB: .BYTE   0       ;;AUTO MODE FLAG
3331  013777  000                     $INTAG: .BYTE   0       ;;INTERRUPT MODE FLAG
3332                                  .SBTTL  TRAP DECODER
3333
3334                                  ;;**********************************************************************
3335                                  ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
3336                                  ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
3337                                  ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
3338                                  ;*GO TO THAT ROUTINE.
3339
3340  014000  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
3341  014002  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
3342  014006  005740                          TST     -(R0)           ;;BACKUP BY 2
3343  014010  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
3344  014012  006300                          ASL     R0              ;;POSITION FOR INDEXING
3345  014014  016000  014034                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
3346  014020  000200                          RTS     R0              ;;GO TO ROUTINE
3347
3348
3349                                  ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
3350
3351  014022  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
3352  014024  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
3353  014032  000002                          RTI                     ;;RESTORE THE PSW
3354
3355                                  .SBTTL  TRAP TABLE
3356
3357                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
3358                                  ;*BY THE "TRAP" INSTRUCTION.
3359
3360                                  ;       ROUTINE
3361                                  ;       -------
3362  014034  014022                  $TRPAD: .WORD   $TRAP2
3363  014036  012356                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
3364  014040  012714                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
3365  014042  012670                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
3366  014044  012730                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
3367
3368  014046  013262                          $GTSWR  ;;CALL=GTSWR    TRAP+5(104405)  GET SOFT-SWR SETTING
3369
3370  014050  013212                          $CKSWR  ;;CALL=CKSWR    TRAP+6(104406)  TEST FOR CHANGE IN SOFT-SWR
3371  014052  013474                          $RDCHR  ;;CALL=RDCHR    TRAP+7(104407)  TTY TYPEIN CHARACTER ROUTINE
3372  014054  013624                          $RDLIN  ;;CALL=RDLIN    TRAP+10(104410) TTY TYPEIN STRING ROUTINE
3373  014056  013116                          $SAVREG ;;CALL=SAVREG   TRAP+11(104411) SAVE R0-R5 ROUTINE
3374  014060  013154                          $RESREG ;;CALL=RESREG   TRAP+12(104412) RESTORE R0-R5 ROUTINE
3375                                  .SBTTL  POWER DOWN AND UP ROUTINES
3376
3377                                  ;;**********************************************************************
3378                                  ;POWER DOWN ROUTINE
3379  014062  012737  014226  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
3380  014070  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
```

```
                                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
                                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
                                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
                                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
                                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
                                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
                                        MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
                                        MOV     SP,$SAVR6       ;;SAVE SP
                                        MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
                                        HALT
                                        BR      .-2             ;;HANG UP

                                ;;**************************************************************************
                                ;POWER UP ROUTINE
                                $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
                                        MOV     $SAVR6,SP       ;;GET SP
                                        CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
                                1$:     INC     $SAVR6          ;;WAIT FOR THE INC
                                        BNE     1$              ;;OF  WORD
                                        MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
                                        MOV     (SP)+,R5        ;;POP STACK INTO R5
                                        MOV     (SP)+,R4        ;;POP STACK INTO R4
                                        MOV     (SP)+,R3        ;;POP STACK INTO R3
                                        MOV     (SP)+,R2        ;;POP STACK INTO R2
                                        MOV     (SP)+,R1        ;;POP STACK INTO R1
                                        MOV     (SP)+,R0        ;;POP STACK INTO R0
                                        MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
                                        MOV     #340,@#PWRVEC+2 ;;PRIO:7
                                        TYPE                    ;REPORT THE POWER FAILURE
                                $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
                                        MOV     (PC)+,(SP)      ;;RESTART AT RESTART
                                $PWRAD: .WORD   RESTART         ;;RESTART ADDRESS
                                        RTI
                                $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
                                        BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
                                $SAVR6: 0                       ;;PUT THE SP HERE
                                $POWER: .ASCIZ  <15><12>'POWER'
                                        .EVEN
                                .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE

                                ;;**************************************************************************
                                ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
                                ;*UNSIGNED DECIMAL ASCIZ NUMBER.
                                ;*CALL
                                ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
                                ;*      JSR     PC,@#$SB2D      ;;CALL
                                ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK

                                $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
                                        MOV     #1$,-(SP)       ;;SET POINTER
                                        JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
                                        ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
                                        MOV     (SP)+,2(SP)     ;;PICKUP POINTER
                                        RTS     PC              ;;RETURN
```

```
3437  014274  000000  000000          1$:     .WORD   0,0
3438                                  .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
3439
3440                                  ;;**********************************************************************
3441                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
3442                                  ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
3443                                  ;*POSITIVE.
3444                                  ;*CALL
3445                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
3446                                  ;*      JSR     PC,@#$DB2D
3447                                  ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
3448                                                                  ;;IS ON THE STACK
3449
3450
3451  014300  104411                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
3452  014302  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
3453  014306  012700  014460                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
3454  014312  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
3455  014316  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
3456  014320  012202                          MOV     (R2)+,R2
3457  014322  012737  000012  014376          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
3458  014330  012704  014410                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
3459  014334  012705  014412                  MOV     #$TNPWR+2,R5
3460  014340  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
3461  014342  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
3462  014344  005602                          SBC     R2
3463  014346  161502                          SUB     (R5),R2
3464  014350  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
3465  014352  005203                          INC     R3              ;;ADD 1 TO PARTIAL
3466  014354  000772                          BR      2$              ;;LOOP
3467  014356  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
3468  014360  005502                          ADC     R2
3469  014362  062402                          ADD     (R4)+,R2
3470  014364  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
3471  014366  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
3472  014372  110320                          MOVB    R3,(R0)+        ;;SAVE IT
3473  014374  005327                          DEC     (PC)+           ;;DONE?
3474  014376  000000                  4$:     .WORD   0
3475  014400  001357                          BNE     1$              ;;BR IF NO
3476  014402  105020                          CLRB    (R0)+           ;;TERMINATOR
3477  014404  104412                          RESREG                  ;;RESTORE REGISTERS
3478  014406  000207                          RTS     PC              ;;RETURN
3479  014410  145000                  $TNPWR: 145000                  ;;1.0E09
3480  014412  035632                          35632
3481  014414  160400                          160400                  ;;1.0E08
3482  014416  002765                          2765
3483  014420  113200                          113200                  ;;1.0E07
3484  014422  000230                          230
3485  014424  041100                          041100                  ;;1.0E06
3486  014426  000017                          17
3487  014430  103240                          103240                  ;;1.0E05
3488  014432  000001                          1
3489  014434  023420                          23420                   ;;1.0E04
3490  014436  000000                          0
3491  014440  001750                          1750                    ;;1.0E03
3492  014442  000000                          0
```

```
3493  014444  0C0144                    144                     ;;1.0E02
3494  014446  000000                    0
3495  014450  000012                    12                      ;;1.0E01
3496  014452  000000                    0
3497  014454  000001                    1                       ;;1.0E00
3498  014456  000000                    0
3499  014460  000014          $DECVL: .BLKB   12.               ;;RESERVE STORAGE FOR ASCIZ STRING
3500
3501                          ;;**********************************************************************
3502
3503                                  ;TYPE NUMERICAL ASCIZ STRING,RIGHT JUSTIFIED
3504                                  ;REPLACING LEADING ZEROS WITH SPACES.
3505                                  ;
3506                                  ;FIRST ADDRESS OF ASCIZ STRING MUST BE ON TOP OF THE STACK
3507
3508  014474  010046          RTJUST:         MOV R0,-(SP)            ;SAVE R0
3509  014476  016600  000004                 MOV 4(SP),R0            ;PICK UP ADDRESS OF ASCIZ STRING
3510  014502  010037  014534                 MOV R0,3$               ;SAVE ADDRESS FOR TYPE OUT
3511  014506  105710          1$:            TSTB (R0)               ;IS THIS THE TERMINATOR
3512  014510  001406                         BEQ 2$                  ;IF YES TYPE IT OUT
3513  014512  122710  000060                 CMPB #'0,(R0)           ;IS IT A ZERO
3514  014516  001005                         BNE 4$                  ;IF NO GO PRINT IT
3515  014520  112720  000040                 MOVB #' ,(R0)+          ;IF YES REPLACE IT WITH A SPACE
3516  014524  000770                         BR 1$                   ;TEST NEXT CHAR.
3517  014526  112740  000060          2$:            MOVB #'0,-(R0)          ;STRING OFF ALL ZEROS,PUT BACK THE LAST ONE
3518  014532  104401          4$:            TYPE                    ;TYPE THE STRING
3519  014534  000000          3$:            OPEN
3520  014536  012600                         MOV (SP)+,R0            ;RESTORE R0
3521  014540  012616                         MOV (SP)+,(SP)          ;RESTORE THE STACK
3522  014542  000207                         RTS PC                  ;RETURN
3523
3524                                  ;TYPES 16 BIT WORD IN DECIMAL
3525
3526  014544  012546          SGLDEC:        MOV (R5)+,-(SP)         ;PUT NUMBER TO BE TYPED ON STACK
3527  014546  004737  014244                 JSR PC,@#$SB2D          ;CONVERT NUMBER TO DECIMAL
3528  014552  004737  014474                 JSR PC,RTJUST           ;TYPE THE DECIMAL NUMBER
3529  014556  000205                         RTS R5
3530
3531
3532  014560  047125  054105  042520  MUNXDD:         .ASCIZ "UNEXPECTED D D MARK"
3533  014566  052103  042105  042040
3534  014574  042040  046440  051101
3535  014602  000113
3536
3537  014604  020104  020104  040515  MDDMIS:         .ASCIZ "D D MARK MISSING"
3538  014612  045522  046440  051511
3539  014620  044523  043516     000
3540
3541
3542  014625     104  052101  026101  MDERHDR:        .ASCIZ "DATA, NO STATUS ERROR"
3543  014632  047040  020117  052123
3544  014640  052101  051525  042440
3545  014646  051122  051117     000
3546
3547  014653     040  047117  052040  MTRK:           .ASCIZ " ON TRACK"
3548  014660  040522  045503     000
```

```
3549
3550
3551  014665  040     043040  047522  MPRES:          .ASCIZ "  FROM TRACK"
3552  014672  020115  051124  041501
3553  014700  000113
3554
3555  014702  027440  051440  041505  MSECT:          .ASCIZ " / SECTOR"
3556  014710  047524  000122
3557
3558  014714  005015  041040  052131  MCOLMUN:        .ASCIZ <15><12>" BYTE  BAD  GOOD"<15><12>
3559  014722  020105  041040  042101
3560  014730  020040  047507  042117
3561  014736  005015  000
3562
3563  014741  015     041412  052501  DOLOAD: .ASCII  <15><12>"CAUTION - IF YOU DESIRE TO TEST UNIT 0"
3564  014746  044524  047117  026440
3565  014754  044440  020106  047531
3566  014762  020125  042504  044523
3567  014770  042522  052040  020117
3568  014776  042524  052123  052440
3569  015004  044516  020124  060
3570  015011  015     051012  050105          .ASCII  <15><12>"REPLACE LOAD MEDIUM WITH A SCRATCH DISKETTE"
3571  015016  040514  042503  046040
3572  015024  040517  020104  042515
3573  015032  044504  046525  053440
3574  015040  052111  020110  020101
3575  015046  041523  040522  041524
3576  015054  020110  044504  045523
3577  015062  052105  042524
3578  015066  005015  044124  047105          .ASCIZ  <15><12>"THEN PRESS CONTINUE"
3579  015074  050040  042522  051523
3580  015102  041440  047117  044524
3581  015110  052516  000105
3582
3583  015114  047516  042040  044522  MNODRY:         .ASCIZ "NO DRIVES READY"<15><12>
3584  015122  042526  020123  042522
3585  015130  042101  006531  000012
3586
3587  015136  020040  020040  020040  TAB:            .ASCIZ <40><40><40><40><40><40>
3588  015144  000
3589
3590  015145  040     000040          DBLSP:          .ASCIZ <40><40>
3591
3592  015150  005015  000             MCRLF:          .ASCIZ <15><12>
3593
3594  015153  104     000             MEOP:           .ASCIZ "D"
3595
3596  015155  055     000             MEREOP:         .ASCIZ "-"
3597
3598  015157  007     000             MABELL:         .ASCIZ <07>
3599
3600  015161  105     051122  051117  MERHEADER:      .ASCIZ "ERROR CONDITIONS  "
3601  015166  041440  047117  044504
3602  015174  044524  047117  020123
3603  015202  000040
3604
```

```
3605  015204  047125  052111  030040  MUNIT0:         .ASCIZ 'UNIT 0 '
3606  015212  000040
3607
3608  015214  047125  052111  030440  MUNIT1:         .ASCIZ 'UNIT 1 '
3609  015222  000040
3610
3611  015224  040510  020123  042502  MDELET:         .ASCIZ 'HAS BEEN DELETED.'
3612  015232  047105  042040  046105
3613  015240  052105  042105  000056
3614
3615  015246  044440  052116  053040  MINTVEC:        .ASCIZ ' INT VECTOR = '
3616  015254  041505  047524  020122
3617  015262  020075     000
3618
3619  015265     122  041530  020123  MRXCS:          .ASCIZ 'RXCS = '
3620  015272  020075     000
3621
3622  015275     040  054122  041104  MRXDB:          .ASCIZ ' RXDB = '
3623  015302  036440  000040
3624
3625  015306  052123  052101  051525  MASTAT:         .ASCIZ 'STATUS A = '
3626  015314  040440  036440  000040
3627
3628  015322  052123  052101  051525  MBSTAT:         .ASCIZ 'STATUS B = '
3629  015330  041040  036440  000040
3630
3631  015336  005015  000012          DBLLF:          .ASCIZ <15><12><12>
3632
3633  015342  036520  000040          MPAT:           .ASCIZ 'P= '
3634
3635  015346  036524  000040          MTEST:          .ASCIZ 'T= '
3636
3637  015352  036523  000040          MSEQ:           .ASCIZ 'S= '
3638
3639  015356  047516  044440  052116  MINTER:         .ASCIZ 'NO INTERUPT AT DONE ERROR'
3640  015364  051105  050125  020124
3641  015372  052101  042040  047117
3642  015400  020105  051105  047522
3643  015406  000122
3644
3645  015410  047125  047113  053517  MUKNINT:        .ASCIZ 'UNKNOWN INTERUPT'
3646  015416  020116  047111  042524
3647  015424  052522  052120     000
3648
3649  015431     124  052117  046101  MERCT:          .ASCIZ 'TOTAL READ CHECK ERRORS = '
3650  015436  051040  040505  020104
3651  015444  044103  041505  020113
3652  015452  051105  047522  051522
3653  015460  036440  000040
3654
3655  015464  044506  046114  052502  MFIL:           .ASCIZ 'FILLBUFFER '
3656  015472  043106  051105  000040
3657
3658  015500  046505  052120  041131  MEMPTY:         .ASCIZ 'EMPTYBUFFER '
3659  015506  043125  042506  020122
3660  015514     000
```

```
3661
3662  015515     104  044522  042526  MICON:          .ASCIZ "DRIVE(S)  "
3663  015522  051450  020051  000040
3664
3665  015530  042524  052123  044040  MHUNG:          .ASCIZ "TEST HUNG"<15><12>
3666  015536  047125  006507  000012
3667
3668  015544  047516  051516  040524  MNONSTD:        .ASCIZ "NONSTANDARD TRACK / SECTOR LIMITS"
3669  015552  042116  051101  020104
3670  015560  051124  041501  020113
3671  015566  020057  042523  052103
3672  015574  051117  046040  046511
3673  015602  052111  000123
3674
3675  015606  042117  000075          MOD:          .ASCIZ "OD="
3676
3677  015612  042111  000075          MID:          .ASCIZ "ID="
3678
3679  015616  044506  051522  036524  MFIRST:         .ASCIZ "FIRST="
3680  015624     000
3681
3682  015625     114  051501  036524  MLAST:          .ASCIZ "LAST="
3683  015632     000
3684
3685  015633     111  044516  027124  MINIT1:         .ASCIZ "INIT.DONE NOT SET ERROR"<15><12>
3686  015640  047504  042516  047040
3687  015646  052117  051440  052105
3688  015654  042440  051122  051117
3689  015662  005015     000
3690
3691  015665     111  044516  027124  MINIT2:         .ASCIZ "INIT.DONE SET ERROR" <15><12>
3692  015672  047504  042516  051440
3693  015700  052105  042440  051122
3694  015706  051117  005015     000
3695
3696  015713     104  042040  042440  MDDER:          .ASCIZ "D D ERROR"
3697  015720  051122  051117     000
3698
3699  015725     122  041505  053117  MREC:           .ASCIZ "RECOVERABLE "
3700  015732  051105  041101  042514
3701  015740  000040
3702
3703  015742  051103  020103  051105  MBADCRC:        .ASCIZ "CRC ERROR NO DATA ERROR"
3704  015750  047522  020122  047516
3705  015756  042040  052101  020101
3706  015764  051105  047522  000122
3707
3708  015772  042522  042101  000040  MREAD:          .ASCIZ "READ "
3709
3710  016000  040510  052114  032040  MHALT4:         .ASCIZ "HALT 4" <15><12>
3711  016006  005015     000
3712
3713  016011     110  046101  020124  MHALT3:         .ASCIZ "HALT 3" <15><12>
3714  016016  006463  000012
3715
3716  016022  040510  052114  030440  MHALT11:        .ASCIZ "HALT 11" <15><12>
```

```
 3717  016030  006461  000012
 3718
 3719  016034  040504  040524  041440  MCRC:           .ASCIZ "DATA CRC ERROR"
 3720  016042  041522  042440  051122
 3721  016050  051117     000
 3722
 3723
 3724  016053     040  047125  042522  MUNREC:         .ASCIZ " UNRECOVERABLE "
 3725  016060  047503  042526  040522
 3726  016066  046102  020105     000
 3727
 3728  016073     123  042505  020113  MSEEK:          .ASCIZ "SEEK ERROR"
 3729  016100  051105  047522  000122
 3730
 3731  016106  051127  052111  020105  MWRITE:         .ASCIZ "WRITE "
 3732  016114     000
 3733
 3734  016115     120  051101  052111  MPAR:           .ASCIZ "PARITY ERROR"
 3735  016122  020131  051105  047522
 3736  016130  000122
 3737
 3738  016132  051105  047522  020122  MNOFLAG:        .ASCIZ "ERROR FLAG ERROR"
 3739  016140  046106  043501  042440
 3740  016146  051122  051117     000
 3741
 3742  016153     122  030530  020061  MDUMP:          .ASCIZ "RX11 DUMP"
 3743  016160  052504  050115     000
 3744
 3745  016165     105  051122  051117  MERS:           .ASCIZ "ERRORS"
 3746  016172  000123
 3747
 3748  016174  044123  051117  020124  MSHORT:         .ASCIZ "SHORT DUMP"
 3749  016202  052504  050115     000
 3750
 3751  016207     122  051505  040524  MRESTART:       .ASCIZ "RESTARTS = "
 3752  016214  052122  020123  020075
 3753  016222     000
 3754
 3755  016223     120  051501  020123  MNOPAS:         .ASCIZ "PASS ABORTED"
 3756  016230  041101  051117  042524
 3757  016236  000104
 3758
 3759  016240  040520  051523  051505  MPASS:          .ASCIZ "PASSES = "
 3760  016246  036440  000040
 3761
 3762  016252  051127  052111  042524  MWRTEN:         .ASCIZ "WRITTEN "
 3763  016260  020116     000
 3764
 3765  016263     057  000040          MSLASH:         .ASCIZ "/ "
 3766
 3767  016266  000040                  SPACE:          .ASCIZ <40>
 3768
 3769  016270  051105  047522  051522  MCODES:         .ASCIZ "ERRORS PER ERROR CODES"<15><12>
 3770  016276  050040  051105  042440
 3771  016304  051122  051117  041440
 3772  016312  042117  051505  005015
```

```
3773  016320  000
3774
3775  016321  124  040522  045503  MTKLOG:   .ASCIZ "TRACK  ACCESSED   MOVED TO    UNIT 0  UNIT 1 ERRORS"<15><12>
3776  016326  020040  041501  042503
3777  016334  051523  042105  020040
3778  016342  046440  053117  042105
3779  016350  052040  020117  020040
3780  016356  052440  044516  020124
3781  016364  020060  052440  044516
3782  016372  020124  020061  051105
3783  016400  047522  051522  005015
3784  016406  000
3785
3786  016407  050  047516  042516  MNONE:   .ASCIZ "(NONE)"<15><12>
3787  016414  006451  000012
3788
3789  016420  047507  042117  000  MGOOD:   .ASCIZ "GOOD"
3790
3791  016425  040  041440  042510  MSUM:     .ASCIZ "  CHECK SUM "
3792  016432  045503  051440  046525
3793  016440  000040
3794
3795  016442  005015  054122  030461  MRX11:    .ASCIZ <15><12>"RX11 / RXV11"
3796  016450  027440  051040  053130
3797  016456  030461  000
3798
3799  016461  015  052012  040522  OD2BIG:   .ASCII <15><12> "TRACK LIMITS SELECTED OUT OF RANGE,"
3800  016466  045503  046040  046511
3801  016474  052111  020123  042523
3802  016502  042514  052103  042105
3803  016510  047440  052125  047440
3804  016516  020106  040522  043516
3805  016524  026105
3806  016526  051525  047111  020107            .ASCIZ 'USING OD=0, ID=114"<15><12>
3807  016534  042117  030075  020054
3808  016542  042111  030475  032061
3809  016550  005015  000
3810
3811  016553  015  051412  041505  S2BIG:    .ASCII <15><12> "SECTOR LIMITS SELECTED OUT OF RANGE,"
3812  016560  047524  020122  044514
3813  016566  044515  051524  051440
3814  016574  046105  041505  042524
3815  016602  020104  052517  020124
3816  016610  043117  051040  047101
3817  016616  042507  054
3818  016621  125  044523  043516            .ASCIZ 'USING FIRST=1, LAST=32"<15><12>
3819  016626  043040  051111  052123
3820  016634  030475  020054  040514
3821  016642  052123  031475  006462
3822  016650  000012
3823
3824  016652  005015  040515  047111  MREV:     .ASCIZ <15><12> 'MAINDEC-11-CZRXA-F" <15><12>
3825  016660  042504  026503  030461
3826  016666  041455  051132  040530
3827  016674  043055  005015  000
3828
```

```
3829          016702                        .EVEN
3830
3831                                        ;;**************************************************************
3832
3833                                        ;THE FOLLOWING LOCATIONS ARE USED FOR DATA STORAGE,RETRY COUNTERS
3834                                        ;ACCESS COUNTERS ETC.
3835
3836  016702  000200                BUFADR:         .BLKB 200
3837
3838                                        ;RETRY COUNTERS
3839  017102  000012                RDRETRY:        10.             ;FOR SETUP PURPOSE RDRETRY MUST BE FIRST ON RETRY LIST
3840  017104  000012                WTRETRY:        10.
3841  017106  000012                DDRETRY:        10.
3842  017110  000012                DATARETRY:      10.
3843  017112  000012                P2RETRY:        10.
3844  017114  000012                PRETRY:         10.
3845  017116  000012                CRETRY:         10.
3846  017120  000012                SRETRY:         10.             ;FOR SETUP PURPOSE SRETRY MUST BE LAST ON RETRY LIST
3847
3848
3849                                        ;GENERAL ERROR COUNTERS
3850  017122  000000                PARLOG:         0               ;FOR SETUP PURPOSE PARLOG MUST BE FIRST ON COUNTERS LIST
3851  017124  000000                HPARLOG:        0
3852  017126  000000                NOERLOG:        0
3853  017130  000000                UKNINT:         0
3854  017132  000000                INTER:          0
3855                                        ;DRIVE RELATED ERROR COUNTERS
3856  017134  000000                ZSEKLOG:        0               ;"Z" LOGS ARE FOR DRIVE UNIT "Z"ERO
3857  017136  000000                SEKLOG:         0               ;NON"Z" LOGS ARE FOR DRIVE UNIT 1
3858  017140  000000                ZCRCLOG:        0
3859  017142  000000                CRCLOG:         0               ; * * * NOTE: * * *
3860  017144  000000                ZCRCBAD:        0               ;ERROR CODES MUST NOT BE CHANGED
3861  017146  000000                CRCBAD:         0               ;FROM THIS ORDER. ERROR DUMP
3862  017150  000000                ZRDLOG:         0               ;ASSUMES TAGS OF LOGS ARE IN ORDER SHOWN.
3863  017152  000000                RDLOG:          0
3864  017154  000000                ZWRTLOG:        0
3865  017156  000000                WRTLOG:         0
3866  017160  000000                ZDATALOG:       0
3867  017162  000000                DATALOG:        0
3868  017164  000000                ZDDMIS:         0
3869  017166  000000                DDMIS:          0
3870  017170  000000                ZUNXDD:         0
3871  017172  000000                UNXDD:          0
3872  017174  000000                ZHSEKLOG:       0
3873  017176  000000                HSEKLOG:        0
3874  017200  000000                ZHCRCLOG:       0
3875  017202  000000                HCRCLOG:        0
3876  017204  000000                ZHCRCBAD:       0
3877  017206  000000                HCRCBAD:        0
3878  017210  000000                ZHRDLOG:        0
3879  017212  000000                HRDLOG:         0
3880  017214  000000                ZHWRTLOG:       0
3881  017216  000000                HWRTLOG:        0
3882  017220  000000                ZHDATALOG:      0
3883  017222  000000                HDATALOG:       0
3884  017224  000000                ZHDDLOG:        0
```

```
3885  017226  000000                  HDDLOG:         0
3886
3887                                  ;ERROR CODES
3888  017230  000021                  ERCODE:         .BLKW 17.
3889
3890                                  ;THE FOLLOWING 2 BLOCKS OF WORDS ARE TRACK ACCESS COUNTER AND
3891                                  ;HEAD MOVED TO TRACK COUNTERS. THEY ARE DOUBLE PRECISION
3892                                  ;COUNTERS IN THE FOLLOWING FORMATT:
3893                                  ;
3894                                  ;LOC.X          LOW ORDER WORD TRACK 0
3895                                  ;LOC.X+2        HIGH ORDER WORD TRACK 0
3896                                  ;LOC.X+4        LOW ORDER WORD TRACK 1
3897                                  ;LOC.X+6        HIGH ORDER WORD TRACK 1
3898                                  ;ETC.
3899
3900                                  ;TOTAL ACCESS / TRACK
3901  017272  000232                  TKACC:          .BLKW 232
3902
3903                                  ;TOTAL HEAD MOVEMENT TO TRACK
3904  017756  000232                  HDMOVE:         .BLKW 232
3905
3906                                  ;THE FOLLOWING 2 BLOCKS OF COUNTERS ARE SINGLE PRECISION
3907
3908                                  ;ERROR PER TRACK ON UNIT 0
3909  020442  000115                  U0TRK:          .BLKW 115
3910
3911                                  ;ERROR PER TRACK ON UNIT 1
3912  020674  000115                  U1TRK:          .BLKW 115
3913
3914                                  ;TOTAL WRITE AND READ FUNCTIONS DOUBLE PRECISION COUNTERS
3915  021126  000000  000000          WTCNTR:         .WORD 0,0
3916  021132  000000  000000          RDCNTR:         .WORD 0,0
3917
3918                                  ;RESTART AND PASSES COMPLTED COUNTERS
3919  021136  000000                  RESTCNTR:       0
3920  021140  000000                  PASCNTR:        0               ;FOR SETUP PURPOSE PASCNTR MUST BE PLACED LAST
3921
3922  021142  032737  000020  010704  U1LOG:         BIT #BIT4,UNITSEL       ;TEST FOR UNIT IN OPERATION
3923  021150  001402                                  BEQ 1$                  ;IF BIT 4 IS 0 RETURN AND INC. UNIT 0 COUNTERS
3924  021152  062703  000002                        ADD #2,R3               ;ADJUST THE CONTENTS OF R3 FOR
3925                                                                        ;THE ADDRESS OF UNIT 1 ERROR LOG COUNTERS.
3926  021156  000207                  1$:             RTS PC
3927
3928                                  ;STATISTICAL ERROR REPORT ROUTEEN
3929                                  ;PRINTS ALL ERROR LOGS AND OPERATING CONDITIONS
3930
3931                                  ;;*****************************************************************
3932
3933  021160  012706  001200          ERDUMP:         MOV #STACK,SP
3934  021164  104401  015336                          TYPE ,DBLLF
3935  021170  005737  022612                          TST SHORTRPT            ;IS SHORT REPORT REQUESTED
3936  021174  001405                                  BEQ 1$                  ;NO,PRINT LONG REPORT
3937  021176  104401  015136                          TYPE ,TAB
3938  021202  104401  016174                          TYPE ,MSHORT            ;YES,TYPE SHORT REPOR HEADER
3939  021206  000404                                  BR 2$
3940  021210  104401  015136          1$:             TYPE ,TAB
```

```
3941  021214  104401  016153                  TYPE ,MDUMP             ;TYPE LONG REPORT HEADER
3942  021220  104401  016652          2$:     TYPE ,MREV              ;PRINT NAME AND REVISION OF PROGRAM
3943  021224  004737  002452                  JSR PC,ICOND            ;TYPE OUT SELECTED DRIVES AND TESTS
3944  021230  005737  021136                  TST RESTCNTR            ;HAVE THERE BEEN ANY RESTARTS
3945  021234  001412                          BEQ 3$                  ;NO
3946  021236  104401  016207                  TYPE ,MRESTART          ;YES,PRINT OUT HOW MANY
3947  021242  013737  021136  021254          MOV RESTCNTR,12$
3948  021250  004537  014544                  JSR R5,SGLDEC
3949  021254  000000                  12$:    OPEN
3950  021256  104401  015336                  TYPE ,DBLLF
3951  021262  005737  021140          3$:     TST PASCNTR             ;HAVE ANY PASSES BEEN COMPLETED
3952  021266  001005                          BNE 4$                  ;YES,PRINT OUT HOW MANY
3953  021270  104401  016223                  TYPE ,MNOPAS            ;NO,TYPE PASS ABORTED
3954  021274  104401  015336                  TYPE ,DBLLF
3955  021300  000412                          BR 5$
3956  021302  104401  016240          4$:     TYPE ,MPASS             ;TYPE OUT NUMBER OF PASSES
3957  021306  013737  021140  021320          MOV PASCNTR,7$
3958  021314  004537  014544                  JSR R5,SGLDEC
3959  021320  000000                  7$:     OPEN
3960  021322  104401  015150                  TYPE ,MCRLF
3961  021326  005737  022612          5$:     TST SHORTRPT            ;IS THIS A SHORT REPORT
3962  021332  001030                          BNE AERRS               ;YES,DON'T PRINT WRITE/READ TOTALS
3963
3964                                  ;PRINTS TOTAL NUMBER OF SECTORS WRITTEN AND/OR
3965                                  ;READ FOR THE DURATION OF RUN TIME.
3966  021334  104401  016252                  TYPE ,MWRTEN            ;PRINT WRT/RD MESSAGE
3967  021340  104401  016263                  TYPE ,MSLASH
3968  021344  104401  015772                  TYPE ,MREAD
3969  021350  104401  015145                  TYPE,DBLSP
3970  021354  012746  021126                  MOV #WTCNTR,-(SP)       ;ADDRESS OF TOTAL WRITES ON STACK
3971  021360  004737  014300                  JSR PC,@#$DB2D          ;TYPE TOTAL WRITES
3972  021364  004737  014474                  JSR PC,RTJUST
3973  021370  104401  016263                  TYPE ,MSLASH
3974  021374  012746  021132                  MOV #RDCNTR,-(SP)       ;ADDRESS OF READS ON STACK
3975  021400  004737  014300                  JSR PC,@#$DB2D          ;TYPE TOTAL READS
3976  021404  004737  014474                  JSR PC,RTJUST
3977  021410  104401  015336                  TYPE ,DBLLF
3978
3979                                  ;TYPE OUT MICRO CPU RELATED ERRORS
3980  021414  104401  015150          AERRS:  TYPE ,MCRLF
3981  021420  005737  017122                  TST PARLOG              ;WERE THERE ANY PARITY ERRORS
3982  021424  001435                          BEQ 1$
3983  021426  013737  017122  021440          MOV PARLOG,20$          ;YES,TYPE OUT THE NUMBER
3984  021434  004537  014544                  JSR R5,SGLDEC
3985  021440  000000                  20$:    OPEN
3986  021442  104401  015145                  TYPE ,DBLSP
3987  021446  104401  016115                  TYPE ,MPAR
3988  021452  104401  015150                  TYPE,MCRLF
3989  021456  005737  017124                  TST HPARLOG             ;WERE THERE ANY HARD PARITY ERRORS
3990  021462  001416                          BEQ 1$
3991  021464  013737  017124  021476          MOV HPARLOG,21$         ;YES,TYPE OUT THE COUNT
3992  021472  004537  014544                  JSR R5,SGLDEC
3993  021476  000000                  21$:    OPEN
3994  021500  104401  015145                  TYPE ,DBLSP
3995  021504  104401  016053                  TYPE ,MUNREC
3996  021510  104401  016115                  TYPE ,MPAR
```

```
                                        TYPE ,MCRLF
                1$:                     TST NOERLOG             ;ANY STATUS ERROR FLAG ERRORS
                                        BEQ 3$                  ;IF NONE CHECK NEXT ERROR
                                        MOV NOERLOG,24$         ;YES,TYPE OUT COUNT
                                        JSR R5,SGLDEC
                24$:                    OPEN
                                        TYPE ,DBLSP
                                        TYPE ,MNOFLAG
                                        TYPE ,MCRLF
                3$:                     TST INTER               ;ANY NO INTERUPT ON DONE ERRORS
                                        BEQ 4$                  ;IF NONE CHECK NEXT ERROR GROUP
                                        MOV INTER,25$           ;YES,PRINT OUT NUMBER
                                        JSR R5,SGLDEC
                25$:                    OPEN
                                        TYPE ,DBLSP
                                        TYPE ,MINTER
                                        TYPE ,MCRLF
                            ;TYPES DRIVE RELATED ERRORS
                4$:                     TYPE ,DBLLF
                                        TYPE ,MUNIT0            ;TYPE OUT COLUMN HEADINGS
                                        TYPE ,MUNIT1
                                        TYPE ,SPACE
                                        TYPE ,MERS
                                        TYPE ,MCRLF
                                        CLR R2                  ;R2 USED AS AN ERROR PRINTED FLAG
                                        MOV ZERO,-(SP)          ;PUT ADDR OF ZERO MARK ON STACK
                                        MOV #MUNXDD,-(SP)       ;PUT ADDRESSES OF ALL RECOVERABLE
                                        MOV #MDDMIS,-(SP)       ;ERROR MESSAGES ON THE STACK
                                        MOV #MDERHDR,-(SP)
                                        MOV #MWRITE,-(SP)
                                        MOV #MREAD,-(SP)
                                        MOV #MBADCRC,-(SP)
                                        MOV #MCRC,-(SP)
                                        MOV #MSEEK,-(SP)
                                        MOV #ZSEKLOG,R1         ;PUT FIRST ERROR CUONTER IN REGISTER
                7$:                     TST (SP)                ;GET ADDRESS OF MESSAGE
                                        BEQ 5$                  ;IF 0 FINISHED SOFT ERRS DO HARD ERRS
                                        TST (R1)+               ;IS DRIVE 0 COUNTER CLEAR
                                        BNE 6$                  ;NO,GO PRINT ERROR COUNTER
                                        TST (R1)                ;IS DRIVE 1 COUNTER CLEAR
                                        BNE 6$                  ;NO,GO PRINT ERROR COUNTER
                                        TST (R1)+               ;ADJUST R1 FOR NEXT UNIT 0 COUNTER
                                        TST (SP)+               ;ADJUST STACK FOR NEXT ADDRESS
                                        BR 7$                   ;GO TEST NEXT PAIR OF COUNTERS
                6$:                     INC R2                  ;MAKE ERROR PRINTED FLAG NON ZERO
                                        MOV -(R1),30$           ;TYPE CONTENTS OF UNIT 0 COUNTER
                                        JSR R5,SGLDEC
                30$:                    OPEN
                                        TYPE ,DBLSP
                                        TST (R1)+               ;ADJUST R1 FOR UNIT 1 COUNTER
                                        MOV (R1)+,31$           ;TYPE COUNTER,GET ADDR OF NEXT IN R1
                                        JSR R5,SGLDEC
                31$:                    OPEN
                                        TYPE ,DBLSP
                                        MOV (SP)+,13$
                                        TYPE                    ;TYPE ERROR MESSAGE FROM STACK
```

```
4053  022006  000000                13$:    OPEN
4054  022010  104401  015150                TYPE ,MCRLF
4055  022014  000740                        BR 7$                   ;GET NEXT COUNTER
4056  022016  104401  015150        5$:     TYPE ,MCRLF
4057  022022  013746  022614                MOV ZERO,-(SP)          ;PUT ADDR OF ZERO MARK ON THE STACK
4058  022026  012746  015713                MOV #MDDER,-(SP)        ;PUT ADDRESS OF ALL HARD ERROR
4059  022032  012746  014625                MOV #MDERHDR,-(SP)      ;MESSAGES ON THE STACK
4060  022036  012746  016106                MOV #MWRITE,-(SP)
4061  022042  012746  015772                MOV #MREAD,-(SP)
4062  022046  012746  015742                MOV #MBADCRC,-(SP)
4063  022052  012746  016034                MOV #MCRC,-(SP)
4064  022056  012746  016073                MOV #MSEEK,-(SP)
4065  022062  012701  017174                MOV #ZHSEKLOG,R1        ;PUT FIRST HARD ERROR COUNTER IN R1
4066  022066  005716                12$:    TST (SP)                ;GET ADDRESS OF MESSAGE FROM STACK
4067  022070  001437                        BEQ BERRS               ;IF 0 FINISHED ERROR LOGS
4068  022072  005721                        TST (R1)+               ;IS DRIVE 0 COUNTER CLEAR
4069  022074  001005                        BNE 11$                 ;NO,PRINT ERROR COUNTER AND MESSAGE
4070  022076  005711                        TST (R1)                ;IS DRIVE 1 COUNTER CLEAR
4071  022100  001003                        BNE 11$                 ;NO,GO PRINT THE ERROR
4072  022102  005721                        TST (R1)+               ;ADJUST R1 FOR NEXT UNIT 0 LOG
4073  022104  005726                        TST (SP)+               ;ADJUST STACK FOR NEXT ADDRESS
4074  022106  000767                        BR 12$
4075  022110  014137  022120        11$:    MOV -(R1),32$           ;TYPE CONTENTS OF UNIT 0 COUNTER
4076  022114  004537  014544                JSR R5,SGLDEC
4077  022120  000000                32$:    OPEN
4078  022122  104401  015145                TYPE ,DBLSP
4079  022126  005721                        TST (R1)+               ;ADJUST R1 FOR UNIT 1 COUNTER
4080  022130  012137  022140                MOV (R1)+,33$           ;TYPE UNIT 1 LOG
4081  022134  004537  014544                JSR R5,SGLDEC
4082  022140  000000                33$:    OPEN
4083  022142  104401  015145                TYPE ,DBLSP
4084  022146  104401  016053                TYPE ,MUNREC            ;TYPE UNRECOVERABLE
4085  022152  012637  022160                MOV (SP)+,14$
4086  022156  104401                        TYPE                    ;ERROR MESSAGE FROM STACK
4087  022160  000000                14$:    OPEN
4088  022162  104401  015150                TYPE ,MCRLF
4089  022166  000737                        BR 12$                  ;GET NEXT LOG
4090                            ;PRINTS ERRORS PER ERROR CODES
4091  022170  005702                BERRS:  TST R2                  ;WAS AN ERROR PRINTED IN THE LAST GROUP
4092  022172  001004                        BNE 5$                  ;IF R2 IS NONZERO BRANCH
4093  022174  104401  015136                TYPE ,TAB
4094  022200  104401  016407                TYPE ,MNONE             ;TYPE NONE
4095  022204  005002                5$:     CLR R2                  ;CLEAR ERROR PRINTED FLAG AGAIN
4096  022206  104401  015336                TYPE ,DBLLF
4097  022212  104401  016270                TYPE ,MCODES            ;TYPE ERROR PER ERROR CODE
4098  022216  012700  000001                MOV #1,R0               ;SET UP CODE COUNTER
4099  022222  012701  017230                MOV #ERCODE,R1          ;GET ADDR OF FIRST ERROR CODE
4100  022226  020027  000022        2$:     CMP R0,#22              ;IS THE LAST CODE PRINTED
4101  022232  001001                        BNE 3$                  ;NO,TEST THE NEXT ONE
4102  022234  000427                        BR TYPTRK               ;YES,GO PRINT TRACK INFOMATION
4103  022236  005721                3$:     TST (R1)+               ;TEST FOR 0 WORD,GET NEXT ADDRESS
4104  022240  001002                        BNE 1$                  ;IF NOT 0 TYPE COUNT AND CODE NUMBER
4105  022242  005200                        INC R0                  ;INC CODE COUNTER
4106  022244  000770                        BR 2$
4107  022246  014137  022256        1$:     MOV -(R1),4$            ;PUT CONTENTS OF COUNTER IN OPEN
4108  022252  004537  014544                JSR R5,SGLDEC           ;FOR TYPE OUT
```

```
4109  022256  000000                  4$:             OPEN
4110  022260  104401  015136                          TYPE ,TAB
4111
4112  022264  010002                                  MOV R0,R2               ;PUT CODE NUMBER IN REGISTER TO
4113  022266  006302                                  ASL R2                  ;TYPE IT OUT IN THE FROM OF ERROR CODE
4114  022270  006302                                  ASL R2
4115  022272  006302                                  ASL R2
4116  022274  010246                          MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
4117  022276  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
4118  022300     004                          .BYTE   4               ;;TYPE 4 DIGIT(S)
4119  022301     001                          .BYTE   1               ;;TYPE LEADING ZEROS
4120  022302  104401  015150                          TYPE ,MCRLF
4121  022306  005200                                  INC R0                  ;SET UP FOR NEXT COUNTER
4122  022310  005721                                  TST (R1)+               ;GET NEXT ERROR COUNTER
4123  022312  000745                                  BR 2$
4124                                  ;PRINTS TRACK ACCESS,HEAD MOVEMENT,AND ERRORS PER TRACK
4125  022314  005702                  TYPTRK:         TST R2                  ;WAS AN ERROR PRINTED IN LAST GROUP
4126  022316  001004                                  BNE 5$                  ;IF PRINTED ERROR FLAG NONZERO BRANCH
4127  022320  104401  015136                          TYPE ,TAB
4128  022324  104401  016407                          TYPE ,MNONE             ;TYPE NONE
4129  022330  104401  015336          5$:             TYPE ,DBLLF
4130  022334  005737  022612                          TST SHORTRPT            ;IF SHORT REPORT DON'T TYPE TRACK ACCESS OR ERRO
4131  022340  001121                                  BNE 6$
4132  022342  104401  016321                          TYPE ,MTKLOG            ;TYPE FORMAT OF ERROR PRINT OUT
4133  022346  005037  022426                          CLR 2$                  ;TRACK ADDRESS COUNTER
4134  022352  012704  017266                          MOV #TKACC-4,R4         ;SET UP ADDRESS OF TRACK ACCESSED
4135  022356  012703  017752                          MOV #HDMOVE-4,R3        ;ADDRESS OF HEAD MOVEMENT COUNTER
4136  022362  012702  020442                          MOV #U0TRK,R2           ;UNIT 0 ERROR PER TRACK COUNTER
4137  022366  012701  020674                          MOV #U1TRK,R1           ;UNIT 1 ERROR PER TRACK COUNTER
4138  022372  062704  000004          1$:             ADD #4,R4               ;ADJUST FOR ADDRESS OF NEXT COUNTER
4139  022376  005714                                  TST (R4)                ;HAS THIS TRACK BEEN ACCESSED
4140  022400  001010                                  BNE 10$                 ;YES,PRINT OUT THE COUNTERS
4141  022402  005764  000002                        TST 2(R4)               ;TEST UPPER WORD OF ACCESS COUNTER
4142  022406  001005                                  BNE 10$
4143  022410  062703  000004                        ADD #4,R3               ;THIS TRACK HAS NOT BEEN USED. ADJUST
4144  022414  005722                                  TST(R2)+                ;REGISTERS TO POINT TO NEXT TRACK COUNTERS
4145  022416  005721                                  TST (R1)+
4146  022420  000463                                  BR 12$                  ;TEST FOR LAST TRACK
4147  022422  004537  014544          10$:            JSR R5,SGLDEC           ;TYPE TRACK NUMBER
4148  022426  000000                  2$:             OPEN                    ;THIS LOCATION USED AS TRACK ADDR COUNTER
4149  022430  104401  016266                          TYPE ,SPACE
4150  022434  010446                                  MOV R4,-(SP)            ;TYPE TRACK ACCESSED COUNT
4151  022436  004737  014300                        JSR PC,@#$DB2D
4152  022442  004737  014474                        JSR PC,RTJUST
4153  022446  104401  016266                          TYPE ,SPACE
4154  022452  062703  000004                        ADD #4,R3
4155  022456  010346                                  MOV R3,-(SP)            ;TYPE HEAD MOVED TO COUNT
4156  022460  004737  014300                        JSR PC,@#$DB2D
4157  022464  004737  014474                        JSR PC,RTJUST
4158  022470  104401  015145                          TYPE ,DBLSP
4159  022474  104401  016266                          TYPE ,SPACE
4160  022500  005712                                  TST (R2)                ;ARE THERE ANY UNIT 0 ERRORS
4161  022502  001421                                  BEQ 20$                 ;NO,CHECK UNIT 1
4162  022504  012237  022514                        MOV (R2)+,3$            ;TYPE UNIT 0 ERRORS
4163  022510  004537  014544                        JSR R5,SGLDEC
4164  022514  000000                  3$:             OPEN
```

```
4165  022516  005711                          TST (R1)              ;ARE THERE ANY UNIT 1 ERRORS
4166  022520  001420                          BEQ 7$                ;NO,GO ADJUST POINTERS
4167  022522  104401  016266                  TYPE ,SPACE
4168  022526  104401  015145          22$:    TYPE ,DBLSP
4169  022532  012137  022542                  MOV (R1)+,4$          ;TYPE UNIT 1 ERRORS
4170  022536  004537  014544                  JSR R5,SGLDEC
4171  022542  000000                  4$:     OPEN
4172  022544  000407                          BR 11$                ;GO TO NEXT TRACK
4173
4174  022546  005722                  20$:    TST (R2)+             ;NO ERRORS,ADJUST REG.FOR NEXT COUNTER
4175  022550  005711                          TST (R1)              ;ARE THERE ANY UNIT 1 ERRORS
4176  022552  001403                          BEQ 7$                ;NO,GO TO NEXT TRACK
4177  022554  104401  015136                  TYPE ,TAB             ;YES,TYPE TAB FOR PLACEMENT
4178  022560  000762                          BR 22$                ;GO TYPE THE NUMBER
4179  022562  005721                  7$:     TST (R1)+             ;NO ERRORS,ADJUST REG. FOR NEXT COUNTER
4180  022564  104401  015150          11$:    TYPE ,MCRLF
4181  022570  005237  022426          12$:    INC 2$
4182  022574  023727  022426  000115          CMP 2$,#115           ;HAVE ALL TRACK ERRORS BEEN TYPED
4183  022602  001273                          BNE 1$                ;NO,TYPE THE NEXT ONE
4184  022604  005037  022612                  CLR SHORTRPT          ;SET UP FOR LONG REPORT
4185  022610  000000                  HLT17:  HALT                  ;YES DONE
4186
4187  022612  000000                  SHORTRPT:       0
4188  022614  000000                  ZERO:           0
4189
4190          000001                          .END
```

```
ADJSUM  005656          1605    2015    2032#
AERRS   021414          3962    3980#
ASTAT   010070          1677    1834    1841    1936    1968    2314*   2317    2320    2434#   2456*   2466
BADBYT  006436          2025*   2026    2027    2078    2139#
BERRS   022170          4067    4091#
BIT0  = 000001           993#   1841
BIT00 = 000001           983#    993
BIT01 = 000002           982#    992
BIT02 = 000004           981#    991
BIT03 = 000010           980#    990
BIT04 = 000020           979#    989
BIT05 = 000040           978#    988
BIT06 = 000100           977#    987
BIT07 = 000200           976#    986
BIT08 = 000400           975#    985
BIT09 = 001000           974#    984
BIT1  = 000002           992#   1677    1834
BIT10 = 002000           973#
BIT11 = 004000           972#
BIT12 = 010000           971#
BIT13 = 020000           970#
BIT14 = 040000           969#   2643    2657
BIT15 = 100000           968#   1375    2007    2449
BIT2  = 000004           991#   1343    1370    2317
BIT3  = 000010           990#
BIT4  = 000020           989#   1735    2376    2410    2437    3922
BIT5  = 000040           988#
BIT6  = 000100           987#   1936    1968    2634    2639    2645
BIT7  = 000200           986#   1353    2014    2073    2442
BIT8  = 000400           985#   1946    1973    2052    2340    2671
BIT9  = 001000           984#   1659    1934    2235    2237    2239
BPTVEC= 000014          1000#
BRONPA  010360          2506*   2514*   2516#
BRONTE  003014          1566*   1573*   1574#
BRONTR  011320          2748*   2755*   2758#
BSTAT   010072          1523    2348*   2349    2351    2435#   2463*   2472
BUFADR  016702          2032*   2033*   2037*   2040*   2041    2515    2611    3836#
BYTECN  006434          1608*   1615*   2012*   2029*   2074    2091*   2138#   2254    2264*
CHARCT  011142          1561*   2666    2669*   2670*   2687*   2703#
CKBYTE  005626          2025#
CKSUM   005746          2016*   2026*   2034*   2035*   2036*   2037    2038*   2039*   2040    2044#   2107
CKSWR = 104406          1509    1626    1632    1699    1704    1860    1865    1886    1891    1915    1942    1949    1975
                        2054    2087    2099    2117    2299    2304    2325    2334    2358    2677    3370#
COMMWO  004022          1664    1741#   1799
CONT1   004366          1806    1815#
CONT10  005400          1935    1968#
CONT11  005276          1944    1949#   1977
CONT12  002542          1502    1506#
CONT13  003310          1634    1636#
CONT14  003650          1706    1708#
CONT15  004654          1867    1869#
CONT16  005000          1893    1895#
CONT17  005310          1951    1953#
CONT2   004436          1816    1825#
CONT20  006202          2089    2091#
CONT21  007244          2306    2308#
```

```
CONT22  011070            2679    2688#
CONT3   006412            2098    2131#
CONT4   003276            1628    1632#
CONT5   003336            1637    1640    1642#
CONT6   005112            1905    1915#
CONT7   005076            1912#   1930
CR    = 000015             908#   3046    3058
CRCBAD  017146            3861#
CRCER   004560            1842    1850#
CRCLOG  017142            3859#
CRETRY  017116            1792*   1871*   3845#
CRLF  = 000200             909#   3000    3058
DATABY  010416            2526#   2535*   2545*   2554*   2564*   2572*   2581*   2583*   2596*   2605*   2609    2610
DATACK  004126            1761#   1793*   1853*   2061    2094
DATACR  004732            1852    1856    1883#
DATAER  006000            2028    2052#
DATALO  017162            3867#
DATARE  017110            1789*   2120*   3842#
DATAO   010422            2517    2535#
DATA1   010434            2518    2545#
DBLLF   015336            1470    1643    1717    1811    1821    1877    1909    1927    1961    2127    2441    2448    3631#
                          3934    3950    3954    3977    4015    4096    4129
DBLSP   015145            1442    1460    1465    2077    2081    2409    2420    2426    3590#   3969    3986    3994    4003
                          4011    4045    4050    4078    4083    4158    4168
DDCHK   005204            1825    1934#
DDERR   005260            1946#   1979
DDISP = 177570             915#   1201
DDMIS   017166            3869#
DDRETR  017106            1513*   1526*   1788*   1955*   3841#
DELUNI  010074            1648    2391    2437#
DISPLA  001216            1201#   1303*
DISPRE  000174            1045#   1303
DONE    010706            2655#   2663
DONEBI= 000040            1016#   2260    2281    2322
DONECK  007122            1342    1365    1515    1665    1800    2277#   2343    2379    2458
DRVSWP  006544            1580    2185#
DRY1    001614            1358    1364#   1369    1378
DSWR  = 177570             914#   1200
DTESTP  001212            1199#   1354    1356    1359    1395    1397    1402    1659    1934    2235    2237*   2239*
DOLOAD  014741            1390    3563#
EBIE  = 000103            1018#   2022
EMPBUF  005536            1854    2009#   2049    2123    2134
EMPDON  006212            2017    2094#
EMPER   005750            2018    2046#
EMPFLA  005622            2023#   2030    2092
EMTVEC= 000030            1003#
ERCNTR  006442            1855    2013*   2053*   2059    2097    2103    2141#
ERCODE  017230            2354    3888#   4099
ERDUMP  021160            1070    2453    3933#
ERRVEC= 000004             996#
ERWRT   004124            1564*   1668    1760#   1920*
EXIT    006432            2011    2132    2136#
FBIE  = 000101            1017#   1612
FILLBU  003136            1605#   1621    1641
FILLDO  003372            1606    1655#
FILLER  003214            1607    1618#
```

```
FILLFL  003176          1613#  1616
FIRST   001202          1101#  1102   1450   1455   1457   1462   1472   1480*  2941   2943*  2946   2949   2963
FLOAT0  010444          2519   2554#
FLOAT1  010506          2520   2572#
FUNCTI  004120          1658*  1661*  1747*  1748   1758#  1796*  2369   2376   2437
GETPAT  010312          1591   1770   1990   2150   2167   2186   2213   2506#  2691
GETSEC  012316          1602   1787   2960#
GETTRA  011254          1594   1773   1993   2153   2170   2189   2219   2227   2747#
GETUNI  010614          1593   1772   1992   2152   2169   2188   2192   2218   2634#
GNS   = ******  U       3363   3364   3365   3366   3368   3370   3371   3372   3373   3374
GOODBY  006440          2082*  2084   2140#
GTSWR = 104405          1309   3368#
HARDSK  003676          1709   1711   1714#
HCNTR1  007200          2247*  2256*  2270*  2279*  2285*  2293#  2664*  2692*
HCNTR2  007202          2280*  2286*  2287   2294#
HCRCBA  017206          3877#
HCRCLO  017202          3875#
HDATAL  017222          3883#
HDDLOG  017226          3885#
HDMOVE  017756          2839   3904#  4135
HERE    011140          2695   2701#
HLT10   004652          1868#
HLT11   004730          1881#
HLT12   004776          1894#
HLT13   005306          1952#
HLT14   006200          2090#
HLT15   007242          2307#
HLT16   011062          2686#
HLT17   022610          4185#
HLT20   007176          2290#
HLT21   007120          2273#
HLT3    002662          1529#
HLT4    002132          1425#
HLT5    002534          1504#
HLT6    003306          1635#
HLT7    003646          1707#
HOME    002550          1348   1509#  1712
HPARLO  017124          1420*  1642*  3851#  3989   3991
HRDLOG  017212          3879#
HSEKLO  017176          3873#
HT    = 000011           906#  2998   3056
HWRTLO  017216          3881#
ICOND   002452          1490#  1560   3943
ID    = 001201          1100#  1432   1435   1444   2713*  2717   2793   2828   2850   2853*
IDCOMP  012042          2902#  2905
IDNEXT  011552          2825   2828#
INITSE  012216          1601   1786   2941#
INITTR  011144          1592   1771   1991   2151   2168   2187   2217   2226   2710#
INTER   017132          2298*  3854#  4006   4008
INTLEA  012312          2952*  2957#  2964   2965*
INTSFR  007250          1315   2308   2314#
INTVEC  001204          1123#  1314   1338
IOTVEC= 000020          1001#
LAST  = 001203          1102#  1452   1457   1467   2944*  2945   2961
LASTTR  011722          2865   2868#
LF    = 000012           907#  3050   3058
```

```
LOAD    010564          2536    2559    2582    2606    2609#
LOGICA  011130          1039    2697#
MABELL  015157          2676    3598#
MASTAT  015306          2465    3625#
MBADCR  015742          1863    1878    3703#   4028    4062
MBSTAT  015322          2471    3628#
MCODES  016270          3769#   4097
MCOLMU  014714          2072    3558#
MCRC    016034          1889    3719#   4029    4063
MCRLF   015150          1418    1423    1486    1490    1500    1631    1647    1729    1814    1824    1864    1879    1890
                        1912    1948    1964    1966    2068    2070    2086    2112    2130    2303    2329    2338    2361
                        2367    2374    2390    2464    2476    2668    2680    2685    3592#   3960    3980    3988    3997
                        4005    4013    4020    4054    4056    4088    4120    4180
MDDER   015713          1963    3696#   4058
MDDMIS  014604          1945    3537#   4024
MDELET  015224          2440    2447    3611#
MDERHD  014625          2069    2129    3542#   4025    4059
MDUMP   016153          3742#   3941
MEMPTY  015500          2047    2048    3658#
MEOP    015153          2675    3594#
MERCT   015431          2102    3649#
MEREOP  015155          2673    3596#
MERHEA  015161          2362    3600#
MERS    016165          2109    3745#   4019
MFIL    015464          1619    1620    3655#
MFIRST  015616          1461    3679#
MGOOD   016420          2111    3789#
MHALT1  016022          1880    3716#
MHALT3  016011          1528    3713#
MHALT4  016000          1424    3710#
MHUNG   015530          2272    2289    3665#
MICON   015515          1491    3662#
MID     015612          1443    3677#
MINIT1  015633          1345    3685#
MINIT2  015665          1372    3691#
MINTER  015356          2302    3639#   4012
MINTVE  015246          1337    3615#
MLAST   015625          1466    3682#
MNODRY  015114          1503    2389    3583#
MNOFLA  016132          2337    3738#   4004
MNONE   016407          3786#   4094    4128
MNONST  015544          1485    3668#
MNOPAS  016223          3755#   3953
MOD     015606          1438    3675#
MPAR    016115          1417    1422    1630    1646    3734#   3987    3996
MPASS   016240          2363    2681    3759#   3956
MPAT    015342          2415    3633#
MPRES   014665          1725    3551#
MREAD   015772          1813    1837    1838    1845    1846    1911    3708#   3968    4027    4061
MREC    015725          1812    1822    3699#
MRESTA  016207          3751#   3946
MREV    016652          1296    3824#   3942
MRXCS   015265          1327    1410    2368    3619#
MRXDB   015275          1332    3622#
MRX11   016442          2395    3795#
MSECT   014702          2404    3555#
```

```
MSEEK   016073          1724    3728#   4030    4064
MSEQ    015352          2427    3637#
MSHORT  016174          3748#   3938
MSLASH  016263          3765#   3967    3973
MSUM    016425          2106    3791#
MTEST   015346          2421    3635#
MTKLOG  016321          3775#   4132
MTRK    014653          2400    3547#
MUKNIN  015410          2328    3645#
MUNIT0  015204          1494    2412    2439    3605#   4016
MUNIT1  015214          1497    2414    2446    3608#   4017
MUNREC  016053          1421    1644    1718    1910    1928    1962    2128    3724#   3995    4084
MUNXDD  014560          1978    3532#   4023
MWRITE  016106          1680    1681    1691    1692    1702    1719    1823    1929    3731#   4026    4060
MWRTEN  016252          3762#   3966
NEWTRK  011562          2783    2786    2797    2799    2827    2829    2836#   2855    2860    2871    2887    2889    2913
NEXTRD  004450          1827    1829#   1848    1914    1967
NOERLO  017126          2333*   3852#   3998    4000
NOERTY  006170          2056    2060    2087#
NOINTE  007204          1666    1801    2298#
NOPRNT  007502          2350    2358#
NOSEL   001676          1355    1378#
OD      001200          1099#   1100    1430    1435    1439    1448    1477*   2710*   2711    2714*   2715    2719    2723*
                        2779*   2782    2795*   2806    2808*   2823*   2824    2826    2856    2858*   2870    2878    2880*
                        2883    2888    2899*
ODCOMP  012062          2903    2906#   2909
ODNEXT  012012          2884    2888#
OD2BIG  016461          1476    3799#
ONEWRT  003130          1604#   1686    1713    1922
OPCOND  001702          1357    1360    1362    1379#
OPEN  = 000000          1025#   1441    1446    1464    1469    1629    1645    1728    2076    2105    2366    2403    2408
                        2684    3519    3949    3959    3985    3993    4002    4010    4044    4049    4053    4077    4082
                        4087    4109    4148    4164    4171
PARLOG  017122          1319    1409*   1625*   3850#   3981    3983
PARTES  003244          1622    1625#   1683    1840    2050
PASCNT  021140          1321    2364    2665*   2682    3920#   3951    3957
PAT     010420          1402*   1403*   1404*   1405*   1406*   2416    2508    2510*   2511    2527#   2689
PATGEN  010426          2536#   2537    2546
PAT125  010514          2521    2581#
PAT314  010534          2522    2596#
PCONT   003332          1621*   1641#   1682*   1839*   2049*
PIRQ  = 177772           913#
PIRQVE= 000240          1007#
PRESCH  012102          2907    2910#
PRESTR  011362          1531*   1726    2747*   2769#   2780    2824    2883    2910
PRETRY  017114          1604*   1638*   1639    1655*   1790*   3844#
PR0   = 000000           930#
PR1   = 000040           931#
PR2   = 000100           932#
PR3   = 000140           933#
PR4   = 000200           934#   1023#   1609
PR5   = 000240           935#
PR6   = 000300           936#
PR7   = 000340           937#   1024#   1293    1556    2248
PS    = 177776           910#    911
PSW   = 177776           911#
```

```
PTYP1   003262  1619* 1629# 1680* 1837* 2047*
PTYP2   003352  1620* 1645# 1681* 1838* 2048*
PWRVEC= 000024  1002# 3379* 3380* 3389* 3395* 3407* 3408*
P2RETR  017112  1349* 1415* 1512* 2341* 3843#
RANDAT  010544  2523  2604# 2607
RANGEN  012122  2604  2900  2915#
RANUM   012214  2605  2901* 2902  2904* 2906  2908* 2910  2912  2930* 2935#
RAN1    012210  1317* 2916  2922* 2927  2933#
RAN2    012212  1318* 2917  2924  2929* 2934#
RDAFTW  004122  1565* 1759# 1769* 1904  1989* 2185* 2216* 2224*
RDCHK   006444  1578  2150#
RDCHR = 104407  3304  3371#
RDCNTR  021132  1797* 1798* 3916# 3974
RDCODE  010200  1522  2456#
RDDONE  004316  1794  1805#
RDER  = 000017  1015# 2342  2457
RDERR   004460  1795  1833#
RDIE  = 000107  1020# 1796
RDLIN = 104410  3372#
RDLOG   017152  3863#
RDONLY  006504  1579  2167#
RDRETR  017102  1323  1562* 1805  1810* 1897* 1903* 3839#
RDOSTA= 000013  1013# 2378
RD1STA= 000033  1014# 1364  2381
READ    004200  1775  1786# 2008  2171
READCH  005526  1995  2007# 2154  2191  2194  2221  2228
RECAL = 040001  1022# 1514
REREAD  004246  1673  1793# 1839  1844  1873  1899  1957  2122
RESREG= 104412  3374# 3477
RESTAR  002700  1069  1555# 2397  3412
RESTCN  021136  1559* 3919# 3944  3947
RESVEC= 000010   997#
RETURN  005454  1937  1969  1980#
REWRIT  003400  1656# 1682
RTJUST  014474  3508# 3528  3972  3976  4152  4157
RTN     002676  1511  1532#
RXCS    001206  1145# 1328  1346  1364* 1411  1514* 1520  1612* 1748* 2022* 2251  2260  2281
                2315  2322  2342* 2378* 2381* 2457*
RXDB    001210  1146# 1333  1343  1351  1366  1370  1373  1516  1614* 1750* 1752* 2025  2314
                2344  2348  2383  2387  2456  2459  2463
RXERRO  007404  2316  2336  2340#
RXPWR   007702  2319  2395#
SAVREG= 104411  3373# 3451
SA200   001220  1068  1290# 1426  1505  1530
SECCNT  012306  1670* 1829* 2009  2131* 2945* 2946* 2947* 2948* 2955#
SEEKER  003576  1693  1695# 1847
SEKLOG  017136  3857#
SEKRTY  003672  1686* 1713# 1844*
SEKTYP  003736  1703  1720  1724#
SEQSAV  007012  2214* 2225  2242#
SEQUEN  011370  1395* 1396* 2214  2215* 2225* 2428  2749  2751* 2752  2772#
SEQ1    011372  2759  2779# 2815
SEQ2    011426  2760  2793# 2814
SEQ3    011460  2761  2806#
SEQ4    011524  2762  2823#
SEQ5    011610  2763  2850#
```

```
SEQ6    011742            2764    2878#
SEQ7    012022            2765    2899#   2911
SGLDEC  014544            1440    1445    1463    1468    1727    2075    2104    2365    2402    2407    2683    3526#   3948
                          3958    3984    3992    4001    4009    4043    4048    4076    4081    4108    4147    4163    4170
SHORTR  022612            2452*   3935    3961    4130    4184*   4187#
SPACE   016266            3767#   4018    4149    4153    4159    4167
SRETRY  017120            1325    1603*   1710*   1791*   3846#
STACK = 001200             901#   1292    1555    3933
START1  001412            1323#
STATER  002046            1368    1409#   1518    2346    2385    2461
STKLMT= 177774             912#
STOP    010732            1598    1778    1998    2157    2174    2197    2231    2663#
STYP1   003626            1691*   1702#   1845*
STYP2   003720            1692*   1719#   1846*
SUM     010612            2034    2507*   2609*   2617#
SWHLT1  003636            1701    1704#
SWR     001214            1200#   1291*   1298    1302*   1307    1510    1627    1633    1636    1700    1705    1708    1861
                          1866    1869    1887    1892    1895    1916    1943    1950    1953    1976    2055    2057    2088
                          2100    2118    2300    2305    2326    2335    2359    2678    3199    3236*   3387    3400*
SWREG   000176            1046#   1302    1307    3199    3212
SW0   = 000001             965#
SW00  = 000001             955#    965
SW01  = 000002             954#    964
SW02  = 000004             953#    963
SW03  = 000010             952#    962
SW04  = 000020             951#    961
SW05  = 000040             950#    960
SW06  = 000100             949#    959
SW07  = 000200             948#    958
SW08  = 000400             947#    957
SW09  = 001000             946#    956
SW1   = 000002             964#
SW10  = 002000             945#
SW11  = 004000             944#    1636    1708    1869    1895    1916    1953    2118
SW12  = 010000             943#    2057
SW13  = 020000             942#    1627    1700    1861    1887    1943    1976    2055    2100    2300    2326    2335    2359
SW14  = 040000             941#    2678
SW15  = 100000             940#
SW2   = 000004             963#
SW3   = 000010             962#
SW4   = 000020             961#
SW5   = 000040             960#
SW6   = 000100             959#
SW7   = 000200             958#
SW8   = 000400             957#    1510
SW9   = 001000             956#
S2BIG   016553            1479    3811#
TAB     015136            1498    2470    3587#   3937    3940    4093    4110    4127    4177
TARGET  011360            1732    1741    1752    2032    2035    2401    2715*   2747    2768#   2782*   2785*   2796*   2798*
                          2826*   2828*   2836    2854*   2859*   2864*   2867*   2870*   2885*   2888*   2912*
TBITVE= 000014             998#
TEST    002140            1397*   1398*   1399*   1400*   1401*   1427#   1567    1569*   1570    2422
TESTDR  001526            1347    1349#
TESTSE  002726            1561#   2445
TEST7   006630            1581    2213#
TEST7X  006642            2215#   2233    2238    2240
```

```
THREE    012314            2950    2958#   2960
TKACC    017272            1744    3901#   4134
TKVEC  = 000060            1005#
TPVEC  = 000064            1006#
TRAPVE= 000034             1004#
TRCK     007014            1613    1749    1751    2023    2247#
TRKCNT   011356            1596*   1776*   1996*   2155*   2172*   2195*   2222*   2229*   2720*   2721*   2722*   2767#   2809*
                           2810*   2813    2852*   2861    2868    2881*   2882*
TRKERR   003770            1698    1732#   1850    1941    1974    2116
TRTVEC= 000014              999#
TSECTO   012310            1750    2033    2036    2405    2949*   2950*   2956#   2960*   2961    2963*   2964*
TSTLIM   002142            1429#   1506
TSTMSG   002432            1437    1459    1483#
TYPADR   007716            1947    1965    2071    2373    2400#
TYPCOD   010250            2375    2465#
TYPE   = 104401            1296    1327    1332    1337    1345    1372    1390    1410    1417    1418    1421    1422    1423
                           1424    1438    1442    1443    1460    1461    1465    1466    1470    1476    1479    1485    1486
                           1490    1491    1494    1497    1498    1500    1503    1528    1629    1630    1631    1643    1644
                           1645    1646    1647    1702    1717    1718    1719    1724    1725    1729    1811    1812    1813
                           1814    1821    1822    1823    1824    1863    1864    1877    1878    1879    1880    1889    1890
                           1909    1910    1911    1912    1927    1928    1929    1945    1948    1961    1962    1963    1964
                           1966    1978    2068    2069    2070    2072    2077    2081    2086    2102    2106    2109    2111
                           2112    2127    2128    2129    2130    2272    2289    2302    2303    2328    2329    2337    2338
                           2361    2362    2363    2367    2368    2374    2389    2390    2395    2396    2400    2404    2409
                           2412    2414    2415    2420    2421    2426    2427    2439    2440    2441    2446    2447    2448
                           2464    2465    2470    2471    2476    2668    2673    2675    2676    2680    2681    2685    3003
                           3127    3210    3211    3214    3227    3238    3257    3308    3311    3315    3363#   3409    3518
                           3934    3937    3938    3940    3941    3942    3946    3950    3953    3954    3956    3960    3966
                           3967    3968    3969    3973    3977    3980    3986    3987    3988    3994    3995    3996    3997
                           4003    4004    4005    4011    4012    4013    4015    4016    4017    4018    4019    4020    4045
                           4050    4052    4054    4056    4078    4083    4084    4086    4088    4093    4094    4096    4097
                           4110    4120    4127    4128    4129    4132    4149    4153    4158    4159    4167    4168    4177
                           4180
TYPERR   006114            2064    2067    2074#
TYPOC  = 104402            3213    3364#
TYPON  = 104404            2085    3366#
TYPOS  = 104403            1329    1334    1339    1412    2079    2370    2417    2423    2429    2467    2473    3365#   4117
TYPSEL   010012            1499    2413    2415#
TYPTRK   022314            4102    4125#
UKNINT   017130            2324*   3853#
UNITSE   010704            1350*   1353*   1361*   1375*   1379    1388*   1492    1495    1501    1735    1747    1946*   1973*
                           2052*   2232    2340*   2410    2442*   2443    2449*   2450    2634    2636    2638*   2639*   2641
                           2643    2645*   2646*   2651#   2655    2657    2671    2688*   3922
UNXDD    017172            3871#
UOTRK    020442            1734    3909#   4136
U1LOG    021142            1696    1715    1808    1818    1858    1875    1884    1901    1907    1924    1939    1959    1971
                           2114    2125    3922#
U1TRK    020674            3912#   4137
WRITE    003112            1595    1601#   1774    1994    2190    2193    2220
WRTDON   003462            1656    1668#
WRTER    003510            1657    1676#
WRTIE  = 000105            1019#   1658
WRTLOG   017156            3865#
WRTONL   003052            1575    1591#
WRTRD    004130            1576    1769#
WRTSEK   003550            1678    1686#
```

```
WTCNTR  021126          1662* 1663* 3915# 3970
WTDDIE= 000115          1021# 1661
WTRDCK  005456          1577  1989#
WTRETR  017104          1563* 1815  1820* 1918* 1926* 3840#
XFRBYT  003202          1614#
XHOME   002670          1521  1525  1531#
XID     011366          2716* 2717* 2720  2771# 2780  2796  2811  2854  2866* 2867  2885  2886* 2902
                        2904
XOD     011364          2718* 2719* 2721  2770# 2812  2859  2863* 2864  2906  2908
XPATGE  010452          2555# 2573
XRDCHK  006450          2151# 2158
XRDONL  006510          2168# 2175
XREAD   004204          1787# 1830  2133
XRETUR  011740          2869  2871#
XSTART  002722          1407  1560#
XWRITE  003116          1602# 1674
XWRTON  003056          1592# 1599
XWRTRD  004140          1771# 1779
XWTRDC  005466          1991# 1999
XXPATG  010522          2582# 2584  2597
ZCRCBA  017144          1857  3860#
ZCRCLO  017140          1883  3858#
ZDATAL  017160          2113  3866#
ZDDMIS  017164          1938  3868#
ZERO    022614          4022  4057  4188#
ZHCRCB  017204          1874  3876#
ZHCRCL  017200          1900  3874#
ZHDATA  017220          2124  3882#
ZHDDLO  017224          1958  3884#
ZHRDLO  017210          1906  3878#
ZHSEKL  017174          1714  3872#  4065
ZHWRTL  017214          1923  3880#
ZRDLOG  017150          1807  3862#
ZSEKLO  017134          1695  3856#  4031
ZUNXDD  017170          1970  3870#
ZWRTLO  017154          1817  3864#
$AUTOB  013776          1311* 3207  3330#
$CHARC  012644          3005* 3015* 3022  3048* 3053#
$CKSWR  013212          3199# 3370
$CNTLG  013747          3210  3325#
$CNTLU  013742          3227  3324#
$CRLF   012665          3004  3065#  3238  3324
$DB2D   014300          3433  3451#  3971  3975  4151  4156
$DECVL  014460          3453  3499#
$FILLC  012662          3008  3062#
$FILLS  012661          3061#
$GTSWR  013262          3211# 3368
$HD   = 000003           875   876
$ILLUP  014226          3379  3395  3414#
$INTAG  013777          3239  3331#
$LF     012666          3066# 3315  3324
$MAIL = ****** U        1307  2992
$MNEW   013765          3214  3328#
$MSWR   013754          3211  3326#
$NULL   012660          3010  3060#
$OCNT   013112          3099* 3128* 3141#
```

```
$OMODE  013114          3094* 3098* 3103  3106* 3117* 3143#
$POWER  014234          2396  3410  3417#
$PWRAD  014222          3412#
$PWRDN  014062          1031  3379# 3407
$PWRMG  014216          3410#
$PWRUP  014134          3389  3395#
$QUES   012664          3064# 3257  3308  3324
$RDCHR  013474          3270# 3371
$RDDEC= ****** U        3373
$RDLIN  013624          3300# 3372
$RDOCT= ****** U        3373
$RDSZ = 000010          3293#
$RESRE  013154          3177# 3374
$R2A  = ****** U        3375
$SAVRE  013116          3161# 3373
$SAVR6  014232          3388* 3396  3397* 3398* 3416#
$SB2D   014244          3431# 3527
$SETUP= 000114          1063# 1304  3194  3330
$STUP = 177777          1063#
$SWR  = 160000           875   876# 3413
$TKB    012652          3029  3036  3057# 3192  3203  3220  3274  3280
$TKS    012650          3027  3034  3056# 3192  3201  3217  3241* 3272  3278
$TN   = 000001           875#
$TNPWR  014410          3458  3459  3479#
$TPB    012656          3045* 3059#
$TPFLG  012663          2986  3063#
$TPS    012654          3043  3058#
$TRAP   014000          1035  3340#
$TRAP2  014022          3351# 3362
$TRP  = 000013          3355# 3364# 3365# 3366# 3367# 3368  3369# 3370  3371# 3372# 3373# 3374# 3375#
$TRPAD  014034          3345  3362#
$TTYIN  013732          3301  3302  3319  3323#
$TYPBN= ****** U        3367
$TYPDS= ****** U        3367
$TYPE   012356          2986# 3355  3363
$TYPEC  012526          3007  3014  3021  3026# 3243
$TYPEX  012646          3049  3051  3054#
$TYPOC  012714          3097# 3364
$TYPON  012730          3096  3099# 3366
$TYPOS  012670          3092# 3365
$XOFF = 000023          3031  3058
$XON  = 000021          3038  3058  3285
$OFILL  013113          3093* 3097* 3107  3142#
.       = 022616        1027# 1029  1030# 1034# 1038# 1041# 1044# 1064# 1098# 1574  2516  2758  3056
                        3057  3058  3059  3060  3061  3062  3063  3064  3065  3066  3067  3192  3323#
                        3324  3330  3331  3332  3391  3415  3499# 3829# 3836# 3888# 3901# 3904# 3909#
                        3912#
```

```
COMMEN   1008#
ENDCOM   1008#
ERROR     902#
ESCAPE   1008#
GETPRI   1008#
GETSWR    862#  1008#  1304
MULT     1008#
NEWTST   1008#
POP      1008#  3182   3400   3401
PUSH     1008#  3162   3381   3387
REPORT   1008#
SCOPE     903#
SETPRI   1008#
SETTRA   3355#  3364   3365   3366   3368   3370   3371   3372   3373   3374
SETUP    1008#
SKIP     1008#
SLASH    1008#
SPACE    1008#
STARS     862#  1008#  1049   1073   1105   1125   1143   1203   1268   1286   1534   1553   1585   1653   1763
          1781  1984   2002   2143   2161   2179   2201   2243   2310   2480   2502   2530   2539   2548   2567
          2575  2590   2599   2619   2632   2705   2728   2745   2774   2788   2801   2818   2831   2845   2873
          2893  2937   2971   3069   3146   3191   3194   3262   3293   3334   3377   3393   3422   3440   3501
          3831  3931
SWRSU    1008#
TRMTRP   3355#
TYPBIN   1008#
TYPDEC   1008#
TYPNAM   1008#
TYPNUM   1008#
TYPOCS   1008#  1328   1333   1338   1411   2369   2416   2422   2428   2466   2472   4116
TYPOCT   1008#  3212
TYPTXT   1008#
$$ESCA   1008#
$$NEWT   1008#
$$SET    3355#  3364   3365   3366   3368   3370   3371   3372   3373   3374
$$SKIP   1008#
.EQUAT    862#   898
.HEADE    862#   865
.SETUP    862#  1063
.$DB2D    862#  3438
.$POWE    862#  3375
.$READ    862#  3189
.$SAVE    862#  3144
.$SB2D    862#  3420
.$TRAP    862#  3332
.$TYPE    862#  2969
.$TYPO    862#  3067

. ABS.  022616     000

 ERRORS DETECTED:  0

 CZRXAF,CZRXAF/SOL/CRF/NL:TOC=SYSMAC.SML/ML,CZRXAF.P11
 RUN-TIME: 18 9 1 SECONDS
```

RUN-TIME RATIO: 87/29=2.9
CORE USED: 19K (38 PAGES)